

July 2011

# DATA CENTER CONSOLIDATION

## Agencies Need to Complete Inventories and Plans to Achieve Expected Savings

U.S. Government Accountability Office

GAO 90

YEARS

1921-2011

ACCOUNTABILITY ★ INTEGRITY ★ RELIABILITY

## Why GAO Did This Study

Over time, the federal government's demand for information technology has led to a dramatic rise in the number of federal data centers and an increase in operational costs. Recognizing this increase, the Office of Management and Budget (OMB) has launched a governmentwide initiative to consolidate data centers.

GAO was asked to (1) assess whether agency consolidation documents include adequate detail for agencies to consolidate their centers, (2) identify the key consolidation challenges reported by agencies, and (3) evaluate whether lessons learned during state government consolidation efforts could be leveraged at the federal level. To address these objectives, GAO assessed the completeness of agency inventories and plans, interviewed agencies about their challenges, and evaluated the applicability of states' consolidation lessons to federal challenges.

## What GAO Recommends

GAO is recommending that the Federal Chief Information Officer, department secretaries, and agency heads take steps to ensure that agency data center inventories and consolidation plans are complete. Most agencies agreed with GAO's recommendations. Defense and SSA did not agree to complete all missing elements of their inventories and plans. Based on OMB guidance on the importance of these elements, GAO maintains these recommendations to be reasonable and appropriate.

# DATA CENTER CONSOLIDATION

## Agencies Need to Complete Inventories and Plans To Achieve Expected Savings

### What GAO Found

In launching its federal data center consolidation initiative, OMB required the 24 participating agencies to submit data center inventories and consolidation plans by the end of August 2010, and provided guidance on key elements to include in the inventories and plans—such as hardware and software assets, goals, schedules, and cost-benefit calculations. The plans indicate that agencies anticipate closing about 650 data centers by fiscal year 2015 and saving about \$700 million in doing so. However, only one of the agencies submitted a complete inventory and no agency submitted complete plans. Further, OMB did not require agencies to document the steps they took, if any, to verify the inventory data. For example, in their inventories, 14 agencies do not provide a complete listing of data centers and 15 do not list all of their software assets. Also, in their consolidation plans, 20 agencies do not reference a master schedule, 12 agencies do not address cost-benefit calculations, and 9 do not address risk management. The reason for these gaps, according to several agency officials, was that they had difficulty completing their inventories and plans within OMB's timelines. Until these inventories and plans are complete, agencies may not be able to implement their consolidation activities and realize expected cost savings. Moreover, without an understanding of the validity of agencies' consolidation data, OMB cannot be assured that agencies are providing a sound baseline for estimating consolidation savings and measuring progress against those goals.

Agencies identified multiple challenges during data center consolidation, including those that are specific to OMB's consolidation initiative as well as those that are cultural, funding-related, operational, and technical in nature. For example, in attempting to fulfill OMB's requirements, 19 agencies reported difficulty in obtaining power usage data. In addition, 9 agencies reported challenges in maintaining services during the transition to consolidated services. Moving forward, it will be important for agencies to focus on mitigating such challenges as they implement their consolidation plans.

Many state governments have undertaken data center consolidation initiatives in recent years and have encountered challenges similar to those reported by federal agencies. Specifically, 19 states reported lessons learned that could be leveraged at the federal level. For example, a West Virginia official reported that since the state had no funding for data center consolidation, it used the natural aging cycle of hardware to force consolidation; that is, when a piece of hardware was ready to be replaced, the new applications and software were put onto a consolidated server. Also, officials from North Carolina reported that organizations are typically concerned that by consolidating data centers, they will lose control of their data, service levels will decline, or costs will rise. The state learned that during the process of consolidation, the organizations' concerns should be documented, validated, and addressed.

---

# Contents

---

Letter		1
	Background	2
	Agencies Established Consolidation Plans, but Incomplete Inventories and Missing Elements Undermine Expected Savings	7
	Agencies Face Multiple Challenges in Consolidation	19
	Lessons Learned by States Can Be Leveraged to Mitigate Challenges at the Federal Level	23
	Conclusions	27
	Recommendations for Executive Action	27
	Agency Comments and Our Evaluation	29
Appendix I	Objectives, Scope, and Methodology	35
Appendix II	Assessments of Agencies' Completion of Consolidation Planning Elements, Arranged by Key Element	37
Appendix III	Assessment of Agencies' Completion of Key Consolidation Planning Elements, Arranged by Agency	39
Appendix IV	OMB-Defined Approaches for Consolidating Data Centers	65
Appendix V	Comments from the Department of Commerce	68
Appendix VI	Comments from the Department of Defense	69
Appendix VII	Comments from the Department of Education	71
Appendix VIII	Comments from the Department of Energy	73

---

---

Appendix IX	Comments from the Department of Health and Human Services	75
Appendix X	Comments from the Department of Homeland Security	79
Appendix XI	Comments from the Department of the Interior	81
Appendix XII	Comments from the Department of Labor	82
Appendix XIII	Comments from the Department of State	83
Appendix XIV	Comments from the Department of the Treasury	87
Appendix XV	Comments from the Department of Veterans Affairs	88
Appendix XVI	Comments from the Environmental Protection Agency	90
Appendix XVII	Comments from the General Services Administration	92
Appendix XVIII	Comments from the National Aeronautics and Space Administration	93
Appendix XIX	Comments from the Nuclear Regulatory Commission	95

---

Appendix XX	Comments from the Social Security Administration	96
-------------	--	----

---

Appendix XXI	GAO Contact and Staff Acknowledgments	98
--------------	---------------------------------------	----

---

Tables

Table 1: Chief Information Officers Council Departments and Agencies Participating in the FDCCI	4
Table 2: OMB Guidance on Key Elements of Agencies' Asset Inventory Baselines	9
Table 3: OMB Guidance on Key Elements of Agencies' Consolidation Plans	14
Table 4: Number of Agencies Experiencing Particular Data Center Consolidation Challenges	20
Table 5: Lessons Learned by States That Can Be Used by Federal Agencies to Address Data Center Consolidation Challenges	25
Table 6: Chief Information Officers Council Departments and Agencies Participating in the FDCCI	35
Table 7: Summary of Agencies' Completion of Key Elements in their Data Center Consolidation Plans	37
Table 8: Assessment of Completeness of Agriculture's Data Center Consolidation Documentation	40
Table 9: Assessment of Completeness of Commerce's Data Center Consolidation Documentation	41
Table 10: Assessment of Completeness of Defense's Data Center Consolidation Documentation	42
Table 11: Assessment of Completeness of Education's Data Center Consolidation Documentation	43
Table 12: Assessment of Completeness of Energy's Data Center Consolidation Documentation	44
Table 13: Assessment of Completeness of HHS's Data Center Consolidation Documentation	45
Table 14: Assessment of Completeness of DHS's Data Center Consolidation Documentation	46
Table 15: Assessment of Completeness of Interior's Data Center Consolidation Documentation	48
Table 16: Assessment of Completeness of Justice's Data Center Consolidation Documentation	49

---

Table 17: Assessment of Completeness of Labor’s Data Center Consolidation Documentation	50
Table 18: Assessment of Completeness of State’s Data Center Consolidation Documentation	51
Table 19: Assessment of Completeness of Transportation’s Data Center Consolidation Documentation	52
Table 20: Assessment of Completeness of Treasury’s Data Center Consolidation Documentation	53
Table 21: Assessment of Completeness of VA’s Data Center Consolidation Documentation	55
Table 22: Assessment of Completeness of EPA’s Data Center Consolidation Documentation	56
Table 23: Assessment of Completeness of GSA’s Data Center Consolidation Documentation	57
Table 24: Assessment of Completeness of NASA’s Data Center Consolidation Documentation	58
Table 25: Assessment of Completeness of NSF’s Data Center Consolidation Documentation	59
Table 26: Assessment of Completeness of NRC’s Data Center Consolidation Documentation	60
Table 27: Assessment of Completeness of OPM’s Data Center Consolidation Documentation	61
Table 28: Assessment of Completeness of SBA’s Data Center Consolidation Documentation	62
Table 29: Assessment of Completeness of SSA’s Data Center Consolidation Documentation	63
Table 30: Assessment of Completeness of USAID’s Data Center Consolidation Documentation	64

---

Figures

Figure 1: Agencies’ Completion of Required Information for Baseline Inventory Key Elements	11
Figure 2: Assessment of Completeness of Agencies’ Consolidation Plan Elements	15

---

---

## Abbreviations

CIO	chief information officer
DHS	Department of Homeland Security
EPA	Environmental Protection Agency
FDCCI	Federal Data Center Consolidation Initiative
GSA	General Services Administration
HHS	Department of Health and Human Services
HUD	Department of Housing and Urban Development
IT	information technology
NASA	National Aeronautics and Space Administration
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
NSF	National Science Foundation
OMB	Office of Management and Budget
OPM	Office of Personnel Management
SBA	Small Business Administration
SSA	Social Security Administration
USAID	U.S. Agency for International Development
VA	Department of Veterans Affairs

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



**G A O**

Accountability \* Integrity \* Reliability

**United States Government Accountability Office**  
Washington, DC 20548

---

July 19, 2011

The Honorable Joseph I. Lieberman  
Chairman  
The Honorable Susan M. Collins  
Ranking Member  
Committee on Homeland Security  
and Governmental Affairs  
United States Senate

The Honorable Thomas R. Carper  
Chairman  
The Honorable Scott P. Brown  
Ranking Member  
Subcommittee on Federal Financial Management,  
Government Information, Federal Services,  
and International Security  
Committee on Homeland Security  
and Governmental Affairs  
United States Senate

The Honorable Benjamin E. Quayle  
House of Representatives

The federal government's demand for information technology (IT) is ever increasing. In recent years, as federal agencies modernized their operations, put more of their services online, and increased their information security profiles, they have demanded more computing power and data storage resources. Over time, this increasing demand has led to a dramatic rise in the number of federal data centers and a corresponding increase in operational costs. The Office of Management and Budget (OMB) has recognized the significance of this increase and has launched the Federal Data Center Consolidation Initiative (FDCCI), a governmentwide effort to consolidate data centers.

This report responds to your request that we review the federal government's efforts to consolidate its data centers. Specifically, our objectives were to (1) assess whether agency consolidation documents include adequate detail, such as performance measures and milestones, for agencies to consolidate their centers; (2) identify the key challenges reported by agencies in consolidating centers; and (3) evaluate whether

---

lessons learned during state government consolidation efforts could be leveraged to mitigate challenges at the federal level.

To address our objectives, we reviewed 24 departments' and agencies' (agencies) data center inventories and consolidation plans and assessed their completeness against key elements, as required by OMB. We interviewed agency officials to determine the extent to which inventory information had been validated and what challenges to consolidation federal agencies have faced. Finally, we assessed state reports and interviewed officials involved with state data center consolidation efforts to identify lessons learned that could be applied to federal consolidation efforts.

We conducted this performance audit from August 2010 to July 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Appendix I contains further details about our objectives, scope, and methodology.

---

## Background

While the term "data center" can be used to describe any room used for the purpose of processing or storing data, OMB defines a data center as a room that is greater than 500 square feet, that is used for processing or storing data, and that meets stringent availability requirements.<sup>1</sup> Other facilities are classified as "server rooms," which are typically less than 500 square feet and "server closets," which are typically less than 200 square feet.

According to OMB, the number of federal data centers grew from 432 in 1998 to 2,094 in July 2010. Operating such a large number of centers places costly demands on the government. While the total annual federal spending associated with data centers has not yet been determined, OMB has found that operating data centers is a significant cost to the federal government, including hardware, software, real estate, and

---

<sup>1</sup>For more information on the classifications used to define availability requirements, see Uptime Institute, *Industry Standard Tier Classifications Define Site Infrastructure Performance* (Santa Fe, N.Mex.: 2005).

---

cooling costs. For example, according to the Environmental Protection Agency (EPA), the electricity cost to operate federal servers and data centers across the government is about \$450 million annually. According to the Department of Energy (Energy), data center spaces can consume 100 to 200 times as much electricity as standard office spaces. Reported server utilization rates as low as 5 percent and limited reuse of these data centers within or across agencies lends further credence to the need to restructure federal data center operations to improve efficiency and reduce costs. In 2010, the Federal Chief Information Officer (CIO) reported that operating and maintaining such redundant infrastructure investments was costly, inefficient, and unsustainable.

---

### OMB and the Federal CIO Established the Federal Data Center Consolidation Initiative

Concerned about the size of the federal data center inventory and the potential to improve the efficiency, performance, and environmental footprint of federal data center activities, in February 2010 OMB, under the direction of the Federal CIO, announced the Federal Data Center Consolidation Initiative (FDCCI). This initiative's four high-level goals are to

- promote the use of "green IT"<sup>2</sup> by reducing the overall energy and real estate footprint of government data centers;
- reduce the cost of data center hardware, software, and operations;
- increase the overall IT security posture of the government; and
- shift IT investments to more efficient computing platforms and technologies.

As part of FDCCI, OMB required 24 departments and agencies that participate on the Chief Information Officers Council (see table 1) to submit a series of documents that ultimately resulted in a data center consolidation plan.

---

<sup>2</sup>"Green IT" refers to environmentally sound computing practices that can include a variety of efforts, such as using energy efficient data centers, purchasing computers that meet certain environmental standards, and recycling obsolete electronics.

**Table 1: Chief Information Officers Council Departments and Agencies Participating in the FDCCI**

<b>Departments</b>	<b>Agencies</b>
Agriculture	Environmental Protection Agency
Commerce	General Services Administration
Defense	National Aeronautics and Space Administration
Education	National Science Foundation
Energy	Nuclear Regulatory Commission
Health and Human Services	Office of Personnel Management
Homeland Security	Small Business Administration
Housing and Urban Development	Social Security Administration
Interior	U.S. Agency for International Development
Justice	
Labor	
State	
Transportation	
Treasury	
Veterans Affairs	

Source: GAO analysis of OMB data.

Specifically, the departments and agencies were to provide the following:

- An initial asset inventory (due April 30, 2010), which was to provide a high-level understanding of the scale and size of existing data centers, IT infrastructure assets, and applications supported by the data centers.
- An initial data center consolidation plan (due June 30, 2010), which was to identify potential areas for consolidation, areas where optimization through server virtualization or cloud computing alternatives<sup>3</sup> could be used, and a high-level roadmap for transitioning to the consolidated end-state architecture.

<sup>3</sup>Virtualization is a technology that allows multiple, software-based virtual machines, with different operating systems, to run in isolation, side by side, on the same physical machine. Cloud computing is an emerging form of computing that relies on Internet-based services and resources to provide computing services to customers, while freeing them from the burden and costs of maintaining the underlying infrastructure.

- 
- A final asset inventory baseline (due July 30, 2010), which was to contain more detailed information and serve as the foundation for developing the final data center consolidation plans. The final inventory was also to identify the consolidation approach to be taken for each data center.
  - A final data center consolidation plan (due August 30, 2010), which was to be incorporated into the agency's fiscal year 2012 budget and was to include a technical roadmap and approach for achieving the targets for infrastructure utilization, energy efficiency, and cost efficiency.

In October 2010, OMB reported that all of the agencies had submitted their plans and that there were 2,094 federal data centers as of July 2010. OMB announced plans to monitor agencies' consolidation activities on an ongoing basis as part of the annual budget process. Further, starting in fiscal year 2011, agencies will be required to provide an annual updated data center asset inventory at the end of every third quarter and a consolidation progress report at the end of every fourth quarter.

To manage the initiative, OMB designated two agency CIOs as executive sponsors to lead the effort within the Chief Information Officers Council.<sup>4</sup> Additionally, the General Services Administration (GSA) has established the FDCCI Program Management Office, whose role is to support OMB in the planning, execution, management, and communication for FDCCI. In this role, GSA collected the responses to the four document deliveries and reviewed the submissions for completeness and reasonableness. GSA also sponsored three workshops on the initiative for agencies and facilitated a peer review of the initial and final data center consolidation plans.

---

### OMB's IT Reform Plan Sets Important Milestones for Data Center Consolidation

In December 2010, OMB published its *25-Point Implementation Plan to Reform Federal Information Technology Management* as a means of implementing IT reform in the areas of operational efficiency and large-scale IT program management. Among the 25 initiatives, OMB has included two goals that relate to data center consolidation:

---

<sup>4</sup>As of April 2011, the two CIOs were from the Departments of Homeland Security and the Interior.

- 
1. By June 2011, complete detailed implementation plans to consolidate at least 800 data centers by 2015.
  2. By June 2012, create a governmentwide marketplace for data center availability.

To accomplish its first goal, OMB required each FDCCI agency to identify a senior, dedicated data center consolidation program manager. It also launched a Data Center Consolidation Task Force comprised of the data center consolidation program managers from each agency. OMB officials stated that this task force is critical to driving forward on individual agency consolidation goals and to meeting the overall federal target of closing a minimum of 800 data centers by 2015. To that end, in April 2011, OMB announced plans to close 137 data centers by the end of December 2011. OMB also plans to launch a publicly-available dashboard for observing agencies' consolidation progress, but this has not yet been completed.

To accomplish its second goal, OMB and GSA plan to create a governmentwide marketplace by June 2012 that will better utilize spare capacity within operational data centers. This online marketplace is intended to match agencies that have extra capacity with agencies with increasing demand, thereby improving the utilization of existing facilities. The marketplace will help agencies with available capacity promote their available data center space. Once agencies have a clear sense of the existing capacity landscape, they can make more informed consolidation decisions.

---

## GAO Has Previously Reported on Federal Data Center Consolidation Efforts

We have previously reported on OMB's efforts to consolidate federal data centers. In March 2011, we reported on the status of the FDCCI and noted that data center consolidation makes sense economically and as a way to achieve more efficient IT operations, but that challenges exist.<sup>5</sup> For example, agencies face challenges in ensuring the accuracy of their inventories and plans, providing upfront funding for the consolidation effort before any cost savings accrue, integrating consolidation plans into agency budget submissions (as required by OMB), establishing and implementing shared standards (for storage, systems, security, etc.),

---

<sup>5</sup>GAO, *Opportunities to Reduce Potential Duplication in Government Programs, Save Tax Dollars, and Enhance Revenue*, [GAO-11-318SP](#) (Washington, D.C.: Mar. 1, 2011).

