Data Centers
Shared Solutions Marketplace

DCOI Guide for Data Center Migration, Consolidation, and Closure

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Data Center Optimization Initiative, Managing Partner
General Services Administration
Office of Government-wide Policy

DCOI Guide for Data Center Migration, Consolidation, and Closure

Purpose

This guide supports Federal agencies in their data center management while ensuring that planning is comprehensive for the evaluation, migration, and consolidation of data centers. This is not an exhaustive how-to guide and does not focus on cloud migrations. This guide provides highlights and key considerations for organizations in their planning process for critical activities and where typical risks occur during the data center migration, consolidation, and closure processes. This guide supports OMB Memorandum M-16-19 "Data Center Optimization Initiative," dated August 1, 2016.[1]

Audience

The intended audience for this guidance is the agency Office of the CIO, agency project management teams, data center operations teams, and data center migration or consolidation teams of both the physical source and destination data centers.

Objective

This document is meant to help initiate, support and inform the process of data center migrations, consolidations and closures. The process at an agency should include several steps: an assessment of the data centers, an analysis of issues and alternatives for data center consolidation, thorough planning for migrations, prioritizing, scheduling with a view of avoiding peak production periods for program users, a full destination data center preparation, move of applications (and hardware if appropriate), decommissioning of the source data center components, ensuring successful operations at the destination data center in the case of migrations or consolidations, and data center closures – all with the engagement of program owners. This effort should result in more consolidated, rationalized, professional, and efficient data center operations for the Government.

Planning Data Center Migration, Consolidation, and Closure

The detailed phases of this document are organized according to the following subjects:

- Organization and Communications
- Streamlining the Environment
- Enterprise Data Center Discovery
- Agency Data Center Optimization Plan
- Detailed Discovery
- Application and Server Migration Phase

[1] See: https://obamawhitehouse.archives.gov/sites/default/files/omb/memoranda/2016/m_16_19_1.pdf

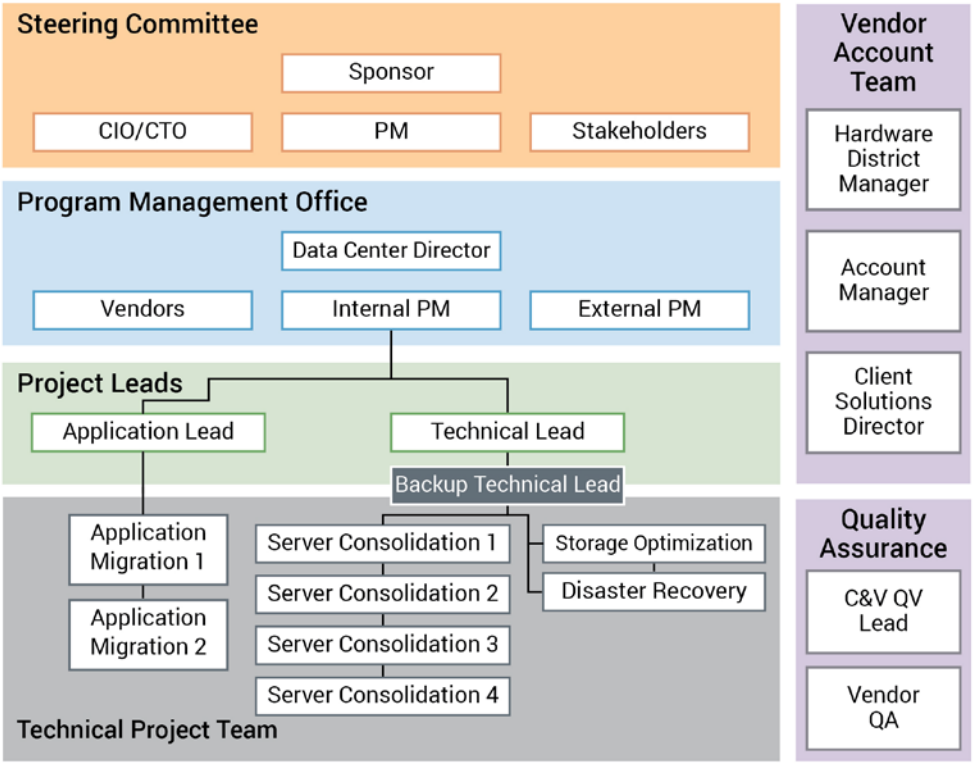
- System Decommissioning
- Data Center Closures (to be treated separately from migrations and consolidations)

Organization and Communications

Data center migrations and consolidations are complex and require committed organizational management. Transitions require a significant amount of coordination and communication at several levels of the agency to be implemented well. Agencies should:

- Commit to a project management structure that will guide the organization through this process (a sample team structure and list of members[2] is provided in Figure 1 below);
- Liaise with cross-functional groups (as seen in Figure 1 below) to coordinate and/or assess concerns such as scheduling impacts, staffing needs, and personnel assignments;
- Facilitate communications, mitigate issues and risks, and maintain overall program quality;
- Monitor, track and report progress to plans, progress and budget;
- Include both an agency engagement model and a roles and responsibilities matrix; and
- Ensure that the lead project manager, the migration teams, the source agency IT team, and the business application owners are aligned during and after the completion of each phase.

