Federal Data Center Consolidation Initiative

Data Center Consolidation Plan for the United States Department of Agriculture

September 30, 2011

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1 Introduction

This plan identifies potential **areas for consolidation**, areas where **optimization through server virtualization** or **cloud computing alternatives** may be used, and a **high-level roadmap for transitioning** to the consolidated end-state architecture for the United States Department of Agriculture (USDA).

USDA:

- Has seven mission areas
- Is made up of 17 agencies and 15 offices
- Has over 100,000 employees
- Is located in all states and counties and over 50 foreign countries

In March 2009, USDA completed a high level business case analysis for Enterprise Data Center Consolidation and is now in the early stages of executing its Enterprise Data Center (EDC) strategy. The USDA is consolidating its distributed server workload into three EDCs that will provide centralized server and storage workload computing. In addition, planning is underway for at least two enterprise server rooms designated to host low priority agency systems.

Cost-cutting and virtualization have caused data center consolidation to raise to the top of USDA's Data Center Operations agenda. The benefits of data center consolidation for the USDA are numerous, including:

- **Cost Cutting** – The President has requested that each non-security agency submit a budget request five percent below the discretionary total provided for that agency for FY 2012 in the FY 2011 Budget. Consolidation reduces the overall cost of running and maintaining the USDA environment, including a reduction in energy spend/consumption.
- **Agility to meet the mission of USDA and productivity** – By centralizing control at the EDCs the agencies within the department will be able to focus on their individual mission as well as the mission of the Department. Additionally, productivity will be improved through the use of similar processes, and centralized operations, management, and technology.
- **Energy Savings** – Move mission critical applications from smaller agency or bureau-specific server rooms out of the Washington D.C. area to larger departmental certified Enterprise Data Centers (EDCs) in order to take advantage of lower energy costs, reduce overall footprint and to leverage enterprise services.
- **Reduced foot print and geographical location** – USDA is renovating much of the office space in Washington D.C. where many of these smaller server rooms exist. This is an opportune time to consolidate to the EDC.
- **Commercial Options** – USDA currently utilizes third party IT services including web acceleration services, mapping services, and e-mail services and is currently seeking an extension to other USDA EDC services via a full and open competition.

- **Interagency sharing** – USDA's EDCs offer USDA-wide solutions to all federal government through fee-for-service agreements.
- **Improved Security** – Improved security services resulting in:
  - Fewer facilities to physically secure and manage
  - Improvement in Disaster Recovery and Security which become easier to implement in a centralized environment versus a distributed environment, and
  - Standardized environment provides ability to apply security policies/patches efficiently across USDA
- **Economies of Scale** – Greater economies of scale in terms of personnel, equipment, and security. Increased utilization of unused capacity.
- **Complexity** – Reduced overall complexity and duplication of environment. Avoids costs for deploying duplicate functionality at individual Agency environments

In support of the Federal Data Center Consolidation Initiative, USDA agencies and offices self-reported their data center inventories to formulate the consolidated Departmental inventory of data center facilities and associated hardware and software. The USDA Data Center Consolidation Program Office initially verified these inventories through interviews with the information providers. Additionally, as data centers and/or computer rooms come due for consolidation the inventories are updated based on output from the tools used during the discovery process.

2 Agency Goals for Data Center Consolidation

Out of 32 agencies and offices in USDA, 13 have consolidated to an EDC, 16 are underway, and 3 remain to start the consolidation process.

QUALITATIVE GOAL	*QUANTITATIVE OBJECTIVE*
Reduce the cost of data center hardware, software and operations and shift IT investments to more efficient computing platforms and technologies	Develop standard infrastructure as a service (IaaS) and platform as a service (PaaS) environments Standardize software suites across the Department: • Wide Area Network Services – being implemented • Web portal – service available • Web Application Server – service available • Document Management – service available • Records Management – service available • Web 2.0 Collaboration Suite – completed • Public Web Sites/Content Management – completed • Financial Management – being implemented • HR - completed • Procurement -completed

QUALITATIVE GOAL	QUANTITATIVE OBJECTIVE
	Goal: Outsource all e-mail – completed Goal: Expand portfolio of cloud services IaaS (Linux/Windows/AIX) – Completed IaaS (Storage) - Completed PaaS (Database) – completed PaaS (Geospatial) – being implemented PaaS (Business Intelligence) – being implemented PaaS (Enterprise Service Bus) – being implemented
Increase the overall IT security posture	Standardize software suites across the Department: • Identity and Access Management - Implemented • Whole Disk Encryption –completed
Reduce overall energy use	The average PUE ratio of 1.69 in the EDCs meets the EPA recommendation of data center PUE ratios of 1.7 by 2011. Participated in and received the EPA Energy Star® Data Center certification. Goal: Implement additional technologies to achieve a PUE ratio of 1.65 or less by 2012.
Reduce real estate footprint for data centers	Installed a virtual tape system that allowed the decommissioning of inefficient tape drives and eliminated approximately 800,000 tapes and freed up 6,000 square feet of space. Goals: • Facilities – reduction in physical number of sites from 95 to 4 data centers and 20 server rooms resulting in an aggregate elimination of 64,983 square feet. (NOTE: a procurement is currently in process for up to 2 additional commercially owned data centers to support consolidation efforts, as needed). • Servers – maximizing virtualization and ensuring efficient CPU utilization will serve to decrease the capital expenditures related to server acquisition resulting in a $70M savings over the life of the consolidation project • Racks – reduction in the number of racks by 406 • Storage – Consolidation to a virtualized SAN/NAS

QUALITATIVE GOAL	QUANTITATIVE OBJECTIVE
	environment to exploit economies of scale resulting in a $25M savings over the life of the consolidation project.

