

Data Center Consolidation in the Federal Government

Looking beyond the technology



Overview

The reported number of Federal data centers grew from 432 in 1998 to 2,094 in 2010¹, an increase that is costly, inefficient, and unsustainable – and one that underscores a need for better IT governance. In response, the Federal Data Center Consolidation Initiative was launched.

It is critical, though, that data center sprawl be thought of as a business challenge – not simply a technology challenge. To achieve substantial benefits, Deloitte recommends that agencies consider a shared-services model of IT organization in addition to consolidating their data centers. Solving the business problem will help reduce costs and energy consumption, increase efficiency, and improve the government's IT security and compliance profile. Moving to a shared-services model will also provide greater agility in provisioning new services.

Data Center Market Trends

Concern over rising energy and IT operating costs has driven many organizations to take a serious

look at their data center operations and to begin initiatives to consolidate facilities. Numerous clients across all industries have major data center consolidation efforts under way. Studies have shown that consolidation of data center facilities alone has the potential to yield cost savings in the range of 10-35 percent². As data centers close, organizations are also restructuring their environments to increase efficiency and improve service offerings. Some trends include:

- **Consolidation** – Consolidation of redundant data center facilities and infrastructure reduces energy consumption, achieves cost savings, and improves operational efficiency.
- **Cloud computing** – Processing power, storage, and bandwidth become commodities in the “cloud,” and you are billed monthly based on usage, much like a utility company.
- **Green IT** – Implementation of energy-efficient data centers.
- **Multitier, modular data center design** – Building out a data center in phases using modular “pod” configurations with appropriate power, cooling, etc. based on the uptime and availability needs of the application(s) to be hosted in the pod.

¹ Executive Office of the President: Office of Management and Budget (2010-10-01) “Update on the Federal Data Center Consolidation Initiative.”

² Computer Economics, *Data Center Consolidation: Business Case Metrics*, August 2008

- **Outsourcing** – Vendors whose core competencies are application hosting and data center operations may be able to provide higher levels of service at a lower overall cost.
- **Virtualization** – Server and storage virtualization allows for the reduction of physical infrastructure. Running multiple virtual machines on the same physical device reduces the infrastructure footprint but increases the demand on power and cooling due to higher densities and utilizations.
- **Capacity on demand** – Technologies like cloud computing and virtualization can provide additional processing power and bandwidth when you need it without the delays of lengthy procurement cycles and installation time.

For the Federal government, the proliferation of data centers has drawn a lot of attention. With more than 2,000 data centers, it has a tremendous opportunity to cut IT cost in the short term (three to five years) by planning and executing a holistic data center consolidation initiative. To really affect long-term change and savings, however, the Federal data center operational model should shift from individual silos to a shared-services model that meets the government’s security and compliance requirements while maximizing the sharing of resources.

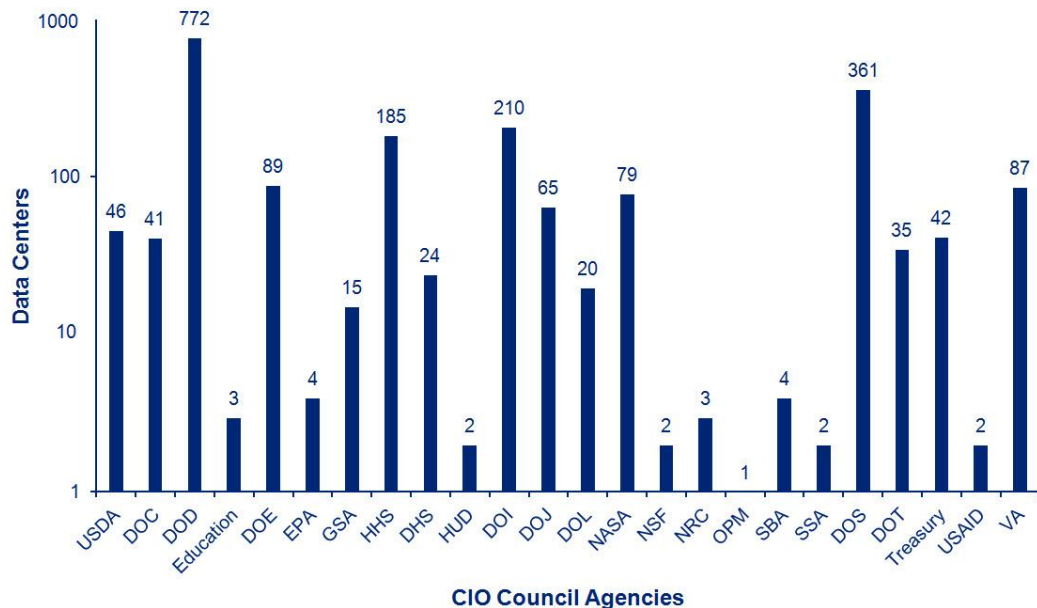
Federal Data Center Consolidation Initiative