Figure 1: Sample project team organization to support data center assessments and migrations



[2] Although Figure 1 describes the most important personnel for the source and destination project teams, everyone who normally installs, configures, or supports both IT and facilities in either environment should be involved in the migration process. By including all technical support staff, the potential number of unknown factors is significantly decreased.

The lead project manager for migration[3] and the data center managers and system owners[4] are jointly responsible for managing and providing necessary project resources. The project management objectives are focused on tightly monitoring, controlling, and balancing the project's three key constraints: scope, budget, and schedule. To be effective in achieving this primary management objective, the following should be established:

- An agreed-upon baseline and change control process;
- A process to monitor progress;
- A clear means of communication;
- An open approach for dealing with issues;
- A process to recognize and manage risks; and
- A definition of project completion.

Streamlining the Environment

It is important to begin streamlining the source and destination environments early in the migration process. A separate team can work with program organizations and the operations and maintenance teams to find areas of these environments to simplify. To that end, agencies should:

- Review and simplify the overall IT environment to facilitate the move;
- Remove unnecessary, outdated or obsolete applications;
- Ensure that applications as hosting agnostic as possible with few unusual dependencies. There may be some applications with unique requirements that may not perform well in generic hosting, but the majority of applications will;
- Simplify the IT environment where possible before and in preparation of planning and executing the physical migration of systems;
- Conduct server and application rationalization to optimize operations;
- Consider if systems can be shifted to virtual servers prior to migration; and
- Ensure that the results and intended changes for simplification are communicated to all other teams involved in the process.

Enterprise Data Center Discovery

The enterprise discovery phase includes a high-level discovery of the server and application environments to determine the best approach for the transformation of the source data center's application and server environment. It includes a review of the practices, tools, and templates and

[3] Moving forward in this guidance, the "Lead Project Manager for Migration" will be used to refer to the person in charge of either migration or consolidation activities. This will be similarly true for all terms related to "Migration", which will apply both to cases of a data center migration for reasons not related to consolidation, and those that are intended for that purpose.
[4] System owners are defined as whomever is in charge of computing system operations (servers) at a given data center location.

involves the development and joint approval of the project definitions driven by the migration complexity. The following events occur during enterprise discovery:

- Validate server and application data inventory;
- Evaluate network, storage and backup capabilities, requirements, and processes;
- Conduct business customer interviews and surveys to confirm and validate requirements and identify risks (a set of starter interview questions are in Appendix A);
- Evaluate existing user authentication and authorization functionality and dependencies;
- Evaluate server and application dependencies and complexities:
    - Site to site dependency analysis, including;
    - Hardware dependency analysis;
    - Application dependency analysis;
    - OS versions and commercial software versions; and
    - Server functionality analysis;
- Establish the scope boundaries of this analysis (sample scope templates are found in Appendix B); and
- Establish initial server group candidates and proposed schedule – e.g. logical server application migration groups, prerequisites, event sequencing, and very high-level move schedule.