USDA monitors/measures the following performance metrics as indicators of the efficiency and effectiveness of the Department's data center consolidation strategy and program.

Key Performance Indicators	
METRIC	*VALUE*
Number of Applications Moved (by location and overall)	Indicator of current status of individual data center migrations and overall consolidation plan completion
Number of Physical Servers Eliminated (by location and overall)	Indicator of efficiency gained through virtualization, higher server utilization, and cloud adoption.
Number of Data Centers/Computer Rooms Closed	Number of closures per year tracks with plan

3 Implementing Shared Services/Multi-tenancy

USDA has a growing portfolio of shared services. Some are shared across a few agencies and others are shared Department wide and some are offered across the federal government.

SHARED SERVICE	ACQUIRED/PROVISIONED	AVAILABLE TO	IMPEDIMENTS/DRIVERS
Identity & Access Management	Acquired	USDA-wide	Driver – Security; HSPD12; Single Sign-on
Email Services	Provisioned	USDA-wide	Driver – Cost; consolidation of duplicative systems
Web Services (Portal, Content Management, development)	Acquired	Government-wide	Driver – standardization of tools; economies of scale
Document Management	Acquired	Government-wide	Driver – standardization of tools; economies of scale
Records Management	Acquired	Government-wide	Driver – standardization of tools; economies of

			scale
Blogging	Acquired	Government-wide	Driver – standardization of tools; economies of scale
Idea Jam (post, rank ideas)	Acquired	Government-wide	Driver – standardization of tools; economies of scale
Web Search	Acquired	Government-wide	Driver – standardization of tools; economies of scale
Web Accelerator	Provisioned	Government-wide	Driver – Cost savings
Whole Disk Encryption	Acquired	USDA-wide	Driver – Security
Managed Hosting	Acquired	Government-wide	Driver – economies of scale; consolidation of duplicative efforts
Storage Services	Acquired	Government-wide	Driver – economies of scale; consolidation of duplicative efforts
Professional Services	Acquired/Provisioned	Government-wide	Driver – Consolidation of duplicative efforts; streamline staffing
WAN Management	Provisioned	USDA-wide	Driver – cost; enhanced communications; economies of scale
Help Desk Services	Acquired/Provisioned	Some agencies share	Driver – Consolidation of duplicative efforts; streamline staffing
Cyber Security Services	Acquired	USDA-wide	Driver – Security
Data Privacy Services		USDA-wide	Driver – Security
IT Inventory and Asset Management Services	Acquired	Some agencies share	Driver – Security; tool standardization; continuous process improvement
Collaboration Tools	Acquired/Provisioned	USDA-wide	Driver – Consolidation of duplicative efforts; streamline staffing
Business Support Services (HR and Payroll)	Acquired	Government-wide	Driver – Consolidation of duplicative efforts; streamline staffing
Telephone Services	Acquired/Provisioned	Some agencies share	Driver – Cost savings;

			simplified ordering/provisioning

4 Agency Approach, Rationale and Timeline

USDA has developed a high-level roadmap for transitioning to the consolidated end-state architecture.

2007 – Developed EDC standards

2008 – Certified three EDCs and one Enterprise Server Room

2008 – Developed a high level business case analysis for enterprise data center consolidation

2009/2010 – Worked with EPA to ensure the USDA EDCs were Energy Star Compliant data centers

2010 – USDA developed a matrix for evaluating applications for cloud suitability

2009/2010 – Began consolidation of Agency server rooms to the USDA EDCs

2011 through 2015 – Migrate remaining sub-Agency server rooms and data centers to the USDA EDCs
For each USDA sub-agency/computer room, USDA basically follows the phases set forth in the OMB Data Center Consolidation Initiative Agency Consolidation Plan Template (See 7.3 – Master Plan Schedule).

- Phase 1 – IT Asset Inventory Baseline: USDA OCIO works with each sub-agency to generate an asset inventory by application
- Phase 2 – Application Mapping: Tools are installed to collect server and application dependency information
- Phase 3 – Analysis & Strategic Decisions: Application and environment data collected in phase 2 is analyzed, migration options are developed. Options typically include: Cloud and highly virtualized, dedicated environments
- Phase 4 – Consolidation Design & Transition Plan: Target architecture is designed and move packages are developed/documented
- Phase 5 – Consolidation & Optimization Execution: Site prep and virtualization in place (P-to-V) are performed and move packages are executed
- Phase 6 – Ongoing Optimization Support: Post migration O&M

Data Center Operations along with each individual agency determines the best method of migration. Migration alternatives include virtual-to-virtual (V to V), physical to virtual (P to V) and physical to physical (P to P).

