



Data center consolidation — A challenge beyond technology

Migrating and consolidating even the simplest of data centers can be a long and arduous process. Much of the frustration stems from a misplaced assumption that data center consolidation is an information technology (IT) exercise. Approaching data center consolidation with purely a technology focus is a primary reason why many such initiatives flounder, as little attention is paid to other critical areas such as organizational culture, people, operations, facilities, and equipment. According to recent case studies, organizations that have implemented data center consolidation primarily with an IT focus have experienced significant cultural challenges, cost overruns, and project delays. CALIBRE's Common Platform for Applications, Systems, and Services (COMPASS™) methodology provides a holistic approach by covering the entire lifecycle of data center consolidation to help agencies maximize their resources and reduce the total cost of data center hardware, software, and operations by shifting IT investments to more efficient computing platforms.

In the U.S. Government Accountability Office's (GAO) Data Center Consolidation report published in July 2011, agencies identified multiple challenges they face during data center consolidation efforts. The most prevalent difficulties are initiative-related, such as obtaining power usage information or meeting tight planning deadlines for Office of Management and Budget (OMB) milestones, followed by cultural challenges, such as accepting cultural change as part of consolidation or implementing data center consolidation in organizational structure. Funding and operational related challenges follow, leaving technical related difficulties as the least common challenges. It is evident that consolidating data centers is not a mere technology exercise, but a complex management challenge. Data center consolidation requires agencies to implement a methodology driven by the nature and scope of the organization's data center consolidation goals and objectives. The methodology must be designed to first envision the project's scope, goals and objectives, then assess and record the organization's current environment, and ultimately establish and execute an in-depth organization specific transition plan.

Description of the Problem and Goals

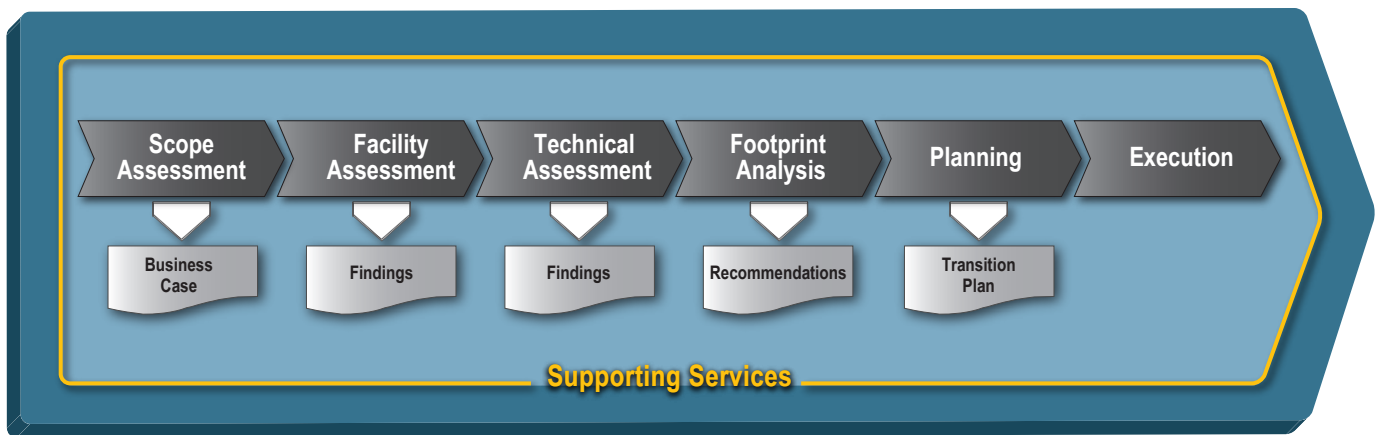
The reported number of federal data centers grew from 432 in 1998 to 2,094 as of July 30, 2010. This growth in redundant infrastructure investments is costly, inefficient, and represents a significant cost to the Federal Government, including real estate, energy, and IT sustainment cost. To address these challenges, the OMB launched the Federal Data Center Consolidation Initiative (FDCCI) under the direction of the Federal Chief Information Officer (CIO) in February 2010, an intra and interagency conjunct effort to consolidate data centers.