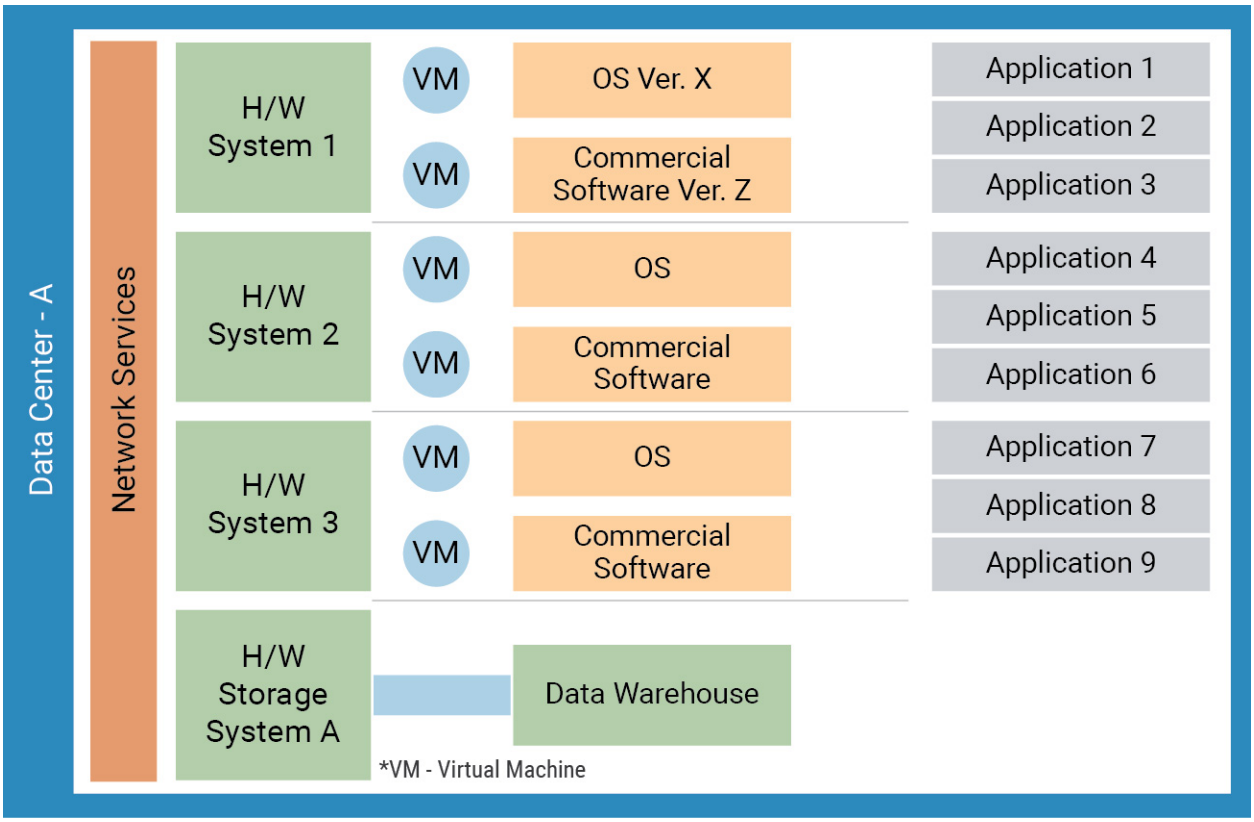
Starting Information

Agencies will need to obtain a significant amount of information about their data centers and the systems and applications that operate within them. In addition to obtaining the required information to address the Optimization, Cost Savings and Avoidance, and Closed Data Centers metrics provided in M-16-19, the following fundamental information will need to be collected:

- Established inventory of data centers with attributes including physical locations, existing physical security and building capacity descriptions including square footage, cubic footage, rack capacity, any containerized modular equipment, cooling and heating requirements and capacity;
- Organizational description, linkages and the people who work on-site and otherwise;
- Work activities of the data center;
- An inventory of stand-alone computers, racks, systems (servers), virtual machines, as well as both operating systems and commercial software (including versions for each);
- For each application, a description, owner, usage cycle, the list of capabilities, system resource requirements, and any special requirements and dependencies;
- An inventory of networks (internal and external) and capabilities; and
- A description of any common services provided at this data center such as an authentication or online storage system or other services (i.e. backup tape archives, UPS).

Figure 2 below is a graphic depicting a typical data center technical structure, with each level needing information.

Figure 2: Information needed for the enterprise data center migration planning process



Planning System Migration Approaches

The server / system migration process requires detailed planning. All individual phases of the plan should be clearly established and strictly followed during execution. Success is dependent on following a prescriptive methodology and adhering to priorities that are determined prior to the actual deployment. Good communication and agreement with the technical and business owners of the systems are of the utmost importance and require excellent project management skills. A strong team at the destination data center is key to ingest the systems and stabilize them for a smooth transition.

While there are a wide variety of issues during migrations, there are essentially only two broad types of data center migrations:

1. **A swing migration** (moving the hardware / systems), where a temporary hosting server location for the applications is provided for operations for the period while the source servers are physically moved and installed in the destination data center. An example of a variation of this (e.g., for internal applications) is to shut down the application on Friday evening, move the servers over the weekend, and operate the servers in the new location on Monday morning. This approach includes a service shutdown for the move days, which may not be viable, depending on the criticality of the applications. If equipment and commercial licensed software is to be transferred to the new data center, the financial obligations for those are part of the negotiations for service from the destination data center. Servers that are due for hardware

refresh within the transformation period can be treated as swing servers and will not involve any activities which require remediation. The swing method allows for a back-out plan to enable business operations to resume if the migration exceeds the planned application outage window. Swing migrations provide duplicate platforms so the application and data can be recovered at the source data center location if the first attempt at migration is not successful.

2. **A push/pull migration**, where the applications are transferred to the destination data center and installed on the resident servers without a prior transfer of equipment.[5] The transfer is made by a (push or pull) transmission earlier for provisioning at the new location and tested. Then, the latest database (and any other files changed by transactions) may be transmitted again on the night of the changeover. The changeover may require the system to be unavailable for a few minutes for the network changes or may have no downtime at all. Another approach is to leave the source system in read-only mode during the period after the final live data is transitioned to the destination data center. The push/pull method requires careful schedule planning and execution since it can take as much as 12 hours or more to rebuild a stack if the transition is not successful. This window covers the total time required to accomplish data backup, de-installation, transmission to new site, reinstallation, basic testing, and user acceptance testing, consuming expensive staff and contractor hours while waiting. If the transition cannot be accomplished in the planned time, then operations remain with source data center for another week until the destination center can solve the issues that remain.

Whenever possible, use a “move as-is” system approach, where activities are accomplished as much as possible before applications are migrated to the new data center. This approach will reduce complexity and risk during the actual data center move. However, this “lift and shift” is never as simple as the words sound and still requires substantial planning and testing. Change management controls will be needed to assist in tracking the application updates and migration schedules for each business unit.

Decommissioning the source data center servers is important so they can be repurposed or surplused. Source systems should not be decommissioned until after the final concurrences by the system owner at the destination data center and the period of possible fallback is passed. Decommissioning processes are discussed later.