USDA established a Department-wide cloud computing work group that developed a matrix to assist in determining which applications are candidates for cloud computing.

Workload Type	Key Differentiators	Recommended Cloud

	Scalability/ Elasticity	Price Sensitivity	Integration Complexity	System Categorization		Security	Approach
				Confidentiality + Integrity *	Availability	Authentication and Audit Controls *	
Group 1	Moderate/High	High	Low	Low	Low/Moderate/High	Low	Public or Hybrid with Public Cloud Computing Offering
Group 2	Low/Moderate/High	Moderate/High	Moderate	Moderate/High	Moderate/High	Moderate/High	Private or Community Cloud Computing Offering
Group 3	Low/Moderate	Low/Moderate	High	High	Moderate/High	High	Not recommended for Cloud Computing

* Note: Applications with High requirements for Confidentiality, Integrity or Security Controls are not candidates for Public Cloud Computing Offerings.

USDA is taking advantage of multiple cloud-based computing services including content delivery networks and e-mail applications.

In 2004, USDA began using a third-party content delivery network for selected websites. At the peak of our usage, we service approximately 85% of our content from the edge, which means it is not coming back to our infrastructure. Using the third-party network provides a better-quality Web experience to citizens for less money than expanding our own infrastructure.

In 2010, USDA contracted with and began the migration to a third-party for all desktop communications services including: email, SharePoint collaboration, Office Communications (OCS), and Live Meeting.

The Agency has determined the project scope and timeline for Data Center Consolidation by identifying the following initial target agency data centers to be consolidated:

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
1	Agricultural Marketing Service (AMS)	Cotton Server Room –Lubbock	Lubbock, TX	Consolidated / Decommissioned	FY12
2	Agricultural Marketing Service (AMS)	Cotton Server Room – Memphis	Memphis, TN	Consolidated / Decommissioned	FY12
3	Agricultural Marketing Service (AMS)	Cotton Server Room – Rayville	Rayville, LA	Consolidated / Decommissioned	FY12
4	Agricultural Marketing Service	Cotton Server Room	Visalia, CA	Consolidated /	FY12

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
	(AMS)	– Visalia		Decommissioned	
5	Agricultural Marketing Service (AMS)	PVPO Server Room	Beltsville, MD	Consolidated / Decommissioned	FY12
6	Agricultural Marketing Service (AMS)	Primary Server Room	Washington, DC	Consolidated / Decommissioned	FY11
7	Agricultural Marketing Service (AMS)	Secondary Server Room	Denver, CO	Consolidated / Decommissioned	FY12
8	Agricultural Marketing Service (AMS)	Dairy Server Room m	Washington, DC	Consolidated / Decommissioned	FY11
9	Agricultural Marketing Service (AMS)	FPB Server Room	Washington, DC	Consolidated/ Decommissioned	FY11
10	Agricultural Marketing Service (AMS)	PPB Server Room	Washington, DC	Consolidated / Decommissioned	FY11
11	Agricultural Marketing Service (AMS)	MNSB Server Room	Washington, DC	Consolidated / Decommissioned	FY11
12	Agricultural Marketing Service (AMS)	PACA Server Room	Washington, DC	Consolidated / Decommissioned	FY11
13	Agricultural Marketing Service (AMS)	PY Server Room 3994	Washington, DC	Consolidated / Decommissioned	FY11
14	Agricultural Marketing Service (AMS)	Seed Server Room	Washington, DC	Consolidated / Decommissioned	FY11
15	Agricultural Research Service	Beltsville Area Server Closet	Beltsville, MD	Consolidated / Decommissioned	FY12

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
	(ARS)				
16	Agricultural Research Service (ARS)	GRIN Server Room	Beltsville, MD	Consolidated / Decommissioned	FY12
17	Agricultural Research Service (ARS)	GWCC Server Closet	Beltsville	Consolidated / Decommissioned	FY12
18	Agricultural Research Service (ARS)	MidSouth Area Server Closet	Stoneville, MS	Consolidated / Decommissioned	FY13
19	Agricultural Research Service (ARS)	MidWest Area Server Closet	Peoria, IL	Consolidated / Decommissioned	FY13
20	Agricultural Research Service (ARS)	NDBS Server Room	Beltsville, MD	Consolidated / Decommissioned	FY12
21	Agricultural Research Service (ARS)	North Atlantic Area Server Closet	Wyndmoor, PA	Consolidated / Decommissioned	FY13
22	Agricultural Research Service (ARS)	Northern Plains Area Server Closet	Ft. Collins, CO	Consolidated / Decommissioned	FY13
23	Agricultural Research Service (ARS)	Pacific West Area Server Closet	Albany, CA	Consolidated / Decommissioned	FY13
24	Agricultural Research Service (ARS)	South Atlantic Area Server Closet	Athens, GA	Consolidated / Decommissioned	FY13
25	Agricultural Research Service (ARS)	Southern Plains Area Server Closet	College Station, TX	Consolidated / Decommissioned	FY13
26	Animal and Plant Health Inspection	Eastern Region Office	Raleigh, NC	Consolidated / Decommissioned	FY14

