



March 2021

DATA CENTER OPTIMIZATION

Agencies Report
Progress and Billions
Saved, but OMB
Needs to Improve Its
Utilization Guidance

Accessible Version



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GAO Highlights

Highlights of [GAO-21-212](#), a report to congressional committees

March 2021

DATA CENTER OPTIMIZATION

Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance

Why GAO Did This Study

In December 2014, Congress enacted federal IT acquisition reform legislation known as FITARA, which 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 and improve federal data centers' performance.

FITARA included a provision for GAO to annually review agencies' data center inventories and strategies. This report addresses (1) agencies' progress on data center closures and the related savings that have been achieved, and agencies' plans for future closures and savings; (2) agencies' progress against OMB's data center optimization targets; and (3) the effectiveness of OMB's metric for server utilization and how the agencies are implementing it. To do so, GAO reviewed the 24 DCOI agencies' data center inventories as of August 2020, their reported cost savings documentation and data center optimization strategic plans, and OMB's revised utilization metric.

What GAO Recommends

GAO reiterates that agencies need to address the 53 recommendations previously made to them that have not yet been implemented. GAO is making one new recommendation to OMB to revise its server utilization metric to more consistently address server efficiency. OMB had no comments on the report and the recommendation directed to the agency. Of the 24 DCOI agencies, five agreed with the information in the report, six did not state whether they agreed or disagreed, and 13 had no comments.

View [GAO-21-212](#). For more information, contact Carol C. Harris, (202) 512-4456 or harriscc@gao.gov

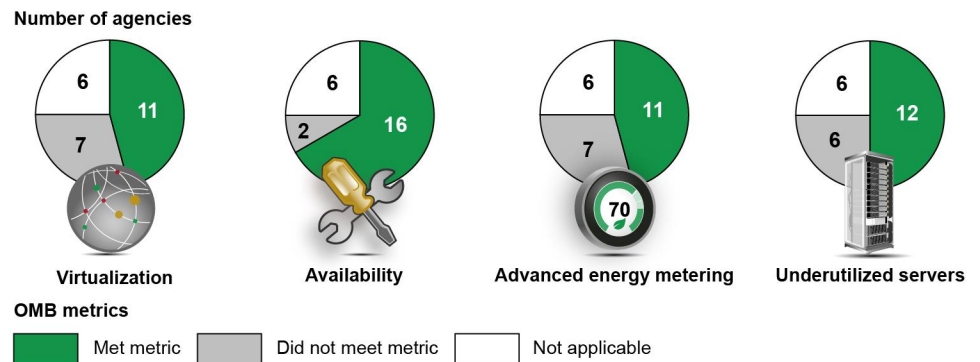
What GAO Found

The 24 agencies participating in the Office of Management and Budget's (OMB) Data Center Optimization Initiative (DCOI) continue to report progress toward meeting OMB's goals for closing data centers and achieving the related cost savings. According to data submitted by the 24 agencies, almost all of them met or planned to meet their closure and cost savings goals for fiscal years 2019 and 2020. As of August 2020, the agencies reported that they expected to achieve 230 data center closures, resulting in \$1.1 billion in savings, over the 2-year period. Agencies expected to realize a cumulative total of \$6.24 billion in cost savings and avoidances from fiscal years 2012 through 2020.

However, agencies have excluded approximately 4,500 data centers from their inventories since May 2019 due to a change in the definition of a data center. Specifically, in June 2019, OMB narrowed the definition of a data center to exclude certain facilities it had previously identified as having potential cybersecurity risks. GAO reported that each such facility provided a potential access point, and that unsecured access points could aid cyber attacks. Accordingly, GAO recommended that OMB require agencies to report those facilities previously reported as data centers so that visibility of the risks of these facilities was retained. However, OMB has not taken action to address the recommendation. Overall, GAO has made 125 recommendations since 2016 to help agencies meet their DCOI goals, but agencies have not implemented 53.

The 24 agencies reported varied progress against OMB's data center optimization targets for fiscal year 2020 (see figure).

Agency-Reported Progress towards Meeting Office of Management and Budget (OMB) Data Center Optimization Targets, as of August 2020



Source: GAO analysis of data from OMB's Information Technology Dashboard. | GAO-21-212

Data table for Agency-Reported Progress towards Meeting Office of Management and Budget (OMB) Data Center Optimization Targets, as of August 2020

	Met	Not Met	N/A
Virtualization	11	7	6
Availability	16	2	6
Advanced energy metering	11	7	6
Underutilized servers	11	7	6

Notes: Virtualization measures the number of servers and mainframes serving as a virtual host. Advanced energy metering counts data centers with metering to measure energy efficiency. A metric is not applicable if an agency does not have any agency-owned data centers or if its remaining centers are exempted from optimization by OMB.

In June 2019, OMB revised the server utilization metric to direct agencies to develop their own definitions of underutilization, and then count their underutilized servers. As a result, agencies adopted widely varying definitions and were no longer required to report actual utilization, a key measure of server efficiency.

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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	<i>Federal Information Technology Acquisition Reform Act</i>
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
NASA	National Aeronautics and Space Administration
NSF	National Science Foundation
NRC	Nuclear Regulatory Commission
OMB	Office of Management and Budget
OPM	Office of Personnel Management
SBA	Small Business Administration
SSA	Social Security Administration
State	Department of State
USAID	U.S. Agency for International Development
VA	Department of Veterans Affairs

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March 4, 2021

Congressional Committees

As federal agencies have increased their use of data processing and storage resources, the costs for maintaining the data centers that provide those resources have also increased. 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 initiative—the Federal Data Center Consolidation Initiative (FDCCI)—started in 2010 and aimed to reduce the number of data centers that were outdated or duplicative. The second initiative—the Data Center Optimization Initiative (DCOI)—was announced in August 2016 and superseded the previous initiative.¹ DCOI 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.²

Congress has emphasized the importance of reforming the government-wide management of information technology (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 2015*.³ Among the requirements related to federal data center consolidation, the act required:⁴

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

²According 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).

³Pub. L. No. 113-291, division A, title VIII, subtitle D, 128 Stat. 3292, 3438 (Dec. 19, 2014). The original sunset date for the data center provisions of FITARA has been extended to October 1, 2022. 44 U.S.C. 3601 note.

⁴Pub. 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)).

-
- Covered departments and agencies (agencies)⁵ to report annually to OMB about their federal data center inventories and strategies to achieve consolidation, including yearly calculations of investments and cost savings.⁶
 - 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 consolidation strategies submitted by covered agencies. Our specific objectives for this review were to determine (1) agencies' progress on data center closures and the related savings that have been achieved, and agencies' plans for future closures and savings; (2) agencies' progress against OMB's data center optimization targets; and (3) the effectiveness of OMB's metric for server utilization and how agencies are implementing it.

To address the first objective, we obtained and analyzed data center inventory documentation from the 24 DCOI agencies available as of March and August 2020.⁷ We used these analyses to identify the agencies' reported data center closures for fiscal year 2019 and from the start of fiscal year 2020 through August 2020. We also identified the agencies' planned future closures from September 2020 through the end

⁵The 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; and 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.

⁶In lieu of submitting a data center inventory and strategy, the Department of Defense could 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*.

⁷OMB collects agencies' data center inventory and cost savings on a quarterly basis, at the end of February, May, August, and November of each year. The November 2020 update was expected to include data for the full fiscal year and was available too late to be included in our review.

of fiscal year 2025. We compared the agencies' completed and planned closures to their fiscal year 2020 consolidation goals, as documented in their DCOI strategic plans.

To verify the quality, completeness, and reliability of the agencies' data center inventories, we compared the information from our analysis on completed and planned data center closures to similar information OMB reported on its Federal IT Dashboard (IT Dashboard) and in agencies' DCOI strategic plans.⁸ We determined that the inventory 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 March and August 2020 cost savings and avoidance⁹ documentation that the 24 DCOI agencies submitted in response to OMB's March 2013 PortfolioStat¹⁰ and June 2019 data center initiative memorandums.¹¹ This documentation included the agencies' quarterly reports of cost savings and avoidances posted to their websites and discussed in their DCOI strategic plans.¹²

We determined cost savings achieved for fiscal year 2019 by adding agencies' reported savings and avoidances, as reported by March 2020.¹³ To determine cost savings achieved for fiscal year 2020 and for the initiative overall, we used the August 2020 cost savings documentation

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 defined cost savings as a reduction in actual expenditures below the projected level of costs to achieve a specific objective and defined 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.

¹¹OMB, *Fiscal Year 2013 PortfolioStat Guidance: Strengthening Federal IT Portfolio Management*, Memorandum M-13-09 (Washington, D.C.: Mar. 27, 2013); Memorandum M-16-19; and *Update to Data Center Optimization Initiative (DCOI)*, Memorandum M-19-19 (Washington, D.C.: June 25, 2019).

¹²We did not independently validate agencies' reported cost savings figures.

¹³We used the data agencies reported to OMB by March 2020 to ensure they had adequate time to identify their cost savings through the end of fiscal year 2019.

and added agencies' reported savings and avoidances from the start of fiscal year 2012 through August 2020, as found in the August 2020 quarterly reports posted to the agencies' digital strategy websites.¹⁴ We identified planned savings by totaling the agencies' projected savings and avoidances for fiscal year 2020, 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 reviewed each agency's August 2020 quarterly cost savings report and DCOI strategic plan for errors and missing data, 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.¹⁵ Further, we obtained written responses from agency officials regarding the steps they took to ensure the accuracy and reliability of their cost savings data. Based on these actions, we determined that the data were sufficiently reliable to report on agencies' data center consolidation cost savings information.

To address the second objective, we assessed information on data center optimization efforts—both planned and achieved—for 18 of the 24 DCOI agencies,¹⁶ as reported on OMB's IT Dashboard in September 2020.¹⁷ We then compared the agencies' current optimization progress

¹⁴Under FDCCI, which OMB launched in February 2010, agencies were required to begin immediately consolidating and closing data centers. However, current OMB guidance only requires agencies to report historical cost savings and avoidances realized since fiscal year 2012.

¹⁵GAO, *Data Center Optimization: Agencies Report Progress, but Oversight and Cybersecurity Risks Need to Be Addressed*, [GAO-20-279](#) (Washington, D.C.: Mar. 5, 2020).

¹⁶Four agencies—the Departments of Education and Housing and Urban Development, and the General Services Administration and the U.S. Agency for International Development—reported that they did not own any data centers and, therefore, did not have a basis to measure and report on optimization progress. In addition, OMB's IT Dashboard indicated, as of September 2020, that the Department of Homeland Security and the Environmental Protection Agency had completed their optimization efforts. Therefore, reporting on optimization metrics for these agencies is not applicable.

¹⁷The IT Dashboard is a public 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. The September 2020 update reported information collected from the agencies in August 2020.

information to the agencies' fiscal year 2020 optimization targets, as documented on the IT Dashboard.¹⁸

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

To address the third objective, we reviewed OMB's DCOI guidance to identify how agencies were expected to define a server efficiency metric and compared the guidance to FITARA's requirement for agencies to have a metric to report on server utilization. We also ascertained how each agency had defined "server utilization" to help determine the number of its underutilized servers. Appendix I provides a more detailed discussion of the objectives, scope, and methodology for our review.

We conducted this performance audit from March 2020 to March 2021 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 data that they submitted to OMB, federal agencies operated 432 data centers in 1998, 2,094 in July 2010, 5,607 in August 2016, and 5,916 in August 2018.¹⁹ As previously mentioned, operating such a large number of centers has been, and continues to be, a significant cost to the

¹⁸In June 2019, OMB announced four new optimization performance metrics: virtualization, data center availability, advanced energy metering, and server utilization.