---

overcoming cultural resistance to such major organizational changes, and maintaining current operations during the transition to consolidated operations. We further reported that mitigating these and other challenges will require commitment from the agencies and continued oversight by OMB and the Federal CIO.

---

## Agencies Established Consolidation Plans, but Incomplete Inventories and Missing Elements Undermine Expected Savings

To help agencies plan their consolidations, OMB issued guidance on the required content of data center inventories and consolidation plans. Specifically, the inventories were to include descriptions of the assets present within individual data centers, as well as information about the physical data center itself. The consolidation plans were to address key elements, including goals, approaches, schedules, cost-benefit calculations, and risk management plans.

As required, 23 of the 24 agencies submitted their inventories and consolidation plans by the end of September 2010; the remaining agency explained that consolidation was not applicable to them.<sup>6</sup> However, of the 23 reporting agencies, all but one of the inventories and all of the plans are missing key elements. For example, 14 agencies do not provide a complete listing of data centers and 15 do not provide a complete listing of software assets in their inventories. Further, OMB did not require that agencies verify these inventory data. Additionally, in their consolidation plans, 20 agencies do not provide a master schedule, 12 agencies do not address cost-benefit calculations, and 9 do not address risk management. Several agency officials noted that they had difficulty completing their inventories and plans within OMB's timelines. Other agencies reported trouble with identifying either required information for the plans or data on the assets within their data centers. Until these inventories and plans are complete, agencies may not be able to implement their consolidation activities or to realize expected cost savings. Moreover, without an understanding of the validity of agencies' consolidation data, OMB cannot be assured that agencies are providing a sound baseline for estimating consolidation savings and measuring progress against those goals.

---

<sup>6</sup>The Department of Housing and Urban Development (HUD) submitted a letter in lieu of consolidation documentation stating that the agency completed its data center consolidation effort and asserting that the agency does not own any data centers and has no arrangements to take ownership of any data centers at the end of any contracts. Thus, it did not submit inventories or consolidation plans.

---

## Agencies Plan Significant Facility Reductions and Cost Savings

In their consolidation plans, agencies identified goals for reducing the number of data center facilities and these facilities' related costs. Specifically, the 23 reporting agencies identified 1,590 data centers as of April 2011, and established goals for reducing that number by 652 centers by the end of fiscal year 2015.<sup>7</sup>

Most federal departments and agencies also estimated cost savings over time. Specifically:

- Fourteen agencies reported savings totaling about \$700 million between fiscal years 2011 and 2015; however, actual savings may be even higher because 12 of these agencies' estimates were incomplete. For example, 11 agencies included expected energy savings and reductions in building operational costs, but not savings from other sources, such as equipment reductions.
- Two agencies expect to accrue net savings after fiscal year 2015.
- Two agencies do not expect to attain net savings from their consolidation efforts.
- Five agencies did not provide estimated cost savings; however, two of these agencies suggested that they plan to develop cost-benefit analyses in the future.

---

## Asset Inventories Are Not Complete or Verified

As part of the data center consolidation initiative, OMB required agencies to provide an inventory of data center assets. This inventory is to address four key elements: (1) IT software assets; (2) IT hardware assets and their utilization; (3) IT facilities, energy, and storage; and (4) geographic location and real estate. According to OMB's guidance, the information is to be organized by data center. For example, in the IT software area, agencies are to report by data center on each major and nonmajor system present in the center. For each identified system, the agency is to report the associated support platforms, servers and computers, and proposed consolidation approach (i.e., decommissioning, consolidation,

---

<sup>7</sup>This figure differs from OMB's July 2010 reported number of 2,094 centers because five agencies revised their number of data centers after the July 2010 number was calculated. Also, as noted later in this report, there are gaps in agency inventories, so the number of centers is likely to change.

cloud computing, or virtualization). Table 2 provides a detailed description of each of the four key elements.

**Table 2: OMB Guidance on Key Elements of Agencies' Asset Inventory Baselines**

Key elements	OMB guidance
IT software assets	The inventory should document all major and nonmajor systems hosted in each data center and their key technical dependencies on platforms and servers. The inventory should also discuss a consolidation approach for each system, if applicable.
IT hardware assets and their utilization	The inventory should document all physical servers and mainframes hosted in each data center; provide counts of physical servers, virtual hosts, and virtual operating systems; and describe the average and maximum utilization of each server.
IT facilities, energy, and storage	The inventory should document information on IT facilities (including fiscal year 2010 construction budget, annual building operational costs, and space utilization), energy (including electricity usage and cost, and power capacity), and storage (including total storage capacity and utilization).
Geographic location and real estate	The inventory should describe the geographic location and type of real estate for each data center. It should identify the agency's total number of data centers, server rooms, and closets, including the gross floor area for each.

Source: GAO analysis of OMB data.

When collecting data, it is important to have assurance that the data are accurate. We have previously reported on the need for agencies, when providing information to OMB, to explain the procedures used to verify their data.<sup>8</sup> Specifically, agencies should ensure that reported data are sufficiently complete, accurate, and consistent, and also identify any significant data limitations. Explaining the limitations of information can provide a context for understanding and assessing the challenges agencies face in gathering, processing, and analyzing needed data. Such a presentation of data limitations can also help identify the actions needed to improve the agency's ability to measure its performance. More recently, we have reiterated the importance of providing OMB with complete and accurate data and the possible negative impact of that data being missing or incomplete.<sup>9</sup>

<sup>8</sup>GAO, *Agencies' Annual Performance Plans under the Results Act: An Assessment Guide to Facilitate Congressional Decisionmaking*, [GAO/GGD/AIMD-10.1.18](#) (Washington, D.C.: February 1998).

<sup>9</sup>GAO, *Information Technology: OMB Has Made Improvements to Its Dashboard, but Further Work Is Needed by Agencies and OMB to Ensure Data Accuracy*, [GAO-11-262](#) (Washington, D.C.: Mar. 15, 2011).

---

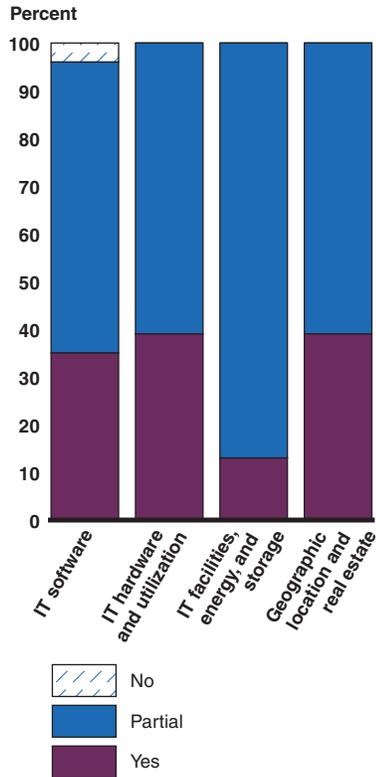
Only One Agency Provides a Complete Asset Inventory

Only 1 of the 23 agency data center inventories contains complete data in all four of the required elements. Specifically, while many agencies provide partial inventory data,

- one agency provides complete information in all four areas,
- five agencies provide complete information in three of the four areas,
- one agency provides complete information for two of the areas,
- eight agencies have complete information for only one area, and
- eight agencies do not have any complete areas in their inventories.

Figure 1 provides an assessment of the completeness of agencies' inventories, by key element, and a discussion of the analysis of each area follows the figure.

**Figure 1: Agencies' Completion of Required Information for Baseline Inventory Key Elements**



Source: GAO analysis of agency data.

**Descriptions:**

Yes—the agency provides complete information for this inventory element.

Partial—the agency provides some, but not all, of the information for this inventory element.

No—the agency does not provide information for this inventory element.

- IT software assets.** Eight agencies provide complete information on their software assets; 14 agencies provide partial information; and 1 agency did not provide information. For example, the Small Business Administration (SBA) provides information on its data center systems, their technical dependencies on platforms and servers, and consolidation approaches for its systems; while GSA provides information on its data center systems and a consolidation approach for each system, but provides only partial information on each system's technical dependencies on platforms and servers. Additionally, Energy provides only partial information on the systems

---

in its data center, the systems' technical dependencies, and consolidation approaches for those systems.

- **IT hardware assets and utilization.** Nine agencies provide complete information on their IT hardware assets and the utilization of those assets and 14 provide partial information. For example, EPA provides complete information on maximum and average server utilization, as well as counts of its physical servers, virtual hosts, and virtual operating systems; while SBA provides complete information on counts of its physical servers, virtual hosts, and virtual operating systems, but only partial information on maximum and average server utilization. Another 7 agencies, including the Departments of Defense (Defense), Homeland Security (DHS), and Transportation (Transportation), provide partial information on their maximum and average server utilization, and on their counts of physical servers, virtual hosts, and virtual operating systems.
- **IT facilities, energy, and storage.** Three agencies provide complete information on their IT facilities, energy, and storage, while 20 provide partial information. For example, the Department of State (State) includes all the required information, while the Department of Education (Education) provides complete information on its annual data center operational cost, total rack count, and storage information, but only provides partial information on its annual data center electricity cost and total electricity usage. Also, the National Aeronautics and Space Administration (NASA), has partial information on its total rack count and does not provide any information for the other required parts of this element.
- **Geographic location and real estate.** Nine agencies provide complete information on their data center locations, while 14 provide partial information. For example, the Office of Personnel Management (OPM) provides complete information on its number of data centers and the gross floor area of those centers, but does not provide information on the number of server rooms and closets and the gross floor area of those facilities. Other agencies such as Energy and the Department of Labor (Labor) only provide partial information on their number of centers, server rooms, and closets, and the gross floor area of those facilities.

Because agency goals are intended to be built on the information provided by the inventories, agencies cannot ensure the reliability of their

---

OMB Did Not Require the Verification of Consolidation Data

savings and utilization forecasts until the underlying inventories have been completed.

While it is important that reported data are sufficiently complete, accurate, and consistent, OMB's guidance on agency inventories does not require agencies to document what they did to verify their data, or to disclose any limitations on that data. Nonetheless, several agencies took informal steps to validate their data. For example, Department of Agriculture (Agriculture) officials stated that they interviewed staff who submitted inventory information and conducted on-site visits of data centers. Additionally, Department of Commerce (Commerce) officials reported that they reviewed the inventory data and clarified missing or suspect entries with those who submitted the information. Also, a Department of the Treasury (Treasury) official stated that there were two rounds of data verification and that Treasury bureaus were sometimes asked to verify submitted information. However, officials from other agencies, such as Defense, Energy, and NASA, confirmed that their inventories had not been verified. Further, in some cases, such as with the Department of Health and Human Services (HHS) and NASA, agency officials reported that their inventory information was estimated.

Notwithstanding agencies' informal verification efforts, complete, accurate, and consistent performance information will be important to OMB to guide its decisions on how best to oversee federal data center consolidations. Without an understanding of the validity and limitations on agencies' data, OMB cannot be assured that agencies are providing a sound baseline for estimating savings and measuring progress against their goals.

---

Agencies Established Consolidation Plans, but Work Remains on Key Elements

In addition to the agencies' inventories, OMB required agencies to establish consolidation plans that address key elements, including quantitative goals, qualitative impacts, approach, scope, timeline, and master schedule, as well as summaries of a cost-benefit analysis, performance metrics, risk management, and communications planning. OMB noted the importance of agencies' consolidation plans in providing a technical road map and approach for achieving specified targets for infrastructure utilization, energy efficiency, and cost efficiency. Table 3 provides a detailed description of each of these elements.

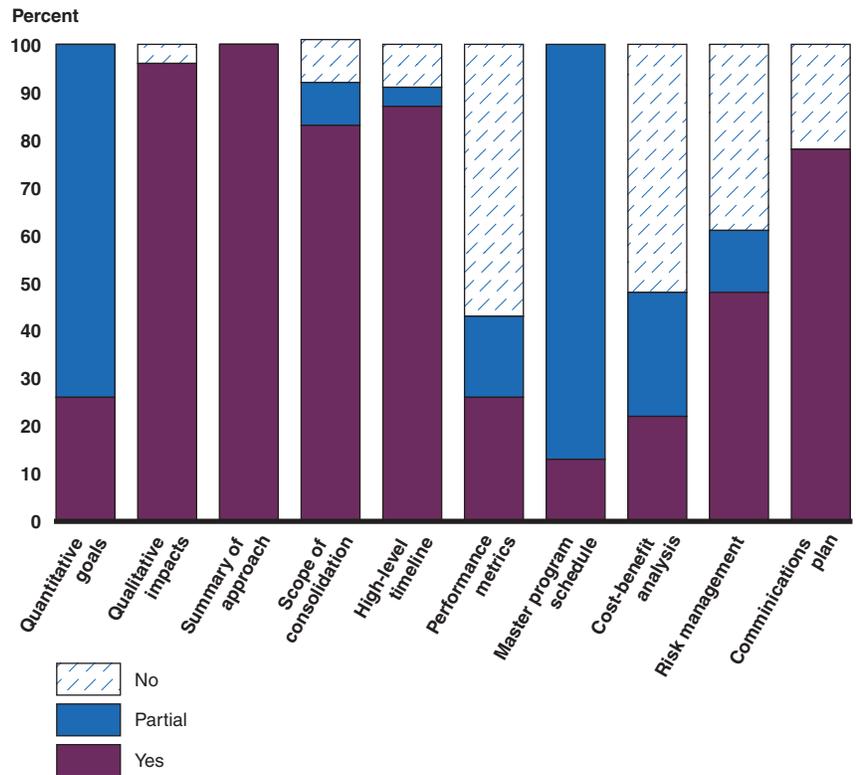
**Table 3: OMB Guidance on Key Elements of Agencies' Consolidation Plans**

<b>Element</b>	<b>OMB guidance</b>
Quantitative goals	The agency should define high-level goals for reducing assets and better utilizing the IT infrastructure. The goals are to reflect agencywide savings and asset utilization forecasts through fiscal year 2015. These targets are to include projected reductions for data centers, aggregate gross floor area, total number of racks, total number of servers, and the corresponding utilization metrics.
Qualitative impacts	The agency goals need to include qualitative impacts targeted by the agency (such as standardization, economies of scale, procurement improvements, enhanced security, and operational efficiencies).
Summary of approach	The agency needs to describe each of the specific approaches that will be undertaken to achieve the stated goals.
Scope of consolidation	The agency needs to include a clear, well-defined scope for implementing its data center consolidation initiative by identifying the specific target agency/component/bureau data centers to be consolidated.
High-level timeline	The plan needs to include a high-level timeline for data center consolidation.
Performance metrics	The agency's governance framework for data center consolidation needs to include the specific metrics that will be used in performance measurement.
Master program schedule	A master program schedule needs to be created for the entire agency, drawn from the detailed implementation schedules provided by each of the data center managers and driven by related federal government activities (such as requirements for OMB reporting and budget submissions).
Cost-benefit analysis	The plan is to include a cost-benefit analysis stating, for each fiscal year included as part of the agency's final consolidation plan, aggregate year-by-year investment and cost savings calculations through fiscal year 2015.
Risk management	A risk management plan needs to be developed and risks need to be tracked using templates.
Communications plan	Depending on the scope and impact of the consolidation plan, the agency should consider developing a communications plan that addresses key internal and external stakeholder needs and concerns, senior leadership briefing reports, and regular coordination with key parties involved in implementing the plan.

Source: GAO analysis of OMB data.

While 23 agencies submitted consolidation plans to OMB, selected elements are missing from each plan. For example, 22 agencies provide complete information on their qualitative impacts, but only 6 provide complete information on their quantitative goals. Further, while all 23 agencies specify their consolidation approach, only 5 indicate that a cost-benefit analysis was performed for the consolidation initiative. In many cases, agencies submitted some, but not all, of the required information. Figure 2 provides an assessment by element, and a discussion of each element follows the figure. A detailed summary of the agencies' status of completion of each key element is provided in appendix II. In addition, this information is provided for each agency in appendix III.

**Figure 2: Assessment of Completeness of Agencies' Consolidation Plan Elements**



Source: GAO analysis of agency data.

**Descriptions:**

- Yes—the agency provides complete information for this element.
- Partial—the agency provides some, but not all, of the information in this element.
- No—the agency does not provide information for this element.

- **Quantitative goals.** Six agencies provide complete savings and utilization forecasts and 17 agencies provide partial forecasts. For example, Defense’s savings and utilization forecasts are incomplete, while Treasury and the Social Security Administration (SSA) provide complete savings forecasts, but incomplete utilization forecasts. Some agencies identified reasons for not having completed these forecasts. For example, Treasury’s plan states that the department’s savings and utilization targets do not include demand from new organizations

---

required under recent legislation<sup>10</sup> and that the plan will be updated as further information becomes available. The plan also notes that the forecasts could change when the department completes associated cost-benefit analyses. Additionally, NASA's plan states that the agency is performing an assessment of its assets to form an accurate baseline, on which actual targets for reduction can be predicted. This plan also notes that as the agency's asset and inventory information is improved, NASA will evaluate opportunities to further consolidate applications and virtualize operating systems.

- **Qualitative impacts.** Twenty-two agencies describe the qualitative impacts of their consolidation initiatives and 1 agency does not. For example, Agriculture's plan describes goals such as reducing overall energy use and reducing the real estate footprint for data centers. Additionally, HHS reports that the consolidation effort will result in more efficient monitoring of data center power. Finally, the U.S. Agency for International Development (USAID) describes goals such as optimizing use of IT funding by increasing efficiencies and increasing the availability of resources and systems to the user community. However, Education does not provide any qualitative impacts. Although the department links its consolidation plan to a federal strategic sustainability plan, the sustainability plan does not contain qualitative impacts such as those required by OMB.
- **Summary of consolidation approach.** All 23 agencies include a summary of the agencies' proposed consolidation approaches. For example, Commerce describes five approaches that will support the department's FDCCI goals: consolidating and decommissioning data centers, increasing server virtualization and IT equipment utilization, moving to cloud computing, acquiring green products and services, and promoting "green IT." Similarly, the Department of the Interior (Interior) provides four approaches to help realize its consolidation goals: decommissioning, consolidation, cloud computing, and server and storage virtualization. For a more detailed discussion of alternative data center consolidation approaches, see appendix IV.
- **Scope of consolidation.** Nineteen agencies' plans include a well-defined scope for data center consolidation, 2 provide partial

---

<sup>10</sup>Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, Titles I, V, and X, 124 Stat. 1376, July 21, 2010.