The initiative seeks to reduce overall energy consumption by data centers, reduce the physical real estate, and lower other key cost drivers, such as hardware and software, associated with data centers. The overall goals of the initiative are to consolidate data centers across the Federal Government; use automation, standardization and security "hardening" of hardware and software; define and monitor standard operational metrics across agencies, and achieve efficiency gains and realize operational cost savings; and maintain cross-agency goals for highly available, scalable, and redundant data center infrastructure.

In December 2010, OMB published its 25-Point Implementation Plan to Reform Federal Information Technology Management to reform federal IT management as a means of implementing IT reform in the areas of operational efficiency and large scale IT program management. The 25 Point Implementation Plan goals include closing more than 800 data centers by 2015. Agencies are closing 195 data centers in calendar year 2011, of which 81 have already been shut down; and 178 data centers in 2012, for a total of 373 closed data centers by the end of 2012.

CALIBRE's experience-based and proven data center consolidation COMPASS™ methodology is a comprehensive organization-customized six-phase process that seeks to maximize the agency's data center resources and reduce the total cost of data center facilities, hardware, software, and operations. By defining and monitoring standard operational metrics and promoting the use of green IT by reducing the overall energy and real estate footprint of data centers, CALIBRE's COMPASS™ methodology seeks to lead the organization to significant efficiency gains.

As will become evident in the remainder of this white paper, CALIBRE holds the necessary experience and proven capabilities to assist agencies in formulating and executing a successful data center consolidation plan that includes a technical roadmap and consolidation targets.



CALIBRE Data Center Consolidation COMPASS™ methodology

The COMPASS™ methodology

■ Phase 1: Scope Assessment

The first phase of the COMPASS™ methodology involves mapping government initiatives and policies to the organization's quantitative and qualitative goals and objectives. The data center consolidation scope establishes well-defined boundaries and expected outcomes, including specific metrics that will be used in performance measurement. Key factors, metrics, and objectives are defined for geographic location and real estate; IT facilities and energy usage; IT hardware assets and use; and IT software asset and use.

The results of the agency's Scope Assessment are documented and delivered as a comprehensive Business Case document. This document represents a meaningful study assembling directions, interrelationships and dynamics of applicable laws, directives, Executive Orders, policies, standards, and regulations. The Business Case will help the organization justify and position data center investments, assessing the total financial, strategic, and business impact of the IT project.

CALIBRE Past Performance

Under the ongoing Base Realignment and Closure (BRAC) Program Management Support contract, CALIBRE provides strategic and technical support, assistance, advice, analysis, and recommendations regarding the implementation of BRAC actions and plans throughout a Department of Defense agency. CALIBRE provides the government with integration, study, and analysis involving the use of numerous databases to support the identification of requirements and tracking the movement of units. CALIBRE has provided business plan (BP) support including development, maintenance and coordination of the agency's 102 business plans. The business plans define requirements, resources, and schedules to meet legislative requirements. In addition to documenting and justifying changes in requirements to the Department of Defense semi-annually, CALIBRE also developed a process and tool to track the execution of 1,147 separate actions required by these BPs. In 2009, CALIBRE supported the development of a BRAC Annex to the agency Campaign plan and incorporated these 1,147 tasks which resulted in the agency's overarching execution document for BRAC

■ Phase 2: Facility Assessment

The Facility Assessment phase makes prudent facility assets management decisions, evaluating the feasibility of their consolidation, identifying areas for process improvement, and tangible ways to reduce real estate costs, minimize latency challenges, improve performance, and optimize use of properties and racks space.

Supporting Services

The COMPASS™ methodology also comprises a cluster of supporting services that provide a robust foundation to ensure an "end-to-end" life cycle management of the data center consolidation process.