¹⁹Between 1998 and 2016, OMB used several different definitions for a data center, which contributed to the increase in the number of centers reported.

agencies.²⁰ For example, in 2007, the Environmental Protection Agency (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 can use 100 to 200 times as much energy as a commercial building.²¹

However, in 2009, OMB reported server utilization rates as low as 5 percent across the federal government's estimated 150,000 servers housed in these centers.²² 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 subsequently launched FDCCI in 2010 to reduce the growing number of federal data centers. Among other things, under the initiative, OMB 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. Each agency also was to measure progress toward defined optimization performance metrics on a quarterly basis, as part of its data center inventory submission.

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, FITARA required federal agencies to:²³

²⁰Costs include hardware, software, real estate, electricity, and heating and cooling.

²¹GAO, *Data Center Consolidation: Agencies Need to Complete Inventories and Plans to Achieve Expected Savings*, [GAO-11-565](#) (Washington, D.C.: July 19, 2011).

²²OMB, *Inventory of Federal Data Center Activity*, Budget Data Request No. 09-41 (Washington, D.C.: Aug. 10, 2009).

²³Pub. 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)).

-
- Submit to OMB a comprehensive inventory of the data centers owned, operated, or maintained by or on behalf of the agency.
 - Submit a multi-year strategy to achieve the consolidation and optimization of the agency's data centers.²⁴ The strategy was to include performance metrics that were consistent with the government-wide data center consolidation and optimization metrics.
 - Report to OMB on a quarterly basis, progress toward meeting government-wide data center consolidation and optimization metrics.

In addition, according to FITARA, the Administrator of the Office of Electronic Government within OMB was to, among other things:

- Establish metrics applicable to the consolidation and optimization of data centers (including server efficiency) and ensure that information related to agencies' progress toward meeting government-wide data center consolidation and optimization metrics was made available to the public in a timely manner.
- 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 that were to be achieved through FDCCI; and, for each year thereafter until October 1, 2022, compare reported cost savings and optimization improvements against those goals.²⁵

OMB Established DCOI to Provide Oversight of FITARA Data Center Consolidation and Optimization Requirements

In August 2016, OMB issued Memorandum M-16-19, which established DCOI and included guidance on how to implement the data center consolidation and optimization provisions of FITARA.²⁶ In June 2019, OMB issued Memorandum M-19-19, which updated DCOI and redefined

²⁴In lieu of submitting a data center inventory and strategy, the Department of Defense could 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*.

²⁵As mentioned previously, the original sunset date for the data center provisions of FITARA has been extended to October 1, 2022. 44 U.S.C. 3601 note.

²⁶OMB, Memorandum M-16-19.

a data center as a purpose-built, physically separate, dedicated space that meets certain criteria.²⁷ The memorandum also directed agencies to focus their efforts on their tiered data centers and to stop reporting on spaces not designed to be data centers (i.e., non-tiered data centers) as part of their inventory.²⁸ The guidance outlined a process by which agencies could request, and OMB would approve, that these facilities no longer be reported.

Since 2016, we have reported on OMB's DCOI requirements for agencies and have made recommendations to improve OMB's oversight of DCOI.²⁹ In addition, since the enactment of FITARA, we have annually reviewed agencies' efforts to implement the data center provisions of FITARA and have published reports documenting the findings from each of these reviews.³⁰ We noted that, while agencies were reporting progress towards DCOI data center closure, cost savings, and optimization goals, many agencies had incomplete optimization plans and were not meeting those goals.

²⁷OMB, Memorandum M-19-19. According to OMB Memorandum M-19-19 and related reporting instructions, a data center generally is a purpose-built, physically separate, and dedicated space that contains one or more racks of servers, mainframes, and/or high-performance computers; has a dedicated uninterruptible power supply and/or backup generator for prolonged power outages; and/or has a dedicated cooling system or zone. Agencies are to report facilities matching these criteria as tiered data centers.

²⁸OMB derived the term "tiered" and its definition 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 should be considered non-tiered.

²⁹GAO, *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); *Data Center Consolidation: Reporting Can Be Improved to Reflect Substantial Planned Savings*, [GAO-14-713](#) (Washington, D.C.: Sept. 25, 2014); *Data Center Consolidation: Strengthened Oversight Needed to Achieve Cost Savings Goal*, [GAO-13-378](#) (Washington, D.C.: Apr. 23, 2013); *Data Center Consolidation: Agencies Making Progress on Efforts, but Inventories and Plans Need to Be Completed*, [GAO-12-742](#) (Washington, D.C.: July 19, 2012); and [GAO-11-565](#).

³⁰GAO, [GAO-20-279](#); *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals*, [GAO-19-241](#) (Washington, D.C.: Apr. 11, 2019); *Data Center Optimization: Continued Agency Actions Needed to Meet Goals and Address Prior Recommendations*, [GAO-18-264](#) (Washington, D.C.: May 23, 2018); *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); *Data Center Optimization: Agencies Need to Complete Plans to Address Inconsistencies in Reported Savings*, [GAO-17-388](#) (Washington, D.C.: May 18, 2017); and [GAO-16-323](#).

Accordingly, we have made 125 recommendations that span fiscal years 2016 through 2020, to improve agencies' optimization plans and help them meet DCOI goals. As of December 2020, agencies had implemented 55 of the 125 recommendations and closed 17 due to changes in DCOI. However, 53 recommendations had not yet been fully addressed. We reiterate the importance of implementing those recommendations. A summary of our previous reports and recommendations is found in appendix II.

Agencies Reported Progress and Future Plans for Data Center Closures and Cost Savings, but Excluded Multiple Data Centers from Their Inventories

As in previous years, the 24 agencies participating in DCOI continued to report progress in closing unneeded data centers and achieving the related cost savings. According to data submitted by the agencies, almost all of them met or planned to meet their closure goals for fiscal years 2019 and 2020.

However, in its 2019 memorandum, OMB changed the definition of a data center and related DCOI reporting requirements. As a result, agencies have excluded about 4,500 data centers from their inventories. Prior to the 2019 revision, agencies had to report these centers as part of their inventories.

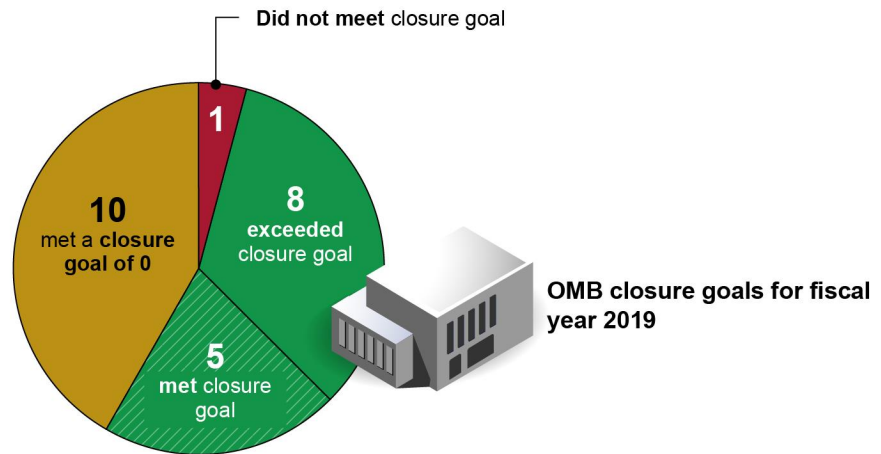
In addition, the agencies reported that their DCOI-related activities had achieved \$344.59 million in cost savings for fiscal year 2019. Further, the agencies either achieved, or planned to achieve, \$783.62 million in total savings for fiscal year 2020.

Almost All 24 DCOI Agencies Reported Meeting Data Center Closure Targets for Fiscal Year 2019

For fiscal year 2019, the agencies participating in DCOI reported progress in closing data centers. As noted in our previous report, issued in March 2020, agencies expected to close 94 data centers in fiscal year 2019.³¹

As of March 2020, 23 of the 24 agencies reported that they had met or exceeded their DCOI closure goals by closing a total of 122 data centers in fiscal year 2019. Included among these agencies were ten that had set a goal of zero closures for fiscal year 2019.³² Figure 1 summarizes what the agencies reported in meeting their data center closure goals for fiscal year 2019.

Figure 1: Agency-Reported Status in Meeting Fiscal Year 2019 Closure Goals



Source: GAO analysis of data from OMB's Information Technology Dashboard. | GAO-21-212

³¹[GAO-20-279](#).

³²The ten agencies included seven agencies that set a goal of zero closures: the Department of Transportation and the Environmental Protection Agency, National Aeronautics and Space Administration, National Science Foundation, Nuclear Regulatory Commission, Office of Personnel Management, and Social Security Administration. In addition, the Departments of Education and Housing and Urban Development and the U.S. Agency for International Development reported that they did not own any data centers and, therefore, set a goal of zero closures.

Data table for Figure 1: Agency-Reported Status in Meeting Fiscal Year 2019 Closure Goals

Not	Exceeded	Met	Closure 0
1	8	5	10

Of the 13 agencies reporting progress:

- Eight agencies exceeded their closure goals.³³
- Five agencies met their closure goals.³⁴

One agency—the Department of Defense (Defense)—did not meet its fiscal year 2019 DCOI closure goal. Specifically, the department reported achieving 33 of 39 planned data center closures. Defense officials stated that the department did not meet its goal because six closures slipped to 2020 due to litigation delays related to implementation of the department’s Joint Enterprise Defense Infrastructure cloud initiative.³⁵

Our April 2019 report recommended that Defense take action to meet its data center closure goal.³⁶ In January 2021, Defense provided data showing that it exceeded its DCOI goal of 233 closures by closing 245 data centers, thus fully implementing our recommendation.

All 24 Agencies Intended to Meet Fiscal Year 2020 Data Center Closure Targets

All 24 agencies participating in DCOI reported as of August 2020, that they had exceeded, met, or planned to meet, their data center closure goals for fiscal year 2020.

Of the 24 agencies:

³³Those agencies were the Departments of Agriculture, Energy, Health and Human Services, Homeland Security, Labor, State, the Treasury, and Veterans Affairs.

³⁴Those agencies were the Departments of Commerce, the Interior, and Justice; the General Services Administration, and Small Business Administration.

³⁵The Joint Enterprise Defense Infrastructure is an initiative to deploy cloud technology to the entire Department of Defense, with a focus on military operations.

³⁶[GAO-19-241](#).

- Seven reported that they had exceeded their closure goals for the fiscal year. This included two agencies that had not planned to close any data centers.³⁷
- One agency, the Department of Justice (Justice), reported that it had met its closure goal for the fiscal year.
- Five agencies had not achieved their planned data center closure goals as of August 2020. However, those agencies did have additional closures planned to meet their 2020 closure goals.³⁸
- Eleven agencies reported that they did not plan to close any data centers in 2020 and closed no data centers during the fiscal year.³⁹

Table 1 details, for each of the 24 agencies, the number of data centers open at the start of fiscal year 2020, the agency’s fiscal year 2020 closure goal, the number of data centers closed, the number planned for closure during the remainder of fiscal year 2020, and data center closures planned for fiscal years 2021 through 2025, as of August 2020.

Table 1: Agency-Reported DCOI Strategic Plan Fiscal Year (FY) 2020 Closure Goals and the Number of Data Centers Reported as Closed in FY 2020, as of August 2020

Agency	Open at start of FY20	DCOI FY20 closure goal	Closed as of August 2020	Additional planned FY20 closures	Additional Planned Closures FY21-25	Met or plans to meet FY 20 closure goal?
Department of Agriculture	8	2	4	2	0	Yes
Department of Commerce	69	4	0	4	0	Yes
Department of Defense	691	17	37	20	79	Yes
Department of Education	0	0	0	0	0	Yes
Department of Energy	107	3	2	4	7	Yes

³⁷Those agencies were the Departments of Agriculture, Defense, the Interior, Labor, State, the Treasury, and Veterans Administration. Labor and State had a goal of zero closures for fiscal year 2020.