Agency Data Center Optimization Plan

Based on the latest available information gathered, the agency’s Plan to Optimize Physical Data Centers (as required by OMB Memo M-16-19) will be updated to rationalize the most efficient path forward. Based on the significance of change of findings, agencies should consider:

- A plan to rationalize and consolidate the agency IT infrastructure (analysis will determine if consolidation will be implemented before or after the move);

[5] Per OMB Memo M-16-19, agencies should “continue to principally reduce application, system, and database inventories to essential enterprise levels by increasing the use of virtualization to enable pooling of storage, network and computer resources, and dynamic allocation on-demand.” An excellent time to virtualize resources would be prior to migration.

- Developing an analysis of alternatives for each data center to move operations to provisioned services (such as cloud service providers) to the furthest extent practicable, consistent with the Cloud First initiative; migrating to Inter-Agency Shared Services Providers (ISSPs) or co-location data centers; or migrating to more optimized data centers within the agency's data center inventory; and
- For each data center and system, plan for the migration of systems to cloud services to an ISSP (including applying to become a shared service provider) or to a more efficient data center within the agency.

Detailed Discovery

Detailed discovery can begin once the lead project manager for migration and the senior agency CIO representative agree to and approve the preliminary transition plans. Migration teams are formed to support the detailed planning and transition of defined groups of applications and systems. The detailed discovery phases are performed by each migration team with the level of details depending on the complexity and criticality of the applications. The purpose of detailed discovery is to refine and verify the migration strategy using additional server and application data. The following events occur during detailed discovery:

- Conduct data verification workshops;
- Verify infrastructure requirements and plans;
- Obtain additional detailed server and applications information;
- Refine strategy and create architectural documentation;
- Technical solution design and proof of concept approach for any consolidations;
- Establish hardware specification, acquisition, and logistical setup definition for all new equipment;
- Confirm consolidation requirements and timeline;
- Review Service-Level Agreements (SLAs) to ensure bilateral understanding and agreement;
- Check the applications for compliance with all of the security and operations rules of the new hosting location (that may be enforced differently than the current hosting environment);
- Perform application integration planning;
- Servers are preliminarily grouped based on findings in the enterprise discovery phase;
- Assigned applications and systems dedicated planned migration teams;
- Establish or adopt application maintenance responsibilities and access schedules;
- Establish or adopt application maintenance responsibilities for patch management;
- Migration planning – e.g., detailed schedule phased move event and solutions incorporated into the transition plans;
- Demonstration lab and application test plans, implementation ROMs and signoffs; and
- A sample typical schedule for a system move is included in Appendix D: Timeline of Activities Needed to Move a System.

Note: The detailed discovery process does not include the remediation of applications. If needed, time needs to be scheduled for that activity. The final plan will also be jointly approved by the Office of the CIO and application owners after the Discovery Phases.

Establishing IAAs, MOUs, SLAs, and/or Contracts

At a high level, agencies should be considering the following potential contract language options for the migration of their data centers:

- Commercial cloud computing services, if part of the plan, that meet the Government and agency requirements are obtained through the appropriate contracting process;
- The overall migration sequence will leverage existing reusable assets as much as possible early on, to provide equipment for downstream migrations and minimize the amount of purchased equipment required to complete the move;
- Consider utilizing any available surplus or underutilized equipment before purchasing new equipment;
- Procurement (if required): The purpose of this step is to obtain the swing capacity or temporary replacements and peripheral equipment required to complete the server and applications migration. The following events occur during procurement:
    - Equipment requirements are established;
    - Facilities requirements are established;
    - Vendor quotes obtained (if needed);
    - Purchase requests and orders completed (if needed);
- Implementation and operational acceptance review begins;
- Existing internal Service Level Agreements (SLAs) should be reviewed and part of the agreement for the destination center;
- If utilizing an Interagency Shared Service Provider (ISSP), the SLAs and interagency agreements all take time to execute and must be included in the planning process; and
- If hosting operations are shifting to another organization within the agency, this may still require new agreements or contract modifications, including potential travel to a new data center site, and should also be planned for.

Considerations for Preparation of the Destination Data Center

Areas to consider when preparing the destination data center:

- The technical project team should be in place at the receiving center to ingest and stabilize the transitioned systems in a methodical way;
- The development, staging, and production environments should all be identical in an ideal world. A high-risk area is one in which minor differences could cause havoc for the application development teams trying to resolve a problem which behaves differently in production vs. staging. As such, a differential analysis must be conducted and each difference examined;

- Adequate additional networking capacity should be available during peak periods to manage the increased capacity needs of the center. This can be estimated based on historical loads and forecasted demand (e.g., adding significant numbers of new users, the addition of new offsite data storage facilities);
- A joint walkthrough with the source and destination teams including all configurations and expectations should be conducted;
- Transferring the knowledge of how a system "behaves" during operation is critical. An understanding that may be second nature to the source team but can become an anomaly for the destination technical project team;
- Infrastructure-related issues such as HVAC migration, running new electrical infrastructure or installing new external network access lines are particularly challenging and should be resolved early in the process;
- Full testing at the new location is important to find obscure dependences such as use of an IP address in code instead of a relative URL. It is especially important to test from computers on the public network when testing a public-facing application;
- APIs may not operate the same from the destination location and their functionality should be tested as early as is practicable;
- The application teams should have access to and should be involved in server setup at the destination hosting location as soon as is practicable; and
- All of the routing, DNS tables and certificate details should be examined at the source location and compared for differences to the destination location. Any updates should be made at least 24 hours in advance of the destination location going live to allow for network propagation.

