

# **Federal Data Center Consolidation Initiative (FDCCI)**

## **Final Data Center Consolidation Plan U. S. Office of Personnel Management Office of the Chief Information Officer Update 9/30/2011**

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## 1 Introduction

In the mid 1990s, the U.S. Office of Personnel Management (OPM) consolidated from three separate data centers to a single, logical data center. This consolidation reduced the complexity and costs associated with operating multiple data centers. Over time, additional requirements in individual OPM business units led to new investments in “server closets” in OPM’s Macon, Georgia, Fort Meade, Maryland and Boyers, Pennsylvania locations. Today, OPM operates a single geographically dispersed data center using a variety of technologies as well as these non-tiered installations. OPM continues to examine and execute ways to improve the efficiency of its IT operations; for example, over the past 12 months OPM has migrated over 70 servers to a virtual environment from a physical environment to reduce costs, footprint, and environmental impact. In addition to the 30 servers virtualized in FY10, OPM has widely adopted virtualization as part of our Green IT and FDCCI strategies and are executing operationally.

The challenge remains to balance additional business requirements for technology with an overall strategy of reducing IT operational costs. As this plan will show, OPM will meet this challenge through a variety of means:

- *Increase virtualization of distributed systems.* Most of the growth in servers and associated hardware has been in the distributed (i.e.: Windows, Linux and Unix) environment. Modern virtualization technologies allow for an increase in available computing power while physical hardware stays constant or decreases.
- *Adopt cloud-based infrastructure for highly variable-demand systems.* Like many agencies, OPM has systems that experience variable demand; for example, during inclement weather the opm.gov home page can see demand spikes of several thousand percent. It would not be cost-effective to build infrastructure based on peak demand, therefore OPM will explore “burstable” capacity options available in the cloud.
- *Adopt Software as a Service/Platform as a Service (SaaS/PaaS) solutions for some applications.* The market for cloud-based applications has matured to the point where very low-cost alternatives exist for some business automation, workflow, productivity and other types of solutions.
- *Increase leverage of government-run shared services.* OPM already uses many shared services provided by other Federal agencies; we will explore more ways we can bring costs down by taking advantage of capacity others have built where it is cost-competitive with the private sector and meets our needs.
- *Re-examine existing service agreements to ensure OPM is getting the most for the dollar.* In some cases, hosted service agreements may not provide the best value. While

continuing to pursue a strategy of reducing our IT infrastructure, OPM must be prepared to bring systems in-house if a hosting arrangement is not the best option.

- *Improve energy efficiency of remaining data centers.* As OPM consolidates its IT infrastructure, it is important that we manage the remaining infrastructure in the most cost-effective, efficient manner possible.

## 2 Agency Goals for Data Center Consolidation

OPM has consolidated the bulk of its IT platform to a single logical data center. Further consolidation and efficiencies will be achieved through virtualization of servers and other efforts listed in this plan. This consolidation will result in many benefits, including:

- Reducing overall spending on data center hardware, software and operations;
- Reducing overall IT operations spending for the government through greater leverage of shared services;
- Increasing the overall IT security posture of the agency;
- Shifting IT investments to more efficient computing platforms and technologies, including cloud-based solutions as well as insourcing in some cases; and
- Promoting the use of Green IT by reducing the overall energy and real estate footprint of government data centers.

OPM has several specific five-year goals for its consolidation efforts. These include:

- Reduce total data center floor space by 40%.
- Improve power usage effectiveness (PUE) by 20%.
- Decrease total IT energy use by 60%.
- Decrease number of physical servers in OPM data centers by 80%.

## 3 Implementing Shared Services/Multi-Tenancy

OPM already leverages shared services for its information technology needs, both within the agency and with other agencies in the Federal government. For example, GSA manages our HR system and our CPIC solution. Internally we have centralized email, help desk, LAN/WAN, identity management and IT asset management, among others. Many other services – such as cyber security, video conferencing and website hosting – are centrally coordinated but operated in a federated manner using established standards.

This year, OPM has responded to several Requests for Information (RFI) posted by the Department of Interior's National Business Center (NBC). The thrust of the RFI's was to co-locate their mainframe system at another agency or hosting provider. OPM's mainframe is very similar in configuration, and we are evaluating the cost proposition, and technical architecture to determine whether or not multi-tenancy within OPM will save the Federal government money and provide the support needed to maintain our mutual agency's mission and IT strategies.