³⁸Those agencies were the Departments of Commerce, Energy, Health and Human Services, and Transportation, and the Office of Personnel Management.

³⁹The agencies that had a goal of zero closures for fiscal year 2020 were the Departments of Education, Homeland Security, Housing and Urban Development, Labor, and State; and the Environmental Protection Agency, General Services Administration, National Aeronautics and Space Administration, National Science Foundation, Nuclear Regulatory Commission, Small Business Administration, Social Security Administration, and the U.S. Agency for International Development.

Agency	Open at start of FY20	DCOI FY20 closure goal	Closed as of August 2020	Additional planned FY20 closures	Additional Planned Closures FY21-25	Met or plans to meet FY 20 closure goal?
Department of Health and Human Services	73	1	0	4	0	Yes
Department of Homeland Security	20	0	0	0	2	Yes
Department of Housing and Urban Development	2	0	0	0	0	Yes
Department of the Interior	59	3	5	0	1	Yes
Department of Justice	14	1	1	0	10	Yes
Department of Labor	10	0	1	0	1	Yes
Department of State	395	0	1	3	2	Yes
Department of Transportation	212	1	0	1	0	Yes
Department of the Treasury	582	1	3	0	0	Yes
Department of Veterans Affairs	298	12	13	1	7	Yes
Environmental Protection Agency	4	0	0	1	0	Yes
General Services Administration	4	0	0	0	0	Yes
National Aeronautics and Space Administration	19	0	0	0	0	Yes
National Science Foundation	1	0	0	0	0	Yes
Nuclear Regulatory Commission	3	0	0	0	0	Yes
Office of Personnel Management	5	1	0	1	2	Yes
Small Business Administration	8	0	0	0	0	Yes
Social Security Administration	12	0	0	0	1	Yes
U.S. Agency for International Development	0	0	0	0	0	Yes
Total	2,596	46	67	41	112	

Source: GAO analysis of agency data

As shown in the table, as of August 2020, agencies reported having closed 67 data centers in fiscal year 2020, with an additional 41 planned closures through the end of the fiscal year. Looking at agencies' closure plans for fiscal year 2021 and beyond, eight agencies reported that they plan to close 60 data centers in fiscal year 2021.⁴⁰ In addition, three agencies—the Departments of Defense, Homeland Security (DHS), and the Interior (Interior)—plan to close 52 additional data centers in fiscal years 2022 through 2025.

⁴⁰The Departments of Defense, Energy, Justice, Labor, State, and Veterans Affairs; and the Office of Personnel Management, and Social Security Administration.

Further, according to the IT Dashboard, as of September 2020, five agencies had completed their closure efforts under the DCOI initiative. This included four agencies that reported they had no agency-owned data centers to close.⁴¹ In addition, OMB had exempted the Social Security Administration's (SSA) data centers from closure and, therefore, SSA had no further planned closures.

Agencies Reported a Decrease in Number of Data Centers Due to OMB's Revised DCOI Guidance

In our March 2020 report, we noted that OMB had directed agencies to stop counting a space not designed to be a data center as part of their inventory. We also noted that, as a result of OMB's new guidance, there were about 2,000 facilities that would not be counted, some of which were considerable in size and would continue to operate.⁴² For example, SSA planned to no longer report on, but to continue operating, five data centers that were each over 8,000 square feet in size. Similarly, the Department of State (State) planned to no longer report on, but to keep operating, two facilities that were each at least 10,000 square feet in size.

We noted in our report that each non-tiered data center was an access point to an agency's interconnection with other internal and external systems and networks, and each access point was a potential point of attack by an outside actor. Because of OMB's decision to remove these types of data centers from DCOI reporting, we stressed that agencies may lose track of the security vulnerabilities that these facilities presented due to the reduction in overall visibility and oversight into all data centers. Accordingly, we recommended that OMB require agencies to report in their quarterly inventory submissions those facilities previously reported as data centers, even if those facilities were not subject to the closure and optimization requirements of DCOI.

However, OMB has not taken action to address our recommendation and this trend of reporting fewer, but still sizable, data centers has continued. As of August 2020, our analysis showed that, since May 2019, agencies had excluded approximately 4,500 data centers from their inventories, per

⁴¹Those agencies were the Departments of Education and Housing and Urban Development, the General Services Administration, and U.S. Agency for International Development.

⁴²[GAO-20-279](#).

OMB's revised guidance. In addition, we identified 842 data centers that agencies planned to operate, but were no longer required to report, under DCOI. Of these, 43 facilities were at least 1,000 square feet in size. This included 13 data centers that were over 5,000 square feet in size.⁴³ We continue to maintain that, because of OMB's decision to remove non-tiered data centers from agency DCOI reporting requirements, agencies risked losing the overall visibility and oversight that is needed for these facilities and the potential security vulnerabilities that they represent.

Almost All Agencies Met or Exceeded Cost Savings Goals for Fiscal Year 2019

In fiscal year 2019, agencies participating in DCOI reported progress in achieving cost savings from data center-related activities.⁴⁴ Our previous report noted that, as of August 2019, the DCOI agencies planned to achieve \$241.5 million in savings by the end of fiscal year 2019.⁴⁵ As of March 2020, 17 agencies identified \$344.59 million in cost savings for fiscal year 2019. The other seven agencies had a cost savings goal of \$0 and reported achieving no savings.⁴⁶ According to agencies' March 2020 quarterly cost savings reports, 23 of the 24 agencies met or exceeded their cost savings goals for the fiscal year. Figure 2 provides a summary of the number of agencies that exceeded, met, or did not meet their cost savings target for fiscal year 2019.

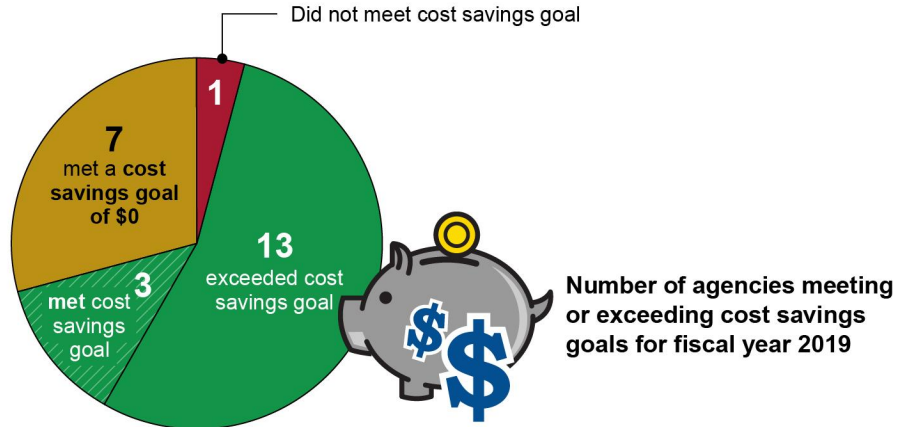
⁴³These data centers were operated by the Departments of State (four facilities), Defense (two), Homeland Security (one), and the Treasury (one), and the Social Security Administration (five).

⁴⁴OMB 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.

⁴⁵[GAO-20-279](#).

⁴⁶The agencies that had a savings goal of \$0 for fiscal year 2019 are the Departments of Housing and Urban Development, Veterans Affairs, and the General Services Administration, National Science Foundation, Nuclear Regulatory Commission, Social Security Administration, and U.S. Agency for International Development.

Figure 2: Federal Agencies that Exceeded, Met, or Did Not Meet, Agency Cost Savings Goals for Fiscal Year 2019



Source: GAO analysis of data from OMB's Information Technology Dashboard. | GAO-21-212

Data table for Figure 2: Federal Agencies that Exceeded, Met, or Did Not Meet, Agency Cost Savings Goals for Fiscal Year 2019

Not	Exceeded	Met	Closure 0
1	13	3	7

Of the 17 agencies reporting savings:

- Thirteen agencies exceeded their cost savings goals for fiscal year 2019.⁴⁷ Among those agencies were four—the Departments of Energy, the Interior, and Education (Education), and EPA—that had a cost savings goal of \$0. The combined savings from these 13 agencies was \$233.28 million.
- Three agencies met their cost savings goals for fiscal year 2019. The Department of Commerce (Commerce), Defense, and OPM reported a cumulative total of \$111.23 million in savings.
- One agency—the National Aeronautics and Space Administration (NASA)—did not meet its 2019 cost savings goals. NASA reported that it only saved \$0.08 million of a planned \$0.11 million for 2019. According to NASA officials, this was due to the agency's increased

⁴⁷These agencies were the Departments of Agriculture, Education, Energy, Health and Human Services, Homeland Security, the Interior, Justice, Labor, State, Transportation, and the Treasury; and the Environmental Protection Agency and Small Business Administration.

migration to cloud computing having an adverse effect on its virtualization objectives for its agency-owned data centers.

In our March 2020 report, we recommended that NASA take action to meet its data center-related cost savings goal. However, as of December 2020, the agency had not fully implemented our recommendation. Accordingly, we reiterate the importance of our recommendation and plan to continue to monitor the agency's progress toward meeting its goal in our future work.

Agencies Planned Significant Cost Savings in Fiscal Year 2020

The DCOI agencies reported plans to achieve significant cost savings in fiscal year 2020. Specifically, their DCOI strategic plans identified a total of \$783.62 million in planned data center-related savings. As of August 2020, 16 of the 24 agencies had identified \$783.27 million in data center-related savings for fiscal year 2020.

In terms of meeting their cost savings goals, 20 agencies reported that they had met or exceeded their fiscal year 2020 cost savings goals, including eight agencies that had a goal of \$0 in cost savings.⁴⁸ In addition, as of August 2020, four agencies had not met their cost savings goals for fiscal year 2020.⁴⁹ Those agencies planned to achieve an additional \$44.68 million to meet their fiscal year 2020 goals.

Table 2 provides a breakdown of agencies' planned and achieved cost savings for fiscal year 2020, as of August 2020. It also shows the agencies' additional planned savings for fiscal year 2020, as reflected in their DCOI strategic plans and quarterly reporting.

⁴⁸The agencies that had a savings goal of \$0 for fiscal year 2020 were the Departments of Commerce, Education, and Housing and Urban Development; and the Environmental Protection Agency, General Services Administration, National Science Foundation, Nuclear Regulatory Commission, and U.S. Agency for International Development.

⁴⁹Those agencies are the Departments of Health and Human Services, Homeland Security, Labor, and Veterans Administration.

Table 2: Agency-Reported DCOI Planned and Achieved Cost Savings for Fiscal Year (FY) 2020, as of August 2020 (dollars in millions)

Agency	DCOI planned savings	Achieved savings for FY 2020	Difference between planned and achieved
Department of Agriculture	\$3.00	11.08	8.08
Department of Commerce	0	0.05	0.05
Department of Defense	178.50	178.50	0
Department of Education	0	0	0
Department of Energy	0.15	2.28	2.13
Department of Health and Human Services	4.00	0.24	(3.76)
Department of Homeland Security ^a	33.8	16.14	(17.66)
Department of Housing and Urban Development	0	0	0
Department of the Interior	0.50	2.00	1.50
Department of Justice	8.73	16.64	7.91
Department of Labor ^a	21.40	16.06	(5.34)
Department of State	69.50	69.50	0
Department of Transportation	23.49	24.21	0.73
Department of the Treasury	17.50	17.50	0
Department of Veterans Affairs ^a	3.10	0	(3.10)
Environmental Protection Agency	0	0	0
General Services Administration	0	0	0
National Aeronautics and Space Administration	0.20	0.33	0.13
National Science Foundation	0	0	0
Nuclear Regulatory Commission	0	0	0
Office of Personnel Management	7.65	16.62	8.97
Small Business Administration	0	0.01	0.01
Social Security Administration	412.10	412.10	0
U.S. Agency for International Development	0	0	0
Total	\$783.62	\$783.27	(\$0.35)

Source: GAO analysis of agency data

Note: Numbers may not add due to rounding.