Factors for Prioritization and Scheduling of Migration

The migration of applications should be governed by a prioritization of the applications / systems based on a set of factors, which may include the following (all of similar priority):

- If the team is not expert at system hosting migration, the least complex systems should be planned for migration first to provide a basis for gaining early experience;
- Prerequisite and dependencies alignments of the applications and systems;
- IT capital refresh schedule (align the migration with the refresh schedule);
- Mission criticality;
- Servers should be inventory-grouped by migration method and complexity;
- Operations quality in current hosting;
- Readiness of destination site;
- Scope (system size and complexity), not migrating three very complex systems on the same weekend;
- Special hardware or software;
- Schedule (including elapsed time, talent availability, and peak user needs); and
- Budget.

This prioritization process will help determine the overall schedule and illuminate windows of opportunity for some systems.

Application and Server Migration Phase

The server migration cycle includes the steps required to successfully migrate servers and applications (if needed). Those steps are:

- Proposed migration groupings and schedules are submitted for final approval by the lead project manager for migration and the source and destination data center prior to execution;
- Ensure that help desks and email accounts that support the applications or hosting migrate to the proper location;
- Key stakeholders need to agree on the schedule and proper user community notification must be given to the user community before applications and systems are migrated;
- A pilot migration to the destination data center of a moderate sized system of simple complexity should be made to surface the first round of issues that needs addressing;
- Detailed planning and facilities preparation: The purpose of this step is to complete and baseline the hour-by-hour plan that will be used during production cutover as well as preparing the receiving environment. The following events occur during detailed planning and facilities preparation:
    - Baseline hour-by-hour plan;
    - Rack space, power, network and fiber runs complete;
    - Migration plan;
    - Application test plan; and
    - Fallback plan.
- Server provisioning: The purpose of this step is to setup a like-for-like or similar environment to receive data and applications. The following events occur during server provisioning:
    - Receive and setup;
    - Re-image systems;
    - Allocate disk space; and
    - Data replication software and equipment.
- Connectivity testing and data replication: The purpose of this step is to verify that the infrastructure build-out was correct and all communication routes are in place. The following events occur during connectivity testing and data replication:
    - WAN, LAN, and static routes;
    - Firewall testing; and
    - Data replication begins.
- Freeze period and mitigation: The purpose of this step is to limit changes to the environment as well as to resolve potential issues prior to production cutover. The freeze period and any planned system unavailability time is discussed and concurred with the program side system

owner well in advance to the program planning can accommodate or mitigate negative impacts. The following events occur during the freeze period and mitigation:

- Application freeze and transition periods are negotiated with the business system owner;
- An advance announcement of the freeze period about a month in advance is provided to the technical support team and users;
- Application freeze period begins;
- Production test of hour-by-hour plan;
- Troubleshooting and mitigation;
- Operational acceptance review checklist complete;
- Operational readiness testing and assessment; and
- Go / no-go decision.

- Production cutover: The purpose of this step is to ensure that all of the activities needed for a complete and successful transition are performed. The following events occur during production cutover:
  - Hour-by-hour execution plan;
  - User operation readiness testing and acceptance;
  - Go / no-go decision by designated person that is available when needed and engaged;
  - Network routing changes; and
  - Production handover.
- Stabilization: The purpose of this step is to ensure no hidden production issues remain that may impact the business owner's operations. The following events occur during stabilization:
  - System monitoring begins;
  - Testing for application integrity;
  - Application owner review for satisfaction in new environment; and
  - Ensure that there is a designated person working on the transitions that has the authority to “call it” if a post transition problem occurs that cannot be resolved quickly to execute the fallback plan.

Plan Testing Approach

To mitigate unplanned outages during the relocation of production business services to the new data center, the agency data center migration program will need to test the proposed strategies for infrastructure rationalization and consolidation, as well as the end-to-end application migration process. The overall test strategy is aimed at verifying the following aspects:

- **Technical Infrastructure Testing** – Verifies the designed and built technical infrastructure meets hardware, technical, and operational specifications and provides the required capabilities for reliability, backup and business application performance;

- **Application Software Testing** – Verifies that the destination software and environment supports the same business function or processes as prior to the move;
- **Operational Testing** – Verifies that security, interfaces to external systems and partners, and operational procedures have been built correctly and that usability has been evaluated and approved.

The source data center operations teams have primary responsibility for defining the set of related components covered during technical infrastructure and operational testing. Plans and resources to perform applicable application testing for all verticals impacted by the data center changes will be identified during the discovery phase. To support the testing effort, three environments will be deployed during development. These environments will support Proof of Concept (PoC), Solution Demonstration Lab (SDL), and pre-production testing functions (i.e., staging).

System Decommissioning

Decommission or redeploy old equipment: The purpose of this step is to decommission and surplus or redeploy vacated equipment.