Vivek Kundra, Federal CIO, is responsible for establishing and overseeing enterprise architecture to ensure system interoperability and information sharing as well as to maintain information security and privacy across the Federal government. In February 2010, he kicked off the FDCCI to address the ongoing cost, inefficiency, and nonsustainability of the government’s current IT infrastructure investment. The major goals of this initiative are to:

- Reduce the energy consumption and real estate footprint of government data centers
- Realize hardware and software cost efficiencies while also reducing the operational costs for data centers
- Improve the IT security position of the government through standardization and centralization
- Shift investments from maintenance of disparate legacy systems to innovating centralized solutions

Through the collection of information from the CIO Council agencies, Kundra identified 2,094 Federal data centers.¹

Number of data centers by agency (as of July 30, 2010)



Source: Executive Office of the President: Office of Management and Budget (2010-10-01) "Update on the Federal Data Center Consolidation Initiative."

The FDCCI called on agencies to develop data center consolidation strategies and to outline their estimated cost savings and returns on investment. Agencies submitted their plans to the office of the White House CIO on August 30, 2010, and they were approved by OMB on December 31, 2010.¹

Benefits of Data Center Consolidation

Improved efficiency

Data center consolidation is the first, and most critical, step toward realizing an efficient data center environment. It offers a prime opportunity to change the current operational model and improve service levels. In addition, these efforts inherently improve data center security and information assurance (IA) through standardization of processes and a better ability to manage fewer centralized facilities than distributed environments. Consolidation also makes it more manageable to develop and implement broad continuity of operations (COOP) plans. Additionally, consolidated environments tend to be more effective at delivering new services and offer increased capabilities in support of their end users.

Based on the number of data centers operated by the Federal government, a tremendous opportunity exists to achieve cost savings and other ancillary benefits through consolidation across agencies that share IA requirements.

Reduced costs

The effectiveness of data center consolidation as a cost-reduction strategy is based on economies of scale experienced by larger data centers. Studies show that the total operating cost per equivalent unit of computing power is significantly lower when maintaining a few large enterprise data centers than when maintaining many more medium-to-small data centers. The cost-saving economies of scale at larger data centers are typically achieved through higher hardware utilization, elimination of redundant services and labor across the data center environment, standardization of the operating models, and efficient use of facilities. Many of the Federal data centers identified by the OMB are smaller facilities, which, when consolidated, typically offer high return on investment.

Types of cost savings

Operating a data center involves a wide spectrum of costs that can be grouped into three major

categories: hardware/software, labor, and facilities. By using a well-planned and balanced approach, a consolidation effort can increase savings in these three areas. Some organizations, however, do not realize labor savings because resources are often re-tasked, and costs are then associated with a separate budget.

The table on the following page shows the range of cost savings experienced by Deloitte clients performing data center consolidation. Actual cost savings within these ranges depend on a number of factors, including: operational maturity, number of data centers/servers being consolidated, level of current redundant spend in each category, and effectiveness of past consolidation or cost-reduction activities.

Levers that drive savings

Data center consolidation comprises multiple key levers that can be executed together or singularly based on need. Below is a list of six key data center consolidation levers and their associated complexities:

- 1. Server consolidation and virtualization:**
Reduction of server sprawl through hardware consolidation. Virtualization leverages the use of hardware to support multiple instances of server operating environments on one device. Typical hardware reduction ratios through virtualization are 7:1 (low to moderate complexity).
- 2. Storage consolidation and virtualization:**
Reduction of storage solutions through hardware consolidation and virtualization (moderate complexity).
- 3. Facilities (data center) consolidation:**
Reduction of the number of facilities that provide data center services for the enterprise. Benefits include enterprise-level reduction of operating costs, improved security, improved availability, and centralized skilled labor (moderate complexity).
- 4. Operational model changes:** Implementing a shared services model leverages centralized resources. Benefits include high quality of services, defined SLAs and OLAs, and reliable standardized services across the enterprise (moderate complexity).