^aCognizant agency officials stated that the agency's November quarterly savings report included savings sufficient to have met the fiscal year 2020 savings goal. However, the November quarterly savings report was not available in time to be included in this report.

Agencies that did not report achieving any cost savings provided a variety of reasons for why they had not done so. For example, officials in the Department of Health and Human Services' (HHS) Office of Information Technology stated that the agency did not meet its cost savings goals because HHS typically tallied and reported its achieved savings at the end of the fiscal year. However, they stated that the agency plans to alter

its procedures to identify and report achieved savings throughout the year instead.

In another example, an official in the Department of Labor's (Labor) Office of the Assistant Secretary for Policy stated that the agency reported \$21.4 million in cost savings in its November 2020 quarterly report to OMB. However, the data were made available too late to be included in this report. In addition, the Department of Veterans Affairs (VA) did not report any achieved cost savings in August 2020 because the majority of its agency-owned data centers were located within multi-use facilities that were still owned and maintained by the agency. A GAO liaison in VA's Office of Congressional and Legislative Affairs stated that the agency identified \$3.4 million in cost savings in its November 2020 quarterly report to OMB. However, the data was sent to us too late to be included in this report.

Overall, as of August 2020, the 24 agencies participating in DCOI reported achieving a total of \$783.27 million in cost savings in fiscal year 2020. Including the remaining \$44.68 million in planned fiscal year 2020 savings, the agencies expect to realize a cumulative \$6.24 billion in cost savings and avoidances from fiscal years 2012 through 2020.

Agencies Reported Mixed Progress Against Optimization Metrics

FITARA required OMB to establish metrics to measure the optimization of agencies' use of their data centers, including, at a minimum, server efficiency. The act also required OMB to ensure that agencies' progress toward meeting those metrics is made available to the public.

Pursuant to this requirement, OMB developed performance measures that have been revised over time and reported agencies' progress against those measures on the IT Dashboard. Most recently, in 2019, OMB issued revised DCOI guidance that defined a set of four (three revised and one new) data center optimization metrics to replace the five previous metrics.

According to the OMB memorandum that published these changes, the new metrics were intended to focus optimization efforts in key areas where agencies can make meaningful improvements and achieve further

cost savings through optimization.⁵⁰ Table 3 provides a description of the four current data center optimization metrics and how each metric is to be calculated.

Table 3: The Office of Management and Budget’s (OMB) Four Data Center Optimization Initiative Metrics

Metric	Description	Applicable agency-owned data centers	How the metric is calculated
Virtualization	The number of servers and mainframes serving as a virtual host in an agency-managed data center.	Tiered data centers	Count of agency-reported servers and mainframes serving as virtual hosts.
Advanced energy metering	The number of data centers with advanced energy metering covering the majority of their floor space.	Tiered data centers	Count of agency-reported data centers with advanced energy metering in place.
Underutilized servers	The number of underutilized production servers in federal data centers.	Tiered data centers	Count of agency-reported underutilized servers.
Data center availability	Ratio of uptime to downtime in data centers.	Tiered data centers	Expected number of available hours minus unplanned downtime, divided by the expected available hours.

Source: OMB

According to OMB’s June 2019 revised DCOI guidance, agencies are to focus their optimization efforts on their remaining open, agency-owned, tiered data centers. OMB also included in the guidance its plans to work with the agencies to set agency-specific optimization performance targets for each fiscal year. According to staff in OMB’s Office of the Federal CIO, these targets are to be established by fiscal year and progress toward meeting them is shown on the IT Dashboard.

Agencies Closed Out Fiscal Year 2019 with Mixed Results in Meeting Optimization Targets

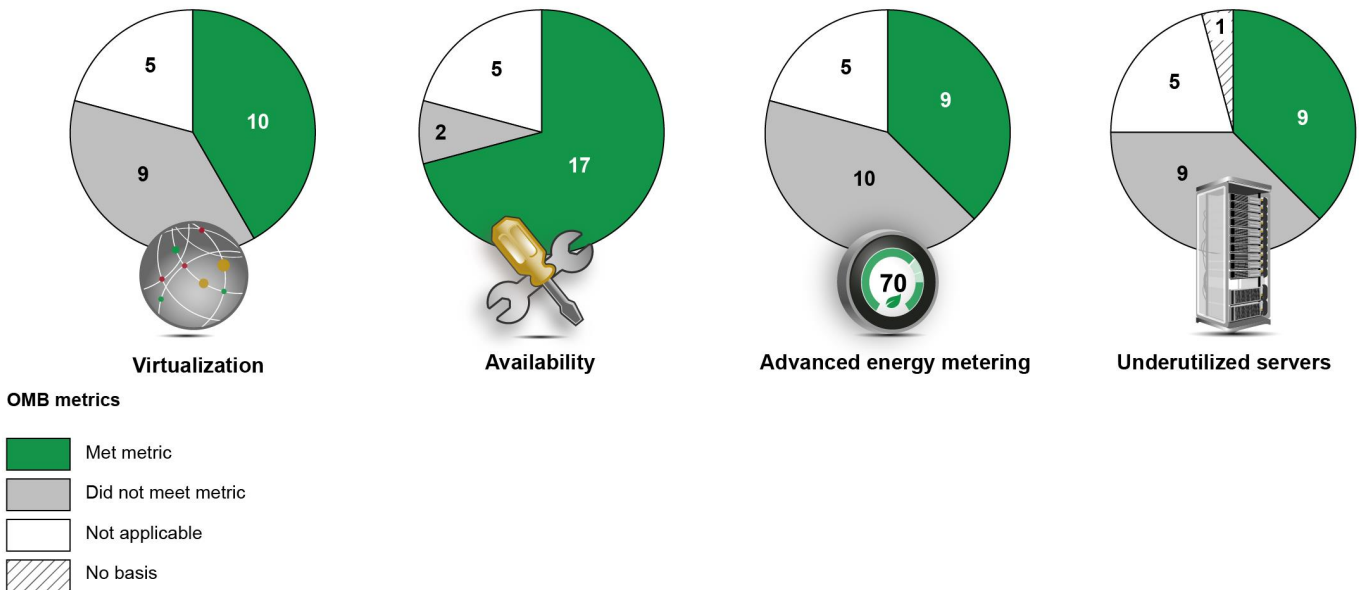
As of September 2019, the 19 DCOI agencies with applicable data centers reported mixed progress in meeting OMB’s fiscal year 2019 data center optimization targets. Of those 19 agencies, nine agencies—the Departments of Agriculture (Agriculture), Defense, Justice, Labor, and VA; and EPA, NASA, the National Science Foundation (NSF), and SSA—reported meeting three or more targets at the end of fiscal year 2019. Also, six agencies reported that they had met two targets, three agencies reported meeting one target, and one agency reported not meeting any of the targets.

⁵⁰OMB, Memorandum M-19-19.

The remaining five agencies—Education, DHS, the Department of Housing and Urban Development (HUD), the General Services Administration (GSA), and USAID—reported that they did not have any applicable agency-owned data centers in their inventories and, therefore, did not have a basis to measure and report optimization progress. Figure 3 summarizes the DCOI agencies’ progress in meeting fiscal year 2019 optimization targets.

Figure 3: Number of Agencies Meeting Each Fiscal Year 2019 Optimization Target

Number of agencies



Source: GAO analysis of data from OMB’s Information Technology Dashboard. | GAO-21-212

Data table for Figure 3: Number of Agencies Meeting Each Fiscal Year 2019 Optimization Target

	Met metric	Did not meet metric	Not applicable	No Basis
Virtualization	10	9	5	0
Availability	17	10	5	0
Advanced EnergyMetering	9	10	5	0
Under Utilized Serv-ers	9	9	5	1

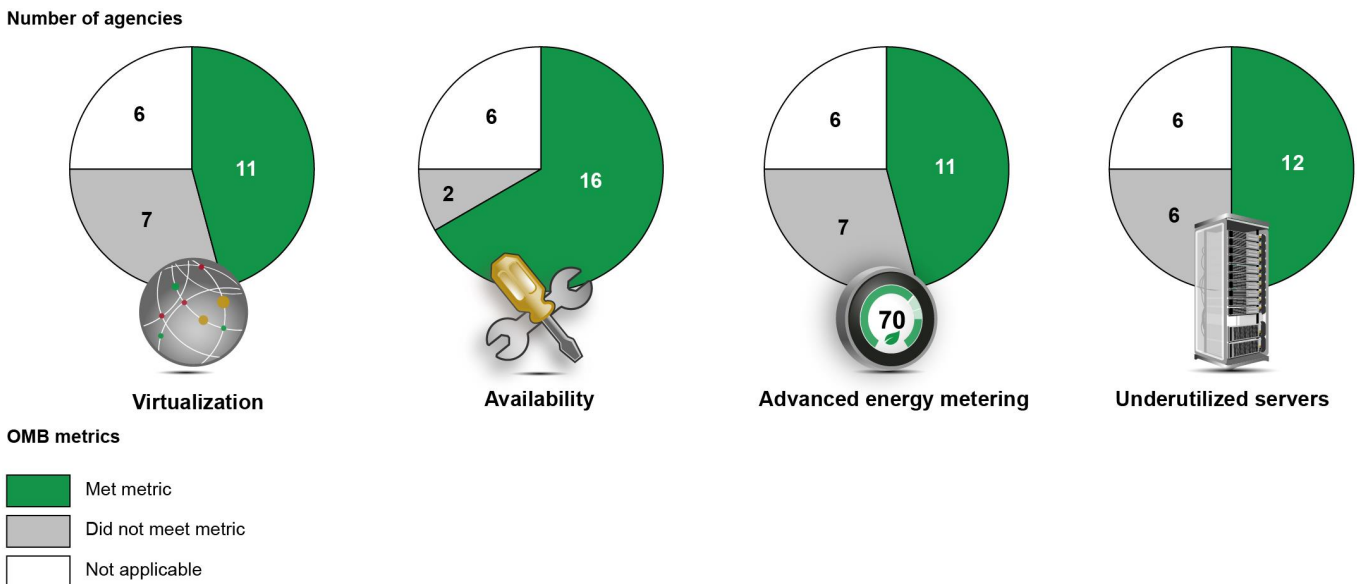
Nevertheless, a number of the agencies did not meet their optimization targets. Specifically, 10 agencies did not meet their fiscal year 2019 advanced energy metering target. The reasons agencies provided for not meeting their targets varied. For example, officials in the Small Business Administration’s (SBA) Office of the CIO reported that the agency did not

meet its advanced energy metering target because the agency did not believe it was cost effective to install tools at a facility it planned to close. As another example, Labor reported that the agency had set a target of having five data centers with advanced energy metering; however, the agency missed the target because it closed one of its data centers that was already equipped with the metering without adjusting its planned target.

Agencies Reported Optimization Progress in Fiscal Year 2020

Overall, agencies continued to report progress in meeting their fiscal year 2020 optimization metrics as of August 2020. With regard to the data center optimization targets, in fiscal year 2020, 16 agencies reported that they had met OMB’s target for availability, 12 agencies reported that they had met the target for server utilization, and 11 agencies reported that they had met the targets for advanced energy metering and virtualization. Figure 4 summarizes the 24 agencies’ progress in meeting each optimization target as of August 2020.