OPM has also completed an initial assessment of OPM applications that would be appropriate to move to Public Clouds. As the market matures and large service providers such as Amazon meet the Federal security requirements, more and more Public Cloud solutions will provide OPM with flexibility to host agency systems in a more cost effective manner. We are currently in the process of planning the migration of three OPM applications, including the agency's primary website OPM.GOV to a Public Cloud by June 2012.

Moving forward, OPM will explore other options for shared services to include our financial management system, network operations center, collaboration tools and the hosting of specific applications that currently reside in OPM's data center.

#### **4 Agency Approach, Rationale and Timeline**

OPM will pursue a variety of strategies as it seeks to lower operational costs and gain efficiencies through consolidation of its IT infrastructure. Several factors must be taken into account as part of this effort:

1. Many critical applications at OPM are hosted on legacy platforms and have not been re-architected in many years. In some cases, documentation of these systems is lacking, making it difficult to estimate time and cost of consolidation.
2. OPM has two revolving fund divisions with both significant IT infrastructure and IT operational resources under their own management. The Office of the Chief Information Officer (OCIO) has made strides toward consolidating these operations into centralized systems and oversight, but more needs to be done. Because of their dynamic natures and independent funding streams, these divisions must constantly weigh the needs of their customers with other OPM strategic objectives, including data center consolidation.
3. OCIO has historically been underfunded, especially on the operations side, making it difficult to make investments in consolidation projects, even when those have positive

- ROI in later years. As a result of this funding situation – as well as budgetary issues more broadly in the Federal government – FY13 is the earliest reasonable timeframe to begin making some of the larger investments in consolidation activities.
4. Sourcing and architectural decisions must be application-specific. A goal such as “do more with cloud computing,” while laudable in the aggregate abstract, must ultimately be implemented where and how it makes good business sense. OPM needs to do more work to analyze these application-level decisions. The OPM Cloud initiative is ongoing. To date, we have identified three applications to move to the Public Cloud by June 2012.
  5. IT is a changing landscape, particularly in many of the technology areas being considered as part of FDCCI. These sometimes align as opposing forces: business requirements increase the need for computing power, virtualization decreases the associated costs and physical footprint; virtualization shifts costs from servers to storage infrastructure, cloud-based infrastructure allows storage to be located offsite; cloud-based infrastructure decreases the cost of servers and drives while increasing the cost of bandwidth and switch gear; increasing the density of equipment racks shifts costs from leases to cooling and support infrastructure capable of managing higher kW per rack; and so on. This push-pull effect and the shifting from one type of operating cost to another increases the complexity of the task of forecasting cost and schedule implications of FDCCI.
  6. OPM has entered into a number of hosted/shared service arrangements that have proven to be cost-ineffective. Part of our consolidation strategy must include remedies for these setups.
  7. To assess the effectiveness of energy conservation changes through consolidation, it is essential to complete a comprehensive baseline of energy consumption. For example, we found that the central data center facility at the OPM Theodore Roosevelt Building (TRB) has a PUE of 1.94. However, OPM currently does not have a comprehensive IT energy baseline across all of its geographically dispersed satellite facilities and therefore does not have the necessary information needed to monitor, manage, and report on energy consumption changes within their entire data center.

None of these points should indicate that we are not moving forward with a data center consolidation strategy. We recognize the need for significant cost savings throughout the Federal government’s IT operation, and we will do our part. OPM’s challenge is to meet our other strategic goals while reducing our IT footprint, all within a limited budget. Some of the specific elements of our plan will emerge in future phases, as we are able to spend the time to analyze the best course of action for each application.

Here are the general strategies OPM will employ to meet the goals of FDCCI:

**Increase virtualization of distributed systems.**

Most of the growth in servers and associated hardware has been in the distributed (i.e.:

Windows, Linux and Unix) environment. Modern virtualization technologies allow for an increase in available computing power while physical hardware stays constant or decreases. OPM has standardized on Linux running VMWare for its virtual host environment; this will allow the agency to reduce the number of operating systems overall (by sunsetting non-Linux UNIX systems, for example) as well as simplify the management of our VM infrastructure. Over the last year, over 150 new Virtual machines have been stood up, converting legacy stand alone servers to a more efficient operating model. In one year, OPM increased our Virtualization from 17% of Windows servers and 5% of Linux servers in FY 10, to the current levels of 50% of all Windows Servers and nearly 33% of Linux servers are hosted within a virtual environment.