Advisory Services are focused on providing the user with knowledge and advice on data center consolidation technology, helping them navigate current mandates, available solutions and discover the best options for their organization's environment.

Capital Planning and Investment Control services assist the organization in developing their funding and planning budgets for their programs, analyzing their investments and tracking both tangible and intangible returns over time. CALIBRE helps develop and acquire information to evaluate program status against baseline plans.

Change Management support understands that sustaining success depends on the organization's ability to adapt to a changing environment. Change Management support provides the organization with an effective communication strategy to address the people dimension of organizational transformation management.

The results of this assessment are summarized in a database, including a full description of all the existing facility assets in place, indicating their geographic location and type of real estate, operational cost, space utilization, energy usage and cost, power use efficiency, rack count and utilization, and total storage capacity and utilization.

CALIBRE Past Performance

CALIBRE is implementing the Meter Data Management System (MDMS) for a Department of Defense agency, which collects, stores, and displays energy consumption information. The MDMS helps the agency achieve its energy goals for approximately one billion square feet of agency buildings. The system interfaces with metering systems at garrisons and armories to collect the data, then securely sends it to an enterprise data warehouse. Installation energy managers access the data to identify savings opportunities, make near real-time decisions, and monitor results of energy savings projects.

■ **Phase 3: Technical Assessment**

A key step in preparing for data center consolidation is to have a complete inventory of the IT assets an organization owns and manages. The purpose of the Technical Assessment phase is to document all critical and subordinate systems hosted in each data center and their key technical dependencies on platforms and servers, as well as to document all physical network infrastructure, servers and mainframes hosted in each data center and provide counts of physical equipment, virtual hosts, and virtual operating systems. The database will also describe the average and maximum utilization of each IT asset and will evaluate the feasibility of their consolidation.

CALIBRE Past Performance

CALIBRE led the architecture, development, implementation for the hardware consolidation, and integration of software and hardware platforms for a Department of Defense agency. The effort included conducting a business analysis of the \$1billion/year program and its information system needs through the final build out of the data facility. This work supports the agency's goal of lowering of overall cost of ownership by reduced servers, information assurance needs and software licensing costs. By providing a common infrastructure, CALIBRE has been able to reduce the number of servers required for hosting common but discrete systems.

CALIBRE has identified similar business processes and developed a strategy for consolidation. By unifying data requirements into a single database and integrating business processes, we were able to enhance the overall desired end state of systems. CALIBRE has also developed a set of services to consolidate user and document management across the program. The set of services created enhanced interoperability between the program applications and has spurred the development of a common data warehouse for holding and disseminating

■ **Phase 4: Footprint Analysis**

Once the facility and technical databases are complete with accurate and consistent data and dependencies are outlined, the following step is to align the assessments' results to the enterprise architecture, and to summarize it in a comprehensive Recommendations document, ranking provisioning tools, application mapping capabilities, and developing a cost and return-on-investment model. Using predictive models, the recommendations will better align requirements, identifying licensing, guidelines, security, performance, maintenance, operational demands, and the technology plan with the organization's vision.

With the objective of leveraging the organization's current resources, the Recommendations document includes an in-depth analysis of the different alternatives to offload data center space, increasing energy efficiency and reducing operational and capital expenditures. The Recommendations document offers a real property stewardship plan, including real estate capacity analysis; energy efficiency assessments and operations; and facility condition and functional assessments. The document also conducts a business

Supporting Services *continued*

Energy Management Services focuses on sustainable and economically viable options for monitoring and reducing energy consumption at facilities. The support includes energy consumption assessments; monitoring, evaluation, identification, and recommendations for implementation options; and oversight for energy conservation projects, helping organizations make timely, informed decisions to achieve their energy goals.

IT Infrastructure Operations and Management make use of reports and dashboards to provide a complete management of all servers, guests, and workloads, providing greater consistency in planning and monitoring machine usage.

Lean Six Sigma support approaches the consolidation of data centers with a scientific method, defining, measuring, analyzing, improving, and controlling the process for optimum effectiveness and efficiency.