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
	Service (APHIS)				
27	Animal and Plant Health Inspection Service (APHIS)	Minneapolis Office	Minneapolis, MN	Consolidated / Decommissioned	FY14
28	Animal and Plant Health Inspection Service (APHIS)	Western Region Office	Ft. Collins, CO	Consolidated / Decommissioned	FY14
29	Animal and Plant Health Inspection Service (APHIS)	National Center for Animal Health	Ames, IA	Consolidated / Decommissioned	FY14
30	Animal and Plant Health Inspection Service (APHIS)	USDA Center at Riverside	Riverdale, MD	Consolidated / Decommissioned	FY12
31	Departmental Management (DM)	S100	Washington, DC	Consolidated / Decommissioned	FY14
32	Departmental Management (DM)	DA Data Center (Room S0061)	Washington, DC	Consolidated / Decommissioned	FY11
33	Economic Research Service (ERS)	ERS LAN/WAN	Washington, DC	Consolidated / Decommissioned	FY11
34	Farm Service Agency (FSA)	Aerial Photography Field Office	Salt Lake City, UT	Consolidated / Decommissioned	FY12
35	Food Safety and Inspection Service (FSIS)	Eastern Lab	Athens, GA	Consolidated / Decommissioned	FY12
36	Food Safety and Inspection Service (FSIS)	FSIS FPC	Urbandale, IA	Consolidated / Decommissioned	FY12
37	Food Safety and Inspection Service (FSIS)	HRC	Minneapolis, MN	Consolidated / Decommissioned	FY12
38	Food Safety and Inspection Service	Mid-Western Lab	St. Louis, MO	Consolidated / Decommissioned	FY12

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
	(FSIS)				
39	Food Safety and Inspection Service (FSIS)	Western Lab	Alameda, CA	Consolidated / Decommissioned	FY12
40	Food Safety and Inspection Service (FSIS)	Headquarters South Building	Washington, DC	Consolidated / Decommissioned	FY11
41	Food and Nutrition Service (FNS)	ASC	Lorton, VA	Consolidated / Decommissioned	FY11
42	Food and Nutrition Service (FNS)	MN	Minneapolis, MN	Consolidated / Decommissioned	FY12
43	Food and Nutrition Service (FNS)	Southwest Region	Dallas, TX	Consolidated / Decommissioned	FY12
44	Food and Nutrition Service (FNS)	National Office	Alexandria, VA	Consolidated / Decommissioned	FY12
45	Foreign Agricultural Service (FAS)	FAS Data Center	Washington, DC	Consolidated / Decommissioned	FY11
46	Foreign Agricultural Service (FAS)	FAS Europe Hub	Brussels, Belgium	Consolidated / Decommissioned	FY11
47	Foreign Agricultural Service (FAS)	FAS Asian Hub	Tokyo, Japan	Consolidated / Decommissioned	FY11
48	Forest Service (FS)	Albuquerque Data Center	Albuquerque, NM	Consolidated / Decommissioned	FY15
49	Forest Service (FS)	Geospatial Computer Room	Salt Lake City, UT	Consolidated / Decommissioned	FY12
50	Forest Service (FS)	Portland Computer Room	Portland, OR	Consolidated / Decommissioned	FY15
51	Grain Inspection, Packers, and Stockyards Administration	GIPSA Server Room	Washington, DC	Consolidated / Decommissioned	FY11

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
	(GIPSA)				
52	National Agricultural Library (NAL)	Server Closet	Beltsville, MD	Consolidated / Decommissioned	FY12
53	National Agricultural Statistics Survey (NASS)	Headquarters Server Room	Washington, DC	Consolidated / Decommissioned	FY11
54	National Agricultural Statistics Survey (NASS)	Geospatial Server Room	Fairfax, VA	Consolidated / Decommissioned	FY12
55	National Institute of Food and Agriculture (NIFA)	CSREES Production	Washington, DC	Consolidated / Decommissioned	FY11
56	National Institute of Food and Agriculture (NIFA)	CSREES Test & Development	Washington, DC	Consolidated / Decommissioned	FY11
57	Natural Resources Conservation Service (NRCS)	Ft. Collins Location	Ft. Collins, CO	Consolidated / Decommissioned	FY12
58	Natural Resources Conservation Service (NRCS)	Ft. Worth Location	Ft. Worth, TX	Consolidated / Decommissioned	FY13
59	Natural Resources Conservation Service (NRCS)	Greensboro Location	Greensboro, NC	Consolidated / Decommissioned	FY14
60	Natural Resources Conservation Service (NRCS)	Portland Location	Portland, OR	Consolidated / Decommissioned	FY14
61	Office of the Chief Information Officer (OCIO)	Beacon Street Computer Room	Kansas City, MO	Consolidated / Decommissioned	FY12
62	Office of the Chief Information Officer (OCIO)	Headquarters Room 2104	Washington, DC	Consolidated / Decommissioned	FY12

