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# **HHS STRATEGIC PLAN FOR DATA CENTER OPTIMIZATION**

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Version 2.0

04/14/2017

## Change Log

Version	Implemented By	Revision Date	Approved By	Approval Date	Change/Addendum
1.0	C. Stevens, HHS ITIO	09/30/2016	George Chambers Acting Executive Director, ITIO	09/30/2016	Publication to OMB
2.0	C. Stevens. HHS ITIO	4/14/2017			2017 OMB-mandated updates

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# 1 Background

The Data Center Optimization Initiative (DCOI) supersedes the Federal Data Center Consolidation Initiative (FDCCI) passed in 2010 to promote the use of green Information Technology (IT) by reducing the energy and real estate foot print of government data centers; reducing the cost of associated data center hardware, software, and operations, increasing the IT security posture of the Federal Government and shifting IT investments to more efficient technologies. M-16-19 promulgates new definitions for data centers and targets for optimization.

While HHS has already been working toward the goals of the FDCCI, the DCOI includes revised definitions of what constitutes a data center and which data centers should be considered tiered versus non-tiered. These new definitions significantly impact the agency’s existing plans for meeting data center optimization goals as well as the metrics used to track progress toward those goals.

## 1.1 What is a Data Center?

Per M-16-19, any room with at least one server, providing services (whether in production, test, staging, development, or any other environment) is considered a data center.<sup>1</sup> The complete definitions of tiered and non-tiered data centers compared to the FDCCI definition are below.

### 1.1.1 FDCCI vs. DCOI Data Center Definitions

One of the key distinctions between FDCCI and DCOI is the abandonment of the core vs. non-core data center definition and the consolidation of tiered data centers into one category. DCOI classifies all data centers as either Tiered or Non-Tiered.

Figure 1: FDCCI vs. DCOI Data Center Definitions

FDCCI Definitions	DCOI Definitions
<b>Tier 1</b> Basic Capacity: A Tier 1 data center provides dedicated site infrastructure to support information technology beyond an office setting. Tier 1 infrastructure includes a dedicated space for IT systems; an uninterruptible power supply (UPS) to filter power spikes, sags, and momentary outages; dedicated cooling equipment that won’t get shut down at the end of normal office hours; and an engine generator to protect IT functions from extended power outages.	<b>Tiered</b> Tiered data centers are defined as those that utilize each of the following: 1) a separate physical space for IT infrastructure; 2) an uninterruptible power supply; 3) a dedicated cooling system or zone; and 4) a backup power generator for prolonged power outages.  Data centers previously classified as tiered in past inventories will automatically be classified as tiered under the DCOI.
<b>Tier 2 (Includes Tier 1 capabilities)</b> Capacity Components: Tier 2 facilities include redundant critical power and cooling components to provide select maintenance opportunities and an increased margin of safety against IT process disruptions that would result from site infrastructure equipment failures. The redundant components include power and cooling equipment such as UPS modules, chillers or pumps, and engine generators.	

<sup>1</sup> OMB Memorandum M-16-19

[https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m\\_16\\_19\\_1.pdf](https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf)

FDCCI Definitions	DCOI Definitions
<p><b>Tier 3</b> (Includes Tier 1-2 capabilities)  Concurrently Maintainable: A Tier 3 data center requires no shutdowns for equipment replacement and maintenance. A redundant delivery path for power and cooling is added to the redundant critical components of Tier 2 so that each and every component needed to support the IT processing environment can be shut down and maintained without impact on the IT operation.</p>	
<p><b>Tier 4</b> (Includes Tier 1-3 capabilities)  Fault Tolerance: Tier 4 site infrastructure builds on Tier 3, adding the concept of Fault Tolerance to the site infrastructure topology. Fault Tolerance means that when individual equipment failures or distribution path interruptions occur, the effects of the events are stopped short of the IT operations.</p>	
<p><b>Non-Tiered</b>  All other data centers shall be considered non-tiered data centers.</p>	<p><b>Non-Tiered</b>  All other data centers shall be considered non-tiered data centers.</p>

## 1.2 What is NOT a Data Center?

The following are not considered data centers:

- Telecom closets
- Rooms with only print servers or network equipment
- Any room or closet with equipment dedicated to network, telecommunications, and other non-user facing equipment

## 1.3 Policy Guidance

In December 2014, the President signed into law the Federal Information Technology Acquisition Reform Act (FITARA), which enacts and builds upon the requirements of the FDCCI. FITARA requires that agencies submit annual reports that are to include: comprehensive data center inventories, multi-year strategies to consolidate and optimize data centers, performance metrics and a timeline for agency activities, and yearly calculations of investment and cost savings.

