



April 2019

DATA CENTER OPTIMIZATION

Additional Agency Actions Needed to Meet OMB Goals

Why GAO Did This Study

In December 2014, Congress enacted federal IT acquisition reform legislation that included provisions related to ongoing federal data center consolidation efforts. OMB's Federal Chief Information Officer launched DCOI to build on prior data center consolidation efforts; improve federal data centers' performance; and establish goals for inventory closures, cost savings and avoidances, and optimizing performance.

The 2014 legislation included a provision for GAO to annually review agencies' data center inventories and strategies. Accordingly, GAO's objectives were to (1) evaluate agencies' progress and plans for data center closures and cost savings; (2) assess agencies' progress against OMB's data center optimization targets; (3) and identify effective agency practices for achieving data center closures, cost savings, and optimization progress. To do so, GAO assessed the 24 DCOI agencies' data center inventories as of August 2018; reviewed their reported cost savings documentation; evaluated their data center optimization strategic plans; and assessed their progress against OMB's established optimization targets. GAO also solicited practices that selected agencies reported to be effective in meeting DCOI goals.

What GAO Recommends

GAO is making 36 recommendations to 22 agencies to improve performance against established DCOI goals. Eleven agencies agreed with the recommendations, three did not fully agree, one disagreed, and seven neither agreed nor disagreed, as discussed in the report.

View [GAO-19-241](#). For more information, contact Carol C. Harris at (202) 512-4456 or harriscc@gao.gov

DATA CENTER OPTIMIZATION

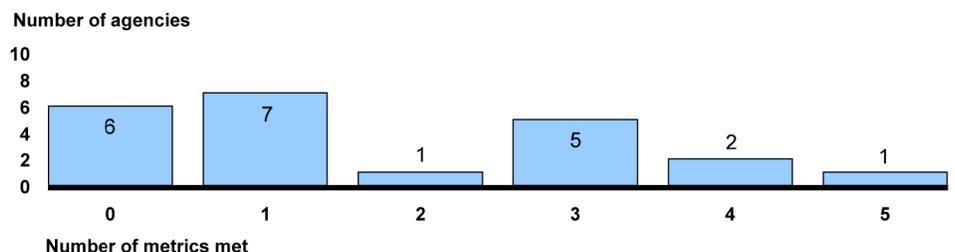
Additional Agency Actions Needed to Meet OMB Goals

What GAO Found

The 24 agencies participating in the Office of Management and Budget's (OMB) Data Center Optimization Initiative (DCOI) reported mixed progress toward achieving OMB's goals for closing data centers and realizing the associated savings by September 2018. As of August 2018, 13 agencies reported that they had met, or had plans to meet, all of their OMB-assigned closure goals by the deadline. However, 11 agencies reported that they did not have plans to meet their goals. Further, 16 agencies reported that, as of August 2018, they had met, or planned to meet, their cost savings targets, for a total of \$2.36 billion in cost savings for fiscal years 2016 through 2018. This is about \$0.38 billion less than OMB's DCOI savings goal of \$2.7 billion. This shortfall is the result of 5 agencies reporting less in planned cost savings and avoidances in their DCOI strategic plans, as compared to their savings targets established for them by OMB. Three agencies did not have a cost savings target and did not report any achieved savings.

In addition, the 24 agencies reported limited progress against OMB's five data center optimization targets for server utilization and automated monitoring, energy metering, power usage effectiveness, facility utilization, and virtualization. As of August 2018, the agencies reported that 3 had met three targets, 9 had met one target, and 10 met none of the targets. Two agencies did not have a basis to report on progress as they do not own any data centers. Further, as of August 2018, 20 agencies did not plan to meet all of OMB's fiscal year 2018 optimization goals. Specifically, only 2 agencies reported plans to meet all applicable targets; 6 reported that they did not plan to meet any of the targets (see figure).

Agencies' Planned Fiscal Year 2018 Progress against OMB's Five Data Center Optimization Metrics, as of August 2018



Source: GAO analysis of data from OMB's Information Technology Dashboard. | GAO-19-241

We selected 6 agencies that had demonstrated success towards meeting their DCOI goals and those agencies reported a number of key practices that contributed to their efforts. The officials noted the importance of, among other things, obtaining executive leadership support for consolidation and optimization activities, employing an organization-wide communications plan, and focusing on data center closures. The officials also cited the use of past experience and lessons learned to inform improvements to future consolidation plans and processes.

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Abbreviations

Agriculture	Department of Agriculture
CIO	chief information officer
Commerce	Department of Commerce
DCOI	Data Center Optimization Initiative
Defense	Department of Defense
DHS	Department of Homeland Security
Education	Department of Education
Energy	Department of Energy
EPA	Environmental Protection Agency
FDCCI	Federal Data Center Consolidation Initiative
FITARA	Federal Information Technology Acquisition Reform Act
GSA	General Services Administration
HHS	Department of Health and Human Services
HUD	Department of Housing and Urban Development
IT	information technology
Interior	Department of the Interior
Justice	Department of Justice
Labor	Department of Labor
NASA	National Aeronautics and Space Administration
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
State	Department of State
Transportation	Department of Transportation
Treasury	Department of the Treasury
USAID	U.S. Agency for International Development
VA	Department of Veterans Affairs

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April 11, 2019

Congressional Committees

The federal government's demand for information technology (IT) is ever increasing. In recent years, as federal agencies have modernized their operations, put more of their services online, and improved their information security profiles, their need for computing power and data storage resources has grown. Accordingly, this growing demand has led to a dramatic rise in the number of federal data centers and a corresponding increase in operational costs.

To reduce data center duplication and costs, the Office of Management and Budget's (OMB) Federal Chief Information Officer (CIO) launched two initiatives. The first, launched in 2010, was the Federal Data Center Consolidation Initiative (FDCCI), which aimed to reduce the number of data centers that were outdated or duplicative. The second initiative—the Data Center Optimization Initiative (DCOI)—was launched in August 2016 and superseded FDCCI. It shifted the focus to optimizing agencies' remaining data centers by requiring, among other things, that agencies consolidate inefficient infrastructure, optimize existing facilities, and transition to more efficient infrastructure, such as cloud services.¹

Further, Congress recognized the importance of reforming the government-wide management of IT and, in December 2014, enacted *Federal Information Technology Acquisition Reform* provisions (commonly referred to as FITARA) as a part of the *Carl Levin and Howard P. 'Buck' McKeon National Defense Authorization Act for Fiscal Year*

¹According to the National Institute of Standards and Technology, cloud services provide one or more capabilities via the cloud computing model. The cloud computing model enables ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services).

2015.² Among the requirements related to federal data center consolidation, the law required:³

- Covered departments and agencies (agencies)⁴ to annually report to OMB about federal data center inventories and strategies to achieve consolidation, including yearly calculations of investment and cost savings.⁵
- OMB to develop goals for the amount of planned cost savings and optimization improvements that agencies are to achieve through FDCCI. OMB is to make the goals publicly available and compare progress against the goals.

In addition to these requirements, FITARA included a provision for GAO to annually review and verify the quality and completeness of federal data center inventories and strategies for consolidation submitted by the agencies covered by the law. Accordingly, our specific objectives were to (1) determine agencies' progress on data center closures and the related savings that have been achieved, and describe agencies' plans for future closures and savings; (2) assess agencies' progress against OMB's data center optimization targets; and (3) identify effective agency practices for achieving data center closures, cost savings, and optimization.

²Pub. L. No. 113-291, division A, title VIII, subtitle D, 128 Stat. 3292, 3438 (Dec. 19, 2014). In November 2017, the *FITARA Enhancement Act of 2017* was enacted to extend, among other things, the sunset date for the data center provisions of FITARA. The law set an expiration date of October 1, 2020 for provisions for data center consolidation and optimization. Pub. L. No. 115-88, 131 Stat. 1278 (Nov. 21, 2017).

³Pub. L. No. 113-291 § 834, 128 Stat. 3444 – 3448 (44 U.S.C. 3601 note). Unless otherwise noted, these requirements apply to the 24 agencies specified in section 834 (corresponding to those agencies covered by the *Chief Financial Officers Act of 1990*. 31 U.S.C. § 901(b)).

⁴The 24 agencies that are required to participate in the Data Center Optimization Initiative are the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Housing and Urban Development, the Interior, Justice, Labor, State, Transportation, the Treasury, and Veterans Affairs; the Environmental Protection Agency, General Services Administration, National Aeronautics and Space Administration, National Science Foundation, Nuclear Regulatory Commission, Office of Personnel Management, Small Business Administration, Social Security Administration, and U.S. Agency for International Development. These are the same agencies covered by FITARA's data center consolidation provisions.

⁵In lieu of submitting a data center inventory and strategy, the Department of Defense may submit this information as part of a defense-wide plan and report on cost savings, as required under §§ 2867(b)(2) and 2867(d) of the *National Defense Authorization Act for Fiscal Year 2012* (10 U.S.C. § 2223a note).

To review closures to date and plans for future closures, we obtained and analyzed August 2018 data center inventory documentation from the 24 DCOI agencies. We compared information on these agencies' completed and planned data center closures to OMB's fiscal year 2018 consolidation goals, as documented in its August 2016 memorandum (M-16-19).⁶ We determined the number of data centers that had been closed by adding the closures from fiscal year 2010 through August 2018, as reported by the agencies in their inventory submissions to OMB.⁷ We identified future closures by counting data centers that agencies reported as planned closures, as of August 2018 through fiscal year 2023.

To verify the quality, completeness, and reliability of the agencies' data center inventories, we compared the information on completed and planned data center closures to similar information reported on OMB's IT Dashboard—a public website that provides information on federal agencies' major IT investments.⁸ We determined that the data were sufficiently reliable to report on agencies' consolidation progress and planned closures.

To evaluate agencies' progress in, and plans for, achieving data center cost savings, we reviewed August 2018 cost savings and avoidance⁹ documentation that the 24 DCOI agencies submitted in response to OMB's March 2013 PortfolioStat¹⁰ and August 2016 data center initiative

⁶OMB, *Data Center Optimization Initiative (DCOI)*, Memorandum M-16-19 (Washington, D.C.: Aug. 1, 2016).

⁷Under FDCCI, which OMB launched in February 2010, agencies were required to begin closing data centers. However, current OMB guidance only requires agencies to report historical cost savings and avoidances realized since fiscal year 2012.

⁸We did not physically visit agencies' data center locations to verify their inventory totals.

⁹Beginning in March 2013, OMB required agencies to report on both cost savings and cost avoidances. OMB defines cost savings as a reduction in actual expenditures below the projected level of costs to achieve a specific objective and defines a cost avoidance as the result of an action taken in the immediate time frame that will decrease costs in the future.

¹⁰Launched by OMB in 2012, PortfolioStat requires agencies to conduct an annual, agency-wide IT portfolio review to, among other things, reduce commodity IT spending and demonstrate how their IT investments align with the agency's mission and business functions.

memorandums.¹¹ This documentation included the agencies' quarterly reports of cost savings and avoidances posted to their digital services websites and discussed in their DCOI strategic plans.

We determined cost savings achieved by adding agencies' reported savings and avoidances from the start of fiscal year 2012 through August 2018, as found in the August 2018 quarterly reports posted to the agencies' digital services websites. We identified planned savings by totaling the agencies' projected savings and avoidances from fiscal years 2016 through 2018, as reported in their DCOI strategic plans.

To assess the quality, completeness, and reliability of each agency's data center consolidation cost savings information, we used the latest version of each agency's update of the August 2018 quarterly cost savings report and DCOI strategic plan. We also reviewed the quarterly reports and DCOI strategic plans for missing data and other errors, such as missing cost savings information.

In addition, we compared agencies' reported cost savings and avoidances with data from our most recently issued report on data center consolidation.¹² Further, we obtained written responses from agency officials regarding the steps they took to ensure the accuracy and reliability of their cost savings data. As a result, we determined that the data were sufficiently reliable to report on agencies' data center consolidation cost-savings information.

To assess agencies' progress against OMB's data center optimization targets, we obtained the August 2018 data center optimization progress information of 22 DCOI agencies, as reported on the IT Dashboard.¹³ To assess the agencies' planned optimization progress, we obtained the planned optimization performance from the 22 agencies' DCOI strategic plans. We then compared the agencies' current and planned optimization

¹¹OMB, *Fiscal Year 2013 PortfolioStat Guidance: Strengthening Federal IT Portfolio Management*, Memorandum M-13-09 (Washington, D.C.: Mar. 27, 2013) and Memorandum M-16-19.

¹²*Data Center Optimization: Continued Agency Actions Needed to Meet Goals and Address Prior Recommendations*, [GAO-18-264](#) (Washington, D.C.: May 23, 2018)

¹³Two agencies—the Departments of Education and Housing and Urban Development—reported that they do not own any data centers and, therefore, do not have a basis to measure and report on optimization progress.

progress information to OMB's fiscal year 2018 optimization targets, as documented in its August 2016 memorandum.¹⁴

To assess the reliability of agencies' optimization progress information on OMB's IT Dashboard, we reviewed the information for errors or missing data, compared agencies' optimization progress information across multiple reporting quarters to identify any inconsistencies in their reported progress, and discussed with agency officials the steps they took to ensure the accuracy and reliability of the reported optimization progress. We determined that the data were sufficiently reliable to report on agencies' optimization progress.

In addition, to assess the reliability of the planned optimization milestones in the DCOI strategic plans, we reviewed agencies' documentation to identify any missing or erroneous data. We also compared the planned data center optimization milestones contained in agencies' documentation against current optimization progress information obtained from the IT Dashboard; we then discussed any discrepancies or potential errors that we identified with agency officials to determine the causes or request additional information. As a result of these efforts, we were able to determine whether each agency's strategic plan information was sufficiently reliable for reporting on plans to meet or not meet OMB's fiscal year 2018 optimization targets.

To identify effective agency practices for achieving data center closures, cost savings, and optimization progress, we selected two of the highest-performing agencies for each of these three data center optimization areas (closures, cost savings, and optimization performance) that we reported on in our May 2018 report.¹⁵ For closures, we selected the Departments of Agriculture (Agriculture) and Justice (Justice) as two agencies that had, as of August 2017, reached or exceeded their DCOI tiered and non-tiered data center closure targets.¹⁶

¹⁴OMB, Memorandum M-16-19.

¹⁵[GAO-18-264](#).

¹⁶The term "tiered" and its definition are derived by OMB from the Uptime Institute's Tier Classification System. However, OMB notes that no specific certification is required in order for a data center to be considered tiered by OMB. According to OMB M-16-19, all data centers not marked as tiered were to be considered non-tiered.

For cost savings, we selected the Department of Commerce (Commerce) and the General Services Administration (GSA) as two agencies reporting some of the highest DCOI cost savings as of August 2017. For optimization performance, we selected the Social Security Administration (SSA) and the Environmental Protection Agency (EPA), the only two agencies reporting, as of August 2017, that they had met more than half of OMB's optimization targets.

We sent each of these 6 agencies a list of open-ended questions designed to solicit information on practices that the agencies found to be effective in closing and optimizing data centers and identifying the resulting cost savings. In doing so, our intent was to compile anecdotal information that could assist other agencies struggling with DCOI implementation. We do not consider the examples they provided to be findings; nor should they be taken to be representative of all the agencies participating in DCOI. Appendix I provides greater details regarding our objectives, scope, and methodology.

We conducted this performance audit from April 2018 to April 2019 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.

Background

According to OMB, federal agencies reported that they operated 432 data centers in 1998, 2,094 in July 2010, and 9,995 in August 2016.¹⁷

Operating such a large number of centers has been, and continues to be, a significant cost to the agencies.¹⁸ For example, in 2007, EPA estimated that the annual cost for electricity to operate federal servers and data centers across the government was about \$450 million.

Further, according to the Department of Energy (Energy), a typical government data center has 100 to 200 times the energy use intensity of

¹⁷Between 1998 and 2016, OMB used several different definitions for a data center, which contributed to the increase in the number of reported centers. This issue is discussed in more detail later in this report.

¹⁸Costs include hardware, software, real estate, electricity, and heating and cooling.

a commercial building.¹⁹ However, in 2009, OMB reported server utilization rates as low as 5 percent across the federal government's estimated 150,000 servers.²⁰ All of these factors contributed to OMB recognizing the need to establish a coordinated, government-wide effort to improve the efficiency, performance, and environmental footprint of federal data center activities.

OMB and the Federal CIO Established FDCCI

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, OMB's Federal CIO established FDCCI in February 2010. This initiative's four high-level goals were to reduce 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.

In February 2010, OMB required all of the agencies participating in the FDCCI to submit a data center inventory and a consolidation plan.²¹ In October 2010, OMB also clarified the definition of a data center and noted that, for the purposes of FDCCI, a data center was to be defined as any room used for the purpose of processing or storing data that is larger than 500 square feet and meets stringent availability requirements. Under this definition, OMB reported that agencies had identified 2,094 data centers as of July 2010.

However, in 2011, the Federal CIO expanded the definition to include a facility of any size and OMB published its revised definition in March 2012.²² Based on the revised definition, OMB estimated that there were a total of 3,133 federal data centers in December 2011. In addition, its goal was to consolidate approximately 40 percent, or 1,253 of these data centers, for a savings of approximately \$3 billion by the end of 2015.

¹⁹GAO, *Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings*, [GAO-11-565](#) (Washington, D.C.: July 19, 2011)

²⁰OMB, *Inventory of Federal Data Center Activity*, Budget Data Request No. 09-41 (Washington, D.C.: Aug. 10, 2009).

²¹The same 24 agencies participated in the FDCCI and DCOI.

²²OMB, *Implementation Guidance for the Federal Data Center Consolidation Initiative* (Washington, D.C.: Mar. 19, 2012).

Figure 1 shows data center server racks at SSA's National Support Center in 2017.