No.	Agency Component	Data Center	Location	Action to be taken	Action Taken during Fiscal Year
63	Office of the Chief Information Officer (OCIO)	NTT America (GP)	Centennial, CO	Consolidated / Decommissioned	FY12
64	Office of the Inspector General (OIG)	OIG DC	Washington, DC	Consolidated / Decommissioned	FY12
65	Office of the Inspector General (OIG)	OIG KC	Kansas City, MO	Consolidated / Decommissioned	FY11
66	Risk Management Agency (RMA)	Primary Data Center	Kansas City, MO	Consolidated / Decommissioned	FY12
67	Risk Management Agency (RMA)	Secondary Data Center	Egan, MN	Consolidated / Decommissioned	FY12
68	Risk Management Agency (RMA)	SDA Data Center	Stephenville, TX	Consolidated / Decommissioned	FY12
69	Rural Development (RD)	RD Computer Room	St. Louis, MO	Consolidated / Decommissioned	FY12
70	Rural Development (RD)	RD HR St. Louis Data Center	St. Louis, MO	Consolidated / Decommissioned	FY12
71	Rural Development (RD)	RD HR Washington Data Center	Washington, DC	Consolidated / Decommissioned	FY11

5 Agency Governance Framework for Data Center Consolidation

The USDA has had fee-for-service enterprise data centers for many years so the facilities and service catalogs are in place. These EDCs are working capital fund entities governed by a working capital fund executive board and technical review board comprised of USDA Agency CIOs and CFOs.

The data center consolidation project will be specifically managed by the USDA's Data Center Operations, which reports to the CIO for USDA. The EDCs follow ITIL and PMI guidelines and best practices.

USDA has established and sustained IT governance at the Department and its agencies to:

- Eliminate redundant spending / solutions on commodity software, infrastructure and operations through the use of an Acquisition Approval Request (AAR) process.
- Eliminate isolated systems solutions through the implementation of department-wide Enterprise Services including e-mail, portal, web services, web content management services, etc.
- Develop a common set of measures as a basis for executive decisions on infrastructure and data centers (e.g. server utilization, average virtualization, and power usage efficiency) reported by Data Center operations to the CIO via an executive dashboard.

USDA EDCs are fee-for-service to all federal government and therefore have established SLAs for their catalog of services.

In 2009, USDA-OCIO-Data Center Operations engaged Gartner Research in a benchmarking and optimization initiative that resulted in a benchmark of data center services costs to peer organizations as well as a road map to optimize:

- Foundational Initiatives
- Service Catalog Management
- Service Level Management
- Financial Management
- Asset Management
- Enterprise Architecture
- Cloud Service Offerings

The road map is an ongoing effort and the benchmark/optimization engagement is planned to be revisited bi-annually.

On August 6, 2010, the USDA CIO sent a memo to all agency CIOs to reaffirm the EDC guidance. Specifically, the memo:

- Identified the current authorized USDA EDCs
- Briefed the status of acquiring commercial data center services as part of the overall OCIO EDC strategy
- Status of data center consolidation
- Direction for all agencies to have an OCIO approved migration plan completed by December 30, 2010
- Direction for all agencies to, at a minimum, have all production instances of Business Applications that are mission critical, mixed financial, disaster support, incident response and/or process privacy, sensitive, or personally identifiable information migrated to an EDC by September 30, 2011. Priority will be given to such production instances of Business Applications

currently in the Washington DC Metropolitan Area. The priority for other systems is listed below in descending order:

- Development and Test instances of Business Applications that are mission critical, mixed financial, disaster support, incident response and/or process privacy, sensitive, or personally identifiable information;
- Development, Test and production instances of remaining Business Applications;
- Public Web Sites;
- File and Print Servers located in Washington DC Metropolitan Area.

- Stated the focus on reducing overall cost and alignment with the goals of the OMB consolidation initiative.

The master program schedule identifies all USDA agency and USDA Office locations. Detailed implementation plans are established for each set of applications or by individual location.