In addition, FITARA requires the Administrator of the Office of E-Government and Information Technology (henceforth referred to as the Office of the Federal Chief Information Officer (OFCIO)) to establish and publish cost savings and optimization improvements, provide public updates on cumulative cost savings and optimization improvements, and review agencies' data center inventories and the implementation of data center management strategies.

Per the OFCIO, agencies must align the FITARA Baseline Milestone dates and DCOI Milestone due dates. DCOI milestones are required to be added to files online by September 30, 2016. The next reporting period for FITARA baseline **AND** DCOI milestones is November 30, 2016. Quarterly updates will continue as part of the Integrated Data Collection (IDC).

The \$20 million spending authorization for life cycle projects under FITARA is not applicable to DCOI efforts. Any expenditure on data centers would have to be approved by the OFCIO.

Per the FITARA HHS Implementation Plan:<sup>2</sup>

*At the Department-level, the HHS [Chief Information Officer] CIO will work closely with the [Chief Finance Officer] CFO, [Chief Acquisition Officer] CAO, Division leadership, Division CIOs, and governance structures to have visibility throughout the planning, programming, and budgeting processes to assure he/she has insight and understanding of the overall Departmental IT portfolio as well as prospective insight into major new programs and the enabling IT required. The primary responsibility and focus for the HHS CIO, CFO and CAO and governance groups will be the approval of IT budget, acquisitions (through acquisition strategy approval), and investment lifecycle for projects over \$20 million annually or \$100 million over five years<sup>4</sup> 4 The CIO and CFO will lead an effort to evaluate the threshold after a cycle of implementation. as well as selected critical investments within a limited number of special Department-wide interest areas (e.g., cybersecurity).*

Per M-16-19:<sup>3</sup>

*Beginning 180 days after issuance of this memorandum, agencies may not budget any funds or resources toward initiating a new data center or significantly expanding an existing datacenter without approval from OMB OFCIO.*

Continued expenditures on new or expanded data centers would undermine the intent of DCOI.

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<sup>2</sup> FITARA HHS Implementation Plan

<sup>3</sup> OMB Memorandum M-16-19

[https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m\\_16\\_19\\_1.pdf](https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf)

## 2 The Future

### HHS Mission

*It is the mission of the U.S. Department of Health & Human Services (HHS) to enhance and protect the health and well-being of all Americans. We fulfill that mission by providing for effective health and human services and fostering advances in medicine, public health, and social services.*

HHS is committed to a healthier and greener future for the US, and its strategic goals clearly provide a path forward to achieve that by strengthening health care; advancing scientific knowledge and innovation; advancing the health, safety, and well-being of the American people; and enduring efficiency, transparency, accountability, and the effectiveness of HHS programs.

### OCIO Mission

*Manage collaborative, secure, cost-effective, and strategic IT solutions and services that enable HHS to help provide the building blocks Americans need to live healthy, successful lives.*

HHS OCIO's IT Strategic Goals provide the technical and architectural support for HHS to achieve its overarching strategic goals:<sup>4</sup>

1. IT Workforce: Acquire, deploy, and sustain a technology-enabled workforce
2. Cybersecurity and Privacy: Minimize occurrence and impact of Cybersecurity incidents
3. Shared Services: Optimize the ability to accomplish the mission by sharing business systems and services
4. Interoperability and Usability: Promote usability, interoperability, data sharing, and integration
5. IT Management: Mature IT management and governance to improve stewardship of IT investments and acquisitions

Data is an integral part of not only the IT goals, but all HHS strategic goals as well. It is used to empower the workforce, advance scientific inquiry and development, provide innovative health care solutions, and support management of programs and infrastructure. In his article "How Big Data is Transforming the Healthcare Sector", Bernard Marr, business and big data expert and CEO of the Advanced Performance Institute, summarizes the impact big data is having on health care including prevention, diagnosis, treatment, and follow up care of patients.