Figure 1: Example of Data Center Server Racks at the Social Security Administration's National Support Center in 2017

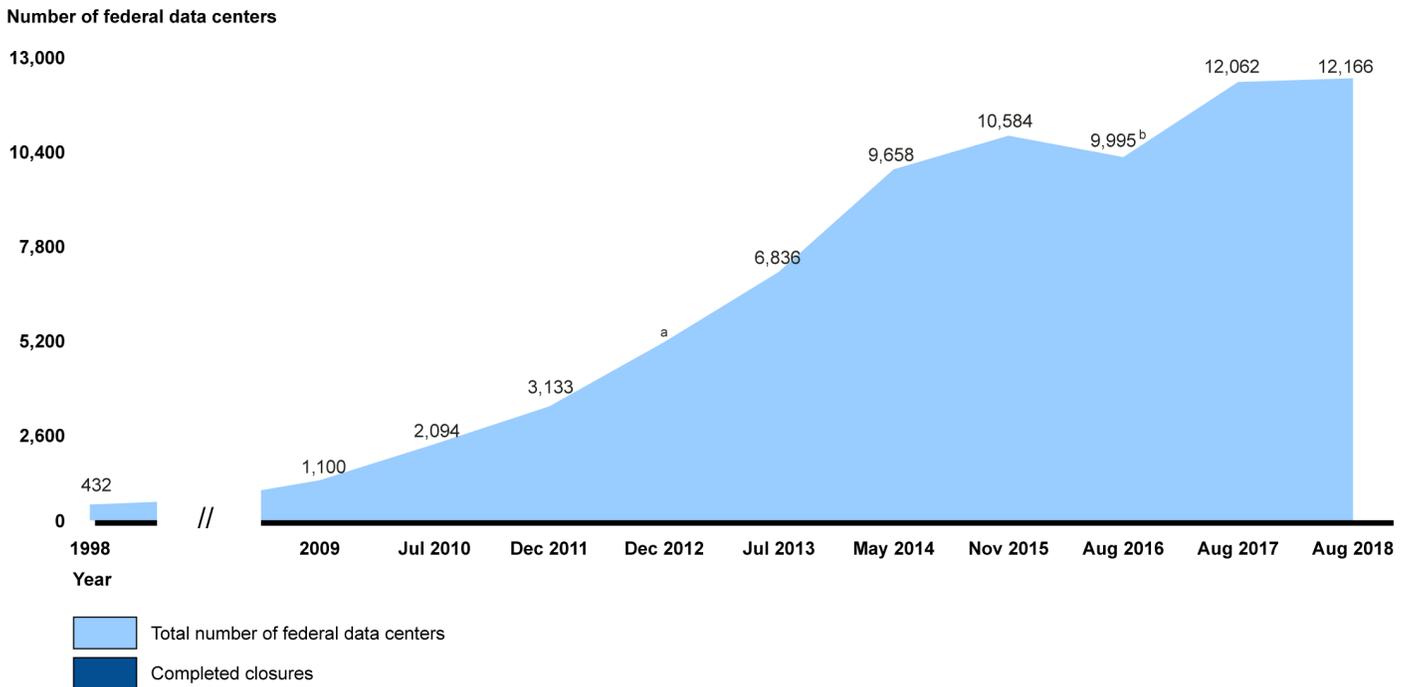


Source: Social Security Administration. | GAO-19-241

The number of federal data centers reported by agencies has continued to grow since 2011. In May 2018, we reported that agencies had collectively identified a total of 12,062 data centers in their inventories as of August 2017—an increase of about 9,000 data centers compared to OMB's October 2011 estimate.²³ According to the Federal CIO, the increase in the number of data centers was primarily due to the expanded definition of a data center (discussed later in this report) and improved inventory reporting by the agencies. See figure 2 for a depiction of the increase in the number of data centers from 1998 through August 2018.

²³[GAO-18-264](#).

Figure 2: The Number of Reported Federal Data Centers from 1998 through August 2018



Source: GAO analysis of Office of Management and Budget and agency data. | GAO-19-241

^aOMB did not publicly report the total number of data centers in 2012 and expanded its definition of a data center in March 2012, which partially accounts for the sharp increase in the number of data centers.

^bOMB again revised the definition of a data center in August 2016.

Further, OMB placed greater emphasis on data center optimization to improve the efficiency of federal data centers when it issued memorandum M-13-09 in March 2013.²⁴ Specifically, OMB stated that, to more effectively measure the efficiency of an agency’s data center assets, agencies would also be measured by the extent to which their primary data centers are optimized for total cost of ownership by incorporating metrics for data center energy, facility, labor, and storage, among other things.

Subsequently, in May 2014, OMB issued memorandum M-14-08, which established a set of data center optimization metrics to measure agency

²⁴OMB, Memorandum M-13-09.

progress, along with target values for each metric.²⁵ All agencies were expected to achieve the target values by the end of fiscal year 2015.

IT Acquisition Reform Law Enhanced Data Center Consolidation and Optimization Efforts

Recognizing the importance of reforming the government-wide management of IT, Congress enacted FITARA in December 2014. Among other things, the law required agencies to:²⁶

- Submit to OMB a comprehensive inventory of the data centers owned, operated, or maintained by or on behalf of the agency.
- Submit, by the end of fiscal year 2016, a multi-year strategy to achieve the consolidation and optimization of the agency's data centers.²⁷ The strategy was to include performance metrics that were consistent with the government-wide data center consolidation and optimization metrics.
- Report progress toward meeting government-wide data center consolidation and optimization metrics on a quarterly basis to OMB's Administrator of the Office of Electronic Government.

In addition, according to FITARA, the Office of Electronic Government at OMB was to:

- Establish metrics applicable to the consolidation and optimization of data centers (including server efficiency), ensure that agencies' progress toward meeting government-wide data center consolidation and optimization metrics is made publicly available, review agencies' inventories and strategies to determine whether they are comprehensive and complete, and monitor the implementation of each agency's strategy.

²⁵OMB, *Fiscal Year 2014 PortfolioStat*, Memorandum M-14-08 (Washington- D.C.: May 7- 2014).

²⁶Pub. L. No. 113-291 § 834, 128 Stat. 3444 – 3448 (44 U.S.C. 3601 note). Unless otherwise noted, these requirements apply to the 24 agencies specified in section 834 (corresponding to those agencies covered by the *Chief Financial Officers Act of 1990*. 31 U.S.C. § 901(b)).

²⁷In lieu of submitting a data center inventory and strategy, the Department of Defense may submit this information as part of a defense-wide plan and report on cost savings, as required under §§ 2867(b)(2) and 2867(d) of the *National Defense Authorization Act for Fiscal Year 2012* (10 U.S.C. § 2223a note).

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- Develop and make publicly available not later than December 19, 2015, a goal broken down by year for the amount of planned cost savings and optimization improvements to be achieved through FDCCI and, for each year thereafter until October 1, 2020, compare reported cost savings and optimization improvements against those goals.²⁸

OMB Established DCOI to Address FITARA Data Center Provisions

OMB issued memorandum M-16-19 in August 2016 to establish DCOI and included guidance on how to implement the data center consolidation and optimization provisions of FITARA.²⁹ Among other things, the guidance required agencies to consolidate inefficient infrastructure, optimize existing facilities, improve their security posture, and achieve cost savings. For example, each agency was required to maintain a complete inventory of all data center facilities owned, operated, or maintained by or on its behalf, and measure progress toward defined optimization performance metrics on a quarterly basis as part of its data center inventory submission.

OMB's memorandum also directed each agency to develop a DCOI strategic plan that defined its data center strategy for fiscal years 2016 through 2018. Among other things, this strategy was to include a timeline for agency consolidation and optimization activities, with an emphasis on cost savings and optimization performance benchmarks that the agency could achieve between fiscal years 2016 and 2018. For example, each agency was required to develop cost savings targets due to consolidation and optimization actions and report any realized cost savings. OMB required each agency to publicly post its DCOI strategic plan to its agency-owned digital strategy website by September 30, 2016, and to post subsequent strategic plan updates by April 14, 2017 and April 13, 2018.

Further, the memorandum stated that OMB was to maintain a public dashboard (referred to as the IT Dashboard) to display government-wide and agency-specific progress in areas such as planned and achieved data center closures, consolidation-related cost savings, and data center optimization performance information. In this regard, OMB began

²⁸As mentioned previously, the *FITARA Enhancement Act of 2017* extended FITARA's data center consolidation and optimization provisions until October 1, 2020. Pub. L. No. 115-88, 131 Stat. 1278 (Nov. 21, 2017).

²⁹OMB, Memorandum M-16-19.

including data center consolidation and optimization progress information on the IT Dashboard in August 2016.

OMB's memorandum also provided new guidance for the classification of a physical data center and expanded the definition of a data center. According to the revised definition, a room with at least one server that provides services (whether in a production, test, staging, development, or any other environment) should be considered a data center, while a room containing only print servers, routing equipment, switches, security devices (such as firewalls), or other telecommunication components, was not to be considered a data center.³⁰

In light of this new definition, OMB directed each agency to perform a comprehensive review of its data centers and maintain a complete and updated data center inventory. Further, OMB directed each agency to categorize each of its data centers as either a tiered data center or a non-tiered data center. OMB's memorandum defined a tiered data center as one that uses each of the following:

- a separate physical space for IT infrastructure;
- an uninterruptible power supply;
- a dedicated cooling system or zone; and
- a backup power generator for a prolonged power outage.

According to the memorandum, all other data centers were to be considered non-tiered.³¹

Moreover, OMB guidance included a series of performance metrics in the areas of data center closures, cost savings, and optimization progress.

- *Data center closures:* According to the guidance, agencies were to close at least 25 percent of tiered data centers government-wide, excluding those approved as inter-agency shared services providers, by the end of fiscal year 2018.³² Further, agencies were to close at

³⁰OMB, Memorandum M-16-19.

³¹The term "tiered" and its definition are derived by OMB from the Uptime Institute's Tier Classification System. However, OMB notes that no specific certification is required in order for a data center to be considered tiered by OMB.

³²For more information about shared services, see OMB, *Federal Information Technology Shared Services Strategy* (Washington, D.C.: May 2, 2012).

least 60 percent of non-tiered data centers government-wide by the end of fiscal year 2018. OMB's guidance further notes that, in the long term, all agencies should continually strive to close all non-tiered data centers, noting that server rooms and closets pose security risks and management challenges and are an inefficient use of resources.

- *Cost savings:* According to the guidance, agencies were to reduce government-wide annual costs attributable to physical data centers by at least 25 percent, resulting in savings of at least \$2.7 billion for fiscal years 2016 through 2018.³³
- *Data center optimization:* According to the guidance, agencies were to measure progress against a series of new data center performance metrics³⁴ in the areas of server utilization, energy metering, power usage, facility utilization, and virtualization.³⁵ Further, OMB's guidance established target values for each metric that agencies were to achieve by the end of fiscal year 2018.

OMB's guidance further noted that agency progress against these performance metrics was to be measured by OMB on a quarterly basis, using agencies' data center inventory submissions and OMB-defined closures, cost savings, and optimization targets.

OMB Published Proposed Changes to DCOI in November 2018

In November 2018, OMB published proposed changes to DCOI for public comment.³⁶ The changes focus federal consolidation and optimization efforts on agencies' larger, tiered data centers and also de-emphasize the consolidation of non-tiered facilities and other smaller spaces. The draft guidance also revises the classification of data centers and data center optimization metrics.

The draft guidance redefines a data center as a purpose-built, physically separate, dedicated space that meets certain criteria. Similarly, OMB

³³OMB established a goal of \$2.7 billion in Memorandum M-16-19. Subsequently, OMB increased the goal to \$2.74 billion when it published agency-specific targets on the IT Dashboard.

³⁴These metrics supersede OMB's previous set of optimization metrics established in 2014.

³⁵Virtualization is a technology that allows multiple software-based machines with different operating systems to run in isolation, side-by-side, on the same physical machine.

³⁶OMB, *Data Center Optimization Initiative*, accessed November 26, 2018, <https://datacenters.cio.gov/policy/>

does not plan to continue to report on spaces not designed to be data centers. According to the draft, OMB also plans to work with agencies to set agency-specific goals for data center closures and cost savings and to update these targets from those set in OMB's August 2016 memorandum to match agencies' current status and progress.³⁷

Additionally, the proposed changes to DCOI make several changes to the metrics currently used by agencies to monitor the performance of their data centers. Specifically, of the five metrics currently in use (described in detail later in this report), OMB proposes updating three, removing two, and adding one new metric.

The draft guidance states that public comments will be collected through the end of December 2018, but does not provide a date for when the proposed changes will be finalized and implemented. However, the draft does state that the new guidance will sunset on September 30, 2020, a date that coincides with the extension of FITARA's data center provisions.

Agencies Have Taken Limited Action to Address Prior GAO Recommendations

Since the enactment of FITARA in December 2014, we have reviewed and verified annually for the quality and completeness of each agency's (covered by the law) inventory and DCOI strategy. We have also published reports documenting the findings from each of our reviews.³⁸ In addition, we have examined and reported on agencies' efforts to optimize their data centers, as well as the challenges encountered and successes achieved.³⁹

In a report that we issued in March 2016, we noted that agencies had reported significant data center closures—totaling more than 3,100 through fiscal year 2015—with the Departments of Agriculture, Defense (Defense), the Interior (Interior), and the Treasury (Treasury) accounting for 84 percent of the total.⁴⁰ Although the agencies fell short of OMB's

³⁷OMB, Memorandum M-16-19.

³⁸GAO, *Data Center Consolidation: Agencies Making Progress, but Planned Savings Goals Need to Be Established* [Reissued on March 4, 2016, [GAO-16-323](#) (Washington, D.C.: Mar. 3, 2016)] and *Data Center Optimization: Agencies Need to Complete Plans to Address Inconsistencies in Reported Savings*, [GAO-17-388](#) (Washington, D.C.: May 18, 2017).

³⁹GAO, *Data Center Optimization: Agencies Need to Address Challenges and Improve Progress to Achieve Cost Savings Goal*, [GAO-17-448](#) (Washington, D.C.: Aug. 15, 2017).

⁴⁰[GAO-16-323](#).

fiscal year 2015 consolidation goal, their plans identified about 2,100 additional centers planned for closure through fiscal year 2019.

Agencies also reported significant consolidation cost savings and avoidances—totaling about \$2.8 billion through fiscal year 2015 and expected to increase to over \$8.0 billion in future years. The Departments of Commerce, Defense, Homeland Security (DHS), Transportation (Transportation), and the Treasury accounted for 96 percent of the total planned savings.

However, we pointed out that many agencies lacked complete cost savings goals for the next several years despite having closures planned. In addition, we reported that 22 agencies had made limited progress against OMB's fiscal year 2015 data center optimization performance metrics, such as the utilization of data center facilities. Accordingly, we recommended that the agencies take actions to complete their cost savings targets and improve optimization progress. As of December 2018, 18 of the 32 recommendations from this report had yet to be fully addressed.

In May 2017, we reported that the agencies were reporting significant data center closures—totaling more than 4,300 through August 2016—with Agriculture, Defense, Interior, and the Treasury accounting for 84 percent of the total.⁴¹ The agencies' plans for 2016 had identified more than 1,200 additional centers for closure through fiscal year 2019.

Agencies also reported significant consolidation and optimization cost savings and avoidances, which totaled about \$2.3 billion through August 2016. However, reductions in the amount of achieved savings reported to OMB, particularly by the Treasury, resulted in a net decrease of more than \$400 million in these savings, compared to amounts we previously reported as planned in 2015.

Further, our report noted that, as of December 2016, agencies' total planned cost savings of about \$656 million were more than \$3.3 billion less compared to the amounts that we reported in 2015, and more than \$2 billion less than OMB's fiscal year 2018 cost savings goal of \$2.7 billion. This reduction in planned savings was the result of eight agencies reporting less in planned cost savings and avoidances in their DCOI

⁴¹[GAO-17-388](#).

strategic plans compared to the savings amounts previously reported to us in November 2015. The reduction also reflected the absence of cost savings information for one agency (Defense) that did not submit its strategic plan in time for our review.

In addition, our May 2017 report identified weaknesses in agencies' DCOI strategic plans.⁴² Of the 23 agencies that had submitted their strategic plans at the time of our review, 7 agencies—Agriculture, the Department of Education (Education), DHS, and the Department of Housing and Urban Development (HUD); GSA; the National Science Foundation (NSF); and the Office of Personnel Management (OPM)—had addressed all five required elements of a strategic plan, as identified by OMB (such as providing information related to data center closures and cost savings metrics). The remaining 16 agencies that submitted their plans either partially met or did not meet the requirements. We also pointed out that there were inconsistencies in the reporting of cost savings in the strategic plans of 11 agencies.

Given these findings, we recommended that OMB improve its oversight of agencies' DCOI strategic plans and their reporting of cost savings and avoidances. We also recommended that 16 agencies and Defense (which did not submit a plan in time for our review) complete the missing elements in their strategic plans, and that 11 agencies ensure the reporting of consistent cost savings and avoidance information to OMB. As of December 2018, 10 of the 30 recommendations had not been fully addressed.

In a subsequent report that we issued in August 2017, we noted that 22 of the 24 agencies required to participate in the OMB DCOI had reported (collectively) limited progress against OMB's fiscal year 2018 performance targets for the five optimization metrics. The 2 remaining agencies, Education and HUD, did not own any data centers and, therefore, did not have a basis to report on progress.⁴³ Specifically, for each of the five targets, no more than 5 agencies reported that they had met or exceeded that specific target. We reported that this limited progress against OMB's optimization targets was due, in part, to agencies not fully addressing our prior recommendations in this area.

⁴²[GAO-17-388](#).

⁴³[GAO-17-448](#).

In addition, we noted in the report that most agencies had not yet implemented automated monitoring tools to measure server utilization, as required by the end of fiscal year 2018. Specifically, 4 agencies reported that they had fully implemented such tools, 18 reported that they had not yet done so, and 2 did not have a basis to report on progress because they did not own any data centers. Accordingly, we recommended that OMB require that agencies include plans, as part of existing OMB reporting mechanisms, to implement automated monitoring tools at their agency-owned data centers. We also recommended that the 18 agencies that did not have fully documented plans take action, within existing OMB reporting mechanisms, to complete plans describing how they intended to achieve OMB's requirement to implement automated monitoring tools at all agency-owned data centers by the end of fiscal year 2018. As of December 2018, none of our 19 recommendations had been fully addressed.

Most recently, in May 2018, we noted that the 24 agencies participating in DCOI had reported mixed progress toward achieving OMB's goals for closing their data centers by September 2018. Thirteen agencies reported that they had either already met, or planned to meet, all of their OMB-assigned goals by the deadline. However, 4 agencies reported that they did not have plans to meet all of their assigned goals and 2 agencies were working with OMB to establish revised targets.

With regard to agencies' progress in achieving cost savings, 20 agencies reported, as of August 2017, that they had achieved \$1.04 billion in cost savings for fiscal years 2016 and 2017. In addition, the agencies' DCOI strategic plans identified an additional \$0.58 billion in planned savings—for a total of \$1.62 billion for fiscal years 2016 through 2018. This total was approximately \$1.12 billion less than OMB's DCOI savings goal of \$2.7 billion. This shortfall was the result of 12 agencies reporting less in planned cost savings and avoidances in their DCOI strategic plans, as compared to the savings targets established for them by OMB.

In addition, the 24 agencies reported limited progress against OMB's five data center optimization targets for server utilization and automated monitoring, energy metering, power usage effectiveness, facility utilization, and virtualization. As of August 2017, 1 agency had met four targets, 1 agency had met three targets, 6 agencies had met either one or two targets, and 14 agencies reported meeting none of the targets. Further, as of August 2017, most agencies were not planning to meet OMB's fiscal year 2018 optimization targets. Specifically, 4 agencies reported plans to meet all of their applicable targets by the end of fiscal

year 2018; 14 reported plans to meet some of the targets; and 4 reported that they did not plan to meet any targets.