Category	Nature of Savings	Potential Cost Improvement
Data center consolidation	<ul style="list-style-type: none"> • Cost reduction through consolidation (cost avoidance, improved real estate costs, operational efficiencies, reduced capital investment, etc.) 	10 to 35 percent
Application rationalization	<ul style="list-style-type: none"> • Cost reduction in removing duplicative application and functions • “Sunsetting” old legacy applications and supporting infrastructures 	10 to 25 percent
Server consolidation	<ul style="list-style-type: none"> • Cost reduction resulting from platform consolidation and staff reduction • Increased efficiencies through technical standardization 	10 to 30 percent
Storage consolidation	<ul style="list-style-type: none"> • Cost reduction through increased efficiency/utilization of new and existing technology • SAN, virtual storage management deployments • Increased business continuity/disaster recovery 	20 to 50 percent

Sources: Deloitte clients performing data center consolidation

5. Sourcing: Leveraging private-sector companies – or existing internal shared services organizations where applicable – that have core competences in data center technologies. Benefits include high-quality solutions and support (moderate complexity).

6. Application rationalization: Reduction of legacy applications, deduplication of applications, reduction of server resources, and standardization of vendor solutions. Benefits include reduced overhead for application support and a simplified support model (high complexity).

These activities support the common goals of reducing footprint, reducing cost, and gaining operational efficiencies.

Deloitte’s Data Center Consolidation Strategy

Executing a data center consolidation program requires detailed planning, executive support, and resources. Addressing the integration of all aspects of the data center strategy and preparing for future initiatives is essential to any data center consolidation effort.

Deloitte’s data center consolidation strategy provides a framework for consolidation efforts with 10 distinct steps in five key focus areas. The development of a governance framework will deliver consistency throughout the data center consolidation life cycle.

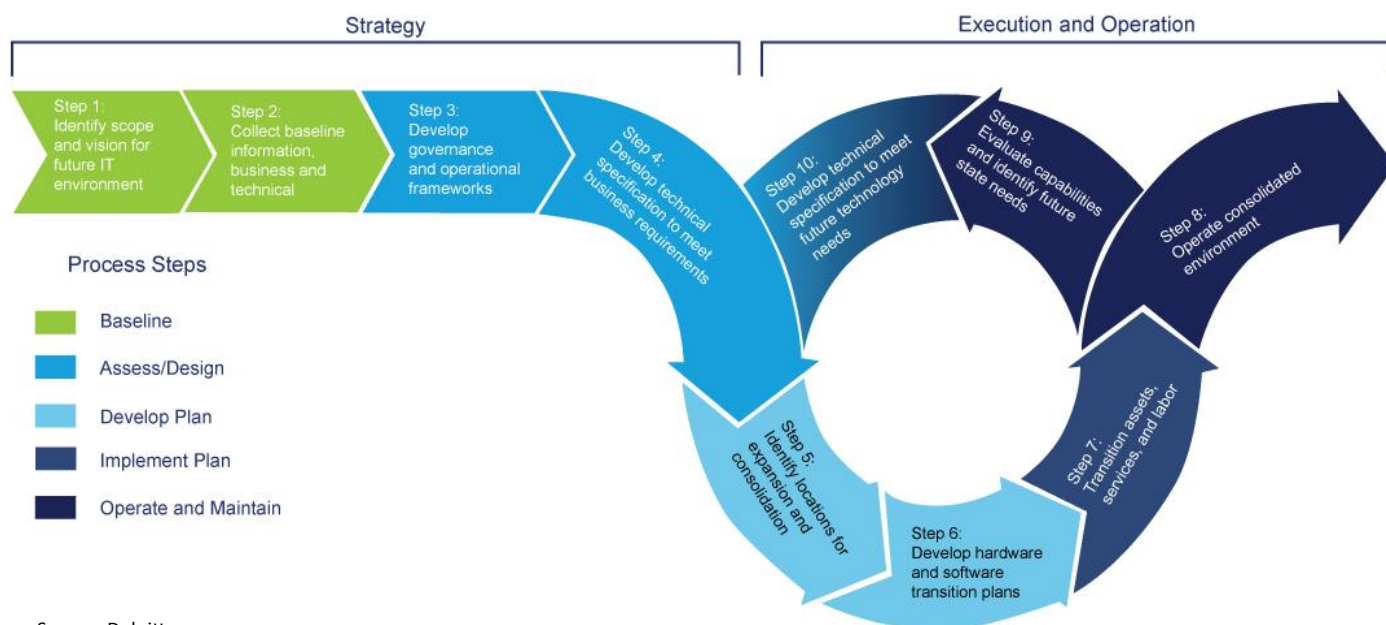
Focus Area 1: Baseline

Define the future-state vision, gather business requirements, and document the current-state environment (architectures, operations, standards, etc.).