Figure 4: Progress toward Meeting Office of Management and Budget (OMB) Data Center Optimization Targets, as Reported by Federal Agencies as of August 2020



Source: GAO analysis of data from OMB’s Information Technology Dashboard. | GAO-21-212

Data table for Figure 4: Progress toward Meeting Office of Management and Budget (OMB) Data Center Optimization Targets, as Reported by Federal Agencies as of August 2020

	Met metric	Did not meet metric	Not applicable
Virtualization	11	7	6
Availability	16	2	6
Advanced Energy Metering	11	7	6
Under Utilized Servers	12	6	6

For the fiscal year 2020 DCOI metrics, agencies reported mixed progress toward meeting their agency-specific optimization targets. Of the 18 agencies with a basis to report against OMB’s optimization targets:⁵¹

- Seven agencies reported that they met all four of their optimization targets.
- Five agencies reported that they met three of four targets.
- Two agencies reported that they met two targets.
- Three agencies reported that they met one target.
- One agency reported that it had not met any of its four targets.

Table 4 summarizes the progress of DCOI agencies in meeting each optimization target as of August 2020.

Table 4: Agency-Reported Progress in Meeting Data Center Optimization Performance Targets Set by the Office of Management and Budget, as of August 2020

Agency	Virtualization	Availability	Advanced energy metering	Server utilization
Department of Agriculture	Met	Met	Met	Met
Department of Commerce	Met	Met	Not Met	Met
Department of Defense	Met	Met	Met	Met
Department of Education ^a	N/A	N/A	N/A	N/A
Department of Energy	Not Met	Met	Met	Met
Department of Health and Human Services	Not Met	Not Met	Not Met	Not Met
Department of Homeland Security ^b	N/A	N/A	N/A	N/A

⁵¹As of September 2020, the IT Dashboard reported that the Departments of Education, Homeland Security, and Housing and Urban Development; and the Environmental Protection Agency, General Services Administration, and the U.S. Agency for International Development had completed their optimization efforts. Therefore, reporting on optimization metrics for these agencies is not applicable.

Department of Housing and Urban Development ^a	N/A	N/A	N/A	N/A
Department of the Interior	Met	Met	Met	Met
Department of Justice	Met	Met	Met	Met
Department of Labor	Met	Met	Met	Met
Department of State	Not Met	Met	Not Met	Not Met
Department of Transportation	Not Met	Met	Not Met	Not Met
Department of the Treasury	Not Met	Met	Not Met	Met
Department of Veterans Affairs	Not Met	Not Met	Not Met	Met
Environmental Protection Agency ^a	N/A	N/A	N/A	N/A
General Services Administration ^a	N/A	N/A	N/A	N/A
National Aeronautics and Space Administration	Met	Met	Met	Met
National Science Foundation	Met	Met	Met	Not Met
Nuclear Regulatory Commission	Met	Met	Met	Not Met
Office of Personnel Management	Met	Met	Not Met	Met
Small Business Administration	Not Met	Met	Met	Not Met
Social Security Administration	Met	Met	Met	Met
U.S. Agency for International Development ^a	N/A	N/A	N/A	N/A

Legend:

● = fully met—the agency’s reported progress met or exceeded OMB’s fiscal year 2020 target for the related metric.

○ = not met—the agency’s reported progress did not meet OMB’s fiscal year 2020 target for the related metric.

N/A = not applicable—the agency did not have any agency-owned data centers or its remaining centers are exempted from optimization by OMB.

Source: GAO analysis of agency data.

^aFor the optimization metrics, OMB’s IT Dashboard displays this agency’s progress against these metrics as being completed and no further work will be required in this area.

^bAll remaining agency-owned data centers have been granted optimization exemptions by OMB.

Multiple agencies reported meeting more optimization targets in fiscal year 2020 as compared to 2019. For example, Commerce met three of its four fiscal year 2020 optimization targets compared to two out of four targets at the end of fiscal year 2019. In addition, SSA and Labor, which previously met three of their four respective targets at the end of fiscal year 2019, met all four targets.

However, a number of agencies did not meet all of their targets for fiscal year 2020. The reasons agency officials provided for not meeting the target varied. For example, regarding virtualization, VA reported that it established its virtualization target prior to OMB revising its DCOI guidance in June 2019. The agency reported that the unforeseen cloud-based virtualization efforts to support COVID-19 operations resulted in the agency falling short of its on-premises virtualization goals for 2020.

With respect to advanced energy metering, officials in OPM's Office of the CIO stated that delays in electrical work at one of the agency's sites prevented it from meeting its target. As another example, Transportation reported in its DCOI strategic plan that it did not meet its server utilization target because it is still in the process of determining the most effective way to define and measure the revised server utilization metric. Once that has been completed, the agency expects to be able to set appropriate targets.

GAO has previously made recommendations to address the issue of agencies not meeting their target metrics for optimization of their data centers.⁵² Until agencies address the existing recommendations to meet their optimization performance targets, they are unlikely to fully realize the expected benefits, including cost savings.

OMB's Metric Provides an Incomplete Picture of Server Utilization and Agencies' Implementation Efforts Vary

As noted earlier, FITARA required OMB to develop metrics applicable to the consolidation and optimization of data centers. Those metrics are to measure and report on efficiencies, including, at a minimum, server efficiency.⁵³ Senate Report 113-262 offers insight into the intent of the server efficiency metric by associating server efficiency with server utilization. The report explains that, in order to assist agency consolidation efforts, Congress required OMB to implement government-wide data center consolidation and optimization metrics. Those metrics included server efficiency (i.e. server utilization) metrics.⁵⁴ Further, a Department of Energy study reported that evaluating data center efficiency should include measuring, among other things, server and

⁵²[GAO-20-279](#) and [GAO-19-241](#).

⁵³Pub. L. No. 113-291, division A, title VIII, subtitle D, 128 Stat. 3292, 3438 (Dec. 19, 2014). While the law grants OMB latitude to develop metrics the agency determines to be appropriate to data center consolidation, the law requires OMB to develop a metric for server efficiency.

⁵⁴S. Rpt. 113-262 at 11 (Sep. 18, 2014) accompanying the *Federal Information Technology Acquisition Reform Act*, H.R. 1232 (Sep. 18, 2014)

storage utilization.⁵⁵ We have also noted that, when establishing metrics such as OMB's optimization metrics, it is important to define appropriate performance parameters to evaluate performance. For server utilization, this would include defining measures with performance targets for the operation of a server's components.⁵⁶

To address FITARA's requirement to establish a metric for server efficiency, OMB established a new metric in Memorandum M-16-19 in August 2016. The metric described how agencies were to measure server utilization and automated monitoring. According to M-16-19, an agency was to calculate server utilization by measuring the percentage of time a server was busy, as determined by continuous, automated monitoring software. Then the agency was to discount the measurement by the fraction of the number of data centers that were fully equipped with automated monitoring. As defined, OMB's server efficiency metric provided an overall view of efficiency and allowed agencies to effectively evaluate progress towards server efficiency goals because it focused on how to measure the utilization of an agency's servers.

However, as noted previously, in June 2019, OMB issued revised DCOI guidance that replaced the optimization metrics from M-16-19 with measures that focused on, among other things, reporting the number of underutilized servers instead of measuring the percentage of time a server was busy (server efficiency).⁵⁷ In making this revision, OMB officials stated that the agency did not believe it could create a definition that properly accommodated each of the DCOI agencies' mission needs and, therefore, left it up to each agency to determine how to evaluate its server utilization.

OMB's June 2019 guidance included a revised server utilization metric that did not provide agencies with a sufficient way to measure and evaluate progress toward server efficiency goals because it directed agencies to report the number of underutilized servers rather than how efficiently the agencies' servers were being utilized. For example, Commerce followed OMB's guidance and reported that it had 67

⁵⁵Department of Energy, National Renewable Energy Laboratory, subcontract report, *Chapter 20: Data Center IT Efficiency Measures*, (Golden, CO: January 2015). Measuring server and storage efficiency includes, among other things, being able to measure how much the central processing unit and data storage are utilized.

⁵⁶[GAO-20-279](#).

⁵⁷OMB, Memorandum M-19-19.

underutilized servers in September 2020. However, Commerce did not report the number or percentage of servers that met the agency's target server utilization. It also did not report other useful information, such as the percentage of time its servers were busy or the average usage of memory or storage space, which could help determine server efficiency.

We noted in our March 2020 report on data center optimization that OMB's revised server utilization metric was lacking a key characteristic of an effective metric by not including parameters that would enable a determination of progress against goals.⁵⁸ The server utilization metric identified how many underutilized servers an agency had, but did not give the context of how that related to the agency's total population of servers. Without this context, percentages cannot be calculated to determine progress. For instance, while the number of an agency's virtualized servers may increase, if the universe of servers were to increase at a higher rate, then progress would actually be negative. Accordingly, we recommended that OMB take action to address the key performance measurement characteristics missing from the DCOI optimization metrics. As of December 2020, OMB had not done so.

Officials in OMB's Office of the Federal CIO stated that they changed the server utilization metric because the agency viewed server utilization as a relative term. According to the officials, OMB intended that the June 2019 revision would enable agencies to define an underutilized server, with their specific operational needs and technological capabilities in mind, and reduce the number of them.

However, OMB's current server utilization metric does not require agencies to report the utilization rates for their servers, nor does it provide the necessary parameters to evaluate agencies' DCOI performance. Without such information, agencies are not providing a complete picture of their server utilization and cannot ensure they are making meaningful progress toward better server utilization.

⁵⁸[GAO-20-279](#).

Agencies' Implementation of OMB's Server Utilization Metric Resulted in Different or Inconsistent Definitions of Server Utilization

In its June 2019 DCOI guidance, OMB directed agencies to develop their own methodology for evaluating server utilization that addressed their individual mission and hardware and software needs. According to the guidance, agencies were to report the number of underutilized servers and consider central processing unit usage and storage space.

Of the 24 DCOI agencies, four agencies were exempt from developing optimization metrics. Three were exempt from developing optimization metrics because they did not report any applicable agency-owned data centers. These agencies were the Department of Education, GSA, and the U.S. Agency for International Development (USAID). Additionally, OMB's IT Dashboard reported that DHS's remaining data centers were exempt from optimization.

Seven other agencies developed a definition for server utilization that allowed them to evaluate and report on information that demonstrated a reasonably complete picture of their server utilization metric. These agencies were Commerce, HUD, and the Interior; and NASA, NSF, the Nuclear Regulatory Commission (NRC), and SBA. Examples of these agencies' server utilization metrics included the following:

- Commerce defined its utilization and underutilized server metrics to measure central processing unit, memory, and storage space usage. Specifically, Commerce determined that its servers should have a performance target of 65 percent average utilization and any server operating below 50 percent was considered to be underutilized. According to officials in Commerce's Office of the CIO, the agency prioritized application performance over target utilization. As such, the agency evaluated servers between the 50 and 65 percent thresholds and adjusted them as necessary to meet the desired application's target performance.
- HUD defined its metrics with a focus on resource usage. The agency considered servers operating over 50 percent to be properly utilized. HUD's target was to have 85 to 90 percent of a server's resources in use. Any server exceeding the target utilization was to be considered over-utilized. Servers below 50 percent usage were classified as underutilized.