Because GAO had made a number of recommendations to OMB and the 24 DCOI agencies to help improve the reporting of data center-related cost savings and to achieve optimization targets, we did not make new recommendations and noted that, as of March 2018, 74 of the 81 prior recommendations had not been fully addressed. While agencies have made considerable progress, as of December 2018, 47 of the 81 recommendations had not been fully addressed.

Agencies Reported Mixed Results in Efforts and Plans to Meet OMB's Targets for Data Center Closures and Cost Savings

According to OMB guidance, agencies were expected to close at least 25 percent of tiered data centers government-wide,⁴⁴ by the end of fiscal year 2018.⁴⁵ In addition, agencies were to close at least 60 percent of non-tiered data centers government-wide by this same deadline. Further, agencies were expected to reduce government-wide annual costs attributable to physical data centers by a least 25 percent by the end of fiscal year 2018, resulting in savings of at least \$2.7 billion.

About Half of the Agencies Planned to Meet OMB's Targets for Data Center Closures

The 24 agencies reported mixed results regarding their data center closure progress and plans, when compared with OMB's goal for each agency to close at least 25 percent of their tiered data centers and at least 60 percent of their non-tiered centers. Specifically, as of August 2018, 13 agencies reported that they had already met the goal of closing 25 percent of their tiered data centers, another 3 agencies reported that they planned to meet the goal by the end of fiscal year 2018, and 6 agencies reported that they did not plan to meet the goal.⁴⁶

⁴⁴Data centers approved as inter-agency shared service providers were excluded from the need to consolidate. For more information about shared services, see OMB, *Federal Information Technology Shared Services Strategy* (Washington, D.C.: May 2, 2012).

⁴⁵OMB, Memorandum M-16-19.

⁴⁶The Department of Education did not report any tiered data centers in its inventory and the National Science Foundation only reported 1 tiered data center. As a result, neither agency had a target for closing tiered data centers.

Further, as of August 2018, 11 agencies reported that they had already met the goal for closing 60 percent of their non-tiered centers, 3 agencies reported that they planned to meet the goal by the end of fiscal year 2018, and 9 agencies reported that they did not plan to meet the goal by the end of fiscal year 2018.⁴⁷ Table 1 displays a breakdown of the number of reported tiered and non-tiered data centers and completed and planned closures by agency, as of August 2018.

Table 1: Number of Reported Tiered and Non-tiered Federal Agency Data Centers with Completed and Planned Closures through Fiscal Year 2018, as of August 2018

Agency	Tiered				Non-tiered			
	Total data centers	Closed through August 2018	Additional planned closures through fiscal year 2018	Percent of closed and planned closures/total	Total data centers	Closed through August 2018	Additional planned closures through fiscal year 2018	Percent of closed and planned closures/ total
Department of Agriculture	35	23	6	83	2,237	2,230	3	100 ^a
Department of Commerce	256	32	1	13	122	74	1	61
Department of Defense	934	202	74	30	2,680	826	742	59
Department of Education	0	0	0	0	2	2	0	100
Department of Energy	110	23	0	21	204	71	9	39
Department of Health and Human Services	93	28	4	34	299	80	2	27
Department of Homeland Security	38	15	0	39	237	35	0	15
Department of Housing and Urban Development	4	2	0	50	63	19	44	100
Department of the Interior	93	28	0	30	328	162	0	49
Department of Justice	41	24	4	68	69	60	3	91

⁴⁷The Social Security Administration did not report any non-tiered data centers and therefore did not have a target for non-tiered closures.

Agency	Tiered				Non-tiered			
	Total data centers	Closed through August 2018	Additional planned closures through fiscal year 2018	Percent of closed and planned closures/total	Total data centers	Closed through August 2018	Additional planned closures through fiscal year 2018	Percent of closed and planned closures/ total
Department of Labor	10	2	3	50	76	46	4	66
Department of State	53	10	1	21	395	37	4	10
Department of Transportation	223	12	0	5	233	162	1	70
Department of the Treasury	61	26	2	46	2,404	1,693	35	72
Department of Veterans Affairs ^b	288	41	11	18	128	54	18	56
Environmental Protection Agency	5	1	0	20	78	42	4	59
General Services Administration	42	36	0	86	93	82	0	88
National Aeronautics and Space Administration	55	33	2	64	4	4	0	100
National Science Foundation	1	0	0	0 ^c	1	1	0	100
Nuclear Regulatory Commission	5	3	0	60	14	9	0	64
Office of Personnel Management	7	3	1	57	2	1	1	100
Small Business Administration	9	0	3	33	43	10	26	84
Social Security Administration	3	1	0	33	0	0	0	0
U.S. Agency for International Development	2	2	0	100	86	3	0	3
Total	2,368	547	112	28	9,798	5,703	897	67%

Source: GAO analysis of agency data. | GAO-19-241

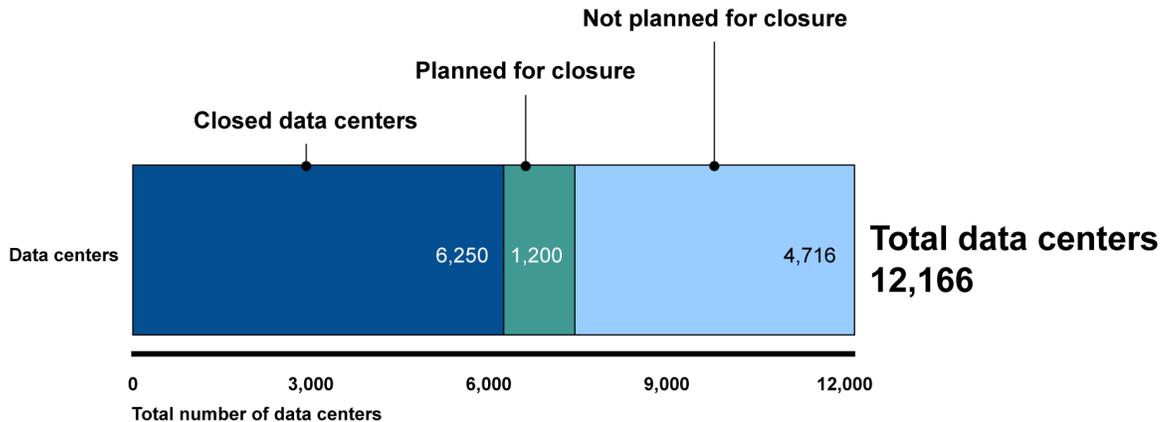
^aThe Department of Agriculture plans to close 99.8 percent of its non-tiered data centers.

^bDepartment of Veterans Affairs, Office of Inspector General, *Lost Opportunities for Efficiencies and Savings During Data Center Consolidation*, 16-04396-44 (Washington, D.C.: Jan. 30, 2019). In January 2019, after VA provided comments on a draft of this report, the VA Office of the Inspector General released a report that concluded VA had not reported a projected 860 facilities as data centers, due to incorrect internal agency guidance on what should be classified as a data center. The department agreed with the report's associated recommendations to develop additional guidance on determining what facilities are subject to DCOI and to establish a process for conducting a VA-wide inventory of data centers. The VA Office of the Inspector General reports the status of these recommendations as closed, based on actions taken by the department.

^cThe National Science Foundation did not have a target for tiered data center closures.

As shown in the figure below, the 24 agencies reported a total of 6,250 data center closures as of August 2018, which represented about half of the total reported number of federal data centers. In addition, the agencies planned 1,009 closures by the end of fiscal year 2018, with an additional 191 closures planned through fiscal year 2023 for a total of 1,200 more closures. This would further reduce the number of open data centers to about 39 percent of the number reported in the agencies' inventories. Figure 3 provides a summary breakdown of agencies' data center inventories that were closed, planned for closure, or not planned for closure, as of August 2018.

Figure 3: As Reported by the Agencies, Total Number of Federal Agency Data Centers Closed, Planned for Closure, or Not Planned for Closure since 2010, as of August 2018



Source: GAO analysis of agency data. | GAO-19-241

As noted, while about half of the agencies had met, or had planned to meet, their OMB targets as of August 2018, the other half planned to miss one or both of them. Officials from the 11 agencies that did not plan to meet one or both of their closure goals provided various reasons for why they had not planned to do so. For example, several agencies indicated that they were seeking revised closure goals because they viewed their goals as unattainable. Specifically, officials from Interior's Office of the CIO stated that a number of the department's non-tiered data centers were either mission-critical or not cost effective to close. Thus, the officials said Interior was working with OMB to establish a revised closure goal.

Similarly, Transportation's Director for IT Compliance stated that the department was working with OMB to establish a revised closure goal. The department reported having 186 tiered data centers in Federal Aviation Administration control towers that it believes should be excluded from its count of data centers when OMB sets the department's goal for closures. In addition, officials in Defense's Office of the CIO stated that the OMB closure targets for the department were based on including special purpose processing nodes that are mission critical and, therefore, are not subject to being closed. The officials noted that the department intends to continue operating its enterprise data centers, close its smaller data centers, and work with OMB to remove the special purpose processing nodes from DCOI consideration.

When OMB launched DCOI in 2016, agencies originally had until the end of fiscal year 2018 to meet OMB's stated time frame for closing their data centers. However, the extension of FITARA's data center consolidation and optimization provisions through fiscal year 2020, and OMB's planned revisions to DCOI goals, provide the 11 agencies that had not planned to meet one or both of OMB's closure targets with additional time to meet their goals. Until these agencies take action to close enough data centers to meet OMB's targets, they may not realize the efficiencies and cost savings that were expected from DCOI.

Almost Two-thirds of Agencies Planned to Meet OMB-Assigned Savings Targets

Since 2013, federal agencies have been required to report on data center cost savings, with guidance from OMB regarding how agencies were to report cost savings and avoidances.⁴⁸ Specifically, the guidance required agencies to report both data center consolidation cost savings and avoidances, among other areas, as part of a quarterly reporting process. FITARA also called for each agency to submit a multi-year strategy for achieving the consolidation and optimization of data centers that included year-by-year quarterly calculations of investment and cost savings through fiscal year 2018, which has now been extended to 2020.

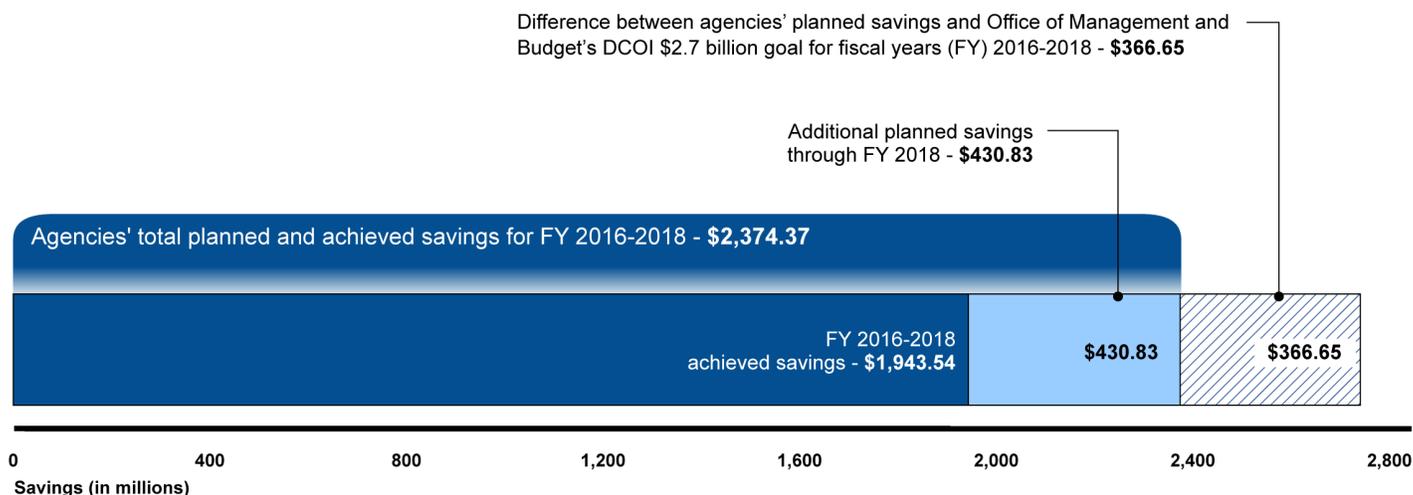
In addition, in August 2016, OMB M-16-19 provided guidance on how agencies should implement the requirements of FITARA. Specifically, agencies were to develop a strategic plan that included information on

⁴⁸OMB Memorandum M-13-09 defines cost savings as a reduction in actual expenditures below the projected level of costs to achieve a specific objective and defines cost avoidances as results from an action taken in the immediate time frame that will decrease costs in the future.

historical cost savings and avoidances due to data center consolidation and optimization through fiscal year 2015. This guidance stated that agency strategic plans were also to include year-by-year calculations of target and actual agency-wide spending and cost savings on data centers from fiscal years 2016 through 2018. Further, the guidance established a DCOI combined cost savings goal of \$2.7 billion for all federal agencies to achieve from fiscal years 2016 through 2018. This overall goal was then broken down into agency-specific targets on the IT Dashboard.

In August 2018, 22 agencies reported through the quarterly reporting process that they had achieved \$1.94 billion in cost savings for fiscal years 2016 through 2018, while 2 agencies reported that they had not achieved any savings. Further, 21 agencies identified an additional \$0.42 billion planned through fiscal year 2018, for a total of \$2.36 billion in planned savings from fiscal years 2016 through 2018. Nevertheless, this total is about \$0.37 billion less than OMB's goal of \$2.7 billion for overall DCOI savings. Figure 4 compares the total achieved savings as reported by the 24 agencies for fiscal years 2016 through 2018 and the agencies' additional planned savings through 2018 to OMB's DCOI savings goal for fiscal years 2016 through 2018.

Figure 4: Agencies' Reported Achieved and Planned Data Center Optimization Initiative Cost Savings Compared to OMB's Goal, Fiscal Years 2016-2018, as of August 2018



Source: GAO analysis of agency data. | GAO-19-241

The 24 participating DCOI agencies had achieved \$1.94 billion in savings as of August 2018. In addition, agencies identified an additional \$0.43

billion, for a difference of \$0.37 billion between planned and achieved savings from fiscal years 2016 through 2018. Table 2 provides specific data related to each agency's total planned savings, total achieved savings, and additional planned savings through 2018.

Table 2: Agencies' Reported Planned and Achieved Data Center Optimization Initiative Savings, Fiscal Years 2016-2018, Compared with Office of Management and Budget (OMB) Targets, as of August 2018 (dollars in millions)

Agency	Total achieved for 2016 through 2018	OMB savings targets	Additional planned through 2018	Difference between OMB target and agencies' planned and achieved savings
Department of Agriculture	\$25.82	\$23.62	-	\$2.20
Department of Commerce	1,115.45	94.97	-	1,020.48
Department of Defense ^a	205.46	1,800	-	(1,594.54)
Department of Education	0.84	-	0.24	1.07
Department of Energy	25.33	-	-	25.33
Department of Health and Human Services	107.70	77.84	48.38	78.24
Department of Homeland Security	112.22	154.94	254.70	211.98
Department of Housing and Urban Development	-	-	-	-
Department of the Interior	10.15	88.19	5.80	(72.24)
Department of Justice	68.92	65.86	5.43	8.49
Department of Labor	22.79	23.94	17.76	16.61
Department of State	109.90	17.07	-	92.83
Department of Transportation	36.93	30.26	3.08	9.75
Department of the Treasury	51.75	86.16	65.04	30.63
Department of Veterans Affairs	3.80	66.04	-	(62.24)
Environmental Protection Agency	-	-	-	-
General Services Administration	7.37	8.35	8.04	7.06
National Aeronautics and Space Administration	28.67	15.10	4.47	18.04
National Science Foundation	-	-	-	-
Nuclear Regulatory Commission	2.24	1.21	2.00	3.03
Office of Personnel Management	4.65	21.92	14.40	(2.87)
Small Business Administration	1.04	0.86	0.92	1.11
Social Security Administration	-	164.69	0.58	(164.12)
U.S. Agency for International Development	2.51	-	-	2.51
Total	1,943.54	2,741.02	430.83	(366.65)

Source: GAO analysis of agency and OMB data | GAO-19-241

^aIn a November 2014 response to our report, GAO-14-713, the Department of Defense noted that, in addition to the \$2.6 billion in cost savings planned by fiscal year 2017, the department expected that figure to increase to \$4.7 billion in future years as efficiencies were gained. Subsequently, the department changed its methodology for calculating cost savings and lowered its planned cost savings estimates accordingly.

As shown in table 2, 13 agencies reported that they had met or planned to meet or exceed their OMB targets, and 3 agencies that did not have an OMB target also identified achieved savings. In contrast, 5 agencies reported that they did not plan to meet their targets. Three agencies did not have a savings target and did not report any achieved savings.

Agencies provided various reasons for why they did not plan to meet their savings targets. For example, the Department of Veterans Affairs (VA) reported that the implementation of its DCOI-related projects in fiscal years 2016 through 2018 was dependent on funding approval and might not result in cost savings and avoidances until later in the projects' life cycles (i.e., fiscal year 2019 or later). In another example, GSA stated that the OMB target may be difficult for the agency to reach due, in part, to the methods OMB used to set the target for fiscal years 2016 through 2018. According to GSA, OMB used the data that GSA had reported on the IT Dashboard regarding the agency's expenditure for data center infrastructure and reduced that amount by 25 percent.

Agencies have now been working toward OMB's DCOI savings goals since fiscal year 2016; however, almost half of the agencies are still not planning to meet OMB's targets. Until agencies plan to meet and achieve OMB's data center-related savings targets, they will likely not realize the expected financial benefits from DCOI.

Most Agencies Continued to Report Limited Progress Toward Meeting Optimization Metrics Targets

FITARA required OMB to establish metrics to measure the optimization of data centers, including server efficiency, and to ensure that agencies' progress toward meeting the metrics is made public. Pursuant to FITARA, OMB established a set of five data center optimization metrics intended to measure agencies' progress in the areas of server utilization and automated monitoring, energy metering, power usage effectiveness, facility utilization, and virtualization. According to OMB, while the server utilization and automated monitoring metric applied to agency-owned tiered and non-tiered data centers, the four remaining metrics applied only to agency-owned tiered centers.⁴⁹

OMB's memorandum also established a target value for each of the five metrics, which agencies were expected to achieve by the end of fiscal

⁴⁹While agencies can also report data centers as outsourced, co-located, or cloud provided in their inventory, OMB's optimization metrics only apply to data centers identified as agency-owned.

year 2018. OMB measures agencies' progress against the optimization targets using the agencies' quarterly data center inventory submission and publicly reports this information on its IT Dashboard. Table 3 provides a description of the five data center optimization metrics and target values.