*The potential to improve patient outcomes, understand disease — even cure cancer — all seem just around the corner with these advances in the quantity and quality of the data we collect along with the computing power to analyze and understand it. —  
Bernard Marr<sup>5</sup>*

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<sup>4</sup> HHS Information Technology Strategic Plan FY 2017-2020.

<sup>5</sup> Bernard Marr, "How Big Data is Transforming the Healthcare Sector"; <https://www.linkedin.com/pulse/how-big-data-transforming-healthcare-sector-bernard-marr?trk=mp-reader-card>

The impact of big data and the management, storage, and protection of that data now extends far beyond the traditional realms associated with IT. The alignment of data center optimization and shared services is clear, but big data also has the potential to not only improve, but save lives. Given the importance of this information, it is more critical than ever that it be managed and maintained in an efficient and accessible manner.

In addition to the direct impacts data and data management have on the health of the American people, providing a more efficient, green, cost-effective data center structure reduces HHS's environmental footprint and reduces spending on power and superfluous equipment.

According to an article published by Total Site Solutions, green data center initiatives provide improved performance and efficiencies for equipment maintenance as well.

"With the appropriate power management policies and measurement systems, the data center manager will have a greater understanding of, and control over, power consumption. This enhanced control enables more successful execution of equipment refresh, updates and maintenance. It also provides superior visibility over the performance and efficiency of the entire network, facilitating the ability to pinpoint areas of opportunity and demonstrate the effectiveness of greener strategies."<sup>6</sup>

The article also estimates that for every dollar spent on a server, \$.50 is spent to power and cool it. While HHS initiatives cannot impact the raw costs of energy, those initiatives can reduce consumption, which in turn lowers energy costs.

To date, under FDCCI, the Department reached 98% of the 100% goal of electronics with power management features enabled in FY 2015. HHS closed eight data centers in FY2015 as well.

DCOI provides a framework for more energy efficient data centers across HHS, allowing faster access to and analysis of the wealth of data stored by HHS and its members, reduced power consumption, and lower energy costs. By leveraging best practices and lessons learned from other Agencies, HHS can move forward with DCOI compliance, and by extension, a healthier and brighter future for the American people.

## 2.1 Optimization Requirements

In addition to moving forward with the HHS strategic goals, the Department must comply with the DCOI requirements set forth by OMB.

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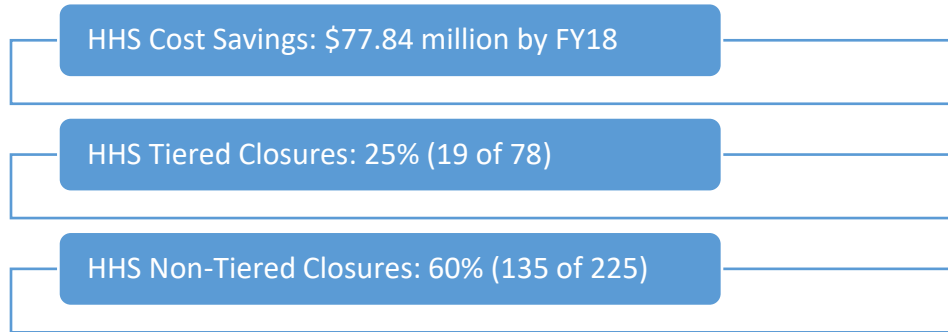
<sup>6</sup> Gerard J. Gallagher and Ramzi Namek, "Implementing Green Initiatives in the Data Center Environment", <http://www.totalsitesolutions.com/implementing-green-initiatives-in-the-data-center-environment/>



### 2.1.1 Cost Savings and Closures

Within 30 days of the August 1, 2016 publication of M-16-19, the Office of Management and Budget (OMB) provided all agencies with targets or requirements for compliance with DCOI.