---

information on the scope of their consolidation efforts, and 2 do not provide this information. Specifically, the agencies that provide this information list the data centers included in the consolidation effort and what consolidation approach will be taken for the systems within each center (i.e., decommissioning, consolidation, cloud computing, or virtualization). For example, the Department of Veterans Affairs (VA) lists 87 data centers and Labor lists 20 data centers, in which all of the systems will be consolidated, decommissioned, or virtualized. Alternatively, Energy has not yet determined what action will be taken for each of its facilities and Interior identifies the total numbers of centers to be retained or expanded, but does not describe the consolidation approach for individual data centers. Two agencies, the Department of Justice (Justice) and NASA, are still working to determine which of their data centers are to be consolidated.

- **High-level timeline.** Twenty agencies include a high-level timeline for consolidation efforts, 1 agency includes partial information on its timelines, and 2 do not provide timelines. For example, Labor and VA both provide the fiscal years in which every data center listed will be consolidated and the National Science Foundation (NSF) states what year the agency's primary data center will be decommissioned and replaced with private and public cloud services. In contrast, Defense only describes broad goals to be accomplished by fiscal year 2013 and does not include specific milestones for each data center. Further, NASA does not include this information in its plan and notes that the agency is still working to determine its data center inventory.
- **Performance metrics.** Six agencies identify specific performance metrics for their consolidation programs, 4 agencies provide partial information on their metrics, and 13 agencies did not identify specific metrics. For example, both Transportation and GSA specify metrics such as savings in energy consumption, cost variance, and schedule variance. Alternatively, State reports that the department's data center consolidation program maintains metrics at both the system and process performance levels, but does not provide any specifics as to the nature of those metrics. Further, although Defense does not provide metrics at the department level, the Air Force has developed a method to provide such measures.
- **Master program schedule.** Three agencies reference a completed master program schedule, and 20 do not. For example, while Agriculture, DHS, and Interior discuss their master schedules, other agencies, such as Commerce and HHS do not. Some agencies, such

---

as Defense, Labor, and the Nuclear Regulatory Commission (NRC), plan to develop them in the future.

- **Cost-benefit analysis.** Five agencies provide a cost-benefit analysis that encompasses their entire consolidation initiative, 6 agencies provide only selected elements of a cost-benefit analysis, and 12 agencies do not provide a cost-benefit analysis. For example, DHS details full annualized investment and savings estimates through fiscal year 2015, while other agencies, such as State and OPM, provide only partial information. Specifically, State acknowledges that not all costs are accounted for in its analysis and OPM reports that its analysis is preliminary. Additionally, Commerce provides costs and savings for several data center consolidations but acknowledges that estimates cannot be provided for all of the department's planned consolidation initiatives. Eight of the agencies that do not provide a cost-benefit analysis, such as HHS, Justice, and USAID, plan to conduct one in the future.
- **Risk management.** Fewer than half of the agencies both reference a consolidation risk management plan and require that risks be tracked. For example, HHS discusses its approach to risk management and identifies a series of technical, security, funding, and management risks and provides a mitigation strategy for each. Additionally, VA describes a five-phase approach to risk management that includes identifying and monitoring risks. However, Education requires that risks be tracked, but does not reference the existence of an actual risk management plan. Nine agencies do not reference a risk management plan or requirements for tracking risks.
- **Communications plan.** Eighteen agencies consider a communications strategy for the agencies' consolidation initiatives, and 5 agencies do not. For example, Energy describes a series of coordinated activities that are intended to support the consolidation effort. Additionally, NASA details its approach to consolidation coordination and communication and SBA details individual communication responsibilities among consolidation stakeholders. However, Treasury and NRC do not describe such a communications strategy.

When asked about the elements missing from their plans, many agency officials stated that they completed what they could within the timelines provided by OMB. Several agency officials noted that it was difficult to obtain all of the required data from component agencies, while others

---

reported that their data collection efforts were made more difficult by OMB's tight time frames and changes in templates and guidance. Moreover, officials from two agencies stated that some of the information contained in their plans had been estimated. However, OMB has not required agencies to complete the missing elements or to resubmit their final plans. According to an OMB official, agencies have been instructed to move forward with their consolidation initiatives, and as noted earlier, OMB intends to monitor the agencies' progress annually.

We have previously reported that without a clear description of the strategies and resources an agency plans to use in meeting its goals, it will be difficult to assess the likelihood of the agency's success in achieving its intended results.<sup>11</sup> In the absence of completed consolidation plans, agencies run the risk of moving forward on their respective initiatives with, among other things, poorly defined approaches and outcomes. Without this information, agencies may not realize anticipated cost savings, improved infrastructure utilization, and energy efficiency.

---

## Agencies Face Multiple Challenges in Consolidation

In preparing agencies for the data center consolidation initiative, OMB held workshops that, among other things, discussed challenges that agencies might face so that they could anticipate and mitigate them. In addition, agencies identified multiple challenges they are facing during data center consolidations. These include challenges related to the data center consolidation initiative as well as those that are cultural, funding related, operational, and technical. Some challenges are more common than others. Specifically, the number of agencies reporting a particular challenge range from 1 agency to 19 agencies. Table 4 details the reported challenges as well as the numbers of agencies experiencing that challenge. The table is followed by a discussion of the most prevalent challenges.

---

<sup>11</sup>[GAO/GGD/AIMD-10.1.18](#).

**Table 4: Number of Agencies Experiencing Particular Data Center Consolidation Challenges**

<b>Challenge type</b>	<b>Challenge</b>	<b>Number of agencies</b>
Initiative-related (47)	Obtaining power usage information, as required by OMB	19
	Meeting tight planning deadlines for OMB's milestones	11
	Including consolidation information in middle of fiscal year 2012 budget cycle	4
	Providing good-quality asset inventories, as required by OMB	4
	Aligning the data center consolidation effort with other initiatives	4
	Adjusting as OMB modified its definition of "data center"	2
	Working towards an undefined future state of the data center consolidation initiative	1
	Reporting savings in an already consolidated organization	1
	Applying same FDCCI targets to all agencies, regardless of situation	1
Cultural (26)	Accepting cultural change that is part of consolidation	15
	Implementing data center consolidation in organizational structure, such as decentralized enterprise, not geared towards consolidation	8
	Assuming significant new responsibilities as a result of consolidation	2
	Receiving enterprise buy-in for the consolidation effort	1
Funding (25)	Acquiring funding required for consolidation/migration efforts	11
	Identifying cost savings to be realized by consolidation	9
	Reimbursing external organizations for shared services/multi-tenancy	2
	Projecting cost information	1
	Accounting for costs in a flat fee lease	1
	Planning consolidation efforts across components with differing funding streams	1
Operational (21)	Maintaining services during consolidation transition	9
	Implementing cloud computing	3
	Managing physical infrastructure	2
	Creating appropriate service level agreements with other organizations	2
	Locating a suitable site for data center	2
	Transitioning to a new service provider	1
	Understanding the limitations of facilities	1
	Relocating displaced staff	1
Technical (17)	Maintaining appropriate level of system security	3
	Planning migration strategy	2
	Configuring the network for consolidation	2
	Forecasting capacity and seasonal demand	2
	Meshing data from multiple locations	2
	Ensuring enough bandwidth for the network	2

Challenge type	Challenge	Number of agencies
	Creating shared standards (including system and physical security, storage, and risk management) for co-located resources and services	1
	Testing of changed applications	1
	Overseeing a vendor's security; certification and accreditation are set up and performed	1
	Analyzing business needs and solutions to be sure of a good fit	1

Source: GAO analysis of information from agency officials.

### Initiative-related Challenges

Agencies reported nine challenges that are specific to OMB's data center consolidation initiative, including meeting tight FDCCI deadlines and obtaining power usage data as required by OMB. Specifically, 19 agencies reported that obtaining power usage data was a challenge. For example, a Commerce official stated that while more than half of the agency's data centers have power consumption figures or costs associated with power usage, some of the agency's facilities do not have metering capabilities for power consumption and that the agency has some server rooms that lack metering at the equipment. Similarly, Labor's Deputy CIO stated that the department does not have metering for data centers. Consequently, the agency used best practices to estimate how much power is being used at data centers. In addition, 11 agencies found that the tight FDCCI deadlines were a challenge. For example, Labor's Deputy CIO stated that the time frames were overly aggressive and did not allow the agency to provide the information OMB requested or to complete the planning that is necessary for such an important undertaking. An Energy official stated that there is no quick path to consolidation and that the agency was faced with the decision of either moving forward with inadequate inventory information or taking more time to make decisions. The official stressed that the agency would like to consolidate in the correct manner.

### Cultural Challenges

Agencies reported four cultural challenges to data center consolidation, including accepting cultural change and implementing consolidation in an organizational structure not geared towards consolidation (i.e., a decentralized enterprise). The most prevalent challenge was acceptance of cultural change, with 15 agencies reporting it as a challenge. For example, an Agriculture official stated that there is a challenge in addressing cultural change surrounding data center consolidation. With data center consolidation, systems personnel may not be in the same location as the data. To address this, Agriculture refined its communications plan so that lessons learned can be passed on to other staff. An EPA official noted the agency experienced this challenge when

---

employees were reluctant to cede control of resources under their immediate control. EPA mitigated that challenge by building relationships with stakeholders early on. In addition, 8 agencies reported that implementing the consolidation was challenged by their organizational structures. For example, a Justice official stated that the agency uses a federated IT approach within which the departmentwide CIO's office has primary responsibility for architecture, common infrastructure, and standards decisions, while each component IT department has primary responsibility for application resource decisions. According to this official, such a federated approach offers Justice's components more autonomy when making decisions, but creates obstacles for departmentwide efforts such as FDCCI. Further, an Energy official cited the department's decentralized environment as a challenge in being able to collect data center inventory information.

## Funding Challenges

The data center consolidation initiative is supposed to result in cost savings, but multiple agencies reported challenges in funding their initiatives. For example, a Transportation official reported that the need for upfront funding for consolidation efforts was a challenge. A NASA official stated that the agency spent approximately \$1.5 million on an asset management tool to assist the agency in creating its inventory. Further, a State official noted the challenge of having to fund the consolidation efforts long before cost savings will be realized. In addition, 9 agencies reported that identifying cost savings for consolidation efforts was a challenge. For example, an Energy official stated that it was too early in the consolidation process for Energy to be able to quantify cost savings, since the agency does not have data on cost or exactly which data centers will be closed. A State official stated that it is difficult to estimate cost savings since the department does not have information on power usage for all facilities. Further, a Treasury official noted challenges in identifying cost savings, particularly because a reduction in utilized square footage at a facility does not mean that the leasing agency will issue a refund check on the lease. Similarly, building managers at private facilities will typically not issue a refund if an agency begins using less energy.

## Operational Challenges

Agencies reported eight operational challenges to data center consolidation, including maintaining services during the consolidation transition and implementing cloud computing. Nine agencies reported that maintaining services during the consolidation transition is a challenge. For example, a Labor official stated that keeping the business running during the transition is a big concern of the agency. Three agencies reported that moving to cloud computing was a challenge. For example, a Commerce

---

## Technical Challenges

official stated that the agency's biggest challenge was how to implement cloud computing. This official cited the need to investigate how private and public cloud computing will fit into the agency's mission, and to determine how to manage security issues surrounding cloud computing.

Agencies reported 10 technical challenges to data center consolidation, including maintaining the appropriate level of system security and planning the migration strategy. While agencies reported more technical challenges than any other type of challenge, these challenges are more diverse, with fewer agencies experiencing each individual challenge. Three agencies reported that maintaining the appropriate level of system security was a challenge. For example, an OPM official stated that one of the challenges faced was the need to maintain personally identifiable information while exploring options such as cloud computing. In addition, a State official identified the challenge of including classified servers in the consolidation initiative. Two agencies reported that planning the migration strategy was a challenge. For example, an SSA official pointed out the difficulty in scheduling migration across approximately 1,500 field offices.

One approach agencies can use to manage challenges such as the ones listed above is through formal risk management processes. However, as noted in the prior section, less than half of the agencies included a discussion of risk management in their data center consolidation plans.

---

## Lessons Learned by States Can Be Leveraged to Mitigate Challenges at the Federal Level

We have previously reported on the importance of using lessons learned—a principal component of an organizational culture committed to continuous improvement.<sup>12</sup> Sharing such information serves to communicate acquired knowledge more effectively and to ensure that beneficial information is factored into planning, work processes, and activities. Lessons learned also provide a powerful method of sharing good ideas for improving work processes, facility or equipment design and operation, quality, safety, and cost-effectiveness.

---

<sup>12</sup>GAO, *NASA: Better Mechanisms Needed for Sharing Lessons Learned*, [GAO-02-195](#) (Washington, D.C.: Jan. 30, 2002) and *Information Technology: DOD Needs to Leverage Lessons Learned from Its Outsourcing Projects*, [GAO-03-371](#) (Washington, D.C.: Apr. 25, 2003).

---

OMB posted lessons learned by three states on its data center consolidation Web page for federal agencies to review.<sup>13</sup> However, there is more that agencies can learn. Many state governments have undertaken data center consolidation initiatives in recent years. Although they have encountered unique challenges, they have also encountered challenges similar to those reported by federal agencies. Specifically, the National Association of State CIOs and a literature search identified 20 states that reported on challenges they faced, or lessons they learned, from their data center consolidation initiatives. Of these, 19 reported lessons learned that could be leveraged at the federal level. For example, officials from North Carolina reported that organizations are typically concerned that by consolidating data centers, they will lose control of their data, service levels will decline, or costs will rise. The state learned that to help mitigate this during the process of consolidation, the organizations' concerns should be documented, validated, and addressed. In another example, a West Virginia official reported that since the state had no funding for a consolidation, it had to be creative in executing the consolidation. The state used the natural aging cycle of hardware to force consolidation; that is, when a piece of hardware was ready to be replaced, the applications and software were put onto a consolidated server. As a final example, two states reported lessons learned that could be applied to the challenge of providing a quality asset inventory. Officials from Utah and Texas emphasized the importance of having an accurate inventory of all equipment that could be impacted by the project. The official from Texas added that it is important to have a third party collect technical data across agencies, and that it is beneficial to have this work completed by outside parties, in order to ensure objectivity and consistency. Table 5 identifies lessons learned by states that could be applied by federal agencies.

---

<sup>13</sup>See <http://www.cio.gov/admin-pages.cfm/page/fdcci>.

**Table 5: Lessons Learned by States That Can Be Used by Federal Agencies to Address Data Center Consolidation Challenges**

Federal challenge	Lesson learned
<b>Initiative-related challenges</b>	
Providing good-quality inventories	<ul style="list-style-type: none"> <li>• Use a third party to collect technical inventory data to ensure objectivity and consistency</li> <li>• Create a configuration management database of all equipment impacted by the project</li> </ul>
<b>Cultural challenges</b>	
Receiving enterprise buy-in for the consolidation effort	<ul style="list-style-type: none"> <li>• Obtain executive support and empowerment to champion the consolidation</li> <li>• Communicate early and often with key agency officials</li> <li>• Find the correct person in the agency who understands the risks and can act as an executive sponsor to ensure issues get addressed</li> <li>• Engage politicians and department executives early</li> <li>• Drive the initiative from the top down</li> </ul>
Accepting cultural change that is part of consolidation	<ul style="list-style-type: none"> <li>• Work with components to address concerns; provide examples of how efforts will benefit their programs</li> <li>• Do not underestimate the resistance to consolidation</li> <li>• Document, validate, and address concerns</li> <li>• Create a well-developed strategic plan</li> <li>• Instruct components to plan for and communicate their IT needs to ensure that staff are better utilized following consolidation</li> <li>• Prioritize agency IT portfolios across the enterprise</li> <li>• Ensure the organizational structure is aligned with the project</li> <li>• Ensure technical groups are committed to the project</li> <li>• Ensure that data center personnel and the infrastructure/virtualization staff are working centrally</li> <li>• Focus on affected employees; give them good career options and keep them informed</li> <li>• Communicate the value and benefit of consolidation to the agency leads</li> </ul>
Assuming significant new responsibilities as a result of consolidation	<ul style="list-style-type: none"> <li>• Provide training to ensure that all members of the workforce have sufficient skills</li> </ul>
Implementing FDCCI in organizational structure, such as decentralized enterprise, not geared towards consolidation	<ul style="list-style-type: none"> <li>• Establish a governance model with a single point of control and vision</li> </ul>
<b>Funding challenges</b>	
Acquiring funding required for consolidation/migration efforts	<ul style="list-style-type: none"> <li>• Consolidate, standardize, and leverage existing IT applications, equipment, and infrastructure to reduce overall cost</li> <li>• Share IT staff to support multiple agencies</li> <li>• Work with private contractors whenever necessary and wherever possible to obtain the best value</li> <li>• Use procurement review process and authority to analyze purchase requests for servers to determine whether there is an opportunity for that agency to utilize the virtual environment</li> <li>• Identify appropriate funding levels for the project</li> <li>• Use the natural aging cycle of hardware to force consolidation; when hardware is ready to be replaced, put the applications and software onto a consolidated server</li> </ul>

Federal challenge	Lesson learned
Identifying cost savings to be realized by consolidation	<ul style="list-style-type: none"> <li>• Use virtualization to reduce costs</li> <li>• Standardize equipment to garner cost savings</li> </ul>
<b>Operational challenges</b>	
Managing physical infrastructure	<ul style="list-style-type: none"> <li>• Do not assume that heating and cooling are adequate to host the additional equipment</li> </ul>
Creating appropriate service level agreements with other organizations	<ul style="list-style-type: none"> <li>• In cases where service levels are not defined or tracked in the agency being consolidated, hold detailed discussions with business stakeholders and IT leadership to define required service levels</li> <li>• Establish service level agreements that hold both the data center and agencies accountable</li> <li>• Establish clear performance/success measures</li> <li>• Set very specific performance targets and hold routine meetings with your customers to review service level agreement results</li> </ul>
<b>Technical challenges</b>	
Planning migration strategy	<ul style="list-style-type: none"> <li>• Set migration windows ahead of time so individual components can negotiate migration dates around their schedules</li> <li>• Plan for a 6-month lead time, start planning as soon as agency is committed to consolidation, and encourage agencies to adopt consistent and disciplined IT inventory practices</li> <li>• Keep migrations simple</li> <li>• Integrate lessons learned and process improvements into the consolidation approach to ensure that subsequent migrations are built upon the previous migration's experience</li> <li>• Perform risk assessments on the data centers to gather information on inventory and share that information with key stakeholders</li> <li>• Develop a migration project process that includes assigning resources, performing discovery and inventory, developing an initial move scenario and a target move date, preparing the target data center, developing a detailed plan; executing the move; and preparing the legacy data center space for reuse</li> <li>• Identify processes for moving the hardware and communicating those moves to the enterprise groups</li> <li>• Follow a strict project management process and initiate a clear change management plan</li> <li>• Keep the customers informed</li> </ul>
Maintaining appropriate level of system security	<ul style="list-style-type: none"> <li>• Work with component agencies to create a total cost of ownership model that allows the components to create a business value proposition</li> </ul>
Analyzing business needs and solutions to be sure of a good fit	<ul style="list-style-type: none"> <li>• Do not allow business case for consolidation to focus too much on cost savings; this can cause unrealistic expectations</li> <li>• Understand the requirements and the possible issues before launching an initiative</li> <li>• Ensure project plan has clearly defined objectives and deliverables to prevent scope creep</li> <li>• Recognize that virtualization is not a solution for everyone</li> <li>• Explain to business community what data centers require to meet expectations</li> </ul>
Creating shared standards (system and physical security, storage, risk management) for co-located resources and services	<ul style="list-style-type: none"> <li>• Standardize IT capabilities and services</li> </ul>

Federal challenge	Lesson learned
Testing of changed applications	<ul style="list-style-type: none"> <li>• Set time frames for task completions to allow for application testing before and after server migrations</li> <li>• Test applications in a hosted environment; virtual environments are not suitable for some applications</li> </ul>

Source: GAO analysis of state reported data.