Table 3: Office of Management and Budget (OMB) Data Center Optimization Metrics and Targets

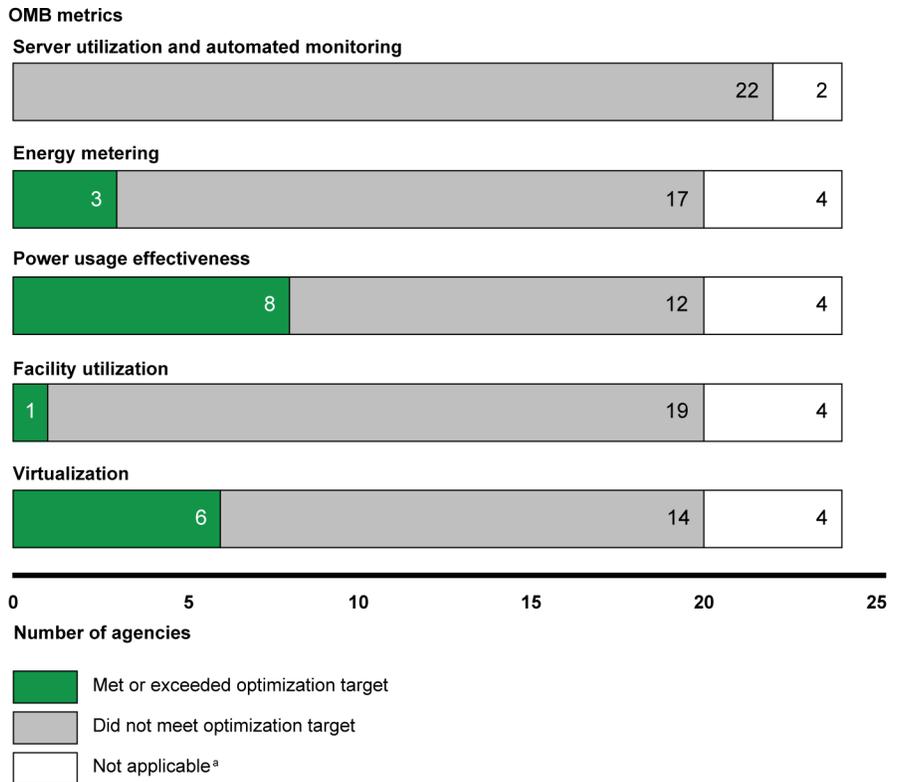
Metrics	Description	Applicable agency-owned data centers	Target value (to be achieved by the end of fiscal year 2018)
Server utilization and automated monitoring	Percent of time busy, measured directly by continuous, automated monitoring software, discounted by the fraction of data centers fully equipped with automated monitoring.	Tiered and non-tiered data centers	At least 65 percent
Energy metering	Percent of total gross floor area in an agency's tiered data center inventory located in tiered data centers that have power metering.	Tiered data centers	100 percent
Power usage effectiveness	Proportion of total data center energy used by IT equipment.	Tiered data centers	1.5 or lower (1.4 or lower for new data centers)
Facility utilization	Portion of total gross floor area in tiered data centers that is actively utilized for racks that contain IT equipment.	Tiered data centers	At least 80 percent
Virtualization	Ratio of operating systems to physical servers.	Tiered data centers	4 or higher

Source: OMB | GAO-19-241

As of August 2018, most (22 of the 24) DCOI agencies continued to report limited progress in meeting OMB's fiscal year 2018 data center optimization targets identified on the IT Dashboard. The remaining 2 agencies—Education and HUD—reported that they did not have any agency-owned data centers in their inventory and, therefore, did not have a basis to measure and report optimization progress.

With regard to the data center optimization targets, agencies reported the greatest progress against two metrics: power usage effectiveness and virtualization metrics. Specifically, 8 agencies reported that they had met OMB's target for power usage effectiveness and 6 agencies reported that they had met the target for virtualization. However, for the energy metering, facility utilization, and server utilization and automated monitoring metrics, no more than 3 agencies reported meeting each. Figure 5 summarizes the 24 agencies' progress in meeting each optimization target, as of August 2018.

Figure 5: Progress towards Meeting Office of Management and Budget (OMB) Data Center Optimization Targets, as Reported by the Agencies, as of August 2018



Source: GAO analysis of data from OMB's Information Technology Dashboard. | GAO-19-241

^aTwo agencies did not have any reported agency-owned data centers in their inventory and, therefore, did not have a basis to measure and report on their progress towards optimization. In addition, two other agencies did not own any tiered data centers and, therefore, did not have a basis to measure and report on four of the five metrics.

As of August 2018, NSF, SSA, and EPA reported the most progress against OMB's metrics among the 22 agencies with a basis to report—each met 3 targets. Nine agencies reported that they had met only one target, and 10 agencies reported they had not met any of the targets.

Further, OMB began requiring the implementation of automated monitoring tools in August 2016; however, as of August 2018, of the 22 agencies with a basis to report, 5 reported that they had either not implemented the tools at any data centers, or had experienced shortcomings in their implementation. For example, the Department of

State (State) reported that it had limited centralized monitoring capability and is installing automated monitoring tools in several phases.

Thus, these 5 agencies were not able to report any progress against either or both of the server utilization or power usage effectiveness metrics because their data centers lacked the required monitoring tools to measure progress in these areas. The remaining 17 agencies reported that they had implemented the tools in at least one data center. Table 4 depicts the performance of the agencies in meeting OMB targets for data center optimization, as of August 2018.

Table 4: Data Center Optimization Performance towards Meeting Office of Management and Budget (OMB) Optimization Targets, as Reported by the Agencies, as of August 2018

Agency	Server utilization & automated monitoring ^a	Energy metering	Power usage effectiveness	Facility utilization	Virtualization
Department of Agriculture	○	○	○	○	●
Department of Commerce	○	○	○	○	○
Department of Defense	○ ^b	○	○	○	○
Department of Education ^c	n/a	n/a	n/a	n/a	n/a
Department of Energy	○	○	●	○	○
Department of Health and Human Services	○	○	○	○	○
Department of Homeland Security	○	○	○ ^b	○	○
Department of Housing and Urban Development ^c	n/a	n/a	n/a	n/a	n/a
Department of the Interior	○	○	○	○	○
Department of Justice	○	○	○	○	○
Department of Labor	○ ^b	○	○	○	●
Department of State	○	○	●	○	○
Department of Transportation	○ ^b	○	○	○	○
Department of the Treasury	○ ^b	○	●	○	○
Department of Veterans Affairs	○	○	○	○	○
Environmental Protection Agency	○	●	●	○	●
General Services Administration ^d	○	n/a	n/a	n/a	n/a
National Aeronautics and Space Administration	○	○	●	○	○
National Science Foundation	○	●	●	○	●
Nuclear Regulatory Commission	○ ^b	○	○ ^b	○	●
Office of Personnel Management	○	○	○	○	●

Agency	Server utilization & automated monitoring ^a	Energy metering	Power usage effectiveness	Facility utilization	Virtualization
Small Business Administration	○	○	●	○	○
Social Security Administration	○	●	●	●	○
U.S. Agency for International Development ^d	○	n/a	n/a	n/a	n/a

Legend:

● = fully met—the agency’s reported progress met or exceeded OMB’s fiscal year 2018 target for the related metric.

○ = not met—the agency’s reported progress did not meet OMB’s fiscal year 2018 target for the related metric.

n/a = not applicable

Source: GAO analysis of data from OMB’s IT Dashboard. | GAO-19-241

^aFor this metric only, OMB’s IT Dashboard displays agency progress for tiered and non-tiered data centers separately. However, for the purpose of this table, and to be consistent with how this metric was established in OMB’s August 2016 memorandum (M-16-19), we combined the progress information for tiered and non-tiered data centers into a single assessment.

^bAccording to OMB’s IT Dashboard, the agency did not report any progress made on this metric. This is due to the agency lacking the monitoring tools required to measure progress and report it.

^cAgency did not have any reported agency-owned data centers in its inventory and, therefore, does not have a basis to measure and report on optimization progress.

^dAgency did not have any reported agency-owned tiered data centers in its inventory and, therefore, does not have a basis to measure and report on four of the five metrics.

As of August 2018, multiple agencies had made changes to their data center inventory and operational environment, such as closing all agency-owned tiered data centers or implementing automated monitoring tools.⁵⁰ These changes impacted which metrics were applicable or an agency’s ability to report on the status of its optimization metrics. For example, GSA reported that it no longer had any agency-owned tiered data centers, and, therefore, did not have a basis to report on four of the five optimization metrics. Additionally, NSF, which previously had only owned one non-tiered data center, migrated from the non-tiered center to a tiered data center as part of its headquarters relocation. Accordingly, NSF began reporting on the metrics applicable to its tiered facility.

Further, the Nuclear Regulatory Commission (NRC) did not report on power usage effectiveness due to delays in awarding a new contract that was to include monitoring tools that would impact the ability to report on this metric. Agency officials stated that NRC plans to have the monitoring tools in place during fiscal year 2019. Overall, these changes since last

⁵⁰These changes were made after issuance of our May 2018 report, [GAO-18-264](#).

year's report have resulted in no significant changes to the progression of these agencies on their optimization metrics.

In addition, agencies' limited progress against OMB's optimization targets was due, in part, to not fully addressing our prior recommendations in this area. As previously mentioned, in March 2016, we reported⁵¹ on weaknesses in agencies' data center optimization efforts, including that 22 agencies⁵² did not meet OMB's fiscal year 2015 optimization targets.⁵³ We noted that this was partially due to the agencies having challenges in optimizing their data centers, including in their decentralized organizational structures that made consolidation and optimization difficult, and in competing priorities for resources. In addition, consolidating certain data centers was problematic because the volume or type of information involved required the data center to be close in proximity to the users. Accordingly, we recommended that the agencies take action to improve optimization progress, to include addressing any of the identified challenges. Most agencies agreed with our recommendations or had no comments. However, as of December 2018, only 4 of the 22 agencies had fully addressed them.

The continuing shortcomings in data center optimization can also be attributed, in part, to agencies viewing OMB's optimization metric targets as unrealistic. For example, Transportation stated in its DCOI strategic plan that it could not meet multiple optimization metrics due to funds not being available and competing priorities. In addition, Treasury indicated in its DCOI strategic plan that it struggles to report on automated monitoring because many of its data centers do not have the ability to centrally aggregate and report on central processing unit data. Further, DHS officials noted that it has 7 smaller tiered data centers where it has determined that it is not cost effective to equip those centers with the

⁵¹[GAO-16-323](#).

⁵²These 22 agencies are the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Housing and Urban Development, the Interior, Justice, Labor, State, Transportation, the Treasury, and Veterans Affairs; the Environmental Protection Agency, General Services Administration, National Aeronautics and Space Administration, Nuclear Regulatory Commission, Office of Personnel Management, Social Security Administration, and U.S. Agency for International Development.

⁵³In May 2014, OMB established fiscal year 2015 targets for the first set of 11 optimization metrics. In August 2016, OMB revised the optimization metrics, kept 2 of the original 11, dropped the other 9, and issued 3 new metrics.

tools needed to report on metrics such as power usage effectiveness. Given these types of challenges, the targets for each optimization metric may not be realistic for every agency. Unless agencies take action to meet the applicable OMB optimization metrics, their data centers may not operate efficiently enough to provide expected cost savings.

Only Two Agencies Planned to Meet OMB's Fiscal Year 2018 Optimization Targets

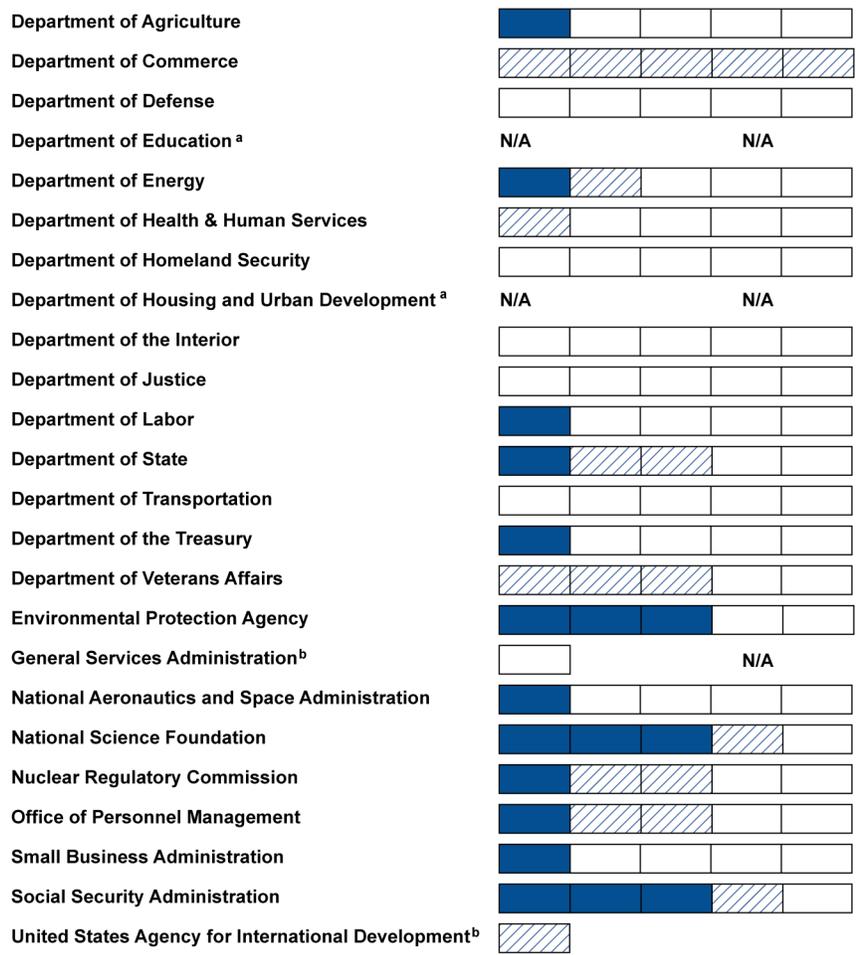
In addition to reporting current optimization progress on the IT Dashboard, OMB required agencies to include in their DCOI strategic plans planned performance levels for fiscal year 2018 for each optimization metric.

However, according to the 24 agencies' DCOI strategic plan information as of August 2018, only 2—Commerce and the U. S. Agency for International Development (USAID)—reported plans to fully meet their applicable targets by the end of fiscal year 2018. Of the remaining agencies, 14 reported plans to meet some, but not all, of the targets; 6 reported that they did not plan to meet any targets, and—as already discussed—Education and HUD did not have a basis to report planned optimization milestones because they did not report having any agency-owned data centers.⁵⁴ Figure 6 summarizes agencies' progress, as of August 2018, in meeting OMB's optimization targets and planned progress to be achieved by September 2018.

⁵⁴USAID did not have any tiered data centers in its data center inventory. Therefore, the agency only has a basis to report on its plans to meet the one OMB optimization metric applicable to its non-tiered data centers (i.e., server utilization and automated monitoring).

Figure 6: Agency-Reported Plans to Meet or Exceed the Office of Management and Budget's (OMB) Data Center Optimization Targets

Planned and achieved performance (as of August 2018)



Achieved (current) metric performance
 Additional **planned** metric performance, by the end of fiscal year 2018
 Metrics that are currently not planned to be met

Source: GAO analysis of OMB Information Technology Dashboard and agency data. | GAO-19-241

^aAgency did not report any agency-owned data centers in its inventory and, therefore, did not have a basis to measure and report on optimization progress.

^bAgency did not report any agency-owned tiered data centers in its inventory and, therefore, did not have a basis to measure and report on four of the five metrics.

At the time of our review, only two agencies planned to meet all of their applicable targets, and it was doubtful that the agencies would be able to achieve OMB's collective optimization target of at least \$2.7 billion in cost savings by the end of fiscal year 2018.⁵⁵ Until the remaining agencies take the steps necessary to meet their optimization targets, it is unlikely that these agencies will achieve the expected benefits of optimization and the resulting cost savings.

Selected Agencies Highlighted Successful DCOI Practices

As we noted previously in this report, many agencies have reported challenges that have hindered their efforts to meet OMB's DCOI targets. However, a number of agencies have also reported success in meeting OMB's targets ahead of DCOI's end of fiscal year 2018 deadline. As noted in our methodology section, six agencies that were among the best performers in achieving data center closures, cost savings, and optimization performance reported a number of key practices that had contributed to their success. These practices were:

- obtaining executive leadership support for consolidation and optimization activities;
- using experiences and lessons learned to refine consolidation planning;
- increasing the use of cloud and shared services to consolidate or optimize data center operations;
- emphasizing closing data centers to meet OMB targets and achieve cost savings;
- increasing the use of virtualization to optimize data centers; and
- employing an organization-wide communications plan to facilitate adoption of consolidation and optimization activities.

⁵⁵Agencies' data center cost savings and optimization progress information displayed on OMB's IT Dashboard is updated by OMB on a quarterly basis, based on data center cost savings and inventory data collected from agencies at the end of February, May, August, and November of each year. The November 2018 update was expected to include data for the full fiscal year and was available too late to be included in our review.

Obtaining Executive Leadership Support for Consolidation and Optimization Activities

Five of the six agencies (Agriculture, Commerce, Justice, EPA, and GSA) reported that their success in consolidation and optimization activities was due to obtaining support from executive leadership for the agency's consolidation efforts. Each agency obtained sponsorship and support from its executive leadership (e.g., Deputy Secretary or agency CIO), such as through a memorandum or policy that directed all agency offices to participate in, or comply with, the consolidation effort. For example,

- The Deputy Secretary for Agriculture issued a memorandum in 2017 that, among other things, declared the department's intent to consolidate from 39 data centers down to 2 by the end of 2019. According to officials in the Office of the CIO, this memorandum from the Secretary's office focused all data center owners on the same project task of reducing the data center inventory.
- The Commerce CIO and the department's CIO Council provided overall governance through organizational policies, processes, and procedures for the department's data center consolidation effort. Leveraging this departmental guidance, each component of Commerce developed its own consolidation plan that identified specific approaches and activities. Using these plans, the department and its components focused on reducing spending on redundant software, infrastructure, and data center operations.
- The Deputy Attorney General issued a memorandum in 2014 to the heads and CIOs of all components. This memorandum formally established Justice's Data Center Transformation Initiative, established the Department Program Review Board to provide oversight for the initiative, and also directed the consolidation of all data centers into 3 enterprise facilities. In addition, Justice's CIO issued a memorandum to component CIOs that provided additional details on how to execute planned activities and established further governance associated with the initiative. These memoranda provided clear leadership buy-in and support for the department's data center consolidation and optimization activities that could be used to resolve any challenges or issues at the departmental level.
- EPA attributed much of its DCOI success to a top-down approach from its CIO office, saying that such support was critical to achieve data center closures. For example, EPA leadership decided to adopt and enforce geographical consolidation of data centers within major areas to minimize costs of consolidation while still meeting closure objectives. In doing so, the agency leadership provided clear direction and support for the agency's consolidation effort by adopting the

strategy to consolidate data centers within specific geographic regions.