Figure 2: OMB-Mandated DCOI Requirements



The numbers of data centers are based upon the Fiscal Year (FY) 2017 Quarter 1 IDC.

### 2.1.2 Performance Metrics

OMB also mandated the following performance metrics in M-16-19.

Figure 3: OMB-Mandated Performance Metrics

Metric	Definition	Calculation	FYE 2018 Target Value
Energy Metering	(%) Percent of total gross floor area (GFA) 25 in an agency's tiered data center inventory located in tiered data centers that have power metering.	$\frac{\text{Total GFA of Energy Metered Data Centers}}{\text{Total GFA of All Tiered Data Centers}}$	100%
Power Usage Effectiveness (PUE)	(Ratio) Proportion of total data center energy used by IT equipment.	$\frac{\text{Total Energy Used}}{\text{Total IT Equipment Energy Used}}$	$\leq 1.5$ ( $\leq 1.4$ for new data centers)
Virtualization	(Ratio) Ratio of operating systems (OS) to physical servers.	$\frac{\text{Total Server Count} + \text{Total Virtual OS}}{\text{Total Physical Servers}}$	$\geq 4$
Server Utilization & Automated Monitoring	(%) Percent of time busy (measured as 1 - percent of time spent idle), measured directly by continuous, automated monitoring software, discounted by the fraction of data centers fully equipped with automated monitoring.	Average Server Utilization X Percent of Data Centers Fully Equipped with Automated Monitoring	$\geq 65\%$
Facility Utilization	(%) Portion of total gross floor area in tiered data centers that is actively utilized for racks that contain IT equipment.	$\frac{\text{Total Active Rack Count} \times 30 \text{ sq. ft}}{\text{Total Gross Floor Area}}$	$\geq 80\%$

## 2.2 Approach

In both the private and public sector, the nature of data storage and services is changing. Gartner estimates that by 2019, Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) will become a common approach for 80% of enterprises. That is up from less than 10% in 2015; however, Gartner estimates that through 2017, more than 50% of organizations that evaluate moving to IaaS will remain with their existing architecture. They also estimate that 10% of organizations will close their onsite data centers by the end of 2018.<sup>7</sup>

This shift away from large numbers of isolated, physical data centers is the heart of DCOI. M-16-19 recommends progress toward cloud-based and virtualized data centers, and shared services.

DCOI's strategy recommends, in order of priority, evaluating the following options for consolidation and closure:

1. Transitioning to technology such as IaaS, PaaS, and Software as a Service (SaaS), "to the furthest extent practicable" with a focus on Cloud First
2. Pursuing internal shared services and co-located data centers
3. Using more optimized data centers within the agency<sup>8</sup>

### 2.2.1 HHS Strategies

HHS's goals for data center consolidation and optimization are in alignment with DCOI mandates:

- Leverage Cloud-based technologies where feasible under budgetary and security constraints
- Reduce expenditures on data center operations by optimizing power usage and real estate, automating monitoring and power metering, and implementing best practices
- Employ and optimize Green IT to reduce power consumption and cooling needs
- Leverage virtualization strategies and technology where applicable and feasible
- Reduce costs on infrastructure through efficient, Green IT purchases and internal shared services where optimal
- Employ the most efficient architecture of datacenters that consolidates where appropriate, allows for geographically dispersed datacenters where appropriate, and leverages cloud and distributing computing where appropriate.
- Eliminate or minimize security risks for all data centers

### 2.2.2 Leveraging Best Practices

HHS will implement data center best practices in order to meet the OMB-required metrics for data center and server performance. The General Services Administration (GSA) published its "Evidenced-Based Best Practices Around Data Center Management" for Agencies to leverage lessons learned and best practices from the public and private sectors.

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<sup>7</sup> 2016 Strategic Roadmap for Data Center Infrastructure. Gartner Research Note for Leslie Glaser, 2016.

<sup>8</sup> OMB Memorandum M-16-19.