Step 1: Identify scope and vision for future IT environment. The initial stages of planning require a look into the future-state goals for the IT environment. While cost reduction may ultimately be the driving force behind data center consolidation efforts, it is important to start with end-state capabilities in mind. Will the end state include a shared-services environment? What are the concerns for the future-state environment (security, availability, innovation, scalability, consistency, etc.)? What challenges will need to be addressed due to the disparate nature of the current environment?

Step 2: Collect business and technical baseline information. To identify the gaps that may exist between the current and future state, it is important to fully understand the current state of the environment. This current state should include the application portfolio that supports the business, the individual application requirements from both a business and technical standpoint, and the current data center landscape, including the number and location of facilities, facility maturity, COOP, operations and support, labor, size, and ability to support expansion.

Deloitte's Data Center Consolidation Strategy



Source: Deloitte

Focus Area 2: Assess/Design

Define the gap between the current environment and the future-state vision. Develop models to support the assessment and definition of future-state architectures, standards, and operational models (shared services).

Step 3: Develop future-state governance and operational frameworks. These frameworks are critical for evaluating any proposed consolidation efforts. Through the development of a governance framework, each consolidation activity can be assessed in terms of its relationship to the overall mission of the organization. The governance model can help to justify the business need for each proposed activity. This step will also put into writing the required user base, applicable security requirements, and the mission criticality of applications to the end user.

Step 4: Develop technical specifications to meet business requirements. Technical requirements can be determined from the business requirements, future-state environment, and governance models, and will meet Federal or agency-specific requirements. Specifically, the need for capacity, the criticality of the application portfolio, and the intended growth of the environment during the next five years will inform

the server, storage, and network requirements. From these requirements, the number, size, and tier of facilities can be determined to support the future-state environment.

Focus Area 3: Develop Plan

Develop a plan and roadmap to achieve the end-state vision, and address gaps in current-state operational abilities.

Step 5: Identify locations for expansion and consolidation: From the technical specification and facility requirements identified in Step 4, locations can be evaluated and selected. Facility selection will be based on the size and tier ratings required as well as external factors such as network and utilities availability, physical security, possibility for catastrophic risk, tax incentives, accessibility, etc.

Step 6: Develop hardware and application transition plans. Once sites have been selected, application and hardware migration plans can be finalized. Taking into consideration uptime requirements and logistical issues associated with transport to the specific locations where the applications will be migrated, detailed outage and transition strategies can be developed.

Focus Area 4: Implement Plan

Implement the roadmap.

Step 7 – Transition assets, services, and labor:

Take action on the plans that have been put in place for transition. Implement the plans that are in place, and deal with any issues that arise during the transition. The specific method of transition for each application and hardware device should already be defined in the Step 6 transition plan. During the transition it is critical to monitor the functionality and availability of the applications/hardware that are being migrated as well as the applications/hardware that are already located at the consolidation points.

Focus Area 5: Operate and Maintain

Operate, maintain, and measure the new environment. Assess metrics, report on operations, and improve current state operations. Begin to develop future-state goals for future improvement activities.

Step 8: Operate the consolidated environment.

Operate the end-state environment and evaluate performance metrics to identify the success of the consolidation. During the operation of the consolidated environment, the IT organization should be able to show specific indicators of the success of the consolidation efforts and realize the cost, uptime, and usage benefits that consolidation has provided.

Step 9: Evaluate capabilities and identify future state needs.

Though the environment may now be operating as a consolidated environment, it is important to stay on top of future needs and requirements. By evaluating the current state and identifying future needs, planning for any future expansion of the data center environment can be done proactively. As such, many of the disparate data centers that would have been created in the past to meet a specific need can now be incorporated into the consolidated environment, mitigating the need for large-scale consolidation efforts in the future.