- GSA reported that it obtained leadership commitment that made its data center consolidation and optimization activities a priority. The agency noted that having strong CIO and executive leadership was important for sponsoring technology modernization. As a result of the buy-in, the agency reported that it had minimized resistance to change and improved acceptance of its consolidation and optimization activities.

Using Experiences and Lessons Learned to Refine Consolidation Planning

Four agencies (Agriculture, Commerce, Justice, and SSA) reported that their success with consolidation and optimization activities was due to the use of a refined consolidation plan or process. Each of these agencies developed an initial consolidation plan or process for closing data centers, and then refined their procedures based on their experiences and lessons learned as data centers were closed. For example,

- Agriculture developed a set of streamlined processes to facilitate DCOI closures that were based on the experiences gained from successful data center closures under FDCCI. The set of processes consisted of 5 steps:
 - The planning step included the discovery and documentation of all data center assets, including applications and IT hardware, in a given data center. In addition, this step involved identifying the necessary resources to move the applications and associated data to a target data center.
 - The preparation step included identification of the target data center and development of a project schedule.
 - The data migration step included moving both applications and data to the target data center or cloud-services, as planned.⁵⁶
 - The testing step included ensuring the applications and data that were moved were integrated into the target data center, and functional testing to ensure that the applications worked and data was accessible.

⁵⁶According to the National Institute of Standards and Technology (NIST), cloud services provide one or more capabilities via the cloud computing model. The cloud computing model enables ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services).

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- The application cutover step included putting the migrated applications and data into operation and closing the original data center.

Using and refining this set of processes allowed the department to become more efficient in closing its data centers. After closing 46 data centers in fiscal years 2011 through 2014, the department closed 2,185 data centers over the next 2 years. In total, Agriculture reported that it had closed 2,253 data centers as of August 2018.

- Commerce established departmental guidance and then each departmental component leveraged that guidance to develop its own consolidation plan. The plans identified specific approaches and activities intended to achieve the stated goals and milestones. According to Commerce, the department and its components leveraged their IT planning processes and established IT governance to, among other things, reduce spending on redundant commodity software, infrastructure, and operations.
- Justice's Office of the CIO developed a master plan for the department's data center consolidation effort in June 2015. The plan included a planning framework, transformation approach, and a master schedule for data center moves and closures. It also included process steps similar to those used by Agriculture. Further, Justice's plan noted that the department would use its initial closure efforts to gain experience and to refine its plans. Justice reported that it used the plan's schedule and semi-monthly progress reports to ensure that consolidation activities stayed on schedule, or the department could make adjustments as needed. As a result, the department closed 84 of its 110 data centers and achieved more than \$128 million in cost savings and avoidances as of August 2018.
- SSA used a project management framework process and controls that it believed efficiently addressed requirements, critical path, and risk management. In addition, SSA reported that it used an incremental development approach to its data center optimization plans, with each project expected to accomplish specific tasks that would lead to another project.⁵⁷ Accordingly, SSA noted that the agency used a multi-year plan with many initiatives focused on specific goals. Using

⁵⁷ Incremental, or modular, development is where an investment may be broken down into discrete projects, increments, or useful segments, each of which are undertaken to develop and implement the products and capabilities that the larger investment must deliver. Dividing investments into smaller parts helps to reduce investment risk, deliver capabilities more rapidly, and permit easier adoption of newer and emerging technologies.

this approach, the agency successfully moved SSA's operations and infrastructure from an older facility to the newly-built National Support Center. The agency reports that this facility is state-of-the-art and provides similar capabilities and efficiencies to major cloud service providers.

Increasing the Use of Cloud and Shared Services to Consolidate or Optimize Data Center Operations

Three agencies (Commerce, GSA, and SSA) also attributed their success in consolidation and optimization activities to increasing their agency's use of cloud and shared services. In doing so, each agency emphasized the move of data center assets and systems to cloud services to optimize their data centers and reduce costs. For example,

- Commerce identified moving to cloud services and utilizing shared services⁵⁸ as being most effective in closing data centers. As an example, the department cited the National Oceanic and Atmospheric Administration's (NOAA) "cloud-first" policy that emphasized using cloud services rather than an agency-owned physical data center whenever feasible. The agency attributed its ability to handle increased traffic as an operational benefit of its increased use of cloud services. For example, NOAA did not have the capacity in its agency-owned facilities to meet the computing demands and requirements of a sudden increase in web traffic on the websites for NOAA and the National Hurricane Center, such as during Hurricanes Irma and Harvey in 2017. Commerce stated that using cloud services allowed NOAA to handle 4.7 billion page hits during Hurricane Harvey over a 6-day span, ensuring the websites were not adversely impacted by the increase in traffic.
- GSA reported that it focused on moving services from agency-owned tiered and non-tiered data centers to cloud services or to shared centers. As a result, GSA had closed 118 data centers as of August 2018, including all of the agency's tiered centers.
- SSA developed an agency cloud initiative that encourages the adoption of cloud technologies as part of the agency's infrastructure modernization. The agency reported that it is employing a hybrid cloud strategy that is comprised of both private cloud and public cloud

⁵⁸OMB, *Federal IT Shared Services Strategy*, (Washington, D.C.: May 2, 2012). A shared service is a function that is provided for consumption by multiple organizations within or between federal agencies.

services for the agency's back office applications.⁵⁹ By doing so, the agency will consolidate and standardize SSA's IT infrastructure systems and software to simplify management of those resources and reduce costs.

Emphasizing the Closure of Data Centers to Meet OMB Targets and Achieve Cost Savings

Three agencies (Agriculture, Justice, and EPA) reported that their success in consolidation and optimization activities was due to focusing on the closure of data centers. In doing so, they emphasized the importance of closing data centers to reduce costs and achieve cost savings and avoidances. For example,

- Agriculture determined that the costs to improve DCOI performance metrics in its agency-owned data centers were prohibitive. Accordingly, the department decided that the only viable alternative was to close data centers to remove underperforming centers and improve optimization metrics performance and reduce costs. As a result, Agriculture reported that it had closed 2,253 data centers through August 2018. In addition, the department reported that it had improved its security posture, reduced its real estate footprint, and achieved realized cost savings and avoidance of \$51.8 million from fiscal year 2012 through 2018.
- Justice reported that it took a practical approach to selecting the data centers that would remain as its enterprise facilities, considering factors such as the number of physical servers that could be eliminated, the efficiency of the remaining hardware, and potential labor savings. The department reported that it focused on retaining more efficient data centers (e.g., those with more efficient use of electricity or virtualization), rather than simply keeping its biggest existing data centers. As a result, Justice has closed 84 of its 110 data centers and achieved more than \$128 million in cost savings and avoidances as of August 2018.
- EPA identified geographical consolidation as its best approach to meeting DCOI goals. Specifically, in its data center consolidation plan, the agency stated that, for geographic areas where it had multiple

⁵⁹According to NIST, a hybrid cloud is a composition of two or more clouds (on-site or off-site, private or public) that remain as distinct entities but are bound to share data and applications. A private cloud gives a single organization the exclusive access to and usage of the cloud service and related infrastructure and computational resources. A public cloud is one in which the cloud infrastructure and computing resources are made available to the general public over a public network. A public cloud is owned by an organization providing cloud services, and serves a diverse pool of clients.

data centers, a single facility was identified into which data center IT assets would be consolidated. Using this approach, EPA had closed 43 of its 83 data centers as of August 2018.

Increasing the Use of Virtualization to Optimize Data Centers

Three agencies (Commerce, EPA, and SSA) reported that their success in consolidation and optimization activities also was due to focusing on the increased use of virtualization⁶⁰ to run more software on the same or a reduced amount of servers. In doing so, the agencies expected to reduce costs by avoiding the purchase of additional servers to meet computing demands or eliminating unnecessary hardware and floor space in their data centers. For example,

- Commerce focused on moving systems from physical hardware to virtual servers, as part of its component offices' plans to update technology and in cases where the systems did not require a specific type of server. Using this approach, the department reported that it had reduced the number of physical servers in its data centers, and was working to improve server utilization. The department also cited the ability to automatically increase or decrease computing capability through virtualization, such as when NOAA handled the increased traffic to its hurricane-related web pages during Hurricanes Irma and Harvey in 2017.
- EPA used the agency's data center consolidation plan to implement an agency-wide "physical-to-virtual" policy that required offices to convert existing physical servers to virtual servers wherever possible. The agency also defined server and software standards for virtualized platforms.
- SSA reported that the agency's goal, using its "Virtual 1st" policy, was to have failover capability within the data center, disaster recovery capability for both data centers, and balanced load capacity between data centers.⁶¹ The agency reported that it has continued to virtualize not only servers but storage and network applications, as well. For example, SSA stated that it has taken steps to virtualize as much storage as possible and used similar techniques to reduce the

⁶⁰Virtualization is a technology that allows multiple software-based machines with different operating systems to run in isolation, side-by-side, on the same physical machine.

⁶¹Failover capability is the ability to automatically switch over (typically without human intervention or warning) to a redundant or standby information system upon the failure or abnormal termination of the previously active system.

physical hardware footprint on the data center floor, as well as power, cooling, and network bandwidth requirements.

Employing an Organization-wide Communications Plan to Facilitate Adoption of Consolidation and Optimization Activities

Two agencies (Justice and GSA) reported that their success in consolidation and optimization activities was due to employing an organization-wide communications plan. In doing so, the agencies adopted a structured method for communicating with agency offices to improve acceptance and adoption of consolidation and optimization activities. This also facilitated conflict resolution. For example,

- Justice reported that it prioritized communications related to its Data Center Transformation Initiative and established an all-encompassing approach to initiative-related communications. To help communicate all related directives, strategies, plans, statuses, and accomplishments, the department used a variety of methods that included:
 - regular meetings to share information,
 - a dedicated email box to provide easy communication for answers or information, without the need to know specific individuals,
 - an intranet web page that provided general information, instructions, templates, decisions, status information, and accomplishments related to the initiative; and
 - email broadcasts on an as-needed basis.
- GSA reported that it communicated and collaborated frequently with business stakeholders to identify the best time frames to move systems, stagger transfers to minimize impact, and determine which systems could be virtualized. The agency indicated that these important factors required continuous communication between system owners, system administrators, and business leadership. As a result, the agency experienced minimal staff resistance to change and a commitment to reach a consensus on moving forward with the agency's consolidation efforts.

The aforementioned practices included elements of sound management techniques, such as gathering leadership support for a project and developing a communications plan to foster adoption of organizational changes. The practices also included activities that aligned with the core tenets of DCOI to consolidate inefficient infrastructure, optimize existing facilities, and achieve cost savings. Further, these practices each proved effective for multiple agencies and, while they were not the only practices that could be effective, they represent concepts that could provide the

foundation for an effective data center consolidation and optimization program.

Conclusions

Federal data center consolidation efforts have been underway since 2010 and OMB's fiscal year 2018 targets provided clear and transparent goals that helped define the tangible benefits that DCOI was expected to provide. However, most agencies continue to report mixed progress against those targets. Although agencies have taken action to close about half of the data centers in their combined inventories, 11 agencies did not plan to meet all of their closure targets.

Further, the data center closures were expected to drive cost savings and avoidances and, to the agencies' credit, the closures have led to more than \$2.37 billion in planned and achieved cost savings and avoidances from fiscal years 2016 through 2018. However, five agencies did not plan to meet their cost savings targets. Until agencies consolidate the data centers required to meet their targets, as well as identify and report the associated cost savings, they will be challenged to realize expected efficiencies and the full benefits of DCOI will not be fully realized.

Similarly, although OMB first established optimization metrics in May 2014, agencies continue to report only limited progress against the current performance targets. While two agencies do not have a basis to report any progress as they do not own any data centers, only two agencies reported that they planned to achieve all of DCOI's fiscal year 2018 optimization targets. Ensuring the optimized performance of data centers is a key component to meeting OMB's DCOI-wide savings goal and the 20 agencies that did not have plans to meet their targets call into question whether DCOI will realize its full potential savings.

Although many agencies have struggled to meet their individual DCOI targets, other agencies have successfully met OMB's goals for data center closures, savings, and optimization. Six such agencies that we identified reported on the importance of gathering leadership support, effective communication, and alignment with the core tenets of DCOI. Key practices such as these can play an important role in helping agencies better meet the overall goals and mission of DCOI.

Recommendations

We are making a total of 36 recommendations to 22 of the 24 agencies in our review. Specifically:

The Secretary of Agriculture should take action to meet the data center optimization metric targets established by OMB under DCOI. (Recommendation 1)

The Secretary of Commerce should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 2)

The Secretary of Defense should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 3)

The Secretary of Defense should identify additional savings opportunities to achieve the targets for data center-related cost savings established under DCOI by OMB. (Recommendation 4)

The Secretary of Defense should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 5)

The Secretary of Energy should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 6)

The Secretary of Energy should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 7)

The Secretary of the Department of Health and Human Services (HHS) should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 8)

The Secretary of HHS should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 9)

The Secretary of DHS should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 10)

The Secretary of DHS should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 11)

The Secretary of Interior should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 12)

The Secretary of Interior should take action to meet the data center-related cost savings established under DCOI by OMB. (Recommendation 13)

The Secretary of Interior should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 14)

The Attorney General should take action to meet the data center optimization metric targets established for Justice under DCOI by OMB. (Recommendation 15)

The Secretary of the Department of Labor (Labor) should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 16)

The Secretary of State should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 17)

The Secretary of State should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 18)

The Secretary of Transportation should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 19)

The Secretary of Transportation should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 20)

The Secretary of Treasury should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 21)

The Secretary of VA should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 22)

The Secretary of VA should take action to meet the data center-related cost savings established under DCOI by OMB. (Recommendation 23)

The Secretary of VA should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 24)

The Administrator of EPA should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 25)

The Administrator of EPA should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 26)

The Administrator of GSA should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 27)

The Administrator of the National Aeronautics and Space Administration (NASA) should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 28)

The Director of NSF should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 29)

The Chairman of NRC should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 30)

The Director of OPM should take action to meet the data center-related cost savings established under DCOI by OMB. (Recommendation 31)

The Director of OPM should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 32)

The Administrator of the Small Business Administration (SBA) should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 33)

The Commissioner of SSA should take action to meet the data center-related cost savings established under DCOI by OMB. (Recommendation 34)

The Commissioner of SSA should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 35)

The Administrator of USAID should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 36)

Agency Comments and Our Evaluation

We requested comments on a draft of this report from OMB and the 24 agencies that we reviewed. Of the 22 agencies to which we made recommendations, 11 agencies agreed with our recommendations; three agencies agreed with some portion, but not all of the recommendations; one agency disagreed with our recommendations; and seven agencies did not state whether they agreed or disagreed with the recommendations. In addition, OMB and two agencies to which we did not make recommendations stated that they had no comments. Further, multiple agencies provided technical comments, which we have incorporated, as appropriate.

The following 11 agencies agreed with our recommendations:

- In written comments from Commerce, State, NASA, SBA, and SSA, the agencies stated that they agreed with the recommendations and indicated their intent to address them. State also provided technical comments, which we have incorporated, as appropriate. The agencies' comments are reprinted in appendices II through VI.
- In written comments, Energy agreed with our recommendations to meet its data center closure and optimization metric targets, and described actions that the department planned to take in order to address the recommendations. Energy initially estimated that it would complete these actions by March 1, 2019; however, the department subsequently revised its estimated completion date to April 15, 2019. Energy also provided technical comments, which we have incorporated, as appropriate. Energy's comments are reprinted in appendix VII.
- In written comments, VA agreed with our recommendations to meet its data center closure, cost savings, and optimization metric targets. In addition, the department requested that we close our recommendation related to data center closures on the basis of its planned actions to implement a new inventory data collection tool and methodology to improve how the department collects data center inventory information, and a positive trend in its data center closures.

The department estimated that its planned actions would be completed in March 2019 and reported that, as of November 2018, it had closed 78 data centers in fiscal year 2018, as compared with 24 in fiscal year 2017.

However, as noted earlier in this report, we found that VA did not plan to meet the closure goal for either tiered or non-tiered data centers, which was the basis for our recommendation. While we acknowledge and encourage VA's reported closure progress, the department still has not met its DCOI closure goals, as we recommended. Further, VA did not provide an update on the status of its planned actions in time for us to address them in this report. As such, we maintain that this recommendation is still appropriate.

In addition, VA referred to OMB's proposed changes to DCOI guidance when describing actions that it planned to take to meet the department's cost savings and optimization metrics targets. However, OMB staff told us that the August 2016 DCOI guidance will remain in effect until the revised DCOI guidance is formally issued. Once OMB's new DCOI guidance is finalized, we plan to assess agency progress against any revised targets, and we will continue to monitor the department's efforts to address our recommendation. VA's comments are reprinted in appendix VIII.

We received emails from officials of Agriculture, Justice, Transportation, and OPM which stated that these agencies agreed with the recommendations we directed to them.⁶² In addition, three agencies agreed with some portion, but not all of our recommendations directed to them:

- In written comments, Defense stated that it agreed with our recommendation to meet its data center closure targets. However, the department partially agreed with our two other recommendations: to identify additional data center-related savings opportunities and to meet OMB's data center optimization metric targets.

In partially agreeing with our recommendation on data center savings, Defense asserted that it had already identified significant cost savings through activities such as the identification of system migration

⁶²We received these emails from Agriculture's Director for Strategic Planning, Policy, Egovernment and Audits on March 1, 2019; Justice's Audit Liaison Specialist in the Justice Management Division on December 20, 2018; Transportation's Director for Audit Relations and Program Improvement on December 21, 2018; and OPM's Director for Internal Oversight and Compliance on February 21, 2019.

candidates and the use of cloud services, among others. The department further stated that, while it would continue to optimize its data centers, the need for IT would continue to grow, and this growth might ultimately lead to an increase in total data center costs, despite overall per unit cost reductions.

However, the department's planned savings of \$205.46 million represented only 11 percent of its \$1.8 billion savings goal by the end of fiscal year 2018 and, as such, this limited progress by the department formed the basis for our recommendation. As discussed in our report, OMB plans to revise DCOI guidance and work with agencies to set agency-specific targets. According to OMB staff, until the guidance is revised, the current guidance and its targets are still applicable. For these reasons, we maintain that our recommendation is still appropriate.

Further, in partially agreeing with our recommendation to meet optimization metric targets, Defense stated that the department will continue to drive towards the achievement of data center optimization targets. It added, however, that it would not invest resources to improve the efficiency of data centers planned for closure and that, as a result, the composite view of Defense's data center efficiency would fall short of meeting OMB's targets.

Our review found that Defense did not plan on meeting any of OMB's five data center optimization metric targets by the end of fiscal year 2018. This finding was the basis for our recommendation. We acknowledge Defense's position that investing resources into optimizing data centers that are already planned for closure would not be the best use of taxpayer dollars. We also noted in our report that OMB had proposed revising its optimization metrics, and that any such changes had not yet been finalized. Our recommendation is not intended to imply that an agency should meet a particular version of OMB targets but, rather, that the agency should meet any targets that are established by OMB. This would include any future changes to DCOI targets. Accordingly, we maintain that our recommendation is still appropriate and will continue to monitor the department's efforts to address our recommendation. Defense's comments are reprinted in appendix IX.