[https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m\\_16\\_19\\_1.pdf](https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf)

The recommendations include<sup>9</sup>:

- Using Data Center Infrastructure Management (DCIM) Software to manage data centers
- Automating power metering at the device level
- Using variable speed drives to match energy usage to workload
- Using alternative cooling methods such as free cooling and direct liquid cooling
- Matching infrastructure power use to IT workload after virtualization
- Eliminating “zombie” servers (unused, but powered servers)
- Benchmarking to track performance over time
- Purchasing Green IT to reduce a facility’s energy footprint
- Developing disaster recovery plans and security awareness curriculums to protect physical and virtual assets
- Increasing automation capabilities to increase uptime

## 2.3 The Path Forward

In alignment with the HHS IT goals, HHS will pursue a shared services model where feasible that leverages shared data centers and cloud services. To provide guidance in implementing the DCOI strategic goals, the DCOI Integrated Project Team (IPT), consisting of representatives of the OpDivs and the Office of the Secretary, which represents the Staff Divisions (StaffDivs) drafts, develops, and proposes DCOI programs and goals targeted for data center optimization.

### 2.3.1 HHS Targets for Meeting OMB-Mandated Goals

HHS continues to optimize and consolidate as many data centers as possible, as required by DCOI. Data center closures and hardware/software upgrade helped HHS, however the change to the definition of a data center had unpredictable impacts on the metrics. This change to the reporting requirements added more than 100 non-tiered data centers. Some metrics improved and some degraded after the change in the reporting requirements.

One metric, energy metering, showed improvement beyond initial expectations. Based upon overall HHS performance on the FY 16 Q4 and FY17 Q1 IDCs, the HHS targets were adjusted up to come closer to meeting the OMB-mandated goal of 100% of tiered data centers using physical energy metering.

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<sup>9</sup> Evidenced-Based Best Practices Around Data Center Management. Data Centers Shared Solutions Marketplace for GSA; August 11, 2016.

Figure 4: HHS Optimization Targets for OMB-Mandated Goals with Prior Performance

Metric	Definition	OMB-Mandated FYE 2018 Target Value	FY16 Planned	FY16 Actual	FY17 Planned	FY18 Planned	11/30/2016 Submission FY16Q4	2/28/2017 Submission FY17Q1
Energy Metering	(%) Percent of total gross floor area (GF A) 25 in an agency's tiered data center inventory located in tiered data centers that have power metering.	100%	46%	<b>52%</b>	72%	80%	52%	69%
Power Usage Effectiveness (PUE)	(Ratio) Proportion of total data center energy used by IT equipment.	≤ 1.5 ( < 1.4 for new data centers )	1.4	<b>1.6</b>	1.4	1.4	1.6	1.5
Virtualization	(Ratio) Ratio of operating systems (OS) to physical servers.	≥ 4	1.8	<b>1.4</b>	1.9	2	1.4	1.6
Server Utilization & Automated Monitoring	(%) Percent of time busy (measured as 1 - percent of time spent idle), measured directly by continuous, automated monitoring software, discounted by the fraction of data centers fully equipped with automated monitoring.	≥ 65%	6%	<b>3%</b>	11%	16%	3%	4%
Facility Utilization	(%) Portion of total gross floor area in tiered data centers that is actively utilized for racks that contain IT equipment.	≥ 80%	52%	<b>49%</b>	57%	62%	49%	56%
Tiered Closures	OMB mandates closure of 25%	19 of 78	1	<b>1</b>	3	6		
Non Tiered Closures	OMB mandates closure of 60%	135 of 225	2	<b>2</b>	5	11	1	1

### 2.3.2 Plan for Progress

HHS, its OpDivs, and its StaffDivs will do the following to move toward the OMB-mandated goals:

#### 2.3.2.1 Consolidation

- Identify local data centers that can be consolidated to regional locations
- Evaluate the remaining tiered and non-tiered locations and develop a plan to distribute the servers and storage from the closing locations to either a suitable cloud environment or to remaining tiered data centers
- Further develop strategies to utilize Cloud approaches for hosting systems and data, such as email and SharePoint to the cloud, and OneDrive as part of a modernization effort and adoption of the Federal Cloud Computing Strategy of 2011.