- All storage devices decommissioned must be wiped clean or destroyed (in accordance with agency procedures and Government-wide regulations[6]) to avoid creating any security risk or data disclosure;
- Note that each Government department or agency may have more specific guidance. The National Institute of Standards and Technology (NIST) addresses decommissioning and sanitation of systems as follows:
    - FIPS 199 - "Standards for Security Categorization of Federal Information and Information Systems"
    - FIPS 200 - "Minimum Security Requirements for Federal Information and Information Systems"
    - NIST SP 800-53 - "Security and Privacy Controls for Federal Information Systems and Organizations"
    - NIST SP 800-64 - "Security Considerations in the System Development Life Cycle"
    - NIST SP 800-88 - "Guidelines for Media Sanitization"
    - NIST SP 800-171 - "Protecting Controlled Unclassified Information in Non-federal Information Systems and Organizations"
- Decommissioned Government equipment can be reutilized within the agency or surplused to other agencies or disposed of through the GSA surplus property program. Leased or rented equipment should be returned to the owner with appropriate property transfer documentation and coordination with the contracting officer.

[6] See NIST publications listed below. Additionally, 36 CFR Chapter XII, Subchapter B - "Records Management", outlines agency responsibilities for the retention and disposition of records and includes a section on electronic records management. https://www.gpo.gov/fdsys/granule/CFR-2011-title36-vol3/CFR-2011-title36-vol3-chapXII-subchapB

Data Center Closures

A facility closure process is multifaceted and requires detailed planning to ensure the process has the resources to complete the process. For example, it would be unwise to disconnect the facility electricity while staff are still working to disassemble local hardware. The process falls into three broad categories: staff (including contractors), equipment, and the building. A sample activity list and timeline is available in Appendix C.

Data Center: Staff

Like any merger and transition, planning for changes that impact staff is the most important. Some of the operational staff will be working on the transition and will be imminently knowledgeable of the migrations and the key dates. Generally, the application operations and maintenance teams may not be co-located with the physical data center, may be location independent and not need any reassignments. If they are associated with the closing data center, then they may need an organizational reassignment. If the staff are not associated with a physical office location, they should continue their support roles at the destination data center. Include the human resources team in the staff reassignment process as early as possible to maintain the greatest amount flexibility and best redeployment opportunities.

If data center staff includes contractors, the contracting officer's technical representative, the contracting officer and the vendor representative will need to briefed so their transition can be planned. Their talent may be needed at the designation data center and post closure activities can be arranged through the contracting office.

Operations, migration, and post-closure activities may be impacted by the departure of employees and contractors who are not mapped to other positions. These staff members may leave the organization at a rate such that existing operations cannot be supported, or such that post-closure activities may not be adequately staffed.

Any data center closure that creates a loss of Federal staffing in a particular city can be problematic if not managed well. HR staff should work with leadership to assist with any internal employee communications that may become necessary. The agency's Office of Congressional Affairs should be kept informed through the process so they are knowledgeable of the migration in case any questions arise.

Data Center Closure: Equipment

An inventory of all equipment, including the ownership type (e.g., leased, rented, contractor-owned, or Government-owned by data center) should be made. All leased, rented or borrowed equipment should be returned to the owners with appropriate coordination with the contracting officer to terminate the contracts and associated billing. All of the spare Government-owned equipment such as racks and furniture may go to the reuse program within the agency, or to another agency, or surplused from the Government through the GSA real property sales programs. Items to consider include:

- Confirm that everything at new location is working and that a “fail back” to this location is not going to be needed;
- Based on lease or contracts, disconnect everything, pack all leased equipment and schedule pickups (frequently owners of leased equipment do not have a high priority for picking up returned equipment). The contracting officer may need to coordinate in writing the time windows and deadlines for removal;
- Ensure that all remaining owned equipment is placed in a location with proper disposal information – keep different disposal paths separate, and schedule pickups;
- Inventory what is left – confirm that actual inventory matches what was expected in the plan;
- Update all documentation and validate all hazardous waste material and equipment has been disposed of properly;
- Have all maintenance contracts perform the last cleaning and shutdown of equipment;
- Ensure that all unnecessary contracts specific to the data center are cancelled at the appropriate time; (some contracts may be shared with other office facilities and only require modification to eliminate the data center as a serviced area); and
- Validate that everything is ready to turn over to the landlord or new occupants.

Data Center Closure: Space

When planning for a data center closure, it is important to consider space release or reutilization early in the process. If an agency is reusing the vacated space, then the agency facilities management staff will need to coordinate the space shift, allocation, and billing. Timing can be very important here, so agencies should budget to keep the space until after all the fallback options have expired and ensure enough time for the post-closure activities. Note that reutilized data center space is usually billed at a higher rate per square foot than general office space because of the special conditioning required. Lease adjustment issues exist, depending on whether the space is Government-owned (in which case another agency tenant may be considered), or if the vacating agency leases or owns the space directly.

If the data center space will not be reutilized by the agency and will be released, have the agency facilities management inform GSA PBS as early in the process as possible if the space is GSA-owned or managed. If the agency has direct leasing authority or owns the building, the facilities management team will need that notification. The agency facilities management team will need to coordinate the utility disconnects or billing changes with all appropriate parties - all power and network circuits should be ordered to be shut off and removed. Once defined and a date is chosen, all the appropriate paperwork to terminate any agency rent obligations need to be executed. A contact person should be designated for everything related to the closed data center. This should be a residual contact person knowledgeable of the close down, who has all of the records to address issues that arise post-closure.