Step 10: Develop technical specifications to meet future technology needs. When new needs arise, it is important to develop the technical specifications and then return to the facility and location evaluation processes outlined in Step 5 so

that the environment continues to serve the needs of the business after consolidation efforts have been completed.

Getting Started – Quick Wins and Savings

While the benefits of data center consolidation are clear, it is sometimes challenging to secure funding to launch a data center consolidation initiative. There are multiple considerations in implementing a data center consolidation program, but it is possible to target early quick wins and their associated savings in order to fuel investment in the broader program. It is prudent to look at some of the aforementioned low-to-medium complexity levers as a means of demonstrating success. Potential quick wins include:

- **Focus on smaller sites:** For smaller sites, consolidation can be more straightforward, through “lift and shift” moves to larger data centers. These moves typically require less planning and upfront investment. By focusing on the smaller, less risky sites first, it allows the overall consolidation process to mature. Moreover, closing these small data centers will also show marked progress toward the end-state consolidation goals for the program.

Smaller sites typically represent some of the greatest inefficiencies in the data center footprint. Deloitte’s past experiences have shown that while an organization’s largest data centers may operate at, or even below, industry average costs, the organization’s smallest data centers may operate at over two times the industry average cost.

- **Assess sourcing options:** By leveraging leading service providers through a competitive process, IT organizations can reduce their data center costs and quickly improve the maturity of their data center infrastructure and business processes. Outsourcing accelerates the ability to transform to a shared-services model.
- **Identify the potential for shared services or cloud computing:** Shared services and cloud computing can significantly reduce duplicative hardware and software. Several efficiency benefits arise from thoroughly analyzing which business applications can be consolidated to shared services across the organization or even outsourced to cloud providers. While the primary effect of reducing redundancies will show immediate cost savings, ancillary effects also

exist. Consolidating multiple disparate systems into a shared-services or cloud environment enables more effective controls on access and security as well as enables any required updates to the application to be done at a centralized location.

Characteristics of a Successful Data Center Consolidation

Deloitte's experience and research has identified several issues that go hand-in-hand with consolidation efforts and are independent from any technology or platform architecture. When given the proper attention, these areas can drive the change needed to successfully consolidate data center environments. They are:

- **Strategic planning for growth:** By implementing modular and multitier data center designs, organizations can prepare for future growth. Many industry-leading practices for modular data center design provide the ability to expand on-demand, significantly lowering any future costs associated with building additional facilities while minimizing any present-day investment to keep the space ready for expansion.
- **Leveraging industry-leading technology practices:** By implementing industry-leading technologies, organizations can be part of the early majority of the adoption life cycle. Understanding technology life cycles minimizes the likelihood of adopting new technologies that do not become standard or fading technologies that are soon obsolete. Current trends include cloud services, server and storage virtualization, and the consolidation of data center environments.
- **Workforce planning, training, and knowledge management:** While consolidation efforts reduce the number of facilities that must be supported by staff, they introduce new challenges to the enterprise IT workforce. Issues that were previously handled locally, for example, may need to be handled at off-site locations. These changes can disrupt the mission of the organization if proper attention is not given to the changing workforce landscape.

- **Security strategies, data privacy, and disaster recovery:** Consolidated environments provide efficiencies in many areas; however, consolidation also results in creating failure points that have larger effects on the enterprise. Proper attention must be given to disaster recovery and security strategies so that the consolidated environment does not weaken the risk position of the organization. By addressing these areas, consolidation offers a means of having applications benefit from well-planned disaster recovery as well as improved data privacy and security.
- **Proper real estate considerations:** Real estate accounts for a considerable financial aspect of the data center. As such, significant financial gains can be realized through the appropriate handling of real estate interests. Additionally, real estate debt and equity positions as well as proper capital planning can provide funding benefits to the organization.
- **Assessing the tax implications of a location:** Though the Federal government may not be able to realize the same direct tax benefits as private corporations in the area of real estate investment, several ancillary considerations are applicable. Understanding the tax implications of a location on employees can lessen the cost of labor.

Looking beyond the technical challenges of consolidation can improve the overall IT position of an organization as well as the realized costs savings associated with the effort. Consolidation provides standardization of systems, cost reductions (energy, real estate, maintenance, labor, etc.), and improved security and disaster-recovery positions – which can lead to a significant return on investment.

Data center consolidation is a cross-functional business issue that requires integrated technology solutions. It is critical not to overlook the business processes and procedures that affect the success of a consolidation effort.

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