- In written comments, DHS stated that it agreed with our recommendation to meet its data center closure targets and disagreed with our recommendation to meet its data center optimization metric targets. Specifically, the department noted that it had met its tiered data center closure targets, and was reviewing the status of its remaining open non-tiered data centers. The department added that it

expected to complete this activity by March 31, 2019. However, the department did not provide an update on its efforts in time to be included in this report.

While we encourage DHS's continued efforts to close its remaining non-tiered data centers, we note that the department's letter cites an inventory of 18 open non-tiered facilities, which differs significantly from the 202 non-tiered centers counted in our draft report, and which DHS officials confirmed in November 2018. According to the department, this discrepancy is because OMB issued revised inventory reporting requirements in November 2018, and these revised requirements exempted certain types of facilities from DCOI reporting and resulted in the lower number.

These changes in reporting requirements are similar to the proposed, but not yet finalized, revisions to the DCOI policy that are discussed earlier in this report. However, OMB staff told us that the August 2016 DCOI guidance will remain in effect until the revised DCOI guidance is formally issued. Once OMB's new DCOI guidance is finalized, we plan to assess agency progress against any revised targets, and we will continue to monitor the department's efforts to address our recommendation.

Further, in disagreeing with our recommendation on meeting optimization metrics, the department stated that, while the recommendation was applicable under the original DCOI guidance that OMB issued in August 2016, OMB's proposed changes to DCOI guidance would exempt most, if not all, DHS agency-owned data centers from the optimization metrics. Consequently, the department requested that our recommendation be closed.

In our review, we found that the department did not plan on meeting any of OMB's five data center optimization metric targets established under DCOI. This finding was the basis for our recommendation on meeting optimization metrics. Also, while OMB has proposed changes to its metrics, as we noted previously, it has not provided a date for when any such proposed changes will be finalized and implemented; and, according to OMB staff, until the changes to DCOI guidance are finalized, the current guidance is still applicable. Further, our recommendations do not specify that an agency should meet any particular version of OMB targets, but rather, that an agency should meet the targets established by OMB. This would include any future changes to DCOI targets. Accordingly, we maintain that our recommendation is still appropriate. DHS also provided technical comments, which we have incorporated, as appropriate. DHS's comments are reprinted in appendix X.

-
- In written comments, Interior stated that it partially agreed with our recommendation to meet its data center closure targets and disagreed with our two recommendations to meet its data center-related cost savings target and its data center optimization metric targets. For all three recommendations, the department stated that OMB had proposed changes to DCOI guidance that would result in new targets for closures, cost savings, and optimization metrics and that Interior planned to adopt the new policy and work through OMB to establish its new targets.

As noted in our report, Interior met its target for tiered data center closures, but did not plan to meet the closure goal for non-tiered data centers. Further, the department planned on achieving only \$15.95 million of its \$88.19 million savings target (18 percent) by the end of fiscal year 2018, and did not plan on meeting any of OMB's five data center optimization metric targets. These three findings were the basis for our recommendations to the department.

We also noted that, as part of OMB's proposed changes to DCOI guidance, it planned to work with agencies to set agency-specific targets for data center closures and planned to modify the metrics currently used by agencies to monitor the performance of their data centers. However, as previously mentioned, OMB has not provided a date for when these proposed changes will be finalized and implemented and, according to OMB staff, until the changes to DCOI guidance are finalized, the 2016 guidance is still applicable. Furthermore, our recommendations do not specify that an agency should meet any particular version of OMB targets, but should meet any targets that are established by OMB. This would include any future changes to DCOI targets. As such, we maintain that our recommendations are appropriate. Interior's comments are reprinted in appendix XI.

One agency disagreed with all of our recommendations:

- In written comments, HHS disagreed with our two recommendations to meet its data center closure targets and data center optimization metric targets. In regard to both recommendations, the department disagreed with being held to what it termed "expired requirements" from DCOI guidance, pending the assignment of new targets being established by OMB.

As noted in our report, HHS met its target for tiered data center closures, but did not plan to meet the closure target for non-tiered data centers. We also found that HHS did not meet any of OMB's five optimization metric targets and had planned to meet only one of the

five by end of fiscal year 2018. These findings were the basis for the two recommendations that we made to the department.

We also noted that, as part of OMB's proposed changes to DCOI guidance, OMB planned to work with agencies to set agency-specific targets for data center closures and planned to modify the metrics currently used by agencies to monitor the performance of their data centers. However, as previously mentioned, OMB did not provide a date for when these proposed changes will be finalized and implemented and, according to its staff, until the changes to DCOI guidance are finalized, the current guidance is still applicable. Further, our recommendations do not specify that an agency should meet any particular version of OMB targets, but rather, that the agency should meet the targets established by OMB. This would include any future changes to DCOI targets. Accordingly, we maintain that our recommendations are still appropriate. HHS's comments are reprinted in appendix XII.

Further, seven agencies did not agree or disagree with the recommendations:

- In written comments, EPA did not state whether it agreed or disagreed with our recommendations to meet its data center closure and data center optimization metrics targets. However, the agency requested that we close our recommendations, citing its reported progress in closing 21 of 34 targeted data centers and OMB's proposed changes in its draft DCOI guidance that could result in revised closure targets and optimization metrics.

As stated in our report, we found that EPA did not plan to meet its closure target for tiered or non-tiered data centers, nor did it plan to meet its data center optimization targets; these findings were the basis for our recommendations. We also noted that, as part of OMB's proposed changes to DCOI, OMB planned to work with agencies to set agency-specific targets for data center closures and planned to modify the metrics currently used by agencies to monitor the performance of their data centers. However, OMB has not provided a date for when these proposed changes will be finalized and implemented and, according to OMB staff, until the changes to DCOI guidance are finalized, the current guidance is still applicable. Further, our recommendations do not specify that an agency should meet any particular version of OMB targets, but that it should meet the targets established by OMB. This would include any future changes to DCOI targets. Accordingly, we maintain that our recommendations are appropriate and should remain open. EPA also provided technical

comments, which we have incorporated, as appropriate. The agency's comments are reprinted in appendix XIII.

- In written comments, GSA did not state whether it agreed or disagreed with our recommendation to meet the agency's data center optimization metrics targets. Specifically, the agency stated that it had complied with revised inventory reporting requirements, which OMB provided to agencies in November 2018 and which eliminated non-tiered data centers from the requirement to meet optimization targets. As a result, the agency noted that it no longer had a basis to measure and report on the one metric our report cited as applicable to GSA (i.e., server utilization and automated monitoring) and asked that we withdraw the recommendation.

These changes in reporting requirements are similar to the proposed, but not yet finalized, revisions to the DCOI policy that are discussed earlier in the report. However, OMB staff told us that the August 2016 DCOI guidance is still in effect until the revised DCOI guidance is formally issued. Until OMB's new DCOI guidance is finalized and agency progress against any revised targets can be evaluated, we maintain that our recommendation to meet the agency's optimization metrics targets is appropriate, and we will continue to monitor the agency's efforts to address it. GSA's comments are reprinted in appendix XIV.

- In written comments, NSF did not state whether it agreed or disagreed with our recommendation. The agency's comments are reprinted in appendix XV.
- In written comments, NRC agreed with the draft report, but did not state whether it agreed or disagreed with our recommendation. The agency's comments are reprinted in appendix XVI.
- In written comments USAID did not state whether it agreed or disagreed with the draft report's recommendation but agreed with our finding that the agency no longer had any tiered data centers. However, USAID stated that it had met DCOI's closure targets for the agency by closing its 4 non-tiered data centers, and requested that we close our recommendation to meet those targets.

While we encourage USAID's continued efforts to close its remaining non-tiered data centers, we note that the agency's letter cites an inventory of 4 non-tiered facilities, which differs significantly from the 83 non-tiered centers counted in our draft report, and which USAID officials confirmed in October 2018. As USAID communicated in subsequent emails, this discrepancy is because OMB issued revised inventory reporting requirements in November 2018 and these revised

requirements exempted certain types of facilities from DCOI reporting, which resulted in the lower number.

These changes in reporting requirements are similar to the proposed, but not yet finalized, revisions to the DCOI policy that are discussed earlier in the report. However, OMB staff told us that the August 2016 DCOI guidance is still in effect until the revised DCOI guidance is formally issued. Until OMB's new DCOI guidance is finalized and agency progress against any revised targets can be evaluated, we maintain that our data center closure recommendation is appropriate, and we will continue to monitor the agency's efforts to address it. The agency's comments are reprinted in appendix XVII.

- In emails received from Labor's GAO liaison in the department's Office of the Assistant Secretary for Policy on January 8, 2019, and from an audit liaison in Treasury's Office of the CIO on February 1, 2019, both departments did not state whether they agreed or disagreed with our respective recommendations.

Finally, in emails received from a Management and Program Analyst in Education's Office of the Secretary/Executive Secretariat on January 8, 2019; an audit liaison in HUD's Office of the CIO, Audit Compliance Branch on February 15, 2019; and a GAO liaison in OMB's Office of General Counsel on February 25, 2019, these agencies stated that they had no comments on the draft report.

We are sending copies of this report to interested congressional committees, the Director of OMB, the secretaries and 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 GAO's website at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please contact me at (202) 512-4456 or harriscc@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 XVIII.



Carol C. Harris
Director, Information Technology
Acquisition Management Issues

List of Committees

The Honorable James M. Inhofe
Chairman

The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Ron Johnson
Chairman

The Honorable Gary C. Peters
Ranking Member
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Adam Smith
Chairman

The Honorable Mac Thornberry
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Elijah Cummings
Chairman

The Honorable Jim Jordan
Ranking Member
Committee on Oversight and Reform
House of Representatives

Appendix I: Objectives, Scope, and Methodology

Our objectives for this engagement were to (1) determine agencies' progress in data center closures and achievement in related savings to date and describe plans for future savings, (2) evaluate the agencies' progress against OMB's data center optimization targets, and (3) identify effective agency practices for achieving data center closures, cost savings, and optimization.

To address the first objective, for data center closures, we obtained and analyzed August 2018 data center inventory documentation from the 24 departments and agencies (agencies)¹ that participate in OMB's Data Center Optimization Initiative (DCOI).² To determine data center closures to date, we totaled their reported closures from fiscal year 2010 through August 2018 and to identify future closures, we totaled their reported planned closures through fiscal year 2018. We also compared agencies' completed and planned closures to OMB's fiscal year 2018 consolidation goals, as documented in its August 2016 memorandum (M-16-19).³

To verify the quality, completeness, and reliability of each agency's data center inventory, we compared information on completed and planned data center closures to similar information reported on OMB's IT Dashboard—a public website that provides information on federal agencies' major IT investments.⁴ We also checked for missing data and other errors, such as missing closure status information. In some cases identified, we followed-up with agency officials to obtain further information. We determined that the data were sufficiently complete and reliable to report on agencies' consolidation progress and planned closures.

¹The 24 agencies that are required to participate in the Data Center Optimization Initiative are the Departments of Agriculture, Commerce, Defense, Education, Energy, Health and Human Services, Homeland Security, Housing and Urban Development, the Interior, Justice, Labor, State, Transportation, the Treasury, and Veterans Affairs; the Environmental Protection Agency, General Services Administration, National Aeronautics and Space Administration, National Science Foundation, Nuclear Regulatory Commission, Office of Personnel Management, Small Business Administration, Social Security Administration, and U.S. Agency for International Development.

²Agencies' data center optimization progress information displayed on OMB's IT Dashboard is updated by OMB on a quarterly basis based on data center inventory data collected from agencies at the end of February, May, August, and November of each year.

³OMB, *Data Center Optimization Initiative (DCOI)*, Memorandum M-16-19 (Washington, D.C.: Aug. 1, 2016).

⁴We did not physically visit agencies' data center locations to verify their inventory totals.

For cost savings and avoidance⁵ we obtained and analyzed documentation from the 24 DCOI agencies. This documentation is required by OMB's March 2013 and August 2016 memorandums and included the agencies' quarterly reports of cost savings and avoidances posted to their digital services websites and their DCOI strategic plans.⁶ To determine cost savings achieved, we totaled agencies' reported savings and avoidances from the start of fiscal years 2012 through August 2018, as found in the August 2018 quarterly reports posted to the agencies' digital services websites.⁷ To identify future planned savings, we totaled the agencies' projected savings and avoidances from fiscal years 2016 through 2018, as reported in their DCOI strategic plans.

To assess the quality, completeness, and reliability of each agency's data center consolidation cost savings information, we used the latest version of each agency's quarterly cost savings report and DCOI strategic plan, as of August 2018. We also reviewed the quarterly reports and DCOI strategic plans for missing data and other errors, such as missing cost-savings information. In addition, we compared agencies cost savings and avoidances with data from our most recent data center consolidation report.⁸ As a result, we determined that the data were sufficiently complete and reliable to report on agencies data center consolidation cost-savings information.

For our second objective, we analyzed the August 2018 data center optimization progress information of the 24 DCOI agencies. This progress information was obtained from the IT Dashboard—an OMB public website that provides information on federal agencies' major IT investments. To assess agencies' planned optimization progress, we obtained the planned

⁵Beginning in March 2013, OMB required agencies to report on both cost savings and cost avoidances. OMB defines cost savings as a reduction in actual expenditures below the projected level of costs to achieve a specific objective and defines a cost avoidance as the result of an action taken in the immediate time frame that will decrease costs in the future.

⁶OMB, Memorandum M-16-19 and *Fiscal Year 2013 PortfolioStat Guidance: Strengthening Federal IT Portfolio Management*, Memorandum M-13-09 (Washington, D.C.: Mar. 27, 2013).

⁷Under FDCCI, which OMB launched in February 2010, agencies were required to begin closing data centers. However, current OMB guidance only requires agencies to report historical cost savings and avoidances realized since fiscal year 2012.

⁸GAO, *Data Center Optimization: Continued Agency Actions Needed to Meet Goals and Address Prior Recommendations*, [GAO-18-264](#) (Washington, D.C.: May 23, 2018).

optimization performance from the 22 agencies' DCOI strategic plans. We then compared the agencies' current and planned optimization progress information to OMB's fiscal year 2018 optimization targets, as documented in its August 2016 memorandum.⁹ Although OMB's memorandum establishes a single optimization target value for the server utilization and automated monitoring metric, the IT Dashboard displays agencies' progress for tiered and non-tiered data centers separately. To report consistently with OMB's implementation memorandum, we combined the progress information for tiered and non-tiered data centers into a single assessment in this report.

In addition, to assess the reliability of the planned optimization milestones in the DCOI strategic plans, we reviewed agencies' documentation to identify any missing or erroneous data. We also compared the planned data center optimization milestones contained in agencies' documentation against current optimization progress information obtained from the IT Dashboard; we then discussed any discrepancies or potential errors that we identified with agency officials to determine the causes or request additional information. As a result of these efforts, we were able to determine whether each agency's strategic plan information was sufficiently reliable for reporting on plans to meet or not meet OMB's fiscal year 2018 optimization targets.

To assess the reliability of agencies' optimization progress information on OMB's IT Dashboard, we reviewed the information for errors or missing data, such as progress information that was not available for certain metrics. We also compared agencies' optimization progress information across multiple reporting quarters to identify any inconsistencies in agencies' reported progress. We discussed with staff from OMB's Office of the Federal Chief Information Officer any discrepancies or potential errors identified to determine the causes.

To identify effective agency practices for achieving data center closures, cost savings, and optimization progress, we selected two of the highest performing departments or agencies for each of those three data center areas that we reported on in our May 2018 report.¹⁰ For the data center inventory closures area, we selected the Departments of Agriculture (Agriculture) and Justice (Justice) from among the five agencies that had,

⁹OMB, Memorandum M-16-19.

¹⁰[GAO-18-264](#).

as of August 2017, reached or exceeded both their tiered and non-tiered data center closure targets for the end of fiscal year 2018. For the cost savings area, we identified two departments and two small agencies reporting the highest cost savings DCOI to date, as of August 2017. From those, we selected one department (Commerce) and one small agency (the General Services Administration) to provide balance relative to agency size. For effective practices related to optimization performance, we reviewed agencies' reported optimization performance as of August 2017 and selected the two highest-performing agencies in this area (the Social Security Administration and the Environmental Protection Agency), since they were the only two agencies reporting that they met more than half of OMB's optimization targets. Selecting these agencies was designed to provide anecdotal information that could assist agencies struggling with DCOI implementation. The examples they provided are not findings nor should they be taken to be representative of all the agencies participating in DCOI.

We asked each selected agency to identify practices that they found effective in implementing DCOI at their agency and in meeting OMB's established targets in each of the areas, not just the area for which they were selected. We also solicited examples that demonstrated how those practices helped agency implementation or the benefits from implementing DCOI. Additionally, we considered information and examples that these agencies provided as part of our work to identify FITARA best practices. We analyzed the responses to determine the practices and reported those that were identified by at least two agencies.

We conducted this performance audit from April 2018 to April 2019 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: Comments from the Department of Commerce



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

February 27, 2019

Ms. Carol C. Harris
Director, Information Technology
Acquisition Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

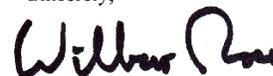
Dear Ms. Harris:

Thank you for the opportunity to review and comment on the Government Accountability Office's (GAO) draft report titled *DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals* (GAO-19-241, March 2019).

On behalf of the Department of Commerce, I have enclosed our comments on the draft report. The GAO-19-241 report on Data Center Optimization Initiative is a fair and thorough assessment of ongoing activities and progress. The Department agrees with the recommendation and is planning to close an additional 22 data centers by the end of Fiscal Year 2022.

If you have any questions, please contact Mary Ann Mausser at (202) 482-8120.

Sincerely,


Wilbur Ross

Enclosure

**Department of Commerce's Comments on
GAO Draft Report titled
DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals
(GAO-19-241, March 2019)**

The Department of Commerce has reviewed the draft report, and we concur with the recommendation.

General Comments

We do not have any comments.

Comments on Recommendations

The Government Accountability Office (GAO) made one (1) recommendation(s) to the Department of Commerce in the report.

Recommendation 1: The Secretary of Commerce should take action to meet the data center closure targets established under DCOI by OMB (page 45).

Commerce Response: The Department agrees with the recommendation and is targeting Q3 FY22 to complete this important work.

Appendix III: Comments from the Department of State



United States Department of State
Comptroller
Washington, DC 20520

FEB 27 2019

Thomas Melito
Managing Director
International Affairs and Trade
Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548-0001

Dear Mr. Melito:

We appreciate the opportunity to review your draft report, "DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals" GAO Job Code 102743.

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 Paula Lee, IT Specialist, Office of Business Management and Planning, Bureau of Information Resource Management at (202) 653-9756.

Sincerely,

A handwritten signature in blue ink that reads "Jeffrey C. Mounts".