## Conclusions

With agencies reporting having almost 1,600 federal data centers, OMB's goal of consolidating 800 centers by 2015 is ambitious. To its credit, OMB has established an accountability infrastructure through its data center consolidation task force composed of representatives from each of the participating agencies. OMB and federal agencies have also taken important steps to reduce the number and increase the efficiency of the federal data centers. However, only one agency has completed its required data center asset inventory, no agencies have completed their consolidation plans, and OMB has not required that agency inventory information be verified. Despite these limitations, OMB has instructed agencies to move forward with their plans. Moving forward to consolidate obviously redundant or underutilized centers is warranted—and should result in immediate cost savings and increased efficiency. However, without a complete asset inventory and a comprehensive plan, agencies are at increased risk that they will be ill-prepared to manage such a significant transformation. This could slow the consolidations and reduce expected savings and efficiencies.

In moving ahead in their consolidation efforts, agencies are encountering challenges, including those that are technical, operational, and cultural in nature. Some state governments have also engaged in data center consolidation initiatives and dealt with similar obstacles in doing so. By virtue of these experiences, these states can offer insights and suggestions that federal agencies can use to mitigate their challenges and risks. In doing so, agencies will be better positioned to address their consolidation goals and to meet OMB's goals for reducing the number and cost of federal data centers.

## Recommendations for Executive Action

To better ensure that the federal data center consolidation initiative improves governmental efficiency and achieves cost savings, we are making four recommendations to OMB. Specifically, we are recommending that the Director of the Office of Management and Budget direct the Federal Chief Information Officer to

- 
- require that agencies, when updating their data center inventories in the third quarter of each fiscal year, state what actions have been taken to verify the inventories and to identify any limitations of this information;
  - require that agencies complete the missing elements in their respective plans and submit complete data center consolidation plans, or provide a schedule for when they will do so, by September 30, 2011;
  - require agencies to consider consolidation challenges and lessons learned when updating their plans; and
  - utilize the existing accountability infrastructure by requiring the Data Center Consolidation Task Force to assess agency consolidation plans to ensure they are complete and to monitor the agencies' implementation of their plans.

In addition, we are making two recommendations to each of the department secretaries and agency heads of the 23 departments and agencies participating in the federal data center consolidation initiative.<sup>14</sup> Specifically, we are recommending that the secretaries and agency heads

- direct their component agencies and their data center consolidation program managers to complete the missing elements in their respective data center consolidation inventories and plans; and
- require their data center consolidation program managers to consider consolidation challenges and lessons learned when updating their consolidation plans.

---

<sup>14</sup>This includes the department secretaries and agency heads of the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Interior, Justice, Labor, State, Transportation, Treasury, and Veterans Affairs; the Environmental Protection Agency, the General Services Administration, the National Aeronautics and Space Administration, the National Science Foundation, the Nuclear Regulatory Commission, the Office of Personnel Management, the Small Business Administration, the Social Security Administration, and the U.S. Agency for International Development.

---

## Agency Comments and Our Evaluation

We received comments on a draft of our report from OMB and the 23 agencies to which we made recommendations. Most agencies generally agreed with our recommendations. Specifically, in commenting on the draft, 15 agencies agreed with our recommendations; 4 agreed with the report's content or findings, but offered no comments on the recommendations; 3 offered no comments on the report's findings or recommendations; and Defense and SSA both did not agree with one of our recommendations, but agreed with the second. Agencies also provided technical comments, which we incorporated as appropriate. Each agency's comments are discussed in more detail below.

- In comments provided via e-mail, an OMB official from the General Counsel Office wrote that the agency generally agreed with our report. The agency offered no comments on our recommendations.
- In comments provided via e-mail, Agriculture's CIO agreed with our recommendations and noted that our assessment of USDA's inventory was accurate.
- In written comments, the Secretary of Commerce concurred with the general findings as they apply to the department and with specific reporting on the department's data center consolidation plan. The Secretary offered no comments on our recommendations, but noted that Commerce plans to address GAO's finding on the department's consolidation master program schedule in the next version of its consolidation plan. Commerce's written comments are provided in appendix V.
- In written comments, Defense's CIO partially concurred with one of our recommendations and concurred with the second. Specifically, regarding our recommendation that the department complete the missing elements from its data center inventory and consolidation plan, the CIO cited the importance of completing consolidation metrics and noted that many of the department's centers and buildings are not equipped to meter energy usage and that using incomplete estimates of such usage would result in inaccurate extrapolations of cost savings. However, OMB addressed such concerns in its guidance on the FDCCI, noting alternative means by which agencies could develop energy utilization estimates. OMB further recognized that these estimates may need time to become more accurate. As such, we believe our recommendation is reasonable and appropriate. Defense's written comments are provided in appendix VI.

- 
- In written comments, Education’s CIO concurred with one recommendation and outlined plans to address the second. The CIO noted the department’s plans to complete, to the extent practicable, the missing information in Education’s data center inventory and consolidation plan. The CIO also cited the department’s intent, when updating its annual consolidation plan, to consider relevant consolidation challenges and lessons learned. Education’s written comments are provided in appendix VII.
  - In written comments, Energy’s Director of the Corporate IT Project Management Office agreed with our assessment of Energy’s data center consolidation plan and offered no comments on our recommendations. The Director cited a series of planned actions by the department intended to gather missing information in Energy’s data center inventory, update the department’s consolidation plan, and document its data center management best practices. Energy’s written comments are provided in appendix VIII.
  - In written comments, HHS’ Assistant Secretary for Legislation stated that the draft accurately depicts the HHS data center consolidation plan as it was delivered to OMB in August 2010 and notes that the agency has continued to improve its inventory and make progress on its data center consolidation goals since that time. Further, the Assistant Secretary outlined a series of actions planned by the department to complete HHS’ data center inventory and consolidation plan. The department did not offer comments on our recommendations. HHS’ written comments are provided in appendix IX.
  - In written comments, DHS’s Director of the Departmental GAO/OIG Liaison Office concurred with our recommendations. Further, the Director outlined the department’s planned actions to complete the missing information from its data center inventory and noted that the department is working to share its consolidation lessons learned with, among others, the Federal Chief Information Officers Council. DHS’s written comments are provided in appendix X.
  - In written comments, Interior’s Assistant Secretary for Policy, Management, and Budget concurred with our findings and recommendations. The Assistant Secretary also noted that the department is continuing to refine its data center inventory and consolidation goals. Interior’s written comments are provided in appendix XI.

- 
- 
- In comments provided via e-mail, the Justice Audit Liaison concurred with our recommendations. Justice also provided technical comments, which we incorporated as appropriate.
  - In written comments, Labor’s Assistant Secretary for Administration and Management stated that, after carefully reviewing the draft report, the department did not have any comments to contribute. Labor’s written comments are provided in appendix XII.
  - In written comments, State’s Chief Financial Officer concurred with our recommendations and outlined a series of actions planned by the department to complete State’s data center inventory and consolidation plan. State’s written comments are provided in appendix XIII.
  - In comments provided via e-mail, Transportation’s Deputy Director of Audit Relations stated that the department had no comments on the report and agreed to consider our recommendations.
  - In written comments, Treasury’s Deputy Assistant Secretary for Information Systems and Chief Information Officer did not provide comments on our recommendations, but noted that Treasury has started its annual data center inventory collection, which will address missing data elements, and that Treasury intends to collect and leverage data center consolidation challenges and lessons learned when updating the department’s consolidation plans. Treasury’s written comments are provided in appendix XIV.
  - In written comments, VA’s Chief of Staff generally agreed with the findings and concurred with our recommendations. Further, the Chief of Staff noted planned actions to complete missing information from the department’s consolidation plan and to supplement updates to the plan with narrative responses on consolidation challenges and lessons learned. The Chief of Staff also noted that the department is continuing to refine its data center inventory, consolidation goals, and consolidation timeline. VA’s written comments are provided in appendix XV.
  - In written comments, EPA’s Assistant Administrator and Chief Information Officer did not agree or disagree with our recommendations, but did offer clarification on its plans to fulfill our recommendations. Specifically, in relation to our recommendation to complete missing elements of the agency’s consolidation plan, the Assistant Administrator clarified that the majority of EPA server rooms

---

are located within leased space managed by GSA. As such, EPA will be able to estimate operating electrical use for these rooms, but the cost-benefit analysis will not reflect a reduction in real estate costs or electricity consumption because such reductions would not result in cost savings to EPA.

Further, the CIO asserted that we had mischaracterized the agency's overall plan for consolidation by stating that EPA does not plan to further consolidate its four data centers and in our description of actions the agency plans to take within those four centers. Specifically, EPA stated that we did not provide adequate detail about EPA's existing infrastructure or the services that will be provided by these four existing centers. However, EPA's data center consolidation plan states that the agency had four data centers as of the end of fiscal year 2010 and the agency plans to have four data centers at the end of fiscal year 2014. As such, we maintain that our description of EPA's broad consolidation goals is factual. EPA's written comments are provided in appendix XVI.

- In written comments, GSA's Administrator agreed with both our findings and our recommendations and stated that GSA would take actions commensurate with our recommendations. GSA's written comments are provided in appendix XVII.
- In written comments, NASA's CIO concurred with our recommendations. Further, the CIO cited ongoing work by NASA to complete the missing information in the agency's data center inventory and consolidation plan. Additionally, the CIO noted the agency's plans to consider consolidation challenges and lessons learned when updating consolidation plans. NASA's written comments are provided in appendix XVIII.
- In comments provided via e-mail, NSF's Acting CIO did not provide comments on our recommendations, but noted NSF's planned actions to complete the missing information from the agency's consolidation plan.
- In written comments, NRC's Deputy Executive Director for Corporate Management within the Office of the Executive Director for Operations stated that the agency had no comments. NRC's written comments are provided in appendix XIX.
- In comments provided via e-mail, OPM's Deputy CIO concurred with our recommendations. The Deputy CIO noted that since OPM does

---

not plan to consolidate further than its one data center, the agency's consolidation focus will be to complete its asset inventory and explore ways to operate more efficiently.

- In comments provided via e-mail, the SBA Program Manager for the Office of Congressional and Legislative Affairs concurred with our recommendations.
- In written comments, SSA's Deputy Chief of Staff disagreed with one recommendation and agreed with the second. Specifically, regarding our recommendation that the agency complete the missing elements from its data center inventory and consolidation plan, the Deputy Chief of Staff disagreed with our assessment of SSA's asset inventory and consolidation plan, stating that SSA responded to OMB's directive in a timely and satisfactory manner. The Deputy Chief of Staff further noted that because SSA does not plan to consolidate its two existing data centers, the plan elements we noted as missing were not applicable to SSA's circumstances.

However, in its asset inventory, SSA does not provide one of the OMB-specified consolidation approaches, which includes an option of "not applicable," for any of the major and nonmajor systems in SSA's data centers. While we acknowledge that SSA does not plan to consolidate from its two physical locations, OMB still required agencies to provide a consolidation approach for every identified system. Further, in a written response to OMB questions about SSA's consolidation plan, SSA acknowledged that the agency planned to virtualize systems within one of its two locations. In light of this planned work, it is reasonable to assume that an agency would complete the important governance-related key plan elements we identified as missing, such as a master program schedule, a cost-benefit analysis, and a risk management plan. In its guidance on the FDCCI, OMB echoed this importance, noting that an agency's governance framework needs to provide specific details about the oversight and internal mechanics that will measure and manage performance and risk of the consolidation implementation. As such, we believe our recommendation is reasonable and appropriate. SSA's written comments are provided in appendix XX.

- In comments provided via e-mail, the liaison from USAID's Office of the Chief Financial Officer concurred with our recommendations.

---

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to interested congressional committees; the Director of OMB; the secretaries and agency heads of the departments and agencies addressed in this report; and other interested parties. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions on the matters discussed in this report, please contact me at (202) 512-6253 or [willemsenj@gao.gov](mailto:willemsenj@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 XXI.



Joel C. Willemsen  
Managing Director, Information Technology

# Appendix I: Objectives, Scope, and Methodology

Our objectives were to (1) assess whether agency consolidation documents include adequate detail, such as performance measures and milestones, for agencies to consolidate their centers; (2) identify the key challenges reported by agencies in consolidating centers; and (3) evaluate whether lessons learned during state government consolidation efforts could be leveraged to mitigate challenges at the federal level.

For this governmentwide review, we assessed the 24 departments and agencies (agencies) that were identified by the Office of Management and Budget (OMB) and the Federal Chief Information Officer (CIO) to be included in the Federal Data Center Consolidation Initiative (FDCCI). Table 6 lists these agencies.

**Table 6: Chief Information Officers Council Departments and Agencies Participating in the FDCCI**

Departments	Agencies
Agriculture	Environmental Protection Agency
Commerce	General Services Administration
Defense	National Aeronautics and Space Administration
Education	National Science Foundation
Energy	Nuclear Regulatory Commission
Health and Human Services	Office of Personnel Management
Homeland Security	Small Business Administration
Housing and Urban Development	Social Security Administration
Interior	U.S. Agency for International Development
Justice	
Labor	
State	
Transportation	
Treasury	
Veterans Affairs	

Source: GAO analysis of OMB data.

To evaluate the agencies' data center inventories and consolidation plans, we reviewed OMB's guidance and identified key required elements for each. We compared agency consolidation inventories and plans to OMB's required elements, and identified gaps and missing elements. We rated each element as "Yes" if the agency provides complete information; "Partial" if the agency provides some, but not all, of the information; and "No" if the agency did not provide the information. We followed up with

agencies to clarify our initial findings and to determine why parts of the inventories and plans were incomplete or missing. We assessed the reliability of the data agencies provided in their data center inventories and plans. Specifically, we interviewed agency officials to determine how the data in the inventories and plans had been collected and their processes for ensuring the reliability of the data contained in these inventories. We reviewed the inventories and plans for omissions, outliers, and typographic mistakes. We compared inventory summary data contained in the consolidation plans to inventories and noted any inconsistencies. In doing so, we found multiple gaps in agency-provided data. We also found that almost half of the agencies had not taken steps to verify their inventory data. We have reported on these limitations in the body of this report.

To identify the key challenges encountered by agencies in consolidating data centers, we analyzed available literature on data center consolidation challenges and interviewed agency officials to determine what challenges to consolidation had been encountered. We then categorized the agency-reported challenges to determine ones that were encountered most often.

To evaluate whether lessons learned during state government consolidation efforts could be leveraged to mitigate challenges at the federal level, we conducted a literature search for information on state experiences in data center consolidation and interviewed the National Association of State Chief Information Officers regarding states' experiences with data center consolidation. These sources identified 20 states that reported challenges or lessons learned from their data center consolidation initiatives. We sought clarification on challenges and lessons learned through e-mail and interviews with state officials. We compared states' challenges and lessons learned to the challenges facing federal agencies in order to identify which lessons learned could be applied to federal consolidation efforts.

We conducted our work at multiple agencies' headquarters in the Washington, D.C., metropolitan area. We conducted this performance audit from August 2010 to July 2011, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

# Appendix II: Assessment of Agencies' Completion of Consolidation Planning Elements, Arranged by Key Element

Table 7 identifies the agencies that provide complete, partial, or no information for each key element of its data center consolidation plan.