### **Adopt cloud-based infrastructure for highly variable-demand systems.**

Like many agencies, OPM has systems that experience variable demand; for example, during inclement weather the opm.gov home page can see demand spikes of several thousand percent. It would not be cost-effective to build infrastructure based on peak demand, therefore OPM will explore “burstable” capacity options available in the cloud. Options are becoming available through GSA; OPM plans to pilot one of these solutions early in FY11. Scalable cloud-based infrastructure with burstable capacity will allow OPM to increase its reach while keeping costs low.

### **Adopt Software as a Service/Platform as a Service (SaaS/PaaS) solutions for some applications.**

The market for cloud-based applications has matured to the point where very low-cost alternatives exist for some business automation, workflow, productivity and other types of solutions. Rather than build or buy such solutions OPM will look first to the cloud in order to save up-front costs as well as avoid the ongoing burden of additional IT infrastructure needed to support the applications. OPM will also evaluate cloud-based options before committing to major upgrades for existing applications. This approach will allow OPM to meet business needs that might otherwise go unmet due to a lack of resources, as well as deploy solutions more cost-effectively.

### **Increase leverage of government-run shared services.**

As indicated above, OPM already uses many shared services provided by other Federal agencies; we will explore more ways we can bring costs down by taking advantage of capacity others have built where it is cost-competitive with the private sector and meets our needs.

**This year we have been responding to the Department of Interior’s National Business Center’s RFIs, to evaluate the feasibility, cost model, and benefit of collocating our mainframe resources in house at OPM.** We hope that this will provide a more efficient IT operating infrastructure to support two agency’s IT missions.

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**Re-examine existing service agreements to ensure OPM is getting the most for the dollar.**

In some cases, hosted service agreements may not provide the best value. While continuing to pursue a strategy of reducing out IT infrastructure, OPM must be prepared to bring systems in-house if a hosting arrangement is not the best option. For example, OPM is conducting a study to determine the feasibility and cost benefits of transitioning the Enterprise Human Resources Integration (eHRI) IT operations in-house. This may reduce costs by utilizing existing virtualized OPM technology while ensuring a very high level of security management; initial estimates indicate OPM may save roughly \$8M annually with this approach.

**Improve energy efficiency of remaining data centers.**

As OPM consolidates its IT infrastructure, it is important that we manage the remaining infrastructure in the most cost-effective, efficient manner possible. As an example, OPM commissioned a Green IT Energy Assessment for part of its central data center facility. This assessment report included best practices in policy and increased awareness, yielding a high return on the investment and enabling OPM to achieve energy reduction goals. If all recommendations in that document are implemented, OPM may save up 2,735,751 kWh or \$427,871 in the next six years in LAN room energy consumption reductions. One immediate need is to ability to measure and monitor total energy consumption within the OPM Data Center and distributed server rooms. This capability is a priority for FY12. Funding has been a challenge to perform the next phases of the Green IT assessments, and we have pushed these objectives through FY13. OPM will implement these recommendations over the next 2 years. As these changes begin to yield savings similar changes will be deployed at the satellite facilities.

To meet its goals of cost savings and operational efficiency, OPM has put together a preliminary consolidation scope as outlined in the following table:

#	Agency Component	Data Center	Location	Action to be Taken	Action Taken during Fiscal Year	FY11 Status
1	eHRI	Hosting agreement with National Business Center	Denver, CO	Decommissioned, servers virtualized in-house	FY11-12	We have responded to two RFIs and are analyzing Co-location of DOI's NBC's mainframe
2	eHRI	Hosting agreement with National Business Center	Ashburn, VA	Decommissioned, servers virtualized in-house	FY11-12	We have responded to 2 RFIs and are analyzing Co-location of DOI's NBC's mainframe
3	OCIO	Hosting agreement with AT&T (website)	Ashburn, VA	Decommissioned, servers virtualized in house and in cloud	FY11	We performed a cost benefit analysis on the disposition, accepted the