Jeffrey C. Mounts (Acting)

Enclosure:
As stated

cc: GAO – Carol C. Harris
IRM – Karen Mummaw (Acting)
OIG - Norman Brown

Department of State Response to the Draft Report

**DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to
Meet OMB Goals**
(GAO-19-241; GAO Code 102743)

Thank you for the opportunity to comment on the GAO draft report "*Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals.*"

Recommendations:

The Secretary of State should take action to meet the data center closure targets established under DCOI by OMB [Recommendation 17]

The Secretary of State should take action to meet the data center optimization metric targets established under DCOI by OMB [Recommendation 18]

Response:

The Department of State Bureau of Information Resource Management (IRM) concurs with recommendation 17 and looks forward to working toward the applicable targets in the forthcoming guidance from OMB.

The Department of State concurs with recommendation 18. IRM continues to increase the August 2018 total by following the multi-year strategy designed to the FITARA requirement for achieving the consolidation and optimization of data centers by the end of fiscal year 2020

Appendix IV: Comments from the National Aeronautics and Space Administration

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



FEB 19 2019

Reply to Attn of: Office of the Chief Information Officer

Ms. Carol C. Harris
Director
Acquisition Management Issues
United States Government Accountability Office
Washington, DC 20548

Dear Ms. Harris:

The National Aeronautics and Space Administration (NASA) appreciates the opportunity to review and comment on the Government Accountability Office (GAO) draft report entitled, "Data Center Optimization: Additional Agency Actions Need to Meet OMB Goals" (GAO-19-241) dated December 12, 2018.

In the draft report, GAO makes one recommendation to NASA intended to drive cost savings and avoidances relating to the Data Center Optimization Initiative (DCOI). Specifically, GAO recommends the following:

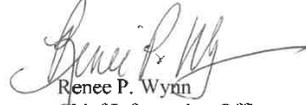
Recommendation 1: The Administrator of NASA should take action to meet the data center optimization metric targets established under DCOI by OMB.

Management's Response: NASA concurs with the recommendation. NASA will take action to meet the data center optimization metric targets established under DCOI by OMB. The DCOI metric targets that were the subject of this report expired at the end of FY18. OMB is working with Federal agencies to revise these metrics. When the new metrics are available, NASA will take action to meet the revised metrics to the extent possible.

Estimated Completion Date: February 28, 2020.

Once again, thank you for the opportunity to comment on the subject draft report. If you have any questions or require additional information, please contact Ruth McWilliams on (202) 358-5125.

Sincerely,



Renee P. Wynn
Chief Information Officer

Appendix V: Comments from the Small Business Administration



February 15, 2019

Ms. Carol C. Harris
Director, Information Technology Acquisition Management Issues
U. S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

Dear Ms. Harris:

Thank you for providing the U. S. Small Business Administration (SBA) with a copy of the Government Accountability Office (GAO) draft report titled "Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals" GAO-19-241 (102743). The draft report analyzes agencies' progress and plans for data center closures and cost savings, assessment against OMB's data center optimization targets, and identify effective agency practices for achieving those objectives. SBA reviewed the draft report and agrees with the one recommendation GAO issued to SBA.

Recommendation 33: The Administrator of the Small Business Administration should take action to meet the data center optimization metric targets established under DCOI by OMB.

SBA Response: Concur. SBA Office of the Chief Information Officer (OCIO) and the appropriate program offices will develop further plans to meet the data center optimization metric targets established under DCOI by OMB. As referenced in this report, OMB recently changed the data center optimization metrics. As such, SBA is revising SBA's DCOI plan and anticipates completion of its revised DCOI plan in March 2019. Due to the changes in DCOI metrics, SBA's action plan and date to meet these revised DCOI metrics is to be determined.

Thank you for the opportunity to comment on this draft report.

Sincerely,

MARIA ROAT
Digitally signed by MARIA
ROAT
Date: 2019.02.15 12:53:58
-05'00'

Maria Roat
Chief Information Officer

Appendix VI: Comments from the Social Security Administration



SOCIAL SECURITY
Office of the Commissioner

January 10, 2019

Ms. Carol C. Harris
Director, Information Technology
Acquisition Management Issues
United States Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Harris:

Thank you for the opportunity to review the draft report, "DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals" (GAO-19-241). Please see our enclosed comments.

If you have any questions, please contact me at (410) 965-9704. Your staff may contact Trae Sommer, Acting Director of the Audit Liaison Staff, at (410) 965-9102.

Sincerely,

A handwritten signature in blue ink that reads "Stephanie Hall".

Stephanie Hall
Acting Deputy Chief of Staff

Enclosure

SOCIAL SECURITY ADMINISTRATION BALTIMORE, MD 21235-0001

SSA COMMENTS ON THE GOVERNMENT ACCOUNTABILITY OFFICE DRAFT REPORT, "DATA CENTER OPTIMIZATION: ADDITIONAL AGENCY ACTIONS NEEDED TO MEET OMB GOALS" (GAO-19-241)

GENERAL COMMENTS

In accordance with the Office of Management and Budget's (OMB) Data Center Optimization Initiative (DCOI) mandate M-16-19, we will work to ensure we properly measure items that yield optimal information technology operations and efficiencies. We continue to engineer and implement data center optimization management to improve energy and cooling efficiency at both our data centers. We will also continue to automate asset inventory into the Data Center Infrastructure Management tool to include application mapping.

Our responses to the recommendations are below.

SSA's Recommendation 1 – GAO's Recommendation 34

Take action to meet the data center-related cost savings established under DCOI by OMB.

Response

We agree.

SSA's Recommendation 2 – GAO's Recommendation 35

Take action to meet the data center optimization metric targets established under DCOI by OMB.

Response

We agree.

Appendix VII: Comments from the Department of Energy



Department of Energy
Washington, DC 20585

January 10, 2019

Ms. Carol C. Harris
Director, Information Technology and Management Issues
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Ms. Harris:

Thank you for the opportunity to provide the Department of Energy's (DOE or Department) management response to the Government Accountability Office's (GAO) draft report *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals (GAO-19-241)*. We understand that GAO conducted this audit to (1) determine agencies' progress in data center closures and achievement in related savings to date and describe plans for future closures and savings; (2) assess agencies' progress against Office of Management and Budget's (OMB's) data center optimization targets and (3) identify effective agency practices for achieving data center closures, cost savings, and optimization progress.

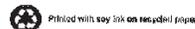
DOE concurs with the recommendations, and continues to work toward meeting or exceeding its targeted metrics and closure goals established under OMB's Data Center Optimization Initiative (DCOI). Details are in the attached Enclosure.

Please direct your questions to Pamela Isom, Office of Architecture, Engineering Technology and Innovation, Office of the Chief Information Officer (OCIO), at 202-287-1450 or via e-mail to Pamela.isom@hq.doe.gov.

Sincerely,

Stephen (Max) Everett
Chief Information Officer

Enclosure



MANAGEMENT RESPONSE
GAO Draft Report, GAO-19-241
*DATA CENTER OPTIMIZATION:
Additional Agency Actions Needed to Meet OMB Goals
(Job Code 102743)*

Recommendation 6: The Secretary of Energy should take action to meet the data center closure targets established under DCOI by OMB.

Management Decision: Concur

DOE continues to make progress toward meeting its target goals for data center closure. To date, we have closed 98 data centers (23 tiered and 75 non-tiered).

On November 26, 2018, OMB published a new draft Data Center Optimization Initiative (DCOI) Memorandum changing the focus from closure to optimizing data centers. This memorandum revises the definition of Data Center, which may require reclassifying a number of our non-tiered data centers to 'invalid', thus potentially removing a significant number of entries from our reported inventory.

The OMB's draft memorandum requires agencies to identify "Key Mission Facility" data centers. Data centers identified as "Key Mission Facility" may be exempt from closure and performance reporting. This will reduce the number of data center closures needed to meet our goals.

DOE has initiated an update of our automated reporting platform with the appropriate definitions and metric fields in order to capture the new reporting requirements. We will update our DCOI Implementation Plan and schedule to reflect the new changes.

Estimated Completion Date: March 1, 2019

Recommendation 7: The Secretary of Energy should take action to meet the data center optimization metric targets established under DCOI by OMB.

Management Decision: Concur

DOE will continue to work to meet or exceed its targeted metrics.

On November 26, 2018, OMB published a new draft DCOI Memorandum changing the key metric requirements for each Agency. The changes in performance metrics have a significant impact to the overall reporting. For example, Power Usage Effectiveness (PUE), and Facilities Utilization are no longer required reporting metrics. The draft memorandum modified other metrics such as Virtualization, Energy Metering, and Server Utilization and added new metrics w, such as, Data Center Availability and Underutilized Servers.

DOE has initiated updates to our automated reporting platform with the appropriate metric fields in order to capture the new reporting requirements. The Department put into place Data Center Information Management (DCIM) software that will enable each data center to measure its operations at an enterprise level. We will update our DCOI Implementation Plan and schedule to reflect the new changes.

Estimated Completion Date: March 1, 2019

Appendix VIII: Comments from the Department of Veterans Affairs



THE SECRETARY OF VETERANS AFFAIRS
WASHINGTON

January 22, 2019

Ms. Carol C. Harris
Director
Information Technology
Acquisition Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Harris:

The Department of Veterans Affairs (VA) has reviewed the Government Accountability Office (GAO) draft report: ***"DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals"*** (GAO-19-241).

The enclosure sets forth the actions to be taken to address the draft report recommendations.

VA appreciates the opportunity to comment on your draft report.

Sincerely,

A handwritten signature in blue ink that reads "Robert L. Wilkie".

Robert L. Wilkie

Enclosure

Enclosure

Department of Veterans Affairs (VA) Comments to
Government Accountability Office (GAO) Draft Report
**"DATA CENTER OPTIMIZATION: Additional Agency
Actions Needed to Meet OMB Goals"**
(GAO-19-241)

Recommendation 1: The Secretary of VA should take action to meet the data center closure targets established under DCOI by OMB. (Recommendation 22)

VA Comment: Concur. The Department of Veterans Affairs (VA) is committed to working with the Office of Management and Budget (OMB) to meet all Data Center Optimization Initiative (DCOI) requirements. Over the past year, VA Office of Information and Technology (OIT) has closely collaborated with OMB to identify synergies and weaknesses to improve the way in which OMB evaluates VA (and other agencies) progress towards meeting OMB requirements (VA is submitting a briefing to OMB, Attachment A, as an example of VA's ongoing collaboration with OMB on data center optimization). Currently, OMB is drafting new guidance on data center consolidation and optimization efforts for Federal agencies (Attachment B). The draft is available for public comment, and the final version is expected to be released early in 2019.

OIT, in concert with OMB, evolved its data center program to better meet the data center closure targets established under DCOI and prepare for the new guidance. The new program leveraged feedback from Area Managers to build a user-friendly tool to collect input for the data center inventory, making it easier for staff to report. A memorandum introducing the new program, as well as OIT-developed user guides are attached, illustrating VA's effort to collaborate with IT and non-IT staff to collect information outside of the required OMB fields to populate a comprehensive inventory (Attachments C, D, and E). VA has continued to evolve its tool and user guides to conform with the new OMB policy on data centers.

The new program also focused on educating Area Managers and non-OIT stakeholders on Federal data center inventory requirements to further improve accuracy and efficiency of reported data center information. This upgraded methodology was designed to meet the OMB reporting requirements by collecting relevant information and inventory that can be used to better identify data centers to consolidate or close. OIT's new program has already produced results which will help inform implementation of OMB's anticipated new guidance. For example, VA closed 78 data centers in Fiscal Year (FY) 2018, a significant increase from the 24 data centers closed in FY 2017 (as reported in VA's November 2018 DCIO Inventory Submission to OMB, Attachment F). Because of the collaborative work between OIT and OMB, OIT is prepared to continue this positive trend of data center closures and meet OMB's requirements. Based on the above described actions, OIT requests closure of the recommendation.

Enclosure

Department of Veterans Affairs (VA) Comments to
Government Accountability Office (GAO) Draft Report
**"DATA CENTER OPTIMIZATION: Additional Agency
Actions Needed to Meet OMB Goals"**
(GAO-19-241)

Recommendation 2: The Secretary of VA should take action to meet the data center-related cost savings established under DCOI by OMB. (Recommendation 23)

VA Comment: Concur. During monthly program update meetings held between OIT and OMB, OIT discussed the feasibility and financial impact associated with meeting data center-related cost savings established under DCOI (M-16-19). Given the VA environment, most of VA's data center closures are due to consolidation efforts (i.e., moving servers from one room to another) rather than the elimination of physical space. OMB agreed that the \$85.35 million target set by DCOI would not be feasible for VA to achieve.

OMB's new guidance will shift its focus away from cost savings realized from closures and will instead center on savings from optimization efforts. To prepare for OMB's new requirements, OIT is working with non-OIT staff to use tools that provide visibility into VA's assets and leverage virtualizing capabilities. Consistent with OMB's new guidance, VA will focus on cost savings realized through optimization efforts, such as virtualizing services whenever feasible. OMB's draft guidance is enclosed (Attachment C). The target completion date is March 2019.

Recommendation 3: The Secretary of VA should take action to meet the data center optimization metric targets established under DCOI by OMB. (Recommendation 24)

VA Comment: Concur. VA has taken action to meet the data center optimization metrics targets established by OMB. As part of VA's effort, OIT has established a Tiger Team to deploy discovery tools to locate assets and leverage virtualization services, as well as monitoring tools. This will help ascertain the following:

- Number of hours of unplanned outages in data centers;
- Number of planned hours of data center availability; and
- Impacts to major systems in data centers.

Additionally, these tools will help VA improve its optimization efforts, including power consumption, underutilized servers, and efficient use of physical and virtual resources. This will allow VA to meet optimization metrics set forth by OMB guidance. The target completion date is March 2019.

Appendix IX: Comments from the Department of Defense



CHIEF INFORMATION OFFICER

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

JAN 31 2019

Ms. Carol C. Harris
Director, Information Technology
U.S. Government Accountability Office
441 G Street, NW, Washington, DC 20548

Dear Ms. Harris:

This is the Department of Defense (DoD) response to the GAO Draft Final Report, GAO-19-241, "DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals," dated December 12, 2018 (GAO Code 102743). The Department is in general agreement with the overall content of the draft final audit report. Enclosed are detailed comments on the report recommendations.

The Department appreciates the opportunity to review the final report. The point of contact for this matter is Bob Brown, james.r.brown632.civ@mail.mil, (571) 372-4445.

Sincerely,

A handwritten signature in black ink, appearing to read "Dana Deasy".

Dana Deasy

Enclosure:
As stated

ENCLOSURE

GAO FINAL REPORT DATED DECEMBER 12, 2018
GAO-19-241 (GAO CODE 102743)

“DATA CENTER OPTIMIZATION: ADDITIONAL AGENCY ACTIONS NEEDED TO
MEET OMB GOALS”

DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATION

RECOMMENDATION 3: The Secretary of Defense should take action to meet the data center closure targets established under DCOI by OMB.

DoD RESPONSE: Concur. DoD will continue to take action to meet the data center closure targets established under OMB’s DCOI guidance. Beyond the measures DoD has already taken to expedite data center closures (e.g., numerous Joint Base and Agency site assessments and closure directives), DoD CIO is revising its Data Center Reference Architecture to eliminate the Installation Processing Node (IPN) data center and directing DoD Components to migrate associated workloads to enterprise level data centers and approved DoD cloud environments. Finally, OMB’s anticipated changes to DCOI will include an exclusion of non-severable data center-like facilities, which will reduce the affected data center population. These actions will enable DoD to achieve OMB prescribed closure targets.

RECOMMENDATION 4: The Secretary of Defense should identify additional savings opportunities to achieve the targets for data center-related cost savings established under DCOI by OMB.

DoD RESPONSE: Partially concur. DoD has already identified significant cost savings through the identification of system migration candidates, the optimization of its enterprise computing environment, and past data center closure activity, and the use of cloud services. While DoD continues to optimize its data centers, the need for IT will continue to grow. This growth in IT demand may ultimately lead to an increase in total data center costs despite the overall per unit cost reductions.

RECOMMENDATION 5: The Secretary of Defense should take action to meet the data center optimization metric targets established under DCOI by OMB.

DoD RESPONSE: Partially concur. As discussed, DoD will continue to drive towards the achievement of data center optimization targets, to include the identification of additional data centers for closure. However, DoD will not invest resources into improving the efficiency of these closing data centers. Therefore, while DoD continues to optimize, composite views of DoD’s data center efficiency will fall short of meeting OMB’s efficiency targets. DoD will focus its energy and resources on ensuring that the enterprise-level data centers, which comprise the target end-state, meet or exceed OMB prescribed efficiencies.

Appendix X: Comments from the Department of Homeland Security



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

**Homeland
Security**

March 1, 2019

Carol C. Harris
Director, Information Technology
Acquisition Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: Management Response to Draft Report GAO-19-241, "DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals"

Dear Ms. Harris:

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

The Department is pleased to note GAO's positive recognition of DHS' progress on achieving Office of Management and Budget (OMB) Federal data center optimization objectives. DHS continues to optimize its physical data center footprint and has closed a total of 55 data centers as part of consolidation efforts. DHS remains committed to optimizing data center service delivery by leveraging Cloud hosting options¹.

The draft report contained two recommendations, one with which the Department concurs and one with which it non-concurs. While the draft report provides valuable insights, recent updates by OMB to data center optimization initiative (DCOI) guidance essentially negate GAO's recommendations. This is because data centers affected either have already been exempted from DCOI closure and other optimization requirements or are currently being reviewed for exemption which we anticipate will occur. Attached find our detailed response to the recommendations. Technical comments were previously provided under separate cover.

¹ DHS adopted the National Institute of Standards and Technology (NIST) definitions of the Cloud, including Public, Community, Hybrid, and Private clouds. DHS's use of Cloud technology will reduce the need for legacy data centers. As part of ongoing efforts to optimize our remaining data centers, DHS is committed to adopting Hybrid and Private cloud computing as the primary modernization and optimization pathway.

Again, thank you for the opportunity to review and comment on this draft report. Please feel free to contact me if you have any questions. We look forward to working with you again in the future.

Sincerely,



JIM H. CRUMACKER, CIA, CFE
Director
Departmental GAO-OIG Liaison Office

Attachment

Attachment: Management Response to Recommendations Contained in GAO 19-241 Draft Report

GAO recommended that the Secretary of Homeland Security:

Recommendation 10: Take action to meet the data center closure targets established under DCOI by OMB.

Response: Concur. DHS has already met OMB’s tiered data center closure target and an FY 2018 update to the DCOI guidance exempts DHS’ 18 non-tiered data centers. More specifically:

Tiered Summary: DHS met OMB’s closure metric for Tiered data centers as of August 2018, and has closed 2 additional Tiered sites, as of the November 2018 Integrated Data Call (IDC) update. In addition, DHS has met GAO’s version of the Tiered closure metric (which incorporates data back to 2010), and the Department previously met the overall Federal Data Center Consolidation Initiative 40 percent closure metric for all sites (Tiered and non-Tiered).