The remaining 13 agencies followed OMB's guidance to identify and report the number of their underutilized servers in each data center. However, the methodologies they developed did not give them the ability to assess overall server utilization. These agencies were Agriculture, Defense, Energy, HHS, Justice, Labor, State, the Departments of the Treasury (Treasury), Transportation (Transportation), and VA; and EPA, OPM, and SSA. These agencies defined server utilization in terms of measuring central processing unit or storage utilization, but did so for only part of the agency's server population or without utilization targets that helped identify properly or poorly performing servers. For example:

- Agriculture defined server utilization to focus on the percentage of time that central processing units and storage were busy during prime business hours (8:00 a.m. to 5:00 p.m.), but only for one of its two data centers.
- Defense provisions servers to meet operational needs and, therefore, it considers all of its servers to be fully utilized. Although the department currently does not have performance thresholds defined to measure server efficiency, for its April 2021 DCOI strategic plan, officials said that the department plans to develop a utilization metric with tentative utilization targets of 80 percent peak workload and 20 percent minimum workload for their enterprise data centers.
- According to officials in its Office of the CIO, Transportation does not have a department-wide definition for server utilization. Each of its component agencies defined this metric to suit its operational needs. Transportation's OCIO defined thresholds for overutilization (e.g., central processing unit or memory usage above 90 percent for 30 minutes, disk storage above 90 percent for 2 hours), but did not define utilization targets for underutilization.

While several agencies developed a definition that could have provided a reasonably complete picture of server utilization, each agency reported its number of underutilized servers rather than how efficiently its servers were being used. This is because OMB's revised guidance did not ask them to report on server utilization but rather directed the agencies to identify and report the number of underutilized production servers in each data center. Unless OMB directs agencies to report on a metric in terms of server utilization, agencies' reporting may not provide an accurate view of their data center optimization progress. In addition, requiring agencies to report on server utilization will help OMB more effectively implement FITARA.

Conclusions

Agencies continue to report progress toward meeting their goals for data center closures and achieving the related savings. Specifically, almost all of the 24 DCOI agencies met their goals for data center closures in fiscal year 2019 and also planned to meet their closure goals for 2020. Additionally, in fiscal year 2019, almost all of the agencies met their savings goals and all planned to meet their 2020 cost savings goals for a total of \$1.1 billion in savings over the 2 years. While agencies' efforts in both respects have made an important contribution to achieving the overall goals of DCOI, taking action to address our prior recommendations could help those agencies that did not meet their goals to achieve even more benefits from DCOI.

Agencies reported mixed progress against OMB's optimization metrics for both fiscal years 2019 and 2020. While most agencies have not met all of their optimization targets, taking action to address our prior recommendations could help those agencies to realize fully the expected benefits of DCOI.

While OMB developed an effective server utilization metric in 2016, the agency's 2019 DCOI guidance revisions resulted in a metric that no longer reported on actual server utilization, resulting in an incomplete picture of utilization. Without better guidance on how to report on server utilization, the server-related optimization metrics will lack meaningful information about agencies' DCOI performance. Absent complete information, OMB and Congress may be hindered in providing oversight and making appropriate decisions about budgeting for data center utilization.

Recommendation for Executive Action

We reiterate the need for agencies to address our prior recommendations on data center consolidation that have not yet been implemented. In addition, we are making one recommendation to OMB. Specifically:

The Director of the Office of Management and Budget should reexamine its DCOI guidance regarding how to measure server utilization and revise it to better and more consistently address server efficiency.

(Recommendation 1)

Agency Comments and Our Evaluation

We provided a draft of this report to OMB and the 24 DCOI agencies for their review and comment. In response, a GAO liaison on OMB's Ethics Team stated via email that the agency had no comments on the draft report and on our recommendation directed to the agency.

In addition, we received responses from the 24 agencies (to which we did not make recommendations). Five of the agencies stated that they agreed with the information presented in the report, six agencies offered comments but did not state whether they agreed or disagreed with the report, and 13 agencies stated that they had no comments. Further, seven of the 24 agencies provided technical comments on the report, which we incorporated, as appropriate.

Specifically, five agencies agreed with the information presented in the report, as follows:

- An Audit Liaison Officer in the Office of the CIO at Agriculture stated via email that the agency generally concurred with the findings and recommendations in the draft report. Agriculture also provided technical comments, which we incorporated, as appropriate.
- Defense provided written comments stating that it concurred with the data center closure updates reflected in our draft report. The agency also provided technical comments, which we incorporated, as appropriate. Defense's comments are reprinted in appendix III.
- Via email, an official responsible for overseeing GAO audits in Justice's Office of the CIO stated that the agency concurred with the draft report.
- The Director of Financial Systems Technology in Treasury's Office of the CIO stated via email that the agency agreed with the draft report.
- In written comments, NRC stated that it generally agreed with the findings in the draft report. The agency added that it had set a goal to decommission underutilized servers, but that achievement of the goal was delayed due to a competing goal to modernize its legacy computer and storage environment. The agency stated that it is committed to achieving the goal to decommission underutilized servers in fiscal year 2021. NRC's comments are reprinted in appendix IV.

In addition, six of the 24 agencies provided comments, but did not state whether they agreed or disagreed with the draft report.

- Via email, a senior audit liaison at HHS stated that the agency was continuing to take strides toward improving its data center operations, including reducing its physical footprint where possible. HHS also provided technical comments, which we incorporated, as appropriate.
- HUD provided written comments, in which it thanked us for the opportunity to review the draft report. The agency also provided a technical comment, which we incorporated, as appropriate. HUD's comments are reprinted in appendix V.
- Via email, an audit liaison in the Office of the Assistant Secretary for Policy at Labor thanked us for the opportunity to review the draft report. Labor also provided technical comments, which we incorporated, as appropriate.
- An audit liaison in the Office of Congressional and Legislative Affairs at VA stated via email that the agency appreciated the opportunity to review the draft report. VA also provided technical comments, which we incorporated, as appropriate.
- In written comments, SSA thanked us for the opportunity to review the draft report and stated that it was continuing to economize and evolve its data center management. The agency also provided technical comments, which we incorporated, as appropriate. SSA's comments are reprinted in appendix VI.
- In written comments, USAID noted that we had accurately characterized its closure of four data centers and achievement of DCOI goals. In addition, the agency provided information on its efforts to further utilize cloud computing to achieve more cost savings. Among other things, the agency also reported on the results of its annual cybersecurity audit. USAID's comments are reprinted in appendix VII.

Finally, via emails, officials of 13 agencies stated that they had no comments on the report. These agencies were Commerce, Education, Energy, DHS, Interior, State, Transportation, EPA, GSA, NASA, NSF, OPM, and SBA.

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 VIII.

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

Carol C. Harris
Director, Information Technology
Acquisition Management Issues

List of Committees

The Honorable Jack Reed
Chairman
The Honorable James M. Inhofe
Ranking Member
Committee on Armed Services
United States Senate

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

The Honorable Adam Smith
Chairman
The Honorable Mike Rogers
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Carolyn B. Maloney
Chairwoman
The Honorable James Comer
Ranking Member
Committee on Oversight and Reform
House of Representatives

Appendix I: Objectives, Scope, and Methodology

The objectives for this engagement were to (1) determine federal agencies' progress on meeting their data center closure goals and the related achieved savings, and describe agencies' plans for future closures and savings; (2) assess agencies' progress against the Office of Management and Budget (OMB) data center optimization goals; and (3) assess the effectiveness of OMB's metric for server utilization and how the agencies are implementing it.

To address the first objective for data center closures, we obtained and analyzed March and August 2020 data center inventory documentation from the 24 departments and agencies (agencies)¹ that participate in OMB's Data Center Optimization Initiative (DCOI).² Using the March 2020 inventory data, we identified the agencies' reported closures for fiscal year 2019.³ Using the August 2020 inventory data, we identified the agencies' reported closures for fiscal year 2020 through August 2020, and we identified the agencies' planned future closures from September 2020 through the end of fiscal year 2025. We also compared agencies' completed and planned closures to their planned fiscal year 2020 consolidation goals, as documented in their DCOI strategic plans. OMB's guidance for developing agencies' DCOI strategic plans required agencies to report cumulative numbers for their planned and achieved

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; and 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 the 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.

³We used the data agencies reported to OMB by March 2020 to ensure they had adequate time to identify their end-of-fiscal year closures.

data center closures; as a result, we calculated agencies' fiscal year 2020 goals from the data reported in DCOI plans.

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 Federal IT Dashboard (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 of the 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.

For cost savings and avoidances,⁵ we obtained and analyzed March and August 2020 documentation from the 24 DCOI agencies. This documentation is required by OMB's March 2013 and June 2019 memorandums and included the agencies' quarterly reports of cost savings and avoidances posted to their digital strategy websites and their DCOI strategic plans.⁶ To determine cost savings achieved for fiscal year 2019, we used the March 2020 cost savings documentation and totaled agencies' reported savings and avoidances.⁷ To determine cost savings achieved for fiscal year 2020 and for the initiative overall, we used the August 2020 cost savings documentation and totaled agencies' reported savings and avoidances from the start of fiscal year 2012⁸ through August 2020, as found in the August 2020 quarterly reports posted to the

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

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, *Fiscal Year 2013 PortfolioStat Guidance: Strengthening Federal IT Portfolio Management*, Memorandum M-13-09 (Washington, D.C.: Mar. 27, 2013) and *Update to Data Center Optimization Initiative (DCOI)*, Memorandum M-19-19 (Washington, D.C.: June 25, 2019).

⁷We used the data agencies reported to OMB by March 2020 to ensure they had adequate time to identify their cost savings through the end of fiscal year 2019.

⁸Under 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.

agencies' digital strategy websites.⁹ To identify future planned savings, we totaled the agencies' projected savings and avoidances from fiscal years 2020 through 2021, 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 2020. 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.¹⁰ 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 complete and reliable to report on agencies' data center consolidation cost savings information.

For our second objective, we analyzed the February 2020 and August 2020 data center optimization progress information of the 20 DCOI agencies.¹¹ This progress information was obtained from the IT Dashboard.¹² We then compared the agencies' current optimization progress information to agencies' fiscal year 2020 optimization targets, as documented on the IT Dashboard.

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 two reporting quarters to identify any inconsistencies in agencies' reported progress. We also followed up with the agencies to understand the steps they took to ensure that what they reported to OMB was

⁹We did not independently validate agencies' reported cost savings figures.

¹⁰GAO, *Data Center Optimization: Agencies Report Progress, but Oversight and Cybersecurity Risks Need to Be Addressed*, [GAO-20-279](#) (Washington, D.C.: Mar. 5, 2020).

¹¹Four agencies—the Departments of Education and Housing and Urban Development, and the General Services Administration and the U.S. Agency for International Development—reported that they do not own any data centers and, therefore, do not have a basis to measure and report on optimization progress.

¹²Although the IT Dashboard shows that it was updated as of September 16, 2020, the data was collected from agencies through the August 2020 integrated data collection. Therefore, we report the progress information as of August 2020.

accurate and reliable. As a result, we determined that the data were sufficiently complete and reliable to report on agencies' progress information for virtualization, availability, advanced energy metering, and server utilization.

For our third objective, we obtained OMB's guidance to agencies on the definition of a server utilization metric. We compared the guidance to FITARA to determine the extent to which it addressed the law's requirement for a metric to report on server efficiency.

In addition, we obtained each agency's definition for a server utilization metric via written responses to questions sent to the agencies' DCOI program officials. The responses also included how the agency was measuring its server utilization. Then, we compared agencies' definitions of server utilization with FITARA and OMB M-19-19 requirements to determine the extent to which the agencies' server utilization definitions met those requirements. We also followed up with relevant agency officials to determine any discrepancies in the server utilization definitions and the criteria, to confirm the accuracy of our analysis and determine the rationale for any discrepancies. As a result, we determined that the definitions were sufficiently complete and reliable to report on the extent to which they provide a reasonably complete picture of agencies' server utilization.