Monitoring and Reporting captures data from multiple systems and synthesizes it into a coherent operating picture, helping evaluate program status against baseline plans, identify and report trends, and isolate potential problems and notify staff early in time.

Risk Management considers effectiveness, efficiency, and constraints and approaches cost, schedule, and technical performance management as it relates to applicable laws, directives, Executive Orders, policies, standards, or regulations to assist in achieving organizational mission. Risk Management support provides training and technical assistance in applying risk management tools and techniques for improved planning, estimation, tracking and monitoring, managing technical performance, and allocating resources intelligently.

analysis of the organization and its information system needs, leading to the lowering of overall cost of ownership by reducing the number of servers, lower information assurance needs and fewer software costs. The Recommendations document concludes with a benchmark analysis of the various solutions in transforming the existing data centers and their potential benefits and common rationale for selecting the suitable alternative. In this document, suggestions are made on the right solution to approach, focusing on aligning the organization's requirements to the market options, its return on investment (ROI) and risk management strategy, identifying potential impacts to the business. Alternatives include decommissioning; consolidating; virtualizing; or migrating to cloud computing.

CALIBRE Past Performance

CALIBRE is deployed throughout Southwest Asia to support budget and cost analysis requirements. CALIBRE supports the government in developing, formulating, and justifying annual and supplemental budget requests and assists in developing resource requirements. CALIBRE also supports developing cost estimates to enhance organizational management and decision making.

CALIBRE cost tools and analysis enabled commanders to make resource informed decisions by considering more efficient options and understanding the near and long-term cost implications. The program established in FY 2009 (starting October 2008) netted identified cost avoidance to the government of \$2.99 billion. In FY 2010, the program increased in sophistication as analysts continued reaching out to customers by speaking, working and teaching the mantra of cost avoidance, identifying cost avoidance of \$4.57 billion.

Furthermore, CALIBRE's analysts provide a portfolio of analytic services to the government that center on: requirements (operations, logistics, basing and contracting); capacity (transportation and maintenance); resources (people, equipment and dollars); plans (integrating staff element plans and analyzing friction points); and execution.

■ **Phase 5: Planning**

The Planning phase of the COMPASS™ methodology focuses on the consolidation's design, identifying opportunities for leveraging shared solutions within organizations and across organizations. The transition is planned to an appropriate level of detail based on the type, size, complexity, and scope of the project. This transition is documented as the Transition Plan: a facility consolidation plan and a technical consolidation plan following a twelve-step management blueprint.

The Transition Plan establishes the key elements of the consolidation process, including stakeholders, quantitative goals, qualitative impacts, approach, scope, timeline, and master schedule, as well as summaries of a cost-benefit analysis, performance metrics, risk management, and communications planning.

The Transition Plan will guide the organization through the necessary steps to undergo adopting the new organization-tailored data center design including the targeted IT software and hardware consolidation architecture; geographic location and real estate adjustments; and a detailed schedule and established milestones for a successful data center consolidation execution.

CALIBRE Past Performance

Under a Department of Defense IT Enterprise project, CALIBRE created a strategy and implementation plan which provided the road map for hardware/software consolidation and enterprise level governance. CALIBRE sought to create and gain approval of an enterprise level strategic plan which included server consolidation as a top leadership priority. To that end, CALIBRE collected, documented and analyzed the as-is state of the hardware and high level software architecture, and designed a to-be architecture in coordination with each of the application technical and functional proponents. CALIBRE also created an Integration and Operations Guide to assist in the movement of the applications, through delivery and testing, to a common hosting environment.

Supporting Services *continued*

Security Services assess the security profile of systems and applications to ensure that security requirements can be maintained with the new consolidated data center architecture, and the organization is ensured with an agency-wide program to provide information security. Analysis includes the application of NIST SP800-30, NIST SP800-53, NIST SP800-60 Volume I and II, and NIST SP800-144, when applicable.