#### 2.3.2.2 Energy Metering

- Install metering equipment in data centers

#### 2.3.2.3 Power Usage Effectiveness

- Replace aging hardware with Green IT

#### 2.3.2.4 Virtualization

- Increase number of virtual operating systems

#### 2.3.2.5 Server Utilization and Automated Monitoring

- Configure current monitoring tools to report on server utilization, including SolarWinds and Splunk

#### 2.3.2.6 Facility Utilization

- Increase virtual machine infrastructure to reduce the physical footprint
- Consolidation of non-tiered data centers into tiered data centers to increase facility utilization and decrease the overall footprint of HHS data centers

### 2.3.3 Internal Shared Services with Enterprise Monitoring and Co-location

HHS already has these policies implemented, including a colocation data center in Rockville, MD. Some HHS OpDivs, including the National Institutes of Health (NIH), provide data center services for other OpDivs.

HHS plans to continue with this model as it allows the agency to save money on DCIM utilities such as monitoring software. HHS can leverage enterprise licensing savings to purchase DCIM tools and software, as well as reducing the physical footprint of HHS's data centers by consolidating under-utilized servers.

This model is also in line with DCOI's consolidation and Cloud First strategy.

### 2.3.4 When Consolidation Does Not Make Sense

HHS identified three use cases in which consolidation would compromise the mission readiness of the Agency and its OpDivs and the public services HHS and its OpDivs provide. In these instances, it is not feasible to consolidate or close some non-tiered data centers.

#### *2.3.4.1 Limited/Inconsistent Telecommunications Infrastructure in Technologically Sub-Optimal Areas*

HHS and its Operating Divisions maintain facilities in remote locations of the country that provide direct and indirect services to the public. Many of these facilities are in isolated locations with

- limited and/or inconsistent access to telecommunications infrastructure
- limited bandwidth
- client/server environments sensitive to latent connections
- circuit outages from singular service providers of “last mile” connectivity
- prohibitively high costs to upgrade the technology infrastructure

Consolidating these non-tiered data centers would compromise mission readiness and service delivery to the public.

Until telecommunications infrastructure in technologically sub-optimal areas provide higher bandwidth, lower cost, multi-carrier redundant circuits, legacy systems are replaced and/or enhanced to be less sensitive to latent connections, or the cost of bringing in that infrastructure declines to affordable levels, HHS must maintain local data centers at these facilities.

#### *2.3.4.2 Requirements for Network Isolation of Data Center*

Some HHS data centers co-locate with data centers for the Department of Homeland Security or have independent requirements that they be operational when not connected to an external network. These requirements exist for security purposes, as well as for continuity of operations in crisis situations such as quarantine centers operated by the Centers for Disease Control at international airports and other locations.

Consolidation to an off-site data center is not feasible because the data center would be non-compliant with the requirement for independent operation.

#### *2.3.4.3 Computing Environments for Research and Analytics*

The capture, processing, analysis, and storage of results of extremely large data sets using big data-intensive and analytical scientific equipment necessitate the co-location of servers with the equipment. Consolidation of these non-tiered data centers would compromise performance and mission readiness in situations that:

- Require massive amounts of data
- Require high-speed data transfers
- Generate real-time renderings of data sets
- Use a large amount of network bandwidth
- Negatively impact network capacity and performance
- Use systems that are sensitive to excessive latency

For example, a Krios cryogenic electron microscope generates massive amounts of data that needs to be stored and retrieved for analyses; each 3D image generated is over 10TB. Moreover, generating the 3D images requires large computational power. All this translates into a need for greater network bandwidth. To minimize network latency and strain on the network capacity, the microscope, and its

supporting data servers and computational infrastructure (usually about a half-rack of servers) need to be co-located for practicality and maintaining research efficiency.

Advancing biomedical research using massive scientific data sets often necessitates the co-location of scientific equipment with its supporting IT/computational infrastructure. While there continues to be technological advances, some equipment and applications are more efficient and effective where data, compute, transit, and storage are co-located and cannot be merged into consolidated data centers.

## 2.4 Timeline

These are the tasks HHS has identified to date. Additional tasks will be added to comply with FITARA reporting requirements.