**Table 7: Summary of Agencies' Completion of Key Elements in their Data Center Consolidation Plans**

<b>Element 1: Quantitative goals for reducing assets and improving IT infrastructure utilization</b>		
<b>Results</b>		<b>Comments</b>
Yes	6	The Departments of Agriculture (Agriculture), Commerce (Commerce), Labor (Labor), Transportation (Transportation), the National Science Foundation (NSF), and the Office of Personnel Management (OPM)
Partial	17	The Departments of Defense (Defense), Education (Education), Energy (Energy), Health and Human Services (HHS), Homeland Security (DHS), Interior (Interior), Justice (Justice), State (State), Treasury (Treasury), Veterans Affairs (VA), the Environmental Protection Agency (EPA), the General Services Administration (GSA), the National Aeronautics and Space Administration (NASA), the Nuclear Regulatory Commission (NRC), the Small Business Administration (SBA), the Social Security Administration (SSA), and the U.S. Agency for International Development (USAID)
No	0	No agencies meet this condition
<b>Element 2: Qualitative impacts targeted by the agency</b>		
Yes	22	Agriculture, Commerce, Defense, DHS, Energy, HHS, Interior, Justice, Labor, State, Transportation, Treasury, VA, EPA, GSA, NASA, NRC, NSF, OPM, SBA, SSA, and USAID
Partial	0	No agencies meet this condition
No	1	Education
<b>Element 3: Brief summary of the specific approaches that will be undertaken to achieve the stated goals</b>		
Yes	23	Agriculture, Commerce, Defense, DHS, Education, Energy, HHS, Interior, Justice, Labor, State, Transportation, Treasury, VA, EPA, GSA, NASA, NRC, NSF, OPM, SBA, SSA, and USAID
Partial	0	No agencies meet this condition
No	0	No agencies meet this condition
<b>Element 4: Clear, well-defined scope for implementing the consolidation initiative</b>		
Yes	19	Agriculture, Commerce, DHS, Education, HHS, Interior, Labor, State, Transportation, Treasury, VA, EPA, GSA, NRC, NSF, OPM, SBA, SSA, and USAID
Partial	2	Defense and Energy <sup>a</sup>
No	2	Justice <sup>a</sup> and NASA <sup>a</sup> do not provide this information
<b>Element 5: High-level timeline for consolidation</b>		
Yes	20	Agriculture, Commerce, DHS, Education, HHS, Interior, Justice, Labor, State, Transportation, Treasury, VA, EPA, GSA, NRC, NSF, OPM, SBA, SSA, and USAID
Partial	1	Defense
No	2	Energy and NASA
<b>Element 6: Performance metrics</b>		
Yes	6	Commerce, Interior, Transportation, Treasury, GSA, and USAID
Partial	4	Defense, Education, <sup>a</sup> Justice, <sup>a</sup> and State
No	13	Agriculture, DHS, Energy, <sup>a</sup> HHS, <sup>a</sup> Labor, <sup>a</sup> VA, <sup>a</sup> EPA, <sup>a</sup> NASA, <sup>a</sup> NRC, <sup>a</sup> NSF, OPM, SBA, and SSA

**Appendix II: Assessment of Agencies' Completion of Consolidation Planning Elements, Arranged by Key Element**

**Element 7: Master program schedule for the entire agency**

Yes	3	Agriculture, DHS, and Interior
Partial	0	No agencies meet this condition
No	20	Commerce, Defense, <sup>a</sup> Education, Energy, <sup>a</sup> HHS, Justice, Labor, <sup>a</sup> State, Transportation, Treasury, VA, <sup>a</sup> EPA, <sup>a</sup> GSA, NASA, NRC, <sup>a</sup> NSF, OPM, <sup>a</sup> SBA, SSA, and USAID <sup>a</sup>

**Element 8: Cost-benefit analysis that aggregates year-by-year investment and cost savings calculations through fiscal year 2015**

Yes	5	DHS, Transportation, VA, GSA, and NSF
Partial	6	Agriculture, Commerce, Interior, <sup>a</sup> Labor, <sup>a</sup> State, and OPM <sup>a</sup>
No	12	Defense, <sup>a</sup> Education, Energy, <sup>a</sup> HHS, <sup>a</sup> Justice, <sup>a</sup> Treasury, EPA, NASA, NRC, SBA, SSA, and USAID <sup>a</sup>

**Element 9: Risk management plan and risk tracking**

Yes	11	Agriculture, Commerce, DHS, HHS, Interior, Justice, Labor, State, Transportation, GSA, and NASA
Partial	3	Defense, Education, and VA
No	9	Energy, <sup>a</sup> Treasury, EPA, <sup>a</sup> NRC, NSF, OPM, <sup>a</sup> SBA, <sup>a</sup> SSA, and USAID <sup>a</sup>

**Element 10: Consideration of a communications plan for the consolidation implementation**

Yes	18	Agriculture, Commerce, Defense, DHS, Education, Energy, HHS, Interior, Justice, Labor, State, Transportation, VA, EPA, GSA, NASA, NSF, and SBA
Partial	0	No agencies meet this condition
No	5	Treasury, NRC, OPM, <sup>a</sup> SSA, and USAID <sup>a</sup>

Source: GAO analysis of agency data.

<sup>a</sup>The agency reports that it is taking, or plans to take, action to address this element.

Descriptions:

Yes—the agency provides complete information for this element.

Partial—the agency provides some, but not all, of the information in this element.

No—the agency does not provide information for this element.

---

# Appendix III: Assessment of Agencies' Completion of Key Consolidation Planning Elements, Arranged by Agency

---

As part of its data center consolidation initiative, OMB required 24 federal departments and agencies to submit a data center inventory and a data center consolidation plan. Key elements of the inventory were to include, for each data center, information on IT hardware, IT software, facilities/energy/storage, and geographic location. Key elements of the plan were to include information on quantitative goals, qualitative impacts, consolidation approach, consolidation scope, timeline, performance metrics, master schedule, cost-benefit analysis, risk management, and consideration of a communications plan.

For each of the agencies, the following sections provide a brief summary of the agencies' goal for reducing the number of data centers, and an assessment of the completeness of their inventories and plans.

The following information describes the key that we used in tables 8 through 30 to convey the results of our assessment of the agencies' compliance with OMB's requirements for the FDCCI.

- The agency provides complete information for this element.
- ◐ The agency provides some, but not all, aspects of the element.
- The agency does not provide information for this element.

**Department of Agriculture** Agriculture plans to consolidate from 46 data centers to 7 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, the department provides complete information for 1 element and partial information for the remaining 3 elements. Additionally, in its consolidation plan, Agriculture provides complete information for 8 of the 10 elements, partial information for 1 element, and does not provide information for the remaining element. Table 8 provides our assessment of Agriculture's compliance with OMB's requirements.

**Table 8: Assessment of Completeness of Agriculture's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	○	The agency provides a list of the systems in its data centers, but provides only partial information on the systems' technical dependencies and the planned consolidation approach for each system.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	○	The agency provides information on its storage use and capacity, but provides only partial information on its facilities' annual operational costs and space utilization and on its annual electricity cost and use.
Geographic location and real estate	○	The agency provides only partial information on its number of centers, server rooms, and closets, as well as on the gross floor area of those facilities.
Key plan element		
Quantitative goals	●	The agency provides this element.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	●	The agency provides this element.
Cost-benefit analysis	○	The agency provides five years of cost and savings data, but does not identify in which year the projections begin.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Agriculture data.

Department of Commerce

Commerce plans to consolidate from 41 data centers to 23 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the department provides complete information for 3 of the 4 key elements and partial information for the remaining element. Additionally, in its consolidation plan, Commerce provides complete information for 8 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining element. Table 9 provides our assessment of Commerce's compliance with OMB's requirements.

**Table 9: Assessment of Completeness of Commerce's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	◐	The agency provides information on its storage use and capacity, but provides only partial information on its facilities' annual operational costs and space utilization, and on its annual electricity cost and use.
Geographic location and real estate	●	The agency provides this element.
<b>Key plan element</b>		
Quantitative goals	●	The agency provides this element.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	●	The agency provides this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	◐	The agency provides cost and savings data for several data centers, but acknowledges that it cannot provide estimates for all of its consolidation initiatives.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Commerce data.

Department of Defense

Defense plans to consolidate from 772 data centers to 532 by fiscal year 2013. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, Defense provides only partial information for all 4 key elements. Additionally, in its consolidation plan, Defense provides complete information for 3 of the 10 elements evaluated, provides partial information for 5 elements, and does not provide information for the remaining 2 elements. A Defense official explained that because they are a decentralized agency and are fighting multiple wars, it was difficult to meet OMB's extremely short deadlines. The official also noted that OMB's changing templates and definitions made it more difficult to compile the needed information. Table 10 provides our assessment of Defense's compliance with OMB's requirements.

**Table 10: Assessment of Completeness of Defense's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	⓪	Some component agencies provide this information, but others do not.
IT hardware assets and utilization	⓪	Some component agencies provide this information, but others do not.
IT facilities, energy, and storage	⓪	Some component agencies provide this information, but others do not.
Geographic location and real estate	⓪	Some component agencies provide this information, but others do not.
<b>Key plan element</b>		
Quantitative goals	⓪	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	⓪	Some component agencies provide this information, but others do not.
High-level timeline	⓪	The agency provides what it plans to accomplish by 2013, but does not include milestones for each data center.
Performance metrics	⓪	Some component agencies provide this information, but others do not.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	⓪	The agency discusses a risk management process, but does not reference a risk management plan for the consolidation initiative.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Defense data.

Department of Education

Education does not have plans to consolidate any of its three data centers before fiscal year 2015. Rather, the agency plans to increase server virtualization within in its centers. However, Education's asset inventory and consolidation plan are not complete. In its asset inventory, the agency provides complete information for 3 key elements and provides partial information for the remaining element. Additionally, in its consolidation plan, Education provides complete information for 4 of the 10 elements evaluated, provides partial information for 3 elements, and does not provide information for the remaining 3 elements. Education officials stated that they did not provide selected plan elements because they are not applicable given the agency's focus on virtualization rather than consolidation. Table 11 provides our assessment of Education's compliance with OMB's requirements.

**Table 11: Assessment of Completeness of Education's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	◐	The agency provides information on its facilities' annual operational costs and space utilization, and on its storage use and capacity, but only provides partial information on its annual electricity cost and usage.
Geographic location and real estate	●	The agency provides this element.
<b>Key plan element</b>		
Quantitative goals	◐	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	○	The agency does not provide this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	◐	The agency provides some savings and utilization metrics and targets.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	◐	The agency discusses its risk tracking process, but does not reference a risk management plan for the consolidation initiative.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Education data.

Department of Energy

Energy plans to consolidate from 31 data centers to 25 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, Energy reports that although it began identifying contractor-operated data centers, this initiative was not completed in time to be included in the inventory. Additionally, in its consolidation plan, Energy provides complete information for 3 of the 10 elements evaluated, provides partial information for 2 elements, and does not provide information for the remaining 5 elements. Table 12 provides our assessment of Energy's compliance with OMB's requirements.

**Table 12: Assessment of Completeness of Energy's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	○	The agency provides only partial information on its systems, their technical dependencies, and the planned consolidation approach for each system.
IT hardware assets and utilization	○	The agency provides only partial information on its maximum and average server utilization, as well as its counts of physical servers, virtual hosts, and virtual operating systems.
IT facilities, energy, and storage	○	The agency provides only partial information on its facilities' annual operational costs and space utilization, its annual electricity cost and usage, and its storage use and capacity.
Geographic location and real estate	○	The agency provides only partial information on its number of centers, server rooms, and closets, as well as on the gross floor area of those facilities.
Key plan element		
Quantitative goals	○	The agency provides partial information on its savings goals, and does not provide any information on its utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	○	The agency provides a list of data centers, but acknowledges that it has not yet identified approaches for consolidating most of its centers.
High-level timeline	○	The agency does not provide this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Energy data.

Department of Health and Human Services

HHS plans to consolidate from 185 data centers to 131 by fiscal year 2015.<sup>1</sup> However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, the department provides partial information for all 4 key elements. Additionally, in its consolidation plan, HHS provides complete information for 6 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 3 elements. Agency officials stated that they are working to complete the elements that are missing or incomplete. Table 13 provides our assessment of HHS' compliance with OMB's requirements.

**Table 13: Assessment of Completeness of HHS' Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	○	The agency provides a list of the systems in its data centers, but provides only partial information on the systems' technical dependencies and no information on the planned consolidation approach for each system.
IT hardware assets and utilization	○	The agency provides only partial information on its maximum and average server utilization, as well as its counts of physical servers, virtual hosts, and virtual operating systems.
IT facilities, energy, and storage	○	The agency provides only partial information on its facilities' annual operational costs and space utilization, on its annual electricity costs and usage, and on its storage capacity and usage.
Geographic location and real estate	○	The agency provides only partial information on its number of centers, server rooms, and closets, as well as on the gross floor area of those facilities.
Key plan element		
Quantitative goals	○	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of HHS data.

<sup>1</sup>In responding to a draft of this report, the department reported a revised goal of consolidating from 176 data centers to 142 by fiscal year 2015.

Department of Homeland Security

DHS plans to consolidate from 43 data centers to 2 by fiscal year 2014. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, DHS provides partial information for all 4 key elements. Additionally, in its consolidation plan, the department provides complete information for 8 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining element. Table 14 provides our assessment of DHS's compliance with OMB's requirements.

Table 14: Assessment of Completeness of DHS's Data Center Consolidation Documentation

Key inventory element	GAO assessment	Description
IT software assets	⦿	The agency provides only partial information on its systems, their technical dependencies, and the planned consolidation approach for each system.
IT hardware assets and utilization	⦿	The agency provides partial information on its maximum and average server utilization, as well as its counts of physical servers, virtual hosts, and virtual operating systems.
IT facilities, energy, and storage	⦿	The agency provides only partial information on its facilities' annual operational costs and space utilization, its annual electricity cost and usage, and its storage use and capacity.
Geographic location and real estate	⦿	The agency provides only partial information on its number of data centers and their associated gross floor area. Further, it provides only partial information on its number of server rooms and computer closets and does not report on their aggregated gross floor area.
Key plan element		
Quantitative goals	⦿	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	●	The agency provides this element.
Cost-benefit analysis	●	The agency provides this element.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of DHS data.

---

Department of Housing  
and Urban Development

The Department of Housing and Urban Development did not submit a data center inventory or consolidation plan. Instead, it submitted a letter that asserts that the department does not own any data centers and has no arrangements to take ownership of any data centers at the end of any contracts.

---

Department of the Interior

Interior plans to consolidate from 95 data centers to 5 by fiscal year 2015.<sup>2</sup> However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, Interior provides complete information for 1 key element and partial information for the remaining 3 elements. In its consolidation plan, Interior provides complete information for 8 of the 10 elements evaluated, and provides partial information for 2 elements. Interior officials stated that they are working to complete the elements that are missing or incomplete. Table 15 provides our assessment of Interior's compliance with OMB's requirements.

---

<sup>2</sup>In responding to a draft of this report, the department reported a revised goal of consolidating from 210 data centers to 115 by fiscal year 2015.

**Appendix III: Assessment of Agencies' Completion of Key Consolidation Planning Elements, Arranged by Agency**

**Table 15: Assessment of Completeness of Interior's Data Center Consolidation Documentation**

<b>Key inventory element</b>	<b>GAO assessment</b>	<b>Description</b>
IT software assets	⦿	The agency provides partial information on the systems in its data centers and their technical dependencies, and provides no information on the planned consolidation approach for each system.
IT hardware assets and utilization	⦿	The agency provides partial information on its maximum and average server utilization, as well as its counts of physical servers, virtual hosts, and virtual operating systems.
IT facilities, energy, and storage	⦿	The agency provides information on its facilities' annual operational costs and its annual electricity cost and usage, but provides only partial information on its facilities' space utilization and on its storage use and capacity.
Geographic location and real estate	●	The agency provides this element.
<b>Key plan element</b>		
Quantitative goals	⦿	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	●	The agency provides this element.
Master program schedule	●	The agency provides this element.
Cost-benefit analysis	⦿	The agency provides initial cost and savings calculations, but acknowledges that it has not yet determined potential savings related to personnel and cannot realize savings from utilities and real estate.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Interior data.

Department of Justice

Justice plans to consolidate from 65 data centers to 50 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, Justice provides complete information for 1 key element and partial information for the remaining 3 elements. Additionally, in its consolidation plan, Justice provides complete information for 5 of the 10 elements evaluated, provides partial information for 2 elements, and does not provide information for the remaining 3 elements. Table 16 provides our assessment of Justice's compliance with OMB's requirements.

**Table 16: Assessment of Completeness of Justice's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	⦿	The agency provides only partial information on its systems, their technical dependencies, and the planned consolidation approach for each system.
IT hardware assets and utilization	⦿	The agency provides information on its count of physical servers, but provides only partial information on its maximum and average server utilization, as well as its counts of virtual hosts and virtual operating systems.
IT facilities, energy, and storage	⦿	The agency provides information on its storage use and capacity and on its facilities' space utilization, but provides only partial information on its facilities' annual operational costs and its annual electricity cost and usage.
Geographic location and real estate	●	The agency provides this element.
<b>Key plan element</b>		
Quantitative goals	⦿	The agency provides its utilization goals, but provides only partial information on its savings goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	○	The agency does not provide this element.
High-level timeline	●	The agency provides this element.
Performance metrics	⦿	The agency provides some utilization metrics and targets, and plans to develop others.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Justice data.

Department of Labor

Labor plans to consolidate from 20 data centers to 18 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, Labor provides complete information for 1 key element and provides partial information for the remaining 3 elements. Additionally, in its consolidation plan, Labor provides complete information for 7 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 2 elements. Table 17 provides our assessment of Labor's compliance with OMB's requirements.

**Table 17: Assessment of Completeness of Labor's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	○	The agency provides information on the systems in its data centers and the planned consolidation approach for each system, but provides only partial information on the systems' technical dependencies.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	○	The agency provides information on its facilities' annual operational costs and space utilization, and on its storage use and capacity, but provides only partial information on its annual electricity cost and usage.
Geographic location and real estate	○	The agency provides only partial information on its number of data centers, server rooms, and closets, as well as on the gross floor area of those facilities.
Key plan element		
Quantitative goals	●	The agency provides this element.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency provides near-term funding requirements, but does not discuss anticipated savings.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Labor data.

Department of State

State plans to consolidate from 13 data centers to 6 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its asset inventory, State provides complete information for 3 of the key elements and provides partial information for the remaining element. Additionally, in its consolidation plan, State provides complete information for 6 of the 10 elements evaluated, provides partial information for 3 elements, and does not provide information for the remaining element. An agency official stated that they have a master program schedule and performance metrics, but acknowledged that they did not provide them to OMB as part of their consolidation plans. Table 18 provides our assessment of State's compliance with OMB's requirements.

**Table 18: Assessment of Completeness of State's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	●	The agency provides this element.
Geographic location and real estate	◐	The agency provides information on its number of centers, server rooms, and closets, as well as on the gross floor area of its data centers. It does not provide information on the gross floor area of its server rooms and closets.
Key plan element		
Quantitative goals	◐	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	◐	The agency reports that it maintains metrics at the system and process performance levels, but does not include specific metrics.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	◐	The agency provides cost estimates and avoidances through fiscal year 2015, but acknowledges that the estimates do not include some types of costs.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of State data.