We conducted this performance audit from March 2020 to March 2021 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: GAO Previously Reported on Agencies' DCOI- Related Efforts

Since the enactment of FITARA in December 2014, we have reviewed and verified the quality and completeness of each covered agency's inventory and Data Center Optimization Initiative (DCOI) strategy annually.¹ Accordingly, we have published five reports documenting the findings and recommendations from each of these reviews.² In addition, we have examined and reported on agencies' efforts to optimize their data centers, as well as the challenges encountered and successes achieved.³ As of December 2020, agencies had implemented 55 of the 125 recommendations from these reports and closed 17 due to changes in DCOI. However, the agencies had not fully implemented the other 53 recommendations.

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; and 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.

²*Data Center Optimization: Agencies Report Progress, but Oversight and Cybersecurity Risks Need to Be Addressed*, [GAO-20-279](#) (Washington, D.C.: Mar. 5, 2020); *Data Center Optimization: Additional Agency Actions Needed to Meet OMB Goals*, [GAO-19-241](#) (Washington, D.C.: Apr. 11, 2019); *Data Center Optimization: Continued Agency Actions Needed to Meet Goals and Address Prior Recommendations*, [GAO-18-264](#) (Washington, D.C.: May 23, 2018); *Data Center Optimization: Agencies Need to Complete Plans to Address Inconsistencies in Reported Savings*, [GAO-17-388](#) (Washington, D.C.: May 18, 2017); and *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).

³GAO, *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).

2016 Report Identifies Need for Agencies to Complete Cost Savings Goals and Improve Data Center Optimization

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—but fell short of the Office of Management and Budget's (OMB) fiscal year 2015 consolidation goal. Agencies also reported significant consolidation cost savings and avoidances—totaling about \$2.8 billion through fiscal year 2015. 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 2020, all 32 recommendations from this report were closed, but agencies had not fully addressed 17 of them due to OMB's changes to DCOI.

2017 Reports Focused on New DCOI Implementation

In May 2017, we reported that the agencies continued to report significant data center closures—totaling more than 4,300 through August 2016—with more than 1,200 additional centers planned for closure through fiscal year 2019.⁴ The agencies also reported achieving about \$2.3 billion in cost savings through August 2016. However, agencies' total planned cost savings for fiscal years 2016 through 2018 were more than \$2 billion less than OMB's fiscal year 2018 cost savings goal of \$2.7 billion.

In addition, our May 2017 report identified weaknesses in agencies' DCOI strategic plans.⁵ Of the 23 agencies that had submitted their strategic plans at the time of our review, seven had addressed all of the five required elements of a strategic plan, as identified by OMB (such as providing information related to data center closures and cost savings

⁴[GAO-17-388](#).

⁵[GAO-17-388](#).

metrics). The remaining 16 agencies that submitted their plans either partially met or did not meet the requirements.

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 17 agencies 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 2020, all 30 recommendations had 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 collectively reported limited progress against OMB's fiscal year 2018 performance targets for the five optimization metrics.⁶ Specifically, for each of the five targets, no more than five agencies reported that they had met or exceeded that specific target.

In addition, we noted in the report that most agencies had not implemented automated monitoring tools to measure server utilization, as required by the end of fiscal year 2018. Specifically, four agencies reported that they had fully implemented such tools and 18 reported that they had not done so. Two agencies did not have a basis to report on progress because they did not have any agency-owned data centers.

Accordingly, we recommended that OMB formally document a requirement for agencies to 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 without 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 2020, eight of the 19 recommendations had been fully implemented.

⁶[GAO-17-448](#).

2018 Report Emphasized Need for Agencies to Address Prior Recommendations

In May 2018, we noted that the 24 agencies participating in DCOI reported mixed progress toward achieving OMB's goals for closing data centers by September 2018.⁷ Over half of the agencies reported that they had either already met, or planned to meet, all of their OMB-assigned closure goals by the deadline. However, four agencies reported that they did not have plans to meet all of their assigned goals and two agencies were working with OMB to establish revised targets. With regard to agencies' progress in achieving cost savings, 20 agencies reported planned and achieved savings that totaled \$1.62 billion for fiscal years 2016 through 2018. However, this total was approximately \$1.12 billion less than OMB's DCOI savings goal of \$2.7 billion.

In addition, the 24 agencies continued to report limited progress against OMB's five data center optimization targets, with one agency meeting four targets, one meeting three targets, six meeting either one or two targets, and 14 meeting none of their targets. Further, as of August 2017, most agencies reported that they were not planning to meet OMB's fiscal year 2018 optimization targets.

Because we had previously 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 in our May 2018 report, but indicated that we would continue to monitor the agencies' progress toward meeting OMB's DCOI goals.

2019 Report Focused on Agencies' Progress as DCOI Neared Sunset in 2018

In April 2019, we reported that the 24 DCOI agencies continued to report mixed progress toward achieving OMB's goals for closing data centers and realizing the associated savings by September 2018.⁸ Thirteen agencies reported that they had met, or had plans to meet, all of their

⁷GAO-18-264.

⁸GAO-19-241.

OMB-assigned closure goals by the deadline. However, 11 agencies reported that they did not have plans to meet their goals.

In addition, 16 agencies reported that 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 five agencies reporting less in planned cost savings and avoidances in their DCOI strategic plans as compared to the savings goals established for them by OMB. Three agencies did not have a cost savings target and did not report any achieved savings.

Regarding data center optimization, the 24 agencies reported limited progress in fiscal year 2018 against OMB's five optimization targets. In this regard, 12 agencies reported that they had met at least one target, while 10 reported that they had not met any of the targets. Two agencies stated that they did not have a basis to report on progress as they did not own any data centers.

Further, 20 agencies did not plan to meet all of OMB's fiscal year 2018 optimization goals. Specifically, only two agencies reported plans to meet all applicable targets, while six reported that they did not plan to meet any of the targets.

As a result of these findings, we recommended that 22 agencies take actions to meet the data center closure, cost savings, and optimization performance metrics targets, as appropriate. As of December 2020, two of the 36 recommendations had been fully implemented.

March 2020 Report Discussed OMB's Revised DCOI Policy Weaknesses

Most recently, in March 2020, we reported that the 24 DCOI agencies continued to report mixed progress toward achieving OMB's goals for closing data centers and realizing the associated savings by September 2019.⁹ Specifically, 23 of the 24 reported that they had met, or planned to meet, their fiscal year closure goals, and would close 286 facilities in doing so.

⁹[GAO-20-279](#).

We noted that OMB issued revised guidance in June 2019 that narrowed the scope of the type of facilities that would be defined as a data center. This revision eliminated the reporting of over 2,000 facilities government-wide. We concluded that, without a requirement to report on these, important visibility would be diminished, including oversight of security risks.

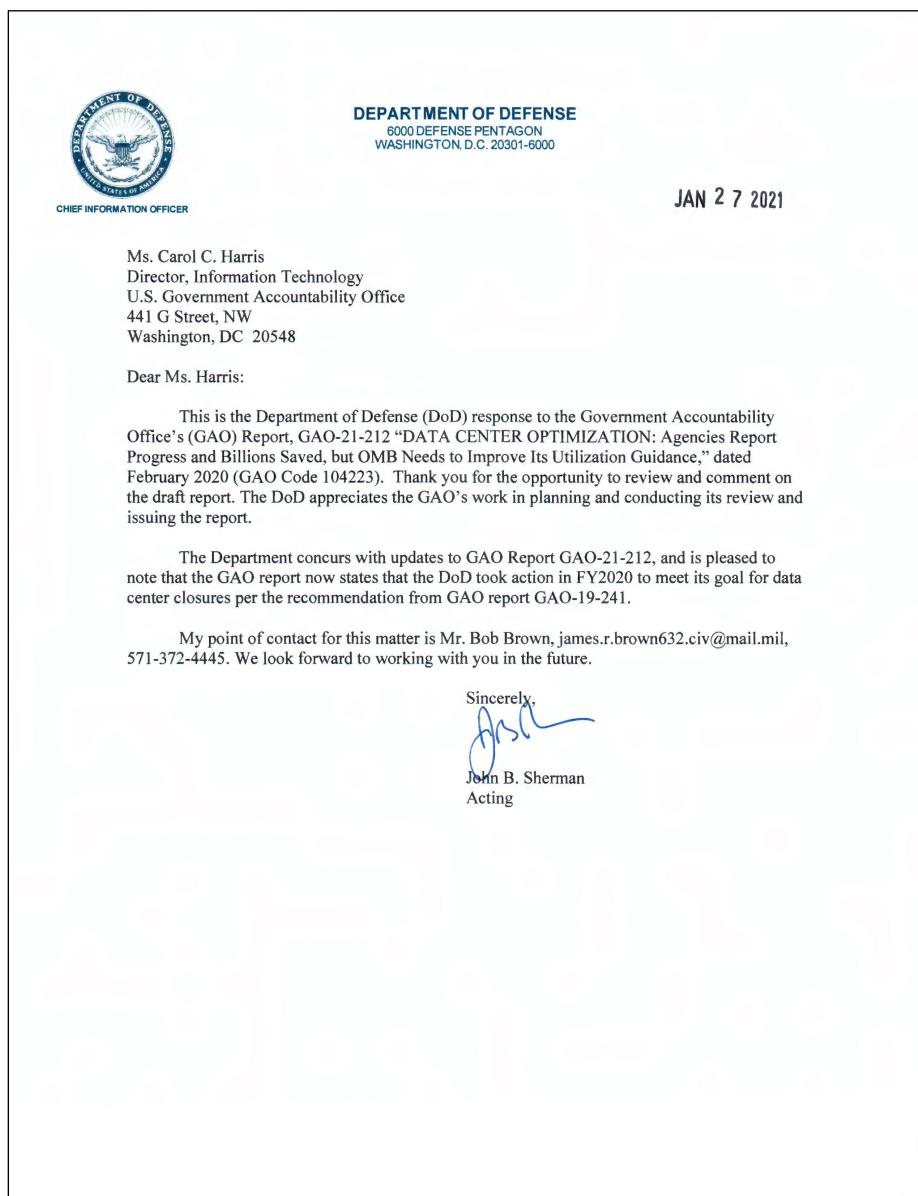
In addition, 23 DCOI agencies reported that they had met, or planned to meet, OMB's fiscal year 2019 savings goal of \$241.5 million. One agency did not complete a plan, but planned to do so in the future. Collectively, the agencies reported a total of \$4.7 billion in cost savings from fiscal years 2012 through 2019.

Regarding data center optimization, the agencies reported progress in meeting OMB's three revised optimization metrics. Eight agencies reported that they met all three targets for the metrics GAO reviewed, five met two targets, and six met one target. In addition, one agency had not established any targets, and four agencies reported that they no longer owned any data centers.

However, we noted that, for a new fourth metric (availability), the data were not sufficiently reliable to report on because of unexpected variances in the information reported by the agencies. We also determined that, in defining the optimization metrics, OMB had not included statistical universe parameters to enable determinations of progress. These metrics called for counts of the actual numbers of (1) virtualized servers, (2) data centers with advanced energy metering, and (3) underutilized servers; but the metrics did not include a count of the universe of all servers and all data centers. Accordingly, percentages could not be calculated to determine progress.

As a result of these findings, we made four recommendations to OMB to address weaknesses in the revised DCOI guidance. We also made four recommendations to three selected agencies to meet the data center cost savings and optimization performance metrics targets, as appropriate. As of December 2020, none of the eight recommendations had been fully implemented.

Appendix III: Comments from the Department of Defense



Text of for Appendix III: Comments from the Department of Defense

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 Government Accountability Office's (GAO) Report, GAO-21-212 "DATA CENTER OPTIMIZATION: Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance," dated February 2020 (GAO Code 104223). Thank you for the opportunity to review and comment on the draft report. The DoD appreciates the GAO's work in planning and conducting its review and issuing the report.