OMB-IT Dashboard version: Tiered Closure Metric Target for DHS	DHS Progress Toward Metric (As of November 2018)	Status
6 Tiered sites Closed based on the DCOI re-baseline	8	Met

GAO version: Tiered Closure Metric Target for DHS	DHS Progress Toward Metric (As of November 2018 data call)	Status
25 percent of Tiered (Valid) inventory	46 percent	Met

Non-Tiered Summary: During FY 2018, OMB engaged in extensive working group discussions with Federal agencies, including DHS, to weigh the benefits against the burden of the original optimization requirements placed on agency owned data centers.

As a result, OMB issued a change in DCOI guidance in the November 2018 OMB IDC. This change provides that tiered and non-tiered data centers that house non-severable systems and services are not suitable for improvements targeted by the original DCOI performance measures. Therefore, per OMB November 2018 updates to DCOI guidance, such data centers are exempt from both DCOI closure and optimization requirements.

- DHS closed 6 non-tiered data centers prior to the updated November 2018 DCOI guidance
- DHS is currently reviewing the status of 18 open non-tiered collocated, outsourced, or consolidated data centers including laboratories, training facilities, and other key mission facilities. We believe that most, if not all, will be found to meet the requirements of non-severable systems and services that are not suitable for the original DCOI performance requirements. Final decisions and updates will be included at the IT Dashboard for the February 2019 OMB IDC.

Estimated Completion Date: March 31, 2019.

Recommendation 11: Take action to meet the data center optimization metric targets established under DCOI by OMB.

Response: Non-concur. This recommendation was applicable to DHS agency owned data centers under original OMB DCOI guidance published in 2016. At that time, automation requirements in agency owned tiered and non-tiered data centers were at the heart of the DCOI performance requirements on which this recommendation is based.

However, the DCOI changes OMB promulgated for the November 2018 IDC, which apply to agency owned tiered and non-tiered data centers that house non-severable systems and services, state these concerns are not suitable for improvements targeted by the original DCOI performance measures. After review of each of 7 tiered and 2 non-tiered agency-owned data centers, DHS determined that these 9 agency-owned data centers are exempt from both DCOI closure and optimization requirements.

DHS tiered and non-tiered agency owned data centers are in the category of facilities that house non-severable systems and services and DHS is in process of updating all reports to OMB to identify these data centers as exempt from DCOI closure and optimization requirements.

- Seven DHS tiered agency owned data centers, representing less than 8 percent of DHS data center gross floor area (GFA), corrected their status to non-severable in the November 2018 IDC exempting them from closure and optimization requirements.
- Five DHS non-tiered agency owned data centers, representing less than 5 percent of DHS data center GFA will update their status to non-severable in the February 2018 IDC exempting them from closure and optimization requirements.

These corrections exempt all DHS agency owned data centers from DCOI closure and compliance requirements that are encompassed in this recommendation and OMB guidance, which apply only to agency owned data centers. Consequently, DHS is no longer required to close or optimize this very narrow and small percent of our overall data center GFA.

We request that GAO consider this recommendation resolved and closed as implemented.

Appendix XI: Comments from the Department of the Interior



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

FEB 19 2019

Ms. Carol C. Harris
Director, Information Technology Acquisition
Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Harris:

Thank you for giving the Department of the Interior (Department) the opportunity to review and comment on the draft Government Accountability Office (GAO) report entitled, *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals* (GAO-19-241). We appreciate GAO's review of data center optimization.

GAO issued several recommendations including three to the Department. Below is a summary of actions planned to implement the recommendations:

Recommendation 12: The Secretary of the Interior should take action to meet the data center closure targets established under the Data Center Optimization Initiative (DCOI) by the Office of Management and Budget (OMB).

Response: The Department partially concurs with recommendation 12. The Department exceeded OMB targets for "Tiered" data centers and applied cost-benefit and mission-need criteria to decide which non-tiered data centers to close. In November 2018, OMB published proposed changes to DCOI¹ policy that will result in new targets replacing the old targets. Therefore, the Department will adopt the new DCOI² policy and work through OMB to establish the new targets.

Recommendation 13: The Secretary of the Interior should take action to meet the data center-related cost savings established under DCOI by OMB.

Response: The Department does not concur with recommendation 13, because we recognize the existing guidance will soon be revised. In November 2018, OMB published proposed changes to DCOI policy that will result in new cost-savings goals replacing the old goals. Therefore, the

¹ OMB Published Proposed Changes to DCOI in November 2018, page 16 of GAO-19-241 Draft Report

² OMB, Data Center Optimization Initiative, accessed November 26, 2018, <https://datacenters.cio.gov/policy/>

Department will adopt the new DCOI policy and work through OMB to establish the new cost-savings goals once the new guidance becomes final.

Recommendation 14: The Secretary of the Interior should take action to meet the data center optimization metric targets established under DCOI by OMB.

Response: The Department does not concur with recommendation 14, because we recognize the existing guidance will soon be revised. In November 2018, OMB published proposed changes to DCOI policy that will result in revised metrics. Therefore, the Department will adopt the new DCOI policy and work through OMB to establish the metric targets once the new guidance becomes final.

If you have any questions or need additional information, please contact Bruce Downs, Acting Chief Information Officer at Bruce_Downs@ios.doi.gov.

Sincerely,



Scott J. Cameron
Principal Deputy Assistant Secretary
for Policy, Management and Budget

Appendix XII: 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

JAN 11 2019

Carol C. Harris
Director, Information Technology
Acquisition Management Issues
U.S. Government Accountability Office
441 G Street NW
Washington, DC 20548

Dear Ms. Harris:

Attached are comments on the U.S. Government Accountability Office's (GAO) report entitled, "*Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals*" (GAO-19-241).

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

Sincerely,

A handwritten signature in blue ink, appearing to read "Matthew D. Bassett".

Matthew D. Bassett
Assistant Secretary for Legislation

Attachment

GENERAL COMMENTS FROM THE DEPARTMENT OF HEALTH & HUMAN SERVICES ON THE GOVERNMENT ACCOUNTABILITY OFFICE'S DRAFT REPORT ENTITLED – DATA CENTER OPTIMIZATION: ADDITIONAL AGENCY ACTIONS NEEDED TO MEET OMB GOALS (GAO-19-241)

The U.S. Department of Health & Human Services (HHS) appreciates the opportunity from the Government Accountability Office (GAO) to review and comment on this draft report.

Recommendation 8

The Secretary of HHS should take action to meet the data center closure targets established under Data Center Optimization Initiative (DCOI) by the Office of Management and Budget (OMB).

HHS Response

HHS non-concurs with GAO's recommendation.

While HHS did meet the tiered data center closure target under the previous DCOI closure targets, HHS does not concur with continuing to meet the expired requirements and looks forward to achieving the new targets proposed by OMB. As the old targets may no longer apply as intended, HHS would not be as prudent as possible with public funds expending resources to meet a prior measures that are no longer valid.

Recommendation 9

The Secretary of HHS should take action to meet the data center optimization metric targets established under DCOI by OMB.

HHS Response

HHS non-concurs with GAO's recommendation.

HHS does not concur with continuing to meet the expired requirements and looks forward to achieving the new targets proposed by OMB. As the old targets may no longer apply as intended, HHS would not be as prudent as possible with public funds expending resources to meet a prior measures that are no longer valid.

Appendix XIII: Comments from the Environmental Protection Agency



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

MAR 05 2019

OFFICE OF
MISSION SUPPORT

Carol C. Harris
Director, Information Technology Acquisition Management Issues
U.S. Government Accountability Office
441 G St. NW
Washington, DC 20548

Dear Ms. Harris:

The Office of Mission Support (formerly the Office of Environmental Information (OEI)) reviewed the Final Report, GAO-19-241, *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals* (102743). The purpose of this memorandum is to provide the Environmental Protection Agency's (EPA's) response to the report. In the Draft Report, GAO had two recommendations for the EPA.

Recommendation 1

GAO recommends that, "The Administrator of the Environmental Protection Agency should take action to meet the data center closure targets established under DCOI by OMB."

Response:

EPA has taken the steps necessary to meet data center closure targets as established in accordance with OMB Memorandum, M-16-19, *Data Center Optimization Initiative (DCOI)*. To date, EPA has successfully closed 21 out of the targeted 34 data centers. In November 2018, OMB released a draft memorandum establishing a new DCOI which will effectively rescind OMB M-16-19 and provide new guidelines to achieve targeted improvements in key optimization areas. EPA has reviewed and provided comments on the draft memorandum. In anticipation of the final release of the updated DCOI policy, EPA has started preparatory activities to achieve the updated DCOI requirements and work with OMB to formalize new targets for data center closures and other performance metrics. Given the anticipated release of OMB's new DCOI policy and EPA's current data center closure rate, EPA recommends this recommendation be closed.

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Recommendation 2

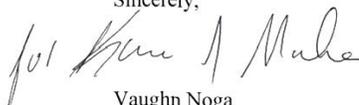
GAO recommends that, "The Administrator of EPA should take action to meet the data center optimization metric targets established under DCOI by OMB."

Response:

EPA worked to achieve the data center optimization metrics in accordance with M-16-19 and successfully met or exceeded 3 of the 5 metrics (energy metering, PUE, and virtualization ratio). As referenced above, OMB is in the process of establishing a new DCOI. On review of this document, the data center optimization metrics will be defined by an agency which may result in metrics different from those outlined in M-16-19. EPA has already started preparatory activities to define data center optimization metrics and will work with OMB to formalize these metrics. Given the anticipated release of OMB's new DCOI policy and the change in the data center optimization metrics, EPA recommends this recommendation be closed.

We appreciate the opportunity to respond to the recommendations. If you require additional information or would like to discuss further, please contact Patricia Williams (202) 564-0204.

Sincerely,



Vaughn Noga
Chief Information Officer
and Deputy Assistant Administrator for
Environmental Information

cc: Bob Trent, OCFO
Brian Epley, OMS/OITO
Patricia Randolph Williams, OMS/ORBO
Janice Jablonski, OMS/ORBP
Juanita Standifer, OMS/ORBO
Justin Booth, GAO
Tim Thorpe, OMS/OITO/EHD
Brenda Young, OMS/OITO
Charleen Townsend, OMS/OITO
Lynsey Lanier, OMS/OITO

Appendix XIV: Comments from the General Services Administration



The Administrator

January 31, 2019

The Honorable Gene L. Dodaro
Comptroller General of the United States
U.S. 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 Government Accountability Office (GAO) draft report titled *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals* (GAO-19-241).

There is one recommendation addressed to the Administrator of General Services:

- The Administrator of General Services should take action to meet the data center optimization metric targets established under the Data Center Optimization Initiative by the Office of Management and Budget (OMB) (Recommendation 27).

In November 2018, after data was provided for the draft report, OMB eliminated non-tiered data centers from the reporting requirements for the "Server Utilization and Automated Monitoring" metric, which was the only metric applicable to GSA. As a result, GSA no longer has a basis to measure and report on this metric. In light of this development, GSA respectfully requests that GAO consider withdrawing its recommendation.

Additionally, GSA respectfully requests correction to a typographical error in the draft report that overstates GSA's savings:

On Page 27, Table 2, Column 3 ("Additional planned [savings] through 2018"), the report reflects that GSA's additional planned savings was \$8.04 million. However, in August 2018, GSA reported its achieved savings as \$7.37 million and its additional planned savings as \$0.67 million. It appears that GAO may have mistakenly added these two figures and used the sum (\$8.04 million) as GSA's additional planned savings. Column 3 of this table should be revised to reflect that GSA's additional planned savings is \$0.67 million. This also necessitates a change to Column 4 ("Difference between OMB target and agencies' planned and achieved savings"), from \$7.06 million to \$0.31 million.

Based on the figures reported in August, GSA's total achieved and planned savings would have been \$8.04 million, which is below the \$8.35 million goal assigned by OMB. However, by the end of FY 2018, GSA exceeded its

1800 F Street, NW
Washington, DC 20405-0002
www.gsa.gov

2

additional planned savings amount, and actually saved \$1.44 million. This brings GSA's actual total savings to \$8.81 million, which exceeds the assigned goal.

If you have any questions, please contact me at (202) 501-0800 or Mr. Jeffrey A. Post, Associate Administrator, Office of Congressional and Intergovernmental Affairs, at (202) 501-0563.

Sincerely,



Emily W. Murphy
Administrator

cc: Ms. Carol C. Harris, Director, Information Technology Acquisition Management
Issues, GAO

Appendix XV: Comments from the National Science Foundation



National Science Foundation
Office of the Chief Information Officer

February 15, 2019

Ms. Carol Harris
Director, Information Technology Management Issues
U.S. Government Accountability Office
441 G St., NW
Washington DC 20226

Dear Ms. Harris:

Thank you for the opportunity to review and comment on the Government Accountability Office (GAO) draft report entitled *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals (GAO-19-241)*. Our response to your recommendation is provided below.

Recommendation 29: "The Director of NSF should take action to meet the data center optimization metric targets established under DCOI by OMB."

NSF RESPONSE: As identified in GAO's report, NSF has addressed all five required elements of a strategic plan for data center optimization as identified by the Office of Management and Budget (OMB), and has met three of five metric targets established under the Data Center Optimization Initiative (DCOI) by OMB. Understanding that OMB is planning to develop new guidance and metrics for data center optimization metrics, NSF will continue to work with OMB to update savings and closure targets appropriate to mission and budget with consideration to overall agency status and progress on data center optimization efforts.

NSF is committed to implementing appropriate improvements to ensure that the Foundation maintains sound IT management policies, and we appreciate GAO's work and continued interest in this area. If you have any questions, please contact Veronica Shelley, NSF Liaison to the GAO, at (703)-292-4384 or vshelley@nsf.gov.

Sincerely,

A handwritten signature in cursive script, appearing to read 'D. Aronson'.

Dorothy Aronson
Chief Information Officer

2415 Eisenhower Avenue | Alexandria, VA 22314

Appendix XVI: Comments from the Nuclear Regulatory Commission



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

January 7, 2019

Ms. Carol C. Harris, Director
Information Technology Acquisition Management Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, D.C. 20548

Dear Ms. Harris:

Thank you for giving the U.S. Nuclear Regulatory Commission (NRC) the opportunity to review and comment on the U.S. Government Accountability Office's (GAO) draft report GAO-19-0241, "Data Center Optimization: Additional Agencies Actions Needed to Meet OMB Goals." The NRC has reviewed the draft report, is in general agreement with it, and does not have any comments.

If you have any questions regarding the NRC's response, please contact Sara Mroz by phone at (301) 415-2900 or by e-mail at Sara.Mroz@nrc.gov.

Sincerely,

A handwritten signature in blue ink that reads "Margaret M. Doane".

Margaret M. Doane
Executive Director
for Operations

Appendix XVII: Comments from the U.S. Agency for International Development



Carol C. Harris
Director
Information Technology Acquisition Management Issues
U.S. Government Accountability Office
441 G Street, N.W.
Washington, DC 20226

FEB 15 2019

Re: DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals (GAO-19-241)

Dear Ms. Harris:

I am pleased to provide the formal response of the U. S. Agency for International Development (USAID) to the draft report produced by the U.S. Government Accountability Office (GAO) entitled, "*DATA CENTER OPTIMIZATION: Additional Agency Actions Needed to Meet OMB Goals*" (GAO-19-241).

USAID is committed to supporting improvements in the efficiency, performance, and the environmental footprint of Federal data centers. The GAO acknowledges this commitment in the text of the draft report by recognizing that USAID is one of only two Federal Departments or Agencies that reported a plan to meet fully their applicable targets under the Data Center Optimization Initiative (DCOI) established by the Office of Management and Budget (OMB) for the end of Fiscal Year 2018. Accordingly, USAID has complied with its DCOI targets, and closed all four of the Agency's data centers. USAID appreciates this opportunity to provide documentation of its compliance with OMB's goals, and our implementation of the one recommendation the GAO issued to USAID in the draft report.

I am transmitting this letter and the enclosed comments from USAID for inclusion in the GAO's final report. Thank you for the opportunity to respond to the draft report, and for the courtesies extended by your staff while conducting this engagement. We appreciate the opportunity to participate in the complete and thorough evaluation of the management of our responsibilities under the DCOI.

Sincerely,

A handwritten signature in blue ink, appearing to read "Angelique M. Crumbly".

Angelique M. Crumbly
Acting Assistant Administrator
Bureau for Management

Enclosure: a/s

**COMMENTS BY THE U. S. AGENCY FOR INTERNATIONAL DEVELOPMENT ON
THE DRAFT REPORT PRODUCED BY THE U. S. GOVERNMENT
ACCOUNTABILITY OFFICE (GAO) ENTITLED, *DATA CENTER OPTIMIZATION:
Additional Agency Actions Needed to Meet OMB Goals (GAO-19-241)***

The U.S. Agency for International Development (USAID) would like to thank the U.S. Government Accountability Office (GAO) for the opportunity to respond to this draft report. We appreciate the extensive work of the GAO's engagement team, and the specific finding that will help USAID achieve greater effectiveness in managing our information-technology (IT) resources.

USAID has committed to meet established Federal goals for reducing the number of data centers; lowering the cost of the IT hardware and software for, and the operations of, data centers; increasing the overall IT-security posture of the Federal Government; and shifting IT investments to more efficient computing platforms and technologies.

As noted in the GAO draft report, USAID does not have any tiered data centers. Therefore, the Agency focused on plans to meet the one optimization metric established by the Office of Management and Budget (OMB) applicable to our non-tiered data centers (the utilization of servers, and automated monitoring).

The report contains one recommendation for USAID:

The Administrator of USAID should take action to meet the data center closure targets established under the Data Center Optimization Initiative (DCOI) by OMB.

USAID has met OMB's targets for closing data centers established under DCOI. USAID's specific goal under DCOI was to close its four data centers, and the Agency has accordingly done so according to the following schedule:

Data Center 1: closed in the Second Quarter of Fiscal Year (FY) 2017;

Data Center 2: closed in the Third Quarter of FY 2018;

Data Center 3: closed in the Third Quarter of FY 2018; and

Data Center 4: closed in the Third Quarter of FY 2018.

USAID is submitting its encrypted DCOI submission for the Fourth Quarter of FY 2018, which indicates and documents the closures of the data centers. USAID has submitted its updated DCOI strategic plan to OMB's IT Dashboard on December 21, 2018 to reflect our compliance with the closure target. USAID requests that GAO close this recommendation upon issuance of the final report.

Appendix XVIII: GAO Contact and Staff Acknowledgments

GAO Contact

Carol C. Harris, (202) 512-4456 or harriscc@gao.gov

Staff Acknowledgments

In addition to the contact named above, individuals making contributions to this report included Dave Powner (director), Dave Hinchman (assistant director), Justin Booth (analyst-in-charge), Alexander Bennett, Chris Businsky, Nancy Glover, and Jonathan Wall.

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