5.1 Best Practices

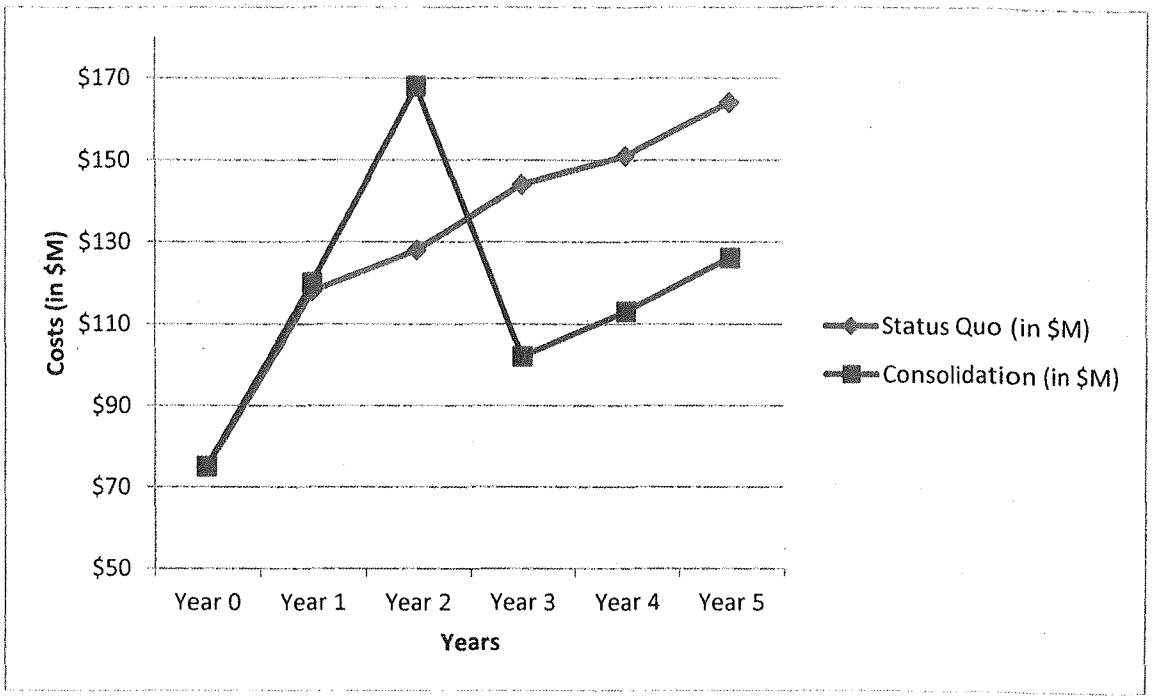
Since the start of USDA's data consolidation initiative in 2010 a number lessons learned have been identified, leading to implementation of several best practices in support of individual data center migrations. The Data Center Consolidation Program Office has actively instituted a culture of continuous process improvement and seeks/investigates new, cost effective methods, tools, and solutions to facilitate the data center migration projects.

Examples of best practices implemented over the past 18 months include:

- Development of a discovery "tool-kit" that includes capabilities for identifying network, server, and storage utilization statistics as well as application dependency mapping.
- Formation of a full time dedicated team from a broad mix of IT technical disciplines whose sole function is to migrate and close data centers
- Procurement and deployment of a "Mobile Data Center", allowing the team to physically bring a complete stack of hardware into a data center slated for closure to expedite virtualization of the environment and the transport of the newly virtualized applications to the EDC
- Development and continual refinement of scoping documents to be completed by the sub-agency data center to facilitate the discovery process

5.2 Cost-benefit Analysis

In March 2009, USDA completed an engagement with Gartner Research to develop a high level business case for enterprise data center consolidation. Below is the five year view of the analysis results for the cost profile.



	Status Quo	Consolidation
Total Five Year Costs (in $M)	$705	$629

Scenario	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Status Quo (in $M)	$75	$118	$128	$144	$151	$164
Consolidation (in $M)	$75	$120	$168	$102	$113	$126
Cost Avoidance	0%	(2.00%)	(31.22%)	29.37%	24.94%	23.00%

- Cost Projections developed based on the information provided by the USDA and USDA data submitted to ITILOB
- Capital Investment $42.88 M incurred by USDA during years 1 and 2 for the consolidation scenario
  - **Approximately $29 M in planning and transition costs and $14 M in facility expansion requirements**
    - Facility expansion costs have been funded through the Department's Working Capital Fund and are being paid back through hosting fees collected at the EDCs
    - Currently there is no explicit funding that is available for the consolidation process and migration activities. These costs are being funded by the sub-agencies on a case by case basis

- Cost savings start in 2011, however on an overall annual basis USDA experiences savings in run costs from 2013 onwards

- USDA experiences a net savings of $75 M over five year horizon

Additional data has been gathered since this analysis which will result in greater savings. These savings are primarily related to virtualization and moving applications to cloud based services that have proved to achieve even greater economies of scale that the 2009 analysis estimated.

5.3 Risk Management and Mitigation

The USDA Data Center Consolidation Program Manager creates and maintains Risk Management Plan at the program level for the overarching initiative and at the project level for individual data centers being consolidated/decommissioned. These plans identify the procedures used to manage risk throughout the life of the program/project. In addition to documenting the approach to risk identification and analysis, each plan covers who is responsible for managing risks, how risks will be tracked throughout the program/project lifecycle, and how mitigation and contingency plans are developed and implemented.

The risk management process for the program/project is accomplished in the following 5 steps:

- Identify
- Analyze
- Plan
- Implement
- Track/Control

Identify

Risk identification is an on-going task throughout the program/project lifecycle, and consists of both a formal and informal approach. All project staff are responsible for identifying risks. The Program Manager and/or Project Manager have the primary responsibility for sponsoring risk identification activities and collecting the identified risks for analysis.

All identified risks are documented, the description of the risk clearly indicates the concern, likelihood (if known), and the possible consequences. The description also includes the impacts to stakeholders, assumptions, constraints, relationship to other project risks, issues or activities, possible alternatives, and impacts to the project budget, schedule or quality.