Department of Transportation

Transportation plans to consolidate from 35 data centers to 31 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, Transportation provides partial information for all 4 key elements, noting that in some instances, data center owners did not provide the requested information. Additionally, in its consolidation plan, Transportation provides complete information for 9 of the 10 elements evaluated and does not provide information for the remaining element. Table 19 provides our assessment of Transportation's compliance with OMB's requirements.

**Table 19: Assessment of Completeness of Transportation's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	◐	The agency provides only partial information on its systems, their technical dependencies, and the planned consolidation approach for each system.
IT hardware assets and utilization	◐	The agency provides partial information on its maximum and average server utilization, as well as its counts of physical servers, virtual hosts, and virtual operating systems.
IT facilities, energy, and storage	◐	The agency provides only partial information on its facilities' annual operational costs and space utilization, its annual electricity cost and usage, and its storage use and capacity.
Geographic location and real estate	◐	The agency provides only partial information on its number of centers, server rooms, and closets, as well as on the gross floor area of those facilities.
<b>Key plan element</b>		
Quantitative goals	●	The agency provides this element.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	●	The agency provides this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	●	The agency provides this element.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of Transportation data.

Department of the Treasury

Treasury plans to consolidate from 42 data centers to 29 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, Treasury provides complete information for 1 key element and provides partial information for the remaining 3 elements. Additionally, in its consolidation plan, Treasury provides complete information for 5 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 4 elements. An agency official stated that the agency is working to complete the missing or incomplete items. Table 20 provides our assessment of Treasury's compliance with OMB's requirements.

**Table 20: Assessment of Completeness of Treasury's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides only partial information on its systems, their technical dependencies, and the planned consolidation approach for each system.
IT hardware assets and utilization	●	The agency provides information on its count of physical servers, but provides only partial information on its maximum and average server utilization, as well as its counts of virtual hosts and virtual operating systems.
IT facilities, energy, and storage	●	The agency provides only partial information on its facilities' annual operational costs and space utilization, and on its annual electricity cost and usage. It provides no information on its storage use and capacity.
Geographic location and real estate	●	The agency provides this element.
Key plan element		
Quantitative goals	●	The agency provides its savings goals, but provides only partial information on its utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	●	The agency provides this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	○	The agency does not provide this element.

Source: GAO analysis of Treasury data.

---

Department of Veterans  
Affairs

VA plans to consolidate 87 data centers into 4 by fiscal year 2015.<sup>3</sup> However, the agency's asset inventory and consolidation plan are not complete. In its inventory, VA provides partial information for all 4 key elements. Additionally, in its consolidation plan, VA provides complete information for 6 of the 10 elements evaluated, provides partial information for 2 elements, and does not provide information for the remaining 2 elements. Table 21 provides our assessment of VA's compliance with OMB's requirements.

---

<sup>3</sup>In responding to a draft of this report, the department reported a revised goal of consolidating 92 data centers to 4 by fiscal year 2018.

**Appendix III: Assessment of Agencies' Completion of Key Consolidation Planning Elements, Arranged by Agency**

**Table 21: Assessment of Completeness of VA's Data Center Consolidation Documentation**

<b>Key inventory element</b>	<b>GAO assessment</b>	<b>Description</b>
IT software assets	●	The agency provides partial information on the systems in its data centers and their technical dependencies. It provides no information on the planned consolidation approach for each system.
IT hardware assets and utilization	●	The agency provides partial information on its maximum and average server utilization, as well as its counts of physical servers, virtual hosts, and virtual operating systems.
IT facilities, energy, and storage	●	The agency provides only partial information on its facilities' annual operational costs and space utilization, and on its annual electricity cost and usage. It provides no information on its storage use and capacity.
Geographic location and real estate	●	The agency provides only partial information on its number of centers and their gross floor area. It provides no information on server rooms and closets, or on the gross floor area of those facilities.
<b>Key plan element</b>		
Quantitative goals	●	The agency provides its utilization goals, but provides only partial information on its savings goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	●	The agency provides this element.
Risk management	●	The agency discusses its risk tracking process, but does not reference a risk management plan for the consolidation initiative.
Communications plan	●	The agency provides this element.

Source: GAO analysis of VA data.

**Environmental Protection Agency**

EPA does not plan to further consolidate its four primary data centers. Instead, the agency plans to focus its consolidation efforts on achieving efficiencies via virtualization within those four centers. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides complete information for 3 of the key elements and provides partial information for the remaining element. Additionally, in its consolidation plan, EPA provides complete information for 5 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 4 elements. Table 22 provides our assessment of EPA's compliance with OMB's requirements.

**Table 22: Assessment of Completeness of EPA's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	◐	The agency provides information on its facilities' space utilization and its storage use and capacity, but provides no information on its facilities' annual operational costs and its annual electricity cost and usage.
Geographic location and real estate	●	The agency provides this element.
Key plan element		
Quantitative goals	◐	The agency provides partial information on its savings goals, and does not provide any information on its utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of EPA data.

General Services Administration

GSA plans to consolidate from 15 data centers to 3 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides complete information for 2 of the key elements and provides partial information for the remaining 2 elements. Additionally, in its consolidation plan, GSA provides complete information for 8 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining element. Table 23 provides our assessment of GSA's compliance with OMB's requirements.

Table 23: Assessment of Completeness of GSA's Data Center Consolidation Documentation

Key inventory element	GAO assessment	Description
IT software assets	○	The agency provides information on the systems in its data centers and the planned consolidation approach for each system, but provides only partial information on the systems' technical dependencies.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	○	The agency provides information on its facilities' annual operational costs and space utilization, and on its storage use and capacity. It provides only partial information on its annual electricity cost and usage.
Geographic location and real estate	●	The agency provides this element.
Key plan element		
Quantitative goals	○	The agency provides its savings goals, but provides only partial information on its utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	●	The agency provides this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	●	The agency provides this element.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of GSA data.

National Aeronautics and Space Administration

NASA plans to consolidate from 79 data centers to 57 by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides partial information for 3 of the key elements and does not provide information for the remaining element. Additionally, in its consolidation plan, NASA provides complete information for 4 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 5 elements. Table 24 provides our assessment of NASA's compliance with OMB's requirements.

Table 24: Assessment of Completeness of NASA's Data Center Consolidation Documentation

Key inventory element	GAO assessment	Description
IT software assets	○	The agency does not provide this element.
IT hardware assets and utilization	◐	The agency provides partial information on its count of physical servers, but provides no information on its maximum and average server utilization, or its counts of virtual hosts and virtual operating systems.
IT facilities, energy, and storage	◐	The agency provides partial information on its facilities' space utilization, but does not provide its facilities' annual operational costs, its annual electricity cost and usage, and its storage use and capacity.
Geographic location and real estate	◐	The agency provides information on its number of data centers, and provides partial information on its number of server rooms and closets. It does not provide information on the gross floor area of those facilities.
Key plan element		
Quantitative goals	◐	The agency provides partial information on its savings goals, and does not provide any information on its utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	○	The agency does not provide this element.
High-level timeline	○	The agency does not provide this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	●	The agency provides this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of NASA data.

National Science Foundation

NSF owns and operates one data center and utilizes one commercial data center. The agency aims to transition all operations to one commercial data center by fiscal year 2014. The agency's asset inventory is complete, but its consolidation plan is not. Specifically, NSF provides complete information for 7 of the 10 elements evaluated, and does not provide information for the remaining 3 elements. Agency officials stated that they have a master schedule and risk management plan, but acknowledged that they did not provide this information to OMB as part of their consolidation plan. Table 25 provides our assessment of NSF's compliance with OMB's requirements.

**Table 25: Assessment of Completeness of NSF's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	●	The agency provides this element.
Geographic location and real estate	●	The agency provides information on its number of data centers and their associated gross floor area. It reports that information on its server rooms and closets is not applicable.
Key plan element		
Quantitative goals	●	The agency provides this element.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	●	The agency provides this element.
Risk management	○	The agency does not provide this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of NSF data.

**Nuclear Regulatory Commission**

NRC plans to consolidate from three existing data centers into one new center by fiscal year 2013. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides complete information for 3 of the key elements and provides partial information for the remaining element. Additionally, in its consolidation plan, NRC provides complete information for 4 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 5 elements. Table 26 provides our assessment of NRC's compliance with OMB's requirements.

**Table 26: Assessment of Completeness of NRC's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	◐	The agency provides information on its count of physical servers and on its maximum and average server utilization, but provides only partial information on its counts of virtual hosts and virtual operating systems.
IT facilities, energy, and storage	●	The agency provides this element.
Geographic location and real estate	●	The agency provides information on its number of data centers and their associated gross floor area. It reports that information on its server rooms and closets is not applicable.
Key plan element		
Quantitative goals	◐	The agency provides its utilization goals, but provides only partial information on its savings goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	○	The agency does not provide this element.

Source: GAO analysis of NRC data.

Office of Personnel Management

OPM does not plan to further consolidate its one data center. Instead, the agency plans to continue to examine and execute ways to improve the efficiency of its IT operations, such as through virtualization. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides complete information for 1 key element and partial information for the remaining 3 elements. Additionally, in its consolidation plan, OPM provides complete information for 5 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 4 elements. Table 27 provides our assessment of OPM's compliance with OMB's requirements.

Table 27: Assessment of Completeness of OPM's Data Center Consolidation Documentation

Key inventory element	GAO assessment	Description
IT software assets	⦿	The agency provides a list of the systems in its data centers, but provides only partial information on the systems' technical dependencies and the planned consolidation approach for each system.
IT hardware assets and utilization	●	The agency provides this element.
IT facilities, energy, and storage	⦿	The agency provides information on its facilities' annual operational costs and space utilization, and on its annual electricity cost and usage. It provides no information on its storage use and capacity.
Geographic location and real estate	⦿	The agency provides information on its number of data centers and the centers' gross floor area, but does not provide information on its number of server rooms and closets and the gross floor area of those facilities.
Key plan element		
Quantitative goals	●	The agency provides this element.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	⦿	The agency provides some cost-benefit information, but acknowledges that a complete cost-benefit analysis has not yet been completed.
Risk management	○	The agency does not provide this element.
Communications plan	○	The agency does not provide this element.

Source: GAO analysis of OPM data.

Small Business Administration

SBA plans to reduce its number of data centers from four to two by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides complete information for 1 key element and partial information for the remaining 3 elements. Additionally, in its consolidation plan, SBA provides complete information for 5 of the 10 elements evaluated, partial information for 1 element, and does not provide information for the remaining 4 elements. Table 28 provides our assessment of SBA's compliance with OMB's requirements.

**Table 28: Assessment of Completeness of SBA's Data Center Consolidation Documentation**

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	◐	The agency provides counts of physical servers, virtual hosts, and virtual operating systems, but only partial information on maximum and average server utilization.
IT facilities, energy, and storage	◐	The agency provides information on its facilities' space utilization and on its storage use and capacity, but provides only partial information on its facilities' annual operational costs and its annual electricity cost and usage.
Geographic location and real estate	◐	The agency provides partial information on its number of data centers and the associated gross floor area of those facilities. It reports that information on its server rooms and closets is not applicable.
Key plan element		
Quantitative goals	◐	The agency provides partial information on its savings and utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	●	The agency provides this element.

Source: GAO analysis of SBA data.

Social Security Administration

SSA does not plan to further consolidate its two data centers. In line with the goals of the FDCCI, the agency plans to improve the efficiency, performance, and stability of its IT infrastructure by reducing the number of its remote operations control centers. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides partial information for all 4 key elements. Additionally, in its consolidation plan, SSA provides complete information for 4 of the 10 elements evaluated, partial information for 1 element, and does not provide information for the remaining 5 elements. Table 29 provides our assessment of SSA's compliance with OMB's requirements.

Table 29: Assessment of Completeness of SSA's Data Center Consolidation Documentation

Key inventory element	GAO assessment	Description
IT software assets	○	The agency provides a list of the systems in its data centers, but does not provide information on each system's technical dependencies and the planned consolidation approach for each system.
IT hardware assets and utilization	○	The agency provides counts of its physical servers, but does not provide counts of its virtual hosts and virtual operating systems, or information on maximum and average server utilization.
IT facilities, energy, and storage	○	The agency provides information on its facilities' space utilization, its annual electricity cost and usage, and on its storage use and capacity. It provides only partial information on its facilities' annual operational costs.
Geographic location and real estate	○	The agency provides only partial information on its number of data centers, server rooms, and closets, as well as the gross floor area associated with those facilities.
Key plan element		
Quantitative goals	○	The agency provides its savings goals, but provides only partial information on its utilization goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	○	The agency does not provide this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	○	The agency does not provide this element.

Source: GAO analysis of SSA data.

U.S. Agency for International Development

USAID plans to consolidate from two data centers into one by fiscal year 2015. However, the agency's asset inventory and consolidation plan are not complete. In its inventory, the agency provides complete information for 1 key element and partial information for the remaining 3 elements. Additionally, in its consolidation plan, USAID provides complete information for 5 of the 10 elements evaluated, provides partial information for 1 element, and does not provide information for the remaining 4 elements. Table 30 provides our assessment of USAID's compliance with OMB's requirements.

Table 30: Assessment of Completeness of USAID's Data Center Consolidation Documentation

Key inventory element	GAO assessment	Description
IT software assets	●	The agency provides this element.
IT hardware assets and utilization	◐	The agency provides counts of its physical servers, virtual hosts, and virtual operating systems, but only partial information on maximum and average server utilization.
IT facilities, energy, and storage	◐	The agency provides information on its storage use and capacity, but it provides only partial information on its facilities' annual operational costs and space utilization. It provides no information on its annual electricity cost and usage.
Geographic location and real estate	◐	The agency provides only partial information on its number of data centers, server rooms, and closets, as well as the gross floor area associated with those facilities.
Key plan element		
Quantitative goals	◐	The agency provides its utilization goals, but provides only partial information on its savings goals.
Qualitative impacts	●	The agency provides this element.
Consolidation approach	●	The agency provides this element.
Consolidation scope	●	The agency provides this element.
High-level timeline	●	The agency provides this element.
Performance metrics	●	The agency provides this element.
Master program schedule	○	The agency does not provide this element.
Cost-benefit analysis	○	The agency does not provide this element.
Risk management	○	The agency does not provide this element.
Communications plan	○	The agency does not provide this element.

Source: GAO analysis of USAID data.

---

# Appendix IV: OMB-Defined Approaches for Consolidating Data Centers

---

In its guidance on data center consolidations, OMB identified four approaches for agencies to consider while evaluating the feasibility of consolidating the individual systems found within each data center. OMB directed agencies to specify which of these approaches was to be utilized for each data center. The four approaches are as follows:

- **Decommissioning:** the system is no longer in use or it is redundant and will be decommissioned.
- **Consolidation:** the system will be consolidated onto a shared infrastructure with other similar systems.
- **Cloud computing:** the system will be migrated to or replaced by Internet-based services and resources.
- **Virtualization:** the system will be migrated to a virtual machine environment.

In response to OMB's guidance, agencies reported that they will pursue a variety of consolidation approaches. Agency-specific examples of how these approaches will be employed are provided below.

---

## Decommissioning

Agencies may choose to decommission their underutilized physical servers as a part of their data center consolidation plans. For example, EPA plans to decommission more than 900 physical servers by 2015. Also, Labor plans to decommission unused servers and storage hardware and replace inefficient hardware with "green IT" hardware. Further, GSA plans to identify and decommission inefficient and underutilized legacy servers and equipment.

Agencies can also choose to decommission an entire data center by moving to an outsourced data center or reducing the number of physical assets. For example, as part of its data center consolidation initiative, NSF plans to decommission its single data center by fiscal year 2014 and to move to a commercial facility. Transportation plans to decommission data centers that spread out across multiple buildings and reduce the department's number of data centers by approximately 25 percent by the close of fiscal year 2015.

---

## Consolidation

Consolidation is a means of combining workload onto fewer computers or concentrating data processing into fewer physical facilities. Physically moving data processing equipment from multiple locations to a lesser number of locations can assist agencies in reaching consolidation goals, such as reducing the cost of data center hardware, software, and operations, in addition to real estate and energy costs. For example, DHS has 43 principal data centers, all of which will be moved into one of two enterprise data centers by the end of fiscal year 2014. In addition, NASA plans to consolidate from 79 data centers to 57 by fiscal year 2015.

---

## Cloud computing

Cloud computing is an emerging form of computing that relies on Internet-based services and resources to provide computing services to customers, while freeing them from the burden and costs of maintaining the underlying infrastructure.<sup>1</sup> This approach is a form of delivering IT services that takes advantage of several broad evolutionary trends, including the use of virtualization;<sup>2</sup> the decreased cost and increased speed of networked communications, such as the Internet; and overall increases in computing power. Examples of cloud computing include Web-based e-mail applications and common business applications that are accessed online through a browser instead of through a local computer. Several agencies are considering both cloud computing and virtualization as a means of achieving their consolidation goals. For example, SBA has plans to migrate commodity computing services such as Web hosting and messaging to cloud solutions. We have recently reported on challenges associated with the implementation of cloud computing.<sup>3</sup>

---

<sup>1</sup>The National Institute of Standards and Technology (NIST) defines cloud computing as a means “for enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction.” NIST began developing its definition in November 2008, and its most recent version, version 15, was released in October 2009. See NIST, *The NIST Definition of Cloud Computing*, version 15 (Gaithersburg, Md., Oct. 7, 2009).

<sup>2</sup>Virtualization is a technology that allows multiple software-based virtual machines that have different operating systems, to run in isolation, side by side, on the same physical machine. Virtual machines can be stored as files, making it possible to save a virtual machine and move it from one physical server to another. Virtualization is often used as part of cloud computing.

<sup>3</sup>GAO, *Information Security: Federal Guidance Needed to Address Control Issues with Implementing Cloud Computing*, [GAO-10-513](#) (Washington, D.C.: May 27, 2010).