Conclusions

Incorporating best practices in project planning and organization into any activity involving a data center migration, consolidation, or closure activity is essential. Specifically, a successful data center change activity will have a well-defined organizational structure with clear lines of communication between stakeholders (such as the steering committee, data center management team, and facilities management team). Additionally, an effective simplification of the existing data center environment and a comprehensive enterprise data center inventory will ensure that the number of unexpected changes to scope, schedule, and cost will remain limited. Finally, agencies must be continuously aware of both their hardware and software needs as they move forward through any of these processes, with specific attention paid to mission critical end-user applications. Please see the appendices that follow for additional templates and diagrams.

For more information about this technical guidance, contact the DCOI Managing Partner PMO at: dcoi@gsa.gov. The DCOI Community of Practice (CoP) also provides meeting materials and a link to a more detailed knowledge portal. Anyone with a ".gov" email address may access the CoP using the MAX Federal Community at: https://community.max.gov/x/DI5tQw.

Appendix A - Sample Data Collection Template Questions

1. Please provide a brief description of the application you support and its importance to client's business.
2. Who are the users?
3. How many users are there?
4. What is the level of security or sensitivity of the data?
5. What is the normal annual operating cycle?
6. What are the hours of operation?
7. Are there any maintenance windows of system planned unavailability?
8. Are there key unique hardware or software constructs that were required for this system?
9. Are there any new changes for this application in process (version upgrades, new modules, etc.)?
10. When are these initiatives due to go into effect?
11. How many individuals support this application?
12. Who will be the staff assigned during the data center move? What are their skill sets?
13. Will we need to have end users test the applications after the move? If so, describe their duties.
14. Who will be assigned to participate in the pre- and post-move test plans?
15. Who will be responsible for final sign-off to confirm the move was accomplished successfully?
16. How would you suggest the migration of your application take place? What kinds of issues would you consider important when moving this system to the new data center?

Appendix B - Sample Scope Setting Templates

Business Process Scope

In Scope
[What functionalities and capabilities are in scope?]

Out of Scope
[What functionalities and capabilities are not in scope?]

Organization Scope

In Scope
[What part of the organization not considered in scope?]

Out of Scope
[Any organization, application or environment not listed as in scope.]

Location Scope

In Scope
[Agency (SXX) source data center]
[Agency (DXX) destination data center]

Out of Scope
[All other source agency locations]

Application Scope

In Scope
[Any agency applications identified during enterprise discovery that are deemed necessary to move]

Out of Scope
[What are the boundaries of the scope; is the agency using out of scope applications to describe this?]

Data Scope

In Scope
[What data sets or systems storage are definitely in scope?]

Out of Scope
[What data sets or systems storage are not in scope using examples to set the boundary?]

Technology Scope

In Scope
[What technologies are definitely in scope?]

Out of Scope
[What technologies are not in scope using examples to set the boundary?]

Appendix C - Sample Data Center Closure Activities Timeline

Part 1: Timeline Prior to Migration

1 — 6 Months Prior

- Identify Stakeholders (Hardware & Application owners, business owners, Facilities Management, etc.)
- Determine a budget
- Create a list of equipment to move

2 — 3 Months Prior

- Identify project owner and project lead form your technical team
- Determine what internal and external resources will be needed
- Decide dates and schedule
- Identify all Wide Area Network circuits and owners, validate current users, and determine if it is being moved or shut off
- Identify power and rack requirements in new location
- Identify any long lead items or special requirements for new location and order (could be equipment, storage, environment, office space, etc)

3 — 2 Months Prior

- Identify what equipment needs installation and de-installation (rack, height restriction, weight, width, order de-install and re-install)
- If a physical move is required, need to map out what technical and physical preparations need to happen, like what type of power plug will be needed, what amount of volts/amps needed, are there any USB devices, etc
- Confirm power and network circuits are ordered and on schedule for new location
- Test migration

4 — 6 Weeks Prior

- Identify and order new local network & Power Distribution Units (PDU) rack or floor, receptacle and outlets
- Identify equipment cables needed to order like Twinax, mouse, SCSI, KVM, Serial, SAS
- Confirm the correct ends and connection for any new equipment
- Match connections to new ordered devices

5 — 4 Weeks Prior

- Begin weekly call with all stakeholders,
- Confirm all trucks, special equipment like server lifts, etc. are ordered and confirmed for move dates
- Freeze IT environment (no changes other than emergency) without the approval of CIO
- Provide Web/print logos

6 — 3 Weeks Prior

- Identify core people who will have access to new location data center and for how long
- Confirm client web portal users

7 — 2 Weeks Prior

- Determine if network circuits and power circuits are live and working
- Move test and dev systems over and use as swing systems
- Test out new network (new IP Address)
- Update all documents and scripts needed prior to production move
- Review any special coding

8 — 1 Week Prior

- Make sure all employees are confirmed and know schedules for certain migration related tasks
- Label equipment for critical things like when to be shut off, where to be move, etc
- Close all business operations by COB of the last day of the business day