Strategic Communication support the development of a communications plan that addresses key internal and external stakeholder needs and concerns, senior leadership briefing reports, and regular coordination with key parties involved in implementing the plan. Furthermore, Strategic Communication provides the organization with the necessary market research and analysis to identify the different audiences and the precise messages

Training Activities familiarize stakeholders, including executives, enterprise architects, engineers, security personnel, and operations and maintenance staff, with the new data center architecture's tools, to ensure that all members of the workforce have the necessary skills.

Furthermore, CALIBRE planned, documented, and executed an information assurance program for the new environment, providing technical and engineering support to developers of hosted applications.

In the end, CALIBRE's plan led to the elimination of two applications (without the loss of any required capability) and the number of physical servers in-use was reduced by 50%. Additionally, one application was moved from of a .com network to an accredited Defense agency node and the enterprise shifted from four data centers to one.

■ Phase 6: Execution

The COMPASS™ methodology Execution phase involves coordinating the right people and resources with the program and project management required to complete the work defined in the organization Transition Plan. It includes the possibility to assemble a team to bring about specialized beneficial skills, adding robust corporate capabilities to meet the specific requirements.

As the plan is executed, progress and resource expenditures are monitored against the plan, a cost-benefit analysis is performed, and corrective actions are taken as needed. The data monitored includes: performance of the process in terms of cost, schedule, risk, number of data centers that have been consolidated, the reduction in floor space, and the reduction in energy consumption. The Execution phase finalizes with the testing of the new system in place.

After the consolidation is performed, the adoption and implementation of energy efficient and cost-effective operations best practices continue, and ongoing periodic annual data updates are conducted, allowing for optimal server utilization and cost and energy further reductions. Additionally, the COMPASS™ methodology will continue to evaluate and promote further data centers' management optimization.

CALIBRE Past Performance

CALIBRE was actively involved in the planning and execution for BRAC 2005 throughout the six-year implementation window and continues to provide support in the post-implementation phase. The BRAC contract work provides CALIBRE with proven differentiating capability as we develop and maintain a synchronized execution schedule of all BRAC 2005 actions; correlate the Master Schedule with business plan submission data; and identify and resolve issues and conflicts. CALIBRE utilizes the execution schedule to track and synchronize the environmental assessments, construction of facilities, movement of units, closure of installations and tracking of excess property conveyances. CALIBRE program managers reviewed construction requirements and identified over \$100 million in savings that were re-invested in valid requirements.

Highlights

- Data center consolidation is not a mere technology exercise, but a complex management challenge. In other words, data center consolidation does NOT equal cloud computing.
- The most prevalent challenges identified by agencies during data center consolidation include issues related to the FDCCI guidance as well as cultural challenges. Technology related challenges were identified as the least common difficulties.
- Successful data center consolidation requires that the focus be expanded beyond IT, to include other critical assets such as facilities, energy, people, and equipment.
- CALIBRE's comprehensive six-phase COMPASS™ methodology provides a holistic approach to data center consolidation ranging from mission objectives to environmental and energy sustainability, to facilities and technology optimization.
- CALIBRE is a proven and trusted partner that helps our customers by providing an established process and credible subject matter expertise to meet mission and data center consolidation goals.

Conclusion

Migrating and consolidating even the simplest of data centers can be a long and arduous process. Contrary to popular belief, data center consolidation is much more than a technology exercise. Success requires that the focus be expanded beyond IT to include other equally critical assets such as facilities, people, and equipment. CALIBRE's COMPASS™ methodology provides this holistic approach that can help agencies overcome the typical cultural, operational, organizational, environmental, and technical challenges that cripple most initiatives. With our years of experience and proven track record, CALIBRE brings an established process and credible subject matter expertise to meet your agency's mission and data center consolidation goals.

CONTACT

[e. Info@calibresys.com](mailto:Info@calibresys.com)

[p. 703.797.8500](tel:703.797.8500) or [1.888.CALIBRE](tel:1.888.CALIBRE)

[international p. 011.1.888.CALIBRE](tel:011.1.888.CALIBRE)