Analyze

Each risk is analyzed to determine what actions should be taken (if any), to establish the priority of the risk, and to identify the level of resources to commit to the risk action plans. At a minimum, the following areas are considered for possible impacts:

- Cost / project budget
- Schedule
- Scope / requirements
- Staffing and resources
- Quality
- Data Center Impacts
- Sponsor/program impacts
- User/customer impacts
- Safety / security
- Privacy

Plan
Risk planning consists of the development of detailed plans for either mitigation and/ or contingency actions for a specific risk.

Implement
Implementation is the act of executing the decisions made and documented in planning phase of the Risk Management Plan. Mitigation and contingency plans are tied either to a trigger event and executed upon that event occurring, or may be implemented immediately.

Track/Control
Risk tracking and control follows the progress of the risk and its probability, as well as the status of any mitigation/contingency strategies that have been executed. When changes to the risk profile occur, the basic cycle of identify, analyze, and plan is repeated. Existing action plans may be modified to change the approach if the desired effect is not being achieved.

5.4 Acquisition Management

Acquisition of capital assets and/or goods and services is an integral part of the USDA Data Center Consolidation Programs planning, programming, and budgeting process. This process takes a systematic approach to prioritizing program needs, allocating resources, measuring performance and delivering results. The process is cyclical and is repeated as needed during the life of the program/project as well as during the fiscal year budgeting process. The following factors are considered for each acquisition:

- This is a need which cannot be met through nonmaterial means
- The selected alternative and approach is the right solution
- A definitive cost, scope, and schedule baseline has been developed
- The project is ready for implementation
- The project is ready for turnover or transition to operations

The USDA Data Center Consolidation Program Manager is responsible for the development of the overall program acquisition management plan. This plan was developed during the project initiation phase when the scope, budget and schedule were identified and evaluated for what would be required

to meet program objectives. Throughout the life of the program Departmental Acquisition Specialists provide guidance and direction on development and execution of all project procurement processes and documents. When contracts are awarded; the assigned Contracting Officer and Contracting Officer's Technical Representative track and monitor contractor performance, evaluate products and deliverables, ensure issues are resolved, contractor invoices are paid, and contracts are properly closed.

All available USDA and Government-wide contract vehicles are evaluated for each procurement need. Where an existing contract vehicle does not meet the program requirements competitively bid fixed price contracts will be executed.

5.5 Communications Strategy

The USDA Data Center Consolidation Program Manager (DCCPM) has developed a communications strategy that includes upward, lateral, and downward communications channels.

Upward communications are used to strengthen buy-in and support from Department Senior Executives. Semi-weekly video teleconferences are held with the Chief Information Officer who serves as the DCC Executive Sponsor. Additionally, other tools such as weekly status reports and e-mail updates are used to keep Senior Executives across the Department apprised of project accomplishments, timelines, risks, and road blocks encountered.

Lateral communications are used to keep functional managers of data centers and server rooms being consolidated/decommissioned informed of project status, bi-lateral requirements, evaluation of risk, and address concerns. Bi-weekly meetings between the DCCPM and the affected agency leadership are held to discuss project issues. Additionally, the Project Manager assigned to the specific data center consolidation keeps the client agency informed with weekly project status reports and ad hoc meetings when/where required.

Downward communications from the DCCPM and or assigned Project Manager to the project teams are used to provide direction to the teams; highlight pending milestones/tasks; and communicate general information to the team. Communications tools used are weekly project team meetings; e-mail; issues logs; and verbal exchanges.

5.6 Real Property

USDA has not encountered any issues surrounding the closure and/or augmentation of data centers/computer rooms within its portfolio. To date all closures have been of rooms collocated within existing office buildings. These former computer rooms have been repurposed to either office space, storage space, or other common use space. The key real property savings have been: reduced utilities costs, elimination of costs related to maintenance of data center infrastructure systems, and avoidance in cost of leasing additional office space.

6 Progress

6.1 FDCCI Consolidation Progress

USDA is on track to close all data centers/computer rooms targeted for consolidation in calendar year 2011. A number of consolidations are already complete and/or substantially complete, a list of the 2011 closure status follows:

- Agricultural Marketing Service (8 locations) – all applications have been virtualized and are scheduled to move to the EDC prior to the end of calendar year 2011.
- Departmental Management (1 location) - is in the process migrating their Washington DC computer rooms to an EDC with an expected completion in December, 2011.
- Economic Research Service (1 location) - completed migration of their Washington DC computer room to the EDC in August, 2011.
- Foreign Agricultural Service (3 locations) - is in the process of cutting all of their business applications over to production at the EDCs with an expected completion date of November 19, 2011. Additionally, the Brussels, Belgium and Tokyo, Japan computer rooms were closed in April, and June respectively.
- Food and Nutrition Service (1 location) – migration of application from current hosting provider to the EDC is in progress with an expected completion date of December, 2011.
- Food Safety and Inspection Service (1 location) – completed migration of their South Building computer room applications to the EDC and cut over production in Q1 FY2011.
- Grain Inspection, Packers & Stockyards Administration (1 location) - is in the process migrating to an EDC with an expected completion in December 2011.
- National Agricultural Statistics Survey (1 location) - is in the process migrating to an EDC with an expected completion in December 2011.
- National Institute of Food and Agriculture (2 locations) - is in the process migrating their Washington DC computer rooms to an EDC with an expected completion in December 2011.
- Office of the Inspector General (1 location) - is in the process of migrating their Kansas City computer room to the EDC with an expected completion in November 2011.
- Rural Development (1 location) – migration completed in July 2011

USDA does not foresee any issues with meeting it's 2012 closure targets and will kick-off the majority of these projects in November and December of 2011.