---

## Virtualization

Virtual machines can be stored as files, making it possible to save a virtual machine and move it from one physical server to another. Virtualization is often used as part of cloud computing. For example, one Defense component reports that 45 percent of all server operating environments supporting customer workload in its data centers have been virtualized. State plans to reduce its environmental impact by hosting 70 percent of the department's servers on virtual infrastructure by 2015. Also, NRC has virtualized 41 Windows-based applications and has identified 50 additional applications to be virtualized by 2013.

---

# Appendix V: Comments from the Department of Commerce

---



**UNITED STATES DEPARTMENT OF COMMERCE**  
**The Secretary of Commerce**  
Washington, D.C. 20230

June 6, 2011

Mr. David A. Powner  
Director, Information Technology Management  
U.S. Government Accountability Office  
Washington, DC 20548

Dear Mr. Powner:

Thank you for the opportunity to comment on the draft report from the U.S. Government Accountability Office entitled, "Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings (GAO-11-565)."

We concur with the general findings as they apply to the Department of Commerce and with the specific reporting on the Commerce Data Center Consolidation Plan. The Master Program Schedule will be addressed in the next update of the Data Center Consolidation Plan.

If you have questions regarding this response, please contact Lisa Westerback in the Office of the Chief Information Officer at (202) 482-0694

Sincerely,

A handwritten signature in cursive script that reads "Gary Locke".

Gary Locke

# Appendix VI: Comments from the Department of Defense



CHIEF INFORMATION OFFICER

DEPARTMENT OF DEFENSE  
6000 DEFENSE PENTAGON  
WASHINGTON, D.C. 20301-6000

JUN 13 2011

Mr. David A. Powner  
Director, Information Technology Management Issues  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Mr. Powner:

This is the Department of Defense response to the GAO draft report 11-565, "DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings," dated July, 2011 (GAO Code 311234).

The Department appreciates the opportunity to comment. We partially concur with the first GAO recommendation and concur with the second recommendation. Our rationale for our partial concurrence is provided.

Sincerely,

A handwritten signature in blue ink, appearing to read "Teresa M. Takai".

Teresa M. Takai

Enclosure:  
As stated

**GAO DRAFT REPORT DATED MAY 20, 2011  
GAO-11-565 (GAO CODE 311234)  
“DATA CENTER CONSOLIDATION: AGENCIES NEED TO COMPLETE  
INVENTORIES AND PLANS TO ACHIEVE EXPECTED SAVINGS”  
DEPARTMENT OF DEFENSE COMMENTS  
TO THE GAO RECOMMENDATIONS**

**RECOMMENDATION 1:** The GAO recommends that the Secretary of Defense direct the component agencies and the data centers consolidation program managers to complete the missing elements in their respective data center consolidation plans and inventories.

**DoD RESPONSE:** The Department of Defense partially concurs with this recommendation. Completing data center consolidation metrics will facilitate setting and monitoring progress toward the Department’s goals for information technology infrastructure consolidation. Many data centers, however, are comprised of rooms within individual buildings for which detailed metrics on energy usage are not available. In addition, many buildings are not metered, further necessitating the use of models for estimating energy consumption. These metrics, if utilized in analysis, would result in inaccurate results, particularly if these metrics are utilized to extrapolate cost savings in out-years.

**RECOMMENDATION 2:** The GAO recommends that the Secretary of Defense require the data center consolidation program managers to consider consolidation challenges and lessons learned when updating their consolidation plans.

**DoD RESPONSE:** The DoD concurs with this recommendation.

# Appendix VII: Comments from the Department of Education



UNITED STATES DEPARTMENT OF EDUCATION

OFFICE OF THE CHIEF INFORMATION OFFICER

June 10, 2011

THE CHIEF INFORMATION OFFICER

Mr. David A. Powner  
Director, Information Technology Management Issues  
Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Powner:

I am writing to respond to recommendations made in the Government Accountability Office (GAO) draft report, "Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings" (GAO-11-565). This report focused on the federal government's demand for information technology (IT) that has led to a dramatic increase in the number of data centers and a corresponding increase in costs.

The U.S. Department of Education (Department) appreciates the opportunity to respond to the GAO report and the need to promote the consolidation of data centers and decrease the costs for operation and maintenance. The Department's Office of the Chief Information Officer (OCIO) has a dedicated data center consolidation program manager who actively participates in the Data Center Consolidation Task Force.

Since 1998, the Department has been operating and maintaining three major data centers and a minimal number of smaller-sized server rooms and closets. These data centers support our consolidated IT infrastructures representing 21 Principal Offices along with several education-related White House Initiatives, boards, and commissions. We believe the Department's approach to operating and maintaining data centers is consistent with the Federal Data Center Consolidation Initiative.

Our responses to GAO's specific recommendations to the Secretaries and Agency Heads of the 24 departments and agencies participating in the federal data center consolidation initiative follow.

**Recommendation 1:** *Direct their component agencies and their data center consolidation program managers to complete the missing elements in their respective data center consolidation plans and inventories.*

**Response:** The Department concurs with this recommendation and will direct the data center consolidation program manager to complete, to the extent practicable, the missing elements in our data center consolidation plans and inventories based on the most current templates developed by the Data Center Consolidation Task Force. We note that the Department does not own any major data centers and has no arrangements to take ownership of any data centers at the end of any contracts.

400 MARYLAND AVE. S.W., WASHINGTON, DC 20202  
[www.ed.gov](http://www.ed.gov)

The Department of Education's mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access.

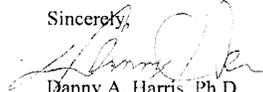
Page 2

**Recommendation 2:** *Require their data center consolidation program manager to consider consolidation challenges and lessons learned when updating their consolidation plans.*

**Response:** When updating our annual data center consolidation plan, the Department will consider consolidation challenges and lessons learned from our own consolidation experiences, relevant experiences from state and local efforts, and experiences from the efforts of other federal government members of the Data Center Consolidation Task Force.

Again, I appreciate the opportunity to respond to the GAO report. If you or your staff has any questions, please contact David Harrity at (202) 245-6483 or [david.harrity@ed.gov](mailto:david.harrity@ed.gov).

Sincerely,



Danny A. Harris, Ph.D.

# Appendix VIII: Comments from the Department of Energy



## Department of Energy

Washington, DC 20585

June 9, 2011

Mr. David A. Powner  
Director, Information Technology Management Issues  
Government Accountability Office  
411 G Street, NW  
Washington, D.C. 20548

Dear Mr. Powner:

Thank you for the opportunity to respond to the U.S. Government Accountability Office's (GAO) draft report entitled "Data Center Consolidation, Agencies Needed to Complete Inventory and Plans to Achieve Expected Savings." We agree with your assessment of the Agencies' Federal Data Center Consolidation (FDCC) Plans as it pertains to the implementation methodology required by the Office of Management and Budget (OMB). The Department of Energy (DOE) is wholly supportive of OMB's goals for data center consolidation, data center energy efficiency, and reducing the operating costs of information technology (IT) infrastructure and data centers across Federal Agencies.

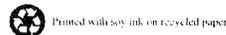
Acknowledging the challenges associated with collecting accurate information on our data centers, DOE is implementing the Data Center Profiling (DC-Pro) tool as a standard capability to baseline all data centers and collect the data needed to determine consolidation and optimization opportunities.

DOE's approach for data center consolidation is integrated with the Department's Strategic Sustainability Performance Plan (SSPP), as required by Executive Order (EO) 13514. Using DC-Pro, all DOE Sites are required to conduct an energy assessment of each data center and identify what IT and facility infrastructure improvements are needed to achieve a Power Utilization Effectiveness (PUE) of 1.4, as outlined in DOE's SSPP. Data center optimization projects will compete with other sustainability projects for funding. During this process DOE expects to identify which data centers are worthy of further investment and which are candidates for closure. This implementation methodology ensures that a complete business assessment is conducted for each data center and the consolidation and optimization activities are properly aligned and prioritized with other sustainability projects.

Additionally, the Department intends to evaluate the use of alternative financing vehicles, such as the Energy Savings Performance Contract (ESPC) and Utility Energy Service Contract (UESC) to finance data center consolidation and optimization projects.

We have the following comments to the report that we would like to provide for your consideration:

1. In accordance with the OMB FDCC implementation methodology and reporting requirements, DOE will focus on the headquarters program and staff office and federal site office data centers for its Data Center Consolidation Plan. The Management and

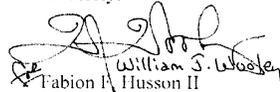


Operating (M&O) contractor operated data centers will be addressed through the SSPP implementation methodology.

2. DOE will conduct a complete inventory of its non-M&O data centers and submit to OMB by 30 June 2011.
3. DOE will update the Data Center Consolidation Plan and submit to OMB by 30 June 2011.
4. DOE will document its data center best management practices and report to the White House Council on Environmental Quality (CEQ) in the annual SSPP.

Again, thank you for the opportunity to review this report. We share the GAO's goal to reduce the number of federal data centers, improve energy efficiency and reduce operating costs for both IT and data center infrastructure. DOE remains fully committed to meeting the objectives of the FDCCI and EO 13514. If you have any questions, please contact Jake Wooley of my staff at (702) 234-1645.

Sincerely,



Fabion P. Husson II  
Director  
Corporate IT Project Management Office  
Office of the Chief Information Officer

# Appendix IX: Comments from the Department of Health and Human Services



DEPARTMENT OF HEALTH & HUMAN SERVICES

OFFICE OF THE SECRETARY

Assistant Secretary for Legislation  
Washington, DC 20201

David A. Powner  
Director, Information Technology  
Management Issues  
U.S. Government Accountability Office  
441 G Street N.W.  
Washington, DC 20548

JUN 13 2011

Dear Mr. Powner:

Attached are comments on the U.S. Government Accountability Office's (GAO) draft report entitled, "DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings" (GAO 11-565).

The Department appreciates the opportunity to review this report prior to publication.

Sincerely,

Jim R. Esquea  
Assistant Secretary for Legislation

Attachment

**GENERAL COMMENTS OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS) ON THE GOVERNMENT ACCOUNTABILITY OFFICE'S (GAO) DRAFT REPORT ENTITLED, "DATA CENTER CONSOLIDATION: AGENCIES NEED TO COMPLETE INVENTORIES AND PLANS TO ACHIEVE EXPECTED SAVINGS" (GAO-11-565)**

The Department appreciates the opportunity to review and comment on this draft report.

We believe the draft report accurately depicts the HHS data center consolidation plan as it was delivered to OMB in August of 2010; however, we have made improvements in the completeness and accuracy of our asset inventory data and have made significant progress towards meeting our data center consolidation goals since the audit timeframe. Also, our current data center consolidation goal is to consolidate from 176 data centers to 142 by FY 2015.

Below you will find the status of the missing and incomplete elements identified in the draft report.

**Section I: Key Inventory Elements**

Since the Department submitted its data center consolidation plan to OMB, several adjustments have been made, due to OMB modifying its definition of data centers. OMB now excludes both commercially owned and commercially operated (COCO) data centers and network operation facilities, which had been included in our initial plan. Our initial plan had several instances of missing information due to untimely data replies from our data centers and COCO vendors, which we were able to eliminate due to the refined definition.

**IT Software Assets:**

All data centers and their software assets will be modeled and tracked in the HHS Enterprise Architecture Repository by the end FY 2011. This will enable system redundancies and consolidation opportunities to be easily identified. Detailed system mapping data and system consolidation plans will be available by the end of FY 2012.

**IT Hardware Assets and Utilization:**

We are currently at 95% compliance on having complete OMB-required data on server counts, number of virtual hosts, and the number of virtual operating systems in the data centers owned and operated by HHS. The physical server count and virtual server information should be 100% complete in our end of FY 2011 asset inventory submission. We expect our server utilization data to improve over the next 12 months as our Operating Divisions (OpDivs; i.e., CDC, CMS, FDA, NIH, etc.) comply with our data center management policy.

**IT Facilities, Energy, and Storage:**

Our energy usage data is incomplete because many of the data centers that the Department owns and operates do not currently meter their energy usage. Our Data Center Management Policy and the HHS Strategic Sustainability Performance Plan require data centers to meter their energy usage, and we anticipate providing a more complete energy usage profile in our annual asset inventory submission at the end of FY 2012. (A delaying factor in the installation of energy

**GENERAL COMMENTS OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS) ON THE GOVERNMENT ACCOUNTABILITY OFFICE'S (GAO) DRAFT REPORT ENTITLED, "DATA CENTER CONSOLIDATION: AGENCIES NEED TO COMPLETE INVENTORIES AND PLANS TO ACHIEVE EXPECTED SAVINGS" (GAO-11-565)**

meters was the uncertainty on which exact data centers would be closed for consolidation, because it would not be efficient to install this equipment in centers that could potentially be closed.)

**Geographical Location and Real Estate:**

This section should be 100% complete when we submit our annual OMB Data Center Consolidation Initiative (DCCI) asset inventory update to OMB at the end of FY 2011.

**Section II: Key Plan Elements**

**Quantitative Goals:**

The plan delivered to OMB contained our estimated data center reduction target as our primary quantitative goal. The data center reduction target has recently been refined and validated. Our OpDivs are developing their detailed data center consolidation plans which will include consolidation processes/procedures and schedules. These plans will provide details on numbers of servers to consolidate and/or virtualize. The server virtualization and rack utilization data will be used to establish quantitative goals for server, rack utilization, and floor space reduction goals.

**Performance Metrics:**

The HHS Data Center Management Policy was signed by the HHS Chief Information Officer (CIO) on March 22, 2011. Its purpose is to establish policies and responsibilities for operating data centers efficiently throughout HHS. The primary focus of this Policy is to enable achievement of the HHS consolidation goals in OMB's DCCI and to satisfy environmental and energy directives and requirements associated with HHS data centers and given in Executive Orders 13423 and 13514.

The policy establishes several key performance metrics/goals for HHS data centers such as: data center size, asset utilization (processor, memory, and rack), data center operating temperature, server count, and equipment refresh. All HHS data center owners must certify annually that their data centers are in compliance with the policy.

**Master Program Schedule:**

On May 13, 2011, our OpDivs confirmed which data centers they will close and provided projected closing dates. By the end of June 2011 they will provide consolidation project schedules (based on the project phases identified by OMB) for each data center that will close. The phases tracked by OMB are: Inventory, Application Mapping, Migration Planning, Migration Execution, and Equipment Removal. A master project schedule will be developed from the plans submitted for the individual data centers.

**GENERAL COMMENTS OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS) ON THE GOVERNMENT ACCOUNTABILITY OFFICE'S (GAO) DRAFT REPORT ENTITLED, "DATA CENTER CONSOLIDATION: AGENCIES NEED TO COMPLETE INVENTORIES AND PLANS TO ACHIEVE EXPECTED SAVINGS" (GAO-11-565)**

**Cost Benefit Analysis:**

The HHS Data Center Management Policy requires our OpDivs to develop a cost benefit analysis for each data center they plan to close. The policy identifies three primary steps in the cost benefit analysis development process: 1. Verify the accuracy and validity of the data that was provided during the asset inventory phase of the DCCI, 2. Determine the costs of moving and maintaining the data center functions in the new environment, and 3. Contrast the costs of moving and maintaining the functions with costs of remaining status quo. We expect all OpDivs to submit these cost benefit analyses by the end of Summer 2011.

# Appendix X: Comments from the Department of Homeland Security

U.S. Department of Homeland Security  
Washington, DC 20528



**Homeland  
Security**

June 10, 2011

David A. Powner  
Director  
Information Technology Management Issues  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Re: Draft Report GAO-11-565, "DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings"

Dear Mr. Powner:

Thank you for the opportunity to review and provide comments this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO's) work in planning and conducting its review.

The Department is pleased to note the report recognizes the progress DHS and other participating agencies have made developing data center inventories and consolidation plans under Office of Management and Budget leadership. DHS particularly appreciates GAO's acknowledgement that the cost benefit analysis portion of DHS's plan detailed full annualized investment and savings estimates through Fiscal Year (FY) 2015 and that the plan referenced a completed master program schedule.

The draft report contained two recommendations directed to the Secretary of Homeland Security. As discussed below, DHS concurs with both recommendations.

**Recommendation 1:** "Direct their component agencies and data center consolidation program managers to complete the missing elements in data center consolidation plans and inventories."

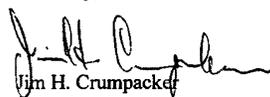
**Response:** Concur. The DHS Office of the Chief Information Officer (OCIO), Information Technology Services Office Data Center Consolidation Division will be conducting a data call in June 2011 requesting DHS Components to respond to questions related to enhancing DHS's submission to the Federal Data Center Consolidation Initiative. Specifically, DHS is planning to satisfy missing elements in its inventory, including information on IT facilities, software and hardware assets, utilization and savings, location, and real estate.

**Recommendation 2:** “Require their data center consolidation program managers to consider consolidation challenges and lessons learned when updating consolidation plans.”

**Response:** Concur. Beginning in 2008, DHS and its service providers have conducted an evaluation during the close-out phase of every migration project to document challenges, strategies, and lessons learned for use in future migration efforts. Additionally, at a higher level, DHS is actively involved in sharing its lessons learned with the Federal Chief Information Officers Council and other agencies and departments. DHS has applied these lessons learned, for instance, in the implementation of the FY 2010–2011 centralized migration funding process.

Again, thank you for the opportunity to review and comment on this draft report. Technical comments have been provided under separate cover. We look forward to working with you on future Homeland Security issues.

Sincerely,



Jim H. Crumpacker  
Director  
Departmental GAO/OIG Liaison Office

# Appendix XI: Comments from the Department of the Interior



United States Department of the Interior

OFFICE OF THE SECRETARY  
Washington, DC 20240



JUN 9 2011

Mr. David A. Powner  
Director  
Information Technology Management Issues  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, D.C. 20548

Dear Mr. Powner:

Thank you for providing the Department of the Interior the opportunity to review and comment on the draft Government Accountability Office Report entitled, *DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings* (GAO-11-565).

The Department of the Interior appreciates the opportunity to review the draft report and concurs with the findings and recommendations.

We provide general and technical comments in the enclosure.

If you have any questions or need additional information, please contact Bruce Downs at (703)648-5681 or Maria Clark at (303)969-5154.