*Figure 5: Known DCOI and FITARA Compliance Dates*

<b>Task</b>	<b>Target Date</b>	<b>Status</b>
Review Strategic Plan Outline and Tasks	September 19, 2016	Complete
Obtain CIO Plan Approval & Publish	September 30, 2016	Complete
DCOI/FITARA Reporting Due	November 30, 2016	Complete
Strategic Plan Update Due	April 14, 2017	Complete
Strategic Plan Update Due	April 13, 2018	Pending

## 3 Strategic Considerations

### 3.1 Federal Shared Services

HHS and its OpDivs are not pursuing becoming a GSA-certified federal shared service data center provider at this time. This option was deemed not feasible.

## Appendix A – Abbreviations

The following table provides definitions for terms relevant to this document.

<b>Term</b>	<b>Definition</b>
CAO	Chief Acquisition Officer
CFO	Chief Finance Officer
CIO	Chief Information Officer
DCIM	Data Center Infrastructure Management
DCOI	Data Center Optimization Initiative
FCIO	Federal Chief Information Officer
FDCCI	Federal Data Center Consolidation Initiative
FITARA	Federal Information Technology Acquisition Reform Act
FY	Fiscal Year
GFA	Gross Floor Area
GSA	General Services Administration
HHS	Health and Human Services
IaaS	Infrastructure as a Service
IDC	Integrated Data Collection
IT	Information Technology
IPT	Integrated Project Team
ITIO	Information Technology Infrastructure Operations
NIH	National Institutes of Health
OFCIO	Office of the Federal Chief Information Officer
OMB	Office of Management and Budget
OPDIV	Operational Division
OS	Operating System



Term	Definition
PaaS	Platform as a Service
SaaS	Software as a Service
STAFFDIV	Staff Division
TIC	Trusted Internet Connection
UPS	Uninterruptible Power Supply

## Appendix B – References

Document Name and Version	Description	Location
OMB Memorandum M-16-19	Official document detailing the Data Center Optimization Initiative (DCOI)	<a href="https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf">https://www.whitehouse.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf</a>
OMB Memorandum M-15-14	Official document detailing the Federal Information Technology Acquisition Reform Act (FITARA)	<a href="https://www.whitehouse.gov/sites/default/files/omb/memoranda/2015/m-15-14.pdf">https://www.whitehouse.gov/sites/default/files/omb/memoranda/2015/m-15-14.pdf</a>
2016 Strategic Roadmap for Data Center Infrastructure	Gartner Research note prepared for OCIO	<a href="https://ociportal.hhs.gov/itio/projects/Documents/OSPG%20Legacy%20Activities/Data%20Center%20Consolidation%20and%20Optimization/2016_strategic_roadmap_for_d_308122.pdf">https://ociportal.hhs.gov/itio/projects/Documents/OSPG%20Legacy%20Activities/Data%20Center%20Consolidation%20and%20Optimization/2016_strategic_roadmap_for_d_308122.pdf</a>
Evidenced-Based Best Practices Around Data Center Management	Data Centers Shared Solutions Marketplace Best practices document prepared for GSA	<a href="https://interact.gsa.gov/tag/max">https://interact.gsa.gov/tag/max</a>
HHS Information Technology Strategic Plan FY 2017-2020	OCIO's strategic plan for IT management	<a href="https://ociportal.hhs.gov/itio/projects/Documents/OSPG%20Legacy%20Activities/Data%20Center%20Consolidation%20and%20Optimization/HHS%20IT%20Strategic%20Plan_final.pdf">https://ociportal.hhs.gov/itio/projects/Documents/OSPG%20Legacy%20Activities/Data%20Center%20Consolidation%20and%20Optimization/HHS%20IT%20Strategic%20Plan_final.pdf</a>
FITARA HHS Implementation Plan	HHS's strategic plan for FITARA compliance	<a href="https://ociportal.hhs.gov/itio/projects/Documents/OSPG%20Legacy%20Activities/Data%20Center%20Consolidation%20and%20Optimization/hhs-fitara-implementation-plan.pdf">https://ociportal.hhs.gov/itio/projects/Documents/OSPG%20Legacy%20Activities/Data%20Center%20Consolidation%20and%20Optimization/hhs-fitara-implementation-plan.pdf</a>

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