6.2 Cost Savings

In FY2011 the USDA Data Center Consolidation Program Office and Enterprise Data Centers(EDC) focus was twofold, establishment of additional cloud computing platforms/services, and the migration/ closure of agency data centers/computer rooms.

Throughout FY2011 the estimated annual savings from consolidations that have been completed is $4.2M.

For the period CY2011 through CY2015 cost savings achieved through the Department's Data Center Consolidation Initiative is estimated to be $75M.

FY2011 adoption of the Department's Private Cloud offering for Infrastructure as a Service (IaaS) for Windows and Linux has allowed the Department to realize an estimated savings of $9.9M. Based on the

650 customer servers currently utilizing IaaS and a savings model depicted below which compares the average annual cost of an agency owned dedicated server to an IaaS virtual server.

Typical Windows Web Application Server Cost Comparison		
	Agency Owned Dedicated Server	**USDA Private Cloud IaaS**
Hardware	$10,700	Included in rate
Software	$1,750	Included in rate
Facility	$2,185	Included in rate
Personnel	$6,900	Included in rate
TOTAL ANNUAL COST	**$21,535**	**$6,240**

7 Appendix - FDCCI Templates

[redacted]

7.2 Appendix B: Final Data Center Consolidation Plan Templates

USDA's Appendix B is included under a separate cover.

[redacted]

Consolidation Progress

Dept/Agency Name	U.S. Department of Agriculture

	Closed	Target Closing Numbers					
	4Q10	4Q11	4Q12	4Q13	4Q14	4Q15	TOTAL Closings Planned
Consolidation Targets- Facilities ≥ 100 sq. ft. - Reported in June 2011 Asset Inventory	0	21	33	8	7	2	71
		6 closed as of September 30th, 2011					

Savings Metrics	Planned Program Cost Savings 2/2010 through 4Q15
Data Center Count Reduction (#)	71
Gross Floor Area Reduction (sq.ft.)	64983
Rack Count Reduction (#)	406
Server Count Reduction (#)	
Mainframes (IBM or compatible) Reduction (#)	1
Mainframes (Other) Reduction (#)	1
Windows Servers Reduction (#)	1193
Linux Servers Reduction (#)	102
UNIX Servers Reduction (#)	321
Other Servers Reduction (#)	115
Energy Usage Reduction (kW)	23003051
Energy Cost Reduction ($)	$ 3,312,440

Dept/Agency-Wide Savings Plan

Dept/Agency Name	U.S. Department of Agriculture

	Calculated from Baseline	Target				
	4Q10	4Q11	4Q12	4Q13	4Q14	4Q15
Data Centers: Total number of Data Centers (#)	**95**	74	41	33	26	24
Data Centers: Aggregate Gross Floor Area (sq.ft.)	**130798**	116400	87584	83642	69415	65815
Total Number of Racks (#)	**1285**	1117	1080	1040	941	879
Total Number of Physical Servers by Type (#)						
Mainframes (IBM or compatible)	6	5	5	5	5	5
Mainframes (Other)	2	1	1	1	1	1
Windows Servers	5193	4900	4650	4250	4100	4000
Linux Servers	1002	949	959	925	900	900
UNIX Servers	1271	1261	1158	1108	1000	950
Other Servers	273	273	234	220	208	158
Aggregate Data Center Energy Usage (kWh/year)	31108278	25514045	15548529	14603395	11191200	8105227
Aggregate Data Center Energy Costs ($/year)	$ 5,500,777	$ 4,345,298	$ 2,974,695	$ 2,856,255	$ 2,501,183	$ 2,188,338
Aggregate Data Center Building Operational Cost ($/year)	$ 11,872,910	$ 10,080,275	$ 7,974,872	$ 7,774,150	$ 7,037,430	$ 5,838,561
Aggregate FY Construction, Expansion, Consolidation Budget ($/year)	$ 2,389,000	$ 7,040,000	$ 10,000,000	$ 10,000,000	$ 10,000,000	$ -

Dept/Agency-Wide Utilization Plan

Dept/Agency Name	U.S. Department of Agriculture

	Calculated from Baseline	Target				
	4Q10	4Q11	4Q12	4Q13	4Q14	4Q15
Average Virtualization (%) [Virtual Host Count / Total]	640.42	662.83	670.17	677.67	685.33	692.67
Average Number of VMs per Virtual Host (#)	1.72	3.05	5.15	7.18	9.55	11.75
Average Power Usage Efficiency (PUE)	1.86	1.8	1.75	1.7	1.65	1.6
Average Power Density Capacity Equivalent (W/sq.ft.)	24.26	35	50	80	120	150