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#	Agency Component	Data Center	Location	Action to be Taken	Action Taken during Fiscal Year	FY11 Status
						recommended solution, and are transitioning the OPM.GOV to a public cloud
4	CFO	Hosting agreement with Accenture/NTT America (FMS)	Sterling, VA	Switch to government shared service or cloud provider	FY11-12	Analyzing insourcing and cloud alternatives for the CFO applications
5	HRS	MCN	Macon, GA	Size reduced through virtualization efforts	FY13-15	No update
6	FIS	Fort Meade	Fort Meade, MD	Size reduced through virtualization efforts	FY13-15	No update
7	OCIO	TRB	Washington, DC	Size reduced through virtualization efforts	FY13-15	No update

Note that the above activities are preliminary and open to internal discussion/approval; many factors will go into OPM's final consolidation scope and schedule.

## 5 Agency Governance Framework for Data Center Consolidation

OPM understands achieving the above-mentioned goals requires effective delegation of tasks and efficient coordination of leadership. OPM has developed the following framework to ensure that consolidation is effectively managed:

- Internal Coordination and Communication – The agency Senior Sustainability Officer will coordinate and delegate implementation of OPM's Strategic Sustainability Performance Plan that includes the data center consolidation.
- Leadership and Accountability – The Senior Sustainability Officer will be responsible for reporting all progress to the Director.
- Agency Policy and Planning Integration – The goals set out in the consolidation plan will be circulated to senior staff so that they may integrate the relevant strategies into daily operation and plans for coming years.
- Agency Budget Integration – OCIO will coordinate with the Chief Financial Officer (CFO) to ensure representation of its consolidation plan.
- Change Control Board (CCB) – OCIO will ensure that all technical changes to the OPM data center are feasible, tested, and validated by the Change Control Board.

An integrated team will manage specific projects within the consolidation effort, with the following members:

- Project Sponsor and/or Project Champion
- Project Manager (PM), Data Center Manager, Network Manager, and Component/System Point-of-Contact for each of the systems that are being migrated.

The project team will create a master integrated project schedule. Changes to baseline schedules will be approved by the PM and be communicated to IT management.

## **5.1 Cost-Benefit Analysis**

OPM has completed preliminary cost-benefit analysis regarding some of its current outsourced hosting arrangements. We plan to use the budgetary savings realized by insourcing some of these solutions as seed money to perform some of the more expensive consolidation activities. The cost benefit analysis is an ongoing process. To date we have performed a cost benefit analysis on three applications and have made the decision to move them to a public cloud. Additional cost benefit analyses have been completed for the DOI NBC co-location of their mainframe with OPM's systems.

## **5.2 Risk Management and Mitigation**

As part of its planning efforts in FY12, OPM will create a risk management plan on an application-by-application basis. Risks will be managed at all levels, including project, system and data center. As part of each engagement, including the analysis to move to a cloud, and the collocation of mainframe resource analysis, we will develop a risk register and manage it throughout the project. This step is an integrated and ongoing process within our project management toolbox.

## **5.3 Acquisition Management**

OPM will leverage its own existing BPA vehicles where applicable for its data center consolidation efforts. In addition, the agency will utilize GSA vehicles such as apps.gov for procuring cloud-based solutions, and GSA Advantage/Smart Buy for software, hardware and services needed to meet the agency's goals.

OPM released an all encompassing Request for Proposal (RFP) for all IT services under the Office of the Chief Information Officer on September 20, 2011. This vehicle will be the future 5 year BPA where all IT services and resource contracts supporting the FDCCI initiatives will be leveraged.

## **5.4 Communications Strategy**

OPM's communication strategy for its data center consolidation efforts will be designed and executed for each major investment. OPM will create communication plan templates for each strategic approach (e.g.: virtualization, cloud computing, insourcing, etc.) so that a standard message can be crafted for stakeholders.

## **6 Appendix – FDCCI Templates**

### **6.1 Appendix A: Final Asset Inventory Baseline**

See Attachment A.

### **6.2 Appendix B: Final Data Center Consolidation Plan Templates**

See Attachment B.