Sincerely,

Rhea Suh  
Assistant Secretary  
Policy, Management and Budget

Enclosure

# Appendix XII: Comments from the Department of Labor

U.S. Department of Labor

Office of the Assistant Secretary  
for Administration and Management  
Washington, D.C. 20210



JUN 10 2011

Mr. David A. Powner  
Director  
Information Technology Management Issues  
Government Accountability Office  
441 G St. NW  
Washington, D.C. 20548

Dear Mr. Powner:

Thank you for the opportunity to review and comment on the Draft Government Accountability Office (GAO) Report # GAO-11-565, *Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings*. We appreciate the GAO's efforts and the insight the report provides.

After carefully reviewing the latest iteration of the GAO report, the Department of Labor has no comments to contribute at this time and we thank you again for the opportunity to comment on the draft report.

Should you have any questions regarding the Department's response, please contact Mr. Thomas C. Wiesner, Deputy Chief Information Officer, at [Wiesner.Thomas@dol.gov](mailto:Wiesner.Thomas@dol.gov) or 202-693-4420.

Sincerely,

  
T. Michael Kerr  
Assistant Secretary for  
Administration and Management

cc: Thomas C. Wiesner, Deputy CIO

---

# Appendix XIII: Comments from the Department of State

---



United States Department of State

*Chief Financial Officer*

*Washington, D.C. 20520*

**JUN 17 2011**

Ms. Jacquelyn Williams-Bridgers  
Managing Director  
International Affairs and Trade  
Government Accountability Office  
441 G Street, N.W.  
Washington, D.C. 20548-0001

Dear Ms. Williams-Bridgers:

We appreciate the opportunity to review your draft report, "DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings," GAO Job Code 311234.

The enclosed Department of State comments are provided for incorporation with this letter as an appendix to the final report.

If you have any questions concerning this response, please contact Ken Rogers, Director, at (202) 634-0405 and Cynthia Cassil, Director, Bureau of Information Resource Management at (202) 634-3877.

Sincerely,

A handwritten signature in black ink, appearing to read "James L. Millette".

James L. Millette

cc: GAO – Dave Powner  
IRM – Susan H. Swart  
State/OIG – Evelyn Klemstine

**Department of State Comments on GAO Draft Report**

**DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories  
and Plans to Achieve Expected Savings**  
(GAO-11-565 GAO Code 311234)

The Department of State appreciates the opportunity to comment on GAO's draft report entitled "*DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings*"

**Recommendation:** Direct their component agencies and their data center consolidation program managers to complete the missing elements in their respective data center consolidation plans and inventories.

**Response:** The Department concurs with the recommendation and has listed these elements by subject in bullet format for clarity:

- **Element:** Geographic location and real estate

**GAO Assessment:** The agency provides some, but not all, aspects of the element.

**GAO Description:** The agency provides information on its number of centers, server rooms, and closets, as well as the gross floor area of its data centers. It does not provide information on the gross floor area of its server rooms and closets.

**Response:** We will provide estimates of the gross floor area of Department server rooms and closets in the July update to our asset inventory.

- **Element:** Quantitative goals

**GAO Assessment:** The agency provides some, but not all, aspects of the element.

**GAO Description:** The agency provides partial information on its savings and utilization goals.

**Response:** Between the DCC Program Goals table in Section 2 (Department Goals for Data Center Consolidation) and the Savings Metrics table in Appendix B, we believe that the Department of State plan provides

2

complete information for this element. We will be more explicit in the September update to the plan to use the specific wording that the OMB direction provided.

- **Element:** Performance goals

**GAO Assessment:** The agency provides some, but not all, aspects of the element.

**GAO Description:** The agency reports that it maintains metrics at the system and process performance levels, but does not include specific metrics.

**Response:** We responded in as much detail as possible considering the 1 page limit set by the OMB direction for Section 5. In addition, specific quantitative and qualitative metrics are provided for each Program Goal in Table 1 – DCC Program Goals in Section 2. We will be more explicit in the September update to the plan to provide the specific metrics in this section.

- **Element:** Master program schedule

**GAO Assessment:** The agency does not provide this element.

**GAO Description:** The agency does not provide this element.

**Response:** We believe that we responded in as much detail as possible considering the 1 page limit set by the OMB direction for Section 5. We described our program schedule at a high level and presented our high-level timeline for the program. We will be more explicit in the September update to the plan to state that we have created a master program schedule and are using it to manage our program.

- **Element:** Cost-benefit analysis

**GAO Assessment:** The agency provides some, but not all, aspects of the element.

**GAO Description:** The agency provides cost estimates and avoidances through fiscal year 2015, but acknowledges that the estimates do not include some types of costs.

**Response:** We will provide cost estimates for the missing elements in the September update to the plan, including labor and other non-facility O&M

3

costs for non-ESOC Data Centers and CAPEX Costs avoided for decommissioned Data Centers.

**Recommendation:** Require their data center consolidation program managers to consider consolidation challenges and lessons learned when updating their consolidation.

**Response:** The Department of State concurs with the recommendation. The Department will address consolidation challenges and lessons learned in the September update to the plan.

# Appendix XIV: Comments from the Department of the Treasury



DEPARTMENT OF THE TREASURY  
WASHINGTON, D.C. 20220

JUN 14 2011

Ms. Colleen Phillips  
Assistant Director  
Government Accountability Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Ms. Phillips:

Thank you for the opportunity to review and comment on the draft report entitled: "Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings." We have reviewed the report and appreciate the GAO's engagement in this important effort.

In response to the last two Recommendations for Executive Action listed on pages 33 and 34, Treasury has started its annual data center inventory collection for Fiscal Year 2011 including addressing any missing data elements. Additionally, it has been Treasury's intent to collect and leverage Data Center Consolidation challenges and lessons learned when updating its Data Center Consolidation plans.

Treasury is committed to the Data Center Consolidation effort and appreciates the recommendations in your report. Please contact me if you have any questions about this response. I can be reached on 202-622-1200.

Sincerely,

A handwritten signature in black ink, appearing to read "Robyn East", with a long horizontal flourish extending to the right.

Robyn East  
Deputy Assistant Secretary for Information Systems  
and Chief Information Officer

---

# Appendix XV: Comments from the Department of Veterans Affairs

---



DEPARTMENT OF VETERANS AFFAIRS  
Washington DC 20420

June 9, 2011

Mr. David A. Powner  
Director  
Information Technology  
Management Issues  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Powner:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office's (GAO) draft report, "**DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings**" (GAO-11-565) and generally agrees with GAO's conclusions and concurs with GAO's recommendations to the Department.

The enclosure specifically addresses GAO's recommendations. VA appreciates the opportunity to comment on your draft report.

Sincerely,

  
John R. Gingrich  
Chief of Staff

Enclosure

Enclosure

Department of Veterans Affairs (VA) Comments to  
Government Accountability Office (GAO) Draft Report  
***DATA CENTER CONSOLIDATION: Agencies Need to Complete Inventories and  
Plans to Achieve Expected Savings***  
(GAO-11-565)

**GAO Recommendation:** We are making two recommendations to each of the Secretaries and Agency Heads of the 24 departments and agencies participating in the federal data center consolidation initiative. Specifically, we are recommending that the Secretaries and Agency Heads:

**Recommendation 1: Direct their component agencies and their data center consolidation program managers to complete the missing elements in their respective data center consolidation plans and inventories.**

**VA Comment:** Concur. VA will issue a data call to identify and reconcile missing elements in our data center consolidation plan. We estimate that the survey will be completed and data analyzed by September 30, 2011.

**Recommendation 2: Require their data center consolidation program managers to consider consolidation challenges and lessons learned when updating their consolidation plans.**

**VA Comment:** Concur. VA will add narrative responses on consolidation challenges and lessons learned to our consolidation plan updates to the Office of Management and Budget.

1

# Appendix XVI: Comments from the Environmental Protection Agency



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JUN 7 2011

OFFICE OF  
ENVIRONMENTAL INFORMATION

Mr. David A. Powner  
Director  
Information Technology Management Issues  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Re: EPA Comments on the Government Accountability Office's (GAO) draft report:  
*Data Center Consolidation – Agencies Need to Complete Inventories and Plans to Achieve Expected Savings (Report No. GAO-11-565)*

Dear Mr. Powner:

The U.S. Environmental Protection Agency (EPA) appreciates the opportunity to provide comments on the GAO's draft report entitled *Data Center Consolidation – Agencies Need to Complete Inventories and Plans to Achieve Expected Savings (Report No. GAO-11-565)*.

I offer two points of clarification, one regarding the recommendations for executive action (pages 32 - 34), and the second addresses the summary assessment of the EPA's Data Center Consolidation Plan provided on page 57.

First, in regards to your recommendation requiring agencies to complete missing elements of the plan, or provide a schedule to do so by September 30, 2011. EPA will continue efforts to virtualize, optimize and consolidate information technology (IT) infrastructure across all EPA server rooms, and will focus its efforts on plan reporting and inventory of the four primary data centers and server rooms greater than 500 square feet, consistent with current direction from the Office of Management and Budget. Therefore, our response to this recommendation will be within this context.

Pertaining to the EPA's missing annual operating and electricity costs information described on page 57 of the report, the majority of EPA server rooms are located within leased space managed by the U.S. General Services Administration, where electricity and facility costs are included in the overall lease agreement. As a result, EPA will estimate operating electrical use for these rooms, but the cost-benefit analysis will not reflect a reduction in agency real estate costs or electricity consumption, because reductions in server room square footage and electrical consumption do not result in cost savings to the agency.

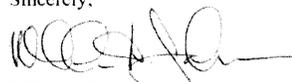
Internet Address (URL): <http://www.epa.gov>  
Recycled/Recyclable: # Printed with Vegetable Oil Based Inks on 100% PostConsumer Paper, Processed with 100% Recycled Paper

Lastly, EPA's plan designates four primary server rooms as consolidation points for the agency. As part of the plan, enterprise applications and servers will be consolidated into these rooms. Therefore, the following statements on page 57 do not accurately characterize the agency's plan. "The Environmental Protection Agency (EPA) does not plan to further consolidate its four data centers." "Instead, the agency plans to focus on achieving efficiencies via virtualization within the existing four centers." EPA's plan is more accurately characterized as follows:

The U.S. Environmental Protection Agency (EPA) has designated four data centers as primary data centers for EPA's consolidation effort. These data centers will provide EPA hosting for enterprise applications, email, backup and disaster recovery services. By 2015, EPA will close over 20 server rooms and eliminate 900 physical servers through a combination of virtualization, consolidation and outsourcing efforts that maximize the efficiency of the four primary data centers and the remaining campus server rooms.

Again, thank you for the opportunity to comment. EPA appreciates the evaluation and assessment efforts made by the GAO to ensure data center consolidation plans and inventories are complete. If you would like to discuss these matters further, please contact me at 202-564-6665, or your staff may contact David Updike, Acting Director of the EPA National Computer Center, at (919) 541-0780.

Sincerely,



Malcolm D. Jackson  
Assistant Administrator  
and Chief Information Officer

cc: Vaughn Noga  
Tim Thorpe  
Johnny Davis

# Appendix XVII: Comments from the General Services Administration



The Administrator

June 23, 2011

The Honorable Gene L. Dodaro  
Comptroller General of the United States  
Government Accountability Office  
Washington, DC 20548

Dear Mr. Dodaro:

The U.S. General Services Administration (GSA) appreciates the opportunity to review and comment on the draft report, "Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings" (GAO-11-605).

The U.S. Government Accountability Office (GAO) recommends that the Administrator of General Services direct the GSA data center consolidation program manager to:

1. Complete the missing elements of the GSA data center consolidation plan and inventory; and
2. Consider consolidation challenges and lessons learned when updating the GSA data center consolidation plan.

We agree with the findings and recommendations of the draft report and will take actions commensurate with those recommendations.

Should you have any questions, please do not hesitate to contact me. Staff inquiries may be directed to Ms. Casey Coleman, Chief Information Officer. She can be reached at (202) 501-1000.

Sincerely,

A handwritten signature in cursive script that reads "Martha Johnson".

Martha Johnson  
Administrator

cc: Mr. David A. Powner,  
Director, Information Technology Management Issues  
GAO

U.S. General Services Administration  
1275 First Street, NE  
Washington, DC 20417  
Telephone: (202) 501-0800  
Fax: (202) 219-1243

# Appendix XVIII: Comments from the National Aeronautics and Space Administration

National Aeronautics and Space Administration  
Headquarters  
Washington, DC 20546-0001



JUN 16 2011

Reply to Attn of: Office of the Chief Information Officer

David A. Powner  
Director  
Information Technology Management Issues  
United States Government Accountability Office  
Washington, DC 20548

Dear Mr. Powner:

The National Aeronautics and Space Administration (NASA) appreciates the opportunity to review and comment on your draft report entitled, "Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings" (GAO-11-565). In the draft report, GAO makes two recommendations to each of the Secretaries and Agency Heads of the 24 departments and agencies participating in the federal data center consolidation initiative to better ensure that the initiative improves governmental efficiency and achieves cost savings.

**Recommendation 1:** The Secretaries and Agency Heads should direct their component agencies and their data center consolidation program managers to complete the missing elements in their respective data center consolidation plans and inventories.

**Response:** NASA concurs with the GAO recommendation. NASA is currently working on completing any missing elements in the Agency's data center consolidation plan and updating its inventory in accordance with OMB's current template. The update will be completed by June 30, 2011, or as required by OMB.

**Recommendation 2:** The Secretaries and Agency Heads should require their data center consolidation program managers to consider consolidation challenges and lessons learned when updating their consolidation plans.

**Response:** NASA concurs with the GAO recommendation. The NASA Enterprise Service Executive for Data Centers will continue to consider consolidation challenges and incorporate lessons learned as NASA's consolidation plans are updated.

2

If you have any questions or require additional information, please contact the NASA  
Enterprise Service Executive for Data Centers, Karen Petraska, at (202) 358-3722.

Sincerely,



Linda Cureton  
Chief Information Officer

# Appendix XIX: Comments from the Nuclear Regulatory Commission



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

June 13, 2011

Mr. David A. Powner  
Director, Information Technology  
Management Issues  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Powner:

In response to your May 20, 2011, email regarding the draft report entitled Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings (GAO-11-565), the U.S. Nuclear Regulatory Commission has no comments.

Please contact Marvin Bell of my staff at 301-415-7174 or [Marvin.Bell@nrc.gov](mailto:Marvin.Bell@nrc.gov), if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Ash", written over a horizontal line.

Darren B. Ash  
Deputy Executive Director  
for Corporate Management  
Office of the Executive Director for Operations

---

# Appendix XX: Comments from the Social Security Administration

---



Mr. David A. Powner  
Director, Information Technology Management Issues  
United States Government Accountability Office  
441 G. Street, NW  
Washington, D.C. 20548

Dear Mr. Powner:

Thank you for the opportunity to review your draft report, "Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings." Our response is enclosed.

If you have any questions, please contact me, or have your staff contact Frances Cord, Director, Audit Management and Liaison Staff, at (410) 966-5787.

Sincerely,

Dean S. Landis  
Deputy Chief of Staff

Enclosure

SOCIAL SECURITY ADMINISTRATION BALTIMORE, MD 21235-0001

**SOCIAL SECURITY ADMINISTRATION COMMENTS ON THE GOVERNMENT ACCOUNTABILITY OFFICE DRAFT REPORT, "DATA CENTER CONSOLIDATION: AGENCIES NEED TO COMPLETE INVENTORIES AND PLANS TO ACHIEVE EXPECTED SAVINGS" (GAO-11-565)**

**RECOMMENDATION 1**

Agency Heads should direct component agencies and their data center consolidation program managers to complete the missing elements in their respective data center consolidation plans and inventories.

Response

We disagree. As you note, the Office of Management and Budget (OMB) required us and 23 other agencies to submit data center inventories and consolidation plans by August 2010. We complied with the directive and responded to subsequent questions and comments from OMB. On page 64, Table 29, under "Key inventory element," you indicate we only partially complied with four elements of OMB's directive. Under "Key plan element," you note partial compliance with one element. We disagree with your assessment - we responded to the directive timely and to OMB's satisfaction.

Similarly, under "Key plan element," you note five elements where we provided no information. We do not plan to consolidate our two data centers, as you acknowledge in the first sentence, first paragraph page 64; therefore, these elements are not applicable.

We meet the overarching goals of the Federal Data Center Consolidation Initiative (FDCCI). We are independently hosting smaller virtualization and consolidation efforts to reduce the footprint of our remote operation control centers to improve efficiency, performance, and stability of our information technology infrastructure.

**RECOMMENDATION 2**

Agency Heads should require their data center consolidation program managers to consider consolidation challenges and lessons learned when updating their consolidation plans.

Response

We agree. We participate in the FDCCI workgroup and share best practices and experiences with other participating agencies.

---

# Appendix XXI: GAO Contact and Staff Acknowledgments

---

## GAO Contact

Joel C. Willemsen, (202) 512-6253 or [willemsenj@gao.gov](mailto:willemsenj@gao.gov)

---

## Staff Acknowledgments

In addition to the contact named above, Colleen Phillips (Assistant Director), Neil Doherty, Rebecca Eyler, Nancy Glover, Dave Hinchman, Linda Kochersberger, and Jessica Waselkow made key contributions to this report.

---

## GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

---

## Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site ([www.gao.gov](http://www.gao.gov)). Each weekday afternoon, GAO posts on its Web site newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to [www.gao.gov](http://www.gao.gov) and select "E-mail Updates."

---

## Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's Web site, <http://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

---

## To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: [www.gao.gov/fraudnet/fraudnet.htm](http://www.gao.gov/fraudnet/fraudnet.htm)

E-mail: [fraudnet@gao.gov](mailto:fraudnet@gao.gov)

Automated answering system: (800) 424-5454 or (202) 512-7470

---

## Congressional Relations

Ralph Dawn, Managing Director, [dawnr@gao.gov](mailto:dawnr@gao.gov), (202) 512-4400  
U.S. Government Accountability Office, 441 G Street NW, Room 7125  
Washington, DC 20548

---

## Public Affairs

Chuck Young, Managing Director, [youngc1@gao.gov](mailto:youngc1@gao.gov), (202) 512-4800  
U.S. Government Accountability Office, 441 G Street NW, Room 7149  
Washington, DC 20548