The Department concurs with updates to GAO Report GAO-21-212, and is pleased to note that the GAO report now states that the DoD took action in FY2020 to meet its goal for data center closures per the recommendation from GAO report GAO-19-241.

My point of contact for this matter is Mr. Bob Brown, james.r.brown632.civ@mail.mil, 571-372-4445. We look forward to working with you in the future.

Sincerely,

John B. Sherman

Acting

Appendix IV: Comments from the Nuclear Regulatory Commission



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

January 19, 2021

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

Dear Ms. Harris:

Thank you for providing the U.S. Nuclear Regulatory Commission (NRC) with the opportunity to review and comment on the U.S. Government Accountability Office's (GAO) draft report GAO-21-212, "Data Center Optimization: Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance." The NRC has reviewed the draft report and is in general agreement with its findings.

Based on the Office of Management and Budget's updated server utilization definition, the NRC set a goal to decommission underutilized servers as a result of re-distribution of workload and sunsetting servers that are no longer in use. This goal has been delayed due to a competing goal to modernize our legacy compute and storage environment. While the NRC has made progress towards optimizing our server utilization, we recognize that we did not meet our goal and are committed to achieving that goal in fiscal year 2021.

If you have any questions regarding the NRC's response, please contact John Jolicœur, Executive Technical Assistant, by phone at (301) 415-1642 or by e-mail at John.Jolicoeur@nrc.gov.

Sincerely,

Margaret M.
Doane
Margaret M. Doane
Executive Director
for Operations

Digitally signed by Margaret M.
Doane
Date: 2021.01.19 13:55:41 -0500

Text of Appendix IV: Comments from the Nuclear Regulatory Commission

January 19, 2021

Ms. Carol C. Harris, Director

Information Technology Management Issues

U.S. Government Accountability Office 441 G Street, NW.

Washington, DC 20548

Dear Ms. Harris:

Thank you for providing the U.S. Nuclear Regulatory Commission (NRC) with the opportunity to review and comment on the U.S. Government Accountability Office's (GAO) draft report

GAO-21-212, "Data Center Optimization: Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance." The NRC has reviewed the draft report and is in general agreement with its findings.

Based on the Office of Management and Budget's updated server utilization definition, the NRC set a goal to decommission underutilized servers as a result of re-distribution of workload and sunseting servers that are no longer in use. This goal has been delayed due to a competing goal to modernize our legacy compute and storage environment. While the NRC has made progress towards optimizing our server utilization, we recognize that we did not meet our goal and are committed to achieving that goal in fiscal year 2021.

If you have any questions regarding the NRC's response, please contact John Jolicoeur, Executive Technical Assistant, by phone at (301) 415-1642 or by e-mail at John.Jolicoeur@nrc.gov.

Sincerely,

Margaret M. Doane

Executive Director for Operations

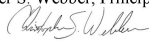
Appendix V: Comments from the Department of Housing and Urban Development



U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410-3000

CHIEF INFORMATION OFFICER

MEMORANDUM FOR: Justin J. Booth, U.S. General Accountability Office

FROM: Christopher S. Webber, Principal Deputy Chief Information
Officer 

SUBJECT: HUD's Comments on GAO's *Data Center Optimization* Draft
Report (GAO-21-212)

Thank you for the opportunity to review the subject report. HUD submits the following comment:

Table 1 on page 15 identifies HUD as having three Data Centers; however, per the Data Center Optimization Initiative (DCOI) May 2020 reporting guidelines, HUD only maintains two Data Centers. The guidelines state that "[i]n accordance with M-19-19 non-agency-owned cloud providers no longer need to be listed in the inventory file. However, all other data centers – whether agency-owned, colocated, or otherwise – must be reported in the inventory." HUD believes the third Data Center identified in the table may be referring to a Cloud infrastructure that, at one time, may have been included in a quarterly DCOI data call, but subsequently was removed from our reporting.

Again, thank you for the opportunity to review the subject draft. Mr. Neeraj Saraf, HUD's Data Center Service Division Director, is available to address any follow-on questions you may have. He is available at (202) 402-2674 (office), (202) 578-5289 (mobile), or Neeraj.Saraf@hud.gov.

www.hud.gov

espanol.hud.gov

Text of Appendix V: Comments from the Department of Housing and Urban Development

MEMORANDUM FOR: Justin J. Booth, U.S. General Accountability Office

FROM: Christopher S. Webber, Principal Deputy Chief Information Officer

SUBJECT: HUD's Comments on GAO's Data Center Optimization Draft Report
(GAO-21-212)

Thank you for the opportunity to review the subject report. HUD submits the following comment:

Table 1 on page 15 identifies HUD as having three Data Centers; however, per the Data Center Optimization Initiative (DCOI) May 2020 reporting guidelines, HUD only maintains two Data Centers. The guidelines state that "[i]n accordance with M-19-19 non-agency-owned cloud providers no longer need to be listed in the inventory file. However, all other data centers – whether agency-owned, colocated, or otherwise – must be reported in the inventory." HUD believes the third Data Center identified in the table may be referring to a Cloud infrastructure that, at one time, may have been included in a quarterly DCOI data call, but subsequently was removed from our reporting.

Again, thank you for the opportunity to review the subject draft. Mr. Neeraj Saraf, HUD's Data Center Service Division Director, is available to address any follow-on questions you may have. He is available at (202) 402-2674 (office), (202) 578-5289 (mobile), or Neeraj.Saraf@hud.gov.

Appendix VI: Comments from the Social Security Administration



SOCIAL SECURITY
Office of the Commissioner

January 28, 2021

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

Dear Director Harris,

Thank you for the opportunity to review the draft report, "DATA CENTER OPTIMIZATION: Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance" (GAO-21-212). We continue to economize and evolve our data center optimization management through participation in the Department of Energy's Better Buildings Challenge, and leadership in the Data Center Optimization Initiative Community of Practice.

If you have any questions, please contact me at (410) 965-2611. Your staff may contact Trae Sommer, Director of the Audit Liaison Staff, at (410) 965-9102.

Sincerely,

A handwritten signature in blue ink that reads "Scott Frey".

Scott Frey
Chief of Staff

SOCIAL SECURITY ADMINISTRATION BALTIMORE, MD 21235-0001

Text of Appendix VI: Comments from the Social Security Administration

January 28, 2021

Ms. Carol C. Harris

Director, Information Technology Management Issues United States Government
Accountability Office

441 G Street, NW Washington, DC 20548

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Sincerely,

Scott Frey Chief of Staff

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



January 19, 2021

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

Re: Draft Report Entitled, DATA-CENTER OPTIMIZATION: Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance (GAO-21-212)

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) titled, *DATA-CENTER OPTIMIZATION: Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization Guidance*, (GAO-21-212).

The GAO's report accurately reflects that USAID does not own any data centers. By closing all four of our data centers, USAID has complied with the targets for optimizing data centers set by the Office of Management and Budget (OMB). The report accordingly has no recommendations directed at USAID.

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 our successful management of our data centers.

Sincerely,

Frederick M. Nutt
Frederick M. Nutt *Jan. 19, 2021*
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) TITLED, *DATA-CENTER OPTIMIZATION:
Agencies Report Progress and Billions Saved, but OMB Needs to Improve Its Utilization
Guidance (GAO-21-212)***

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. As noted in draft report GAO-21-212, USAID does not have any tiered data centers.

USAID is proud to be a leader in data-center optimization in the U.S. Government, and we plan to continue to innovate and improve our operations to achieve our mission as efficiently and effectively as possible. Over the past several years, USAID has closed our four data centers and fulfilled all of the targets in our Strategic Plan for the Data-Center Optimization Initiative (DCOI) set by the Office of Management and Budget (OMB).

Beginning in 2012, USAID began to invest our information-technology (IT) resources strategically to modernize and improve our key enterprise systems. Since that time, USAID has become a leader among Federal Departments and Agencies in IT modernization, having eliminated legacy IT, adopted cloud-based platforms for email and services, and implemented IT collaboration tools.

In 2018, USAID fully met the spirit and intent of DCOI by migrating our enterprise data center to a cloud-services provider and incorporating a high-availability computing infrastructure to support the Agency's data-center services and disaster recovery. Our cloud data center has provided the Agency with substantial cost-avoidance, and increased our return on investment.

More recently, these early modernization efforts paid off for USAID. Despite the challenges presented by the pandemic of COVID-19, the Agency was able to pivot successfully - literally overnight - to a safe and productive telework environment. Since mid-March 2020, our cloud collaboration platform has produced a significant and accelerated increase in our computing capacity and has adjusted to increases in demand quickly and efficiently. The Agency was able to enhance communications for our workforce through our audio/video collaboration tools. Additionally, the Office of the Chief Information Officer (CIO) in our Bureau for Management (M) rapidly implemented increased IT security and monitoring to ensure all our systems and equipment had the highest level of protection, educated our staff on increased cyber threats, and gave our Agency's leadership full visibility into our IT operations.

On the [Federal Information Technology Acquisition Reform Act \(FITARA\) Scorecards](#), USAID has consistently received "A" grades for the consolidation and optimization of data centers, incremental development, transparency and risk-management, portfolio-management, and software licensing. In fact, USAID was the first of 24 Government Departments and

Agencies to receive an overall “A” rating, and is the only one to receive four overall “A” ratings on the FITARA Scorecards (January 2017, November 2017, December 2019, and July 2020).

USAID has worked diligently to build excellent cybersecurity and Federally compliant systems and remain on the forefront of innovation, while concurrently providing flexibility and mobility to our staff as they carry out our mission around the globe. Our cybersecurity work over the last few years has laid an important foundation for working closely with OMB, the U.S. Department of Homeland Security (DHS), the Federal Chief Information Officers Council, and other U.S. Government organizations to protect our networks, systems, and information from unauthorized access or disruption while continually providing essential services and protecting privacy.

For our FISMA Audit for Fiscal Year (FY) 2020, USAID has recorded strong results, including the following:

- USAID achieved a perfect 10 out of 10 for the Cyber Cross-Agency Priority goals, the highest grade possible, for the third straight year:
 - This earns USAID the designation of “Managing Risk,” which is the highest designation;
- USAID received a Level 4 FISMA Metrics Rating, which designates the Agency as having an “Effective Cybersecurity Program”; and
- USAID recorded a strong 3.8 out of 5.0 on the Office of Inspector General FISMA Metrics Maturity Score, an increase over our solid 3.4 score in FY 2019.

USAID also continues to explore and integrate innovative technologies to streamline our processes, leverage our data, and deliver value-added solutions to our internal and external clients. Over this past year, we focused on innovative solutions, such as robotics-process automation (RPA), artificial intelligence (AI), and data-visualization, to deliver results faster and help our partners draw insights for future development priorities. For example the Agency piloted the integration, management, and analysis of data for the President’s Malaria Initiative by using consolidated information from partners to target malaria interventions and predict future potential outbreaks to align our resources in advance. In addition, the Agency launched an RPA solution to automate 70 percent of our human-resource (HR) actions in 2021, which will speed up our ability to hire and take care of our staff.

Text of Appendix VII: Comments from the U.S. Agency for International Development

Page 1

January 19, 2021

Carol C. Harris

Director, Information-Technology Acquisition Management Issues

U.S. Government Accountability Office 441 G Street, N.W.

Washington, D.C. 20226

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(GAO- 21-212)

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Page 2

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Appendix VIII: 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 Eric Winter (Assistant Director), Justin Booth (Analyst-in-Charge), Chris Businsky, Garret Chan, Nancy Glover, Dave Hinchman, Gina Hoover, Lisa Maine, and Jonathan Wall.

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