9 — 3 Days Prior

- Check all special needs cables, equipment, storage is arrived and ready and operational
- List out what equipment needs to move and which equipment, if any, require special attention
- If no equipment needs to move, make sure that new equipment has enough technical capacity, like CPU memory speed, disk size, KVM, etc
- Confirm status with new facilities

Part 2: Timeline After Migration

1 Day After Move

- Confirm everything at new location is working and that a fail back to this location is not going to be used
- Order all power and network circuits for data center to be shut off and removed
- Inventory remaining equipment
- Confirm you have what was expected in the plan

2 Day 2 After Move

- Based on lease or contracts, disconnect everything, pack all leased equipment and schedule pickups

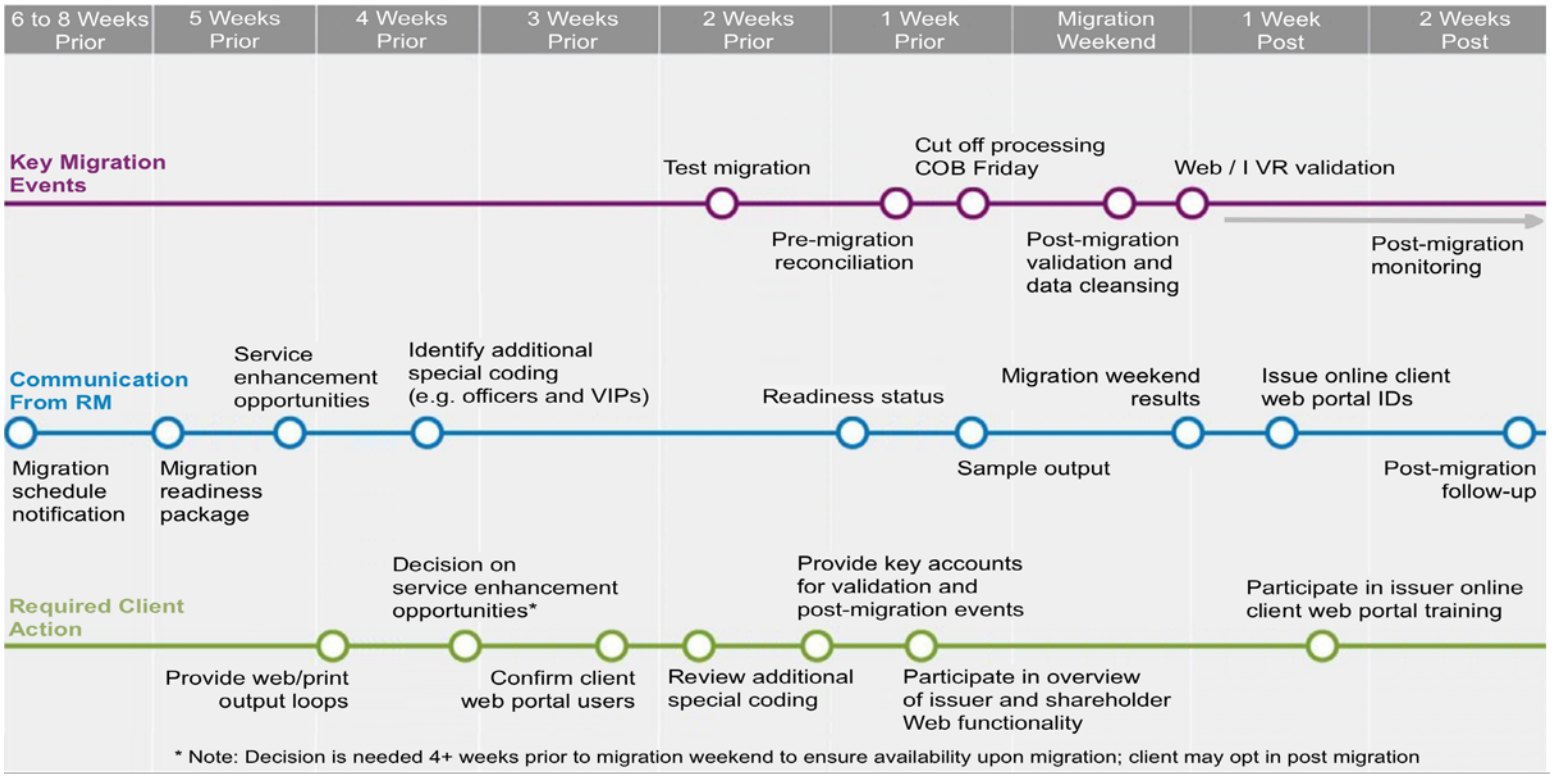
3 Day 3 After Move

- Put all owned equipment that has not been left in a location with proper disposal information – keep different disposal separate
- Schedule pickup for equipment needed to be disposed of or moved to a new location

4 Day 4 After Move

- Update documentation, particularly those regarding attention to certifications, regulations or policies
- Validate that all hazard waste material and equipment have been disposed properly

5 Day 5 & Beyond After Move

- If data center is going to stay, have all maintenance contracts perform last facility clean up and shutdown of equipment and cancel contracts
- If data center is to be dismantled, have team start and remove equipment based on list that has been created and provided
- Have cleaning crew come through and thoroughly clean the center
- Validate everything is ready to turn over to landlord or new occupants

Appendix D: Timeline of Activities Needed to Move a System