A Report for

State of Florida Senate

Final Report—State of Florida Data Center Consolidation Feasibility Study

22 April 2008

Engagement: 222027430

Gartner

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Executive Summary

1.0 Executive Summary

As a critical component for improving the investment and effectiveness of the State's IT infrastructure, the Florida State Senate engaged Gartner, Inc. to conduct a study of the current data center operations of State departments and agencies. Currently, there are 67 data center/computing facilities serving State departments and agencies. In the final report, Gartner analyzed data from 43 of these data center facilities.

The Florida Senate has requested an assessment to analyze current data center costs, determine areas for potential savings, and to study the feasibility of consolidating State data centers to both improve the return on IT investments through achieving long-term cost avoidance and savings, and to develop a stronger IT infrastructure that will provide a more viable IT foundation for the modernization and enhanced responsiveness of IT support across State departments and agencies.

1.1 Scope

Gartner performed an assessment of 43 data center facilities from 15 organizations within the State of Florida. The workload consisted of:

- 10 IBM mainframes with 7,126 MIPS
- 3,456 X86-Windows physical servers
- 437 physical Unix servers
- 4,620 logical servers (all technologies)
- 14 iSeries (AS/400)
- 4 Unisys mainframes with 368 MIPS

Supporting this workload required 466 Full-Time Equivalents (FTEs) and an annual Total Cost of Ownership (TCO) of $112.4 million.

The facilities Gartner reviewed:

- Contain 134,778 sq. ft. of raised floor space
- Consume 2.6 megawatts
- Have a capacity of 5.4 megawatts

1.2 Key Findings

Gartner identified findings in three areas:

- Benchmarking—which compared Florida's individual agencies to observations made among similar peers captured in Gartner's benchmarking database to identify short-term savings.
  - Eleven agencies have differences from the Gartner peer group that offer short-term saving opportunities of $3,255,089. These opportunities are based on the differences from the individual agency peers that were discounted by 75%. This level of discounting was required to establish what Gartner believes to be an achievable level of short-term savings.

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- Data Center Facility Assessment—which identified the potential “surviving” data centers and the number of data centers required for consolidation.
  - Those with a solid infrastructure and either idle capacity or the potential to be significantly upgraded were strongly considered as potential data center consolidation sites.
  - Based on analysis of the required data center workload and the facility analysis, Gartner believes that the entire data center workload can be accommodated by the Shared Resource Center (SRC), the Northwest Regional Data Center (NWRDC) and the Northwood Center. To provide a level of contingency, we added the Department of Environmental Protection (DEP) Annex data center to this list of consolidated centers. We included the DEP Annex largely because of its potential to be expanded to be a 15,000–20,000 sq. ft. facility if the existing warehouse located on the second floor of the Annex building were displaced to another location. An additional contingency site can be the location of the current Lottery data center. This facility has a significant amount of two-story warehouse space (approximately 15,000–20,000 sq. ft.) that also has the potential for expansion if required by the State.
- Financial Modeling—which examined three consolidation scenarios.
  - Gartner’s financial analysis is based on a model that forecast workload and workload-driven costs out to Year 2018. The following three consolidation scenarios were modeled:
    - Scenario 1: Status Quo

      The Status Quo represents the extension of the current situation into the future, but is not a no-growth scenario
    - Scenario 2: Leverage Existing Facilities

      Scenario Two uses existing State facilities to serve as a base for consolidation and future growth. The existing facilities will require significant improvements.
    - Scenario 3: Leverage New Data Center

      Scenario Three uses a new Tier 2+ data center to serve as a base for consolidation and future growth
    - Potential cost avoidance is estimated through the differential in costs from the Status Quo and each consolidation scenario

      The terms “cost avoidance,” "future savings" or "long-term savings" are used interchangeably to refer to the difference between the current cost of each scenario, which is assumed to grow by an inflation-based growth rate, and any future-state of that scenario. Any future based savings quoted in this assessment may be considered as cost avoidance rather than savings from current spending levels to the extent that the rate of inflation plus the costs of consolidation are not offset by specific consolidation related savings. The short-term savings recommended are intended to be reductions from current spending levels and are also referred to as savings.
    - A 6% discount rate is used in the NPV calculations
  - Scenarios 2 and 3 both show significant long-term savings when compared to the costs of maintaining the current Status Quo environment.

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- Scenario 2: $93.3 million
- Scenario 3: $70.0 million

1.3 Major Recommendations

Gartner recommends that Florida utilize the consolidation scenario identified as *Scenario 2: Leverage Existing Facilities*, and begin the process of consolidating data centers. The recommendation is based on the following criteria:

- Significant savings are available to warrant data center consolidation. Depending on whether the State begins counting the savings from the time the decision to consolidate is made, or if the State begins counting savings when the first investments occur, the savings are estimated to be between $93.3 million and $103.9 million.
- Florida has the raised floor space to perform the consolidation without building a new data center. While significant upgrades will be required to the existing Florida data center facilities (i.e., those identified in this report as consolidation sites), Gartner's model predicts that, after one year of investment and transition, Florida will begin seeing net savings as early as the second transition year.
- Florida is somewhat familiar with the operation of a consolidated data center, since three of the data centers identified as consolidation sites are currently hosting multiple agencies.
- Florida knows the "lessons learned" regarding developing effective governance models.
- The initiation of a new IT organizational structure provides opportunity for a successful transformation.
- This approach is well-aligned with the current constraints that the State is facing.

At their heart, successful data center consolidation projects are built around a decision to transform the organization—not just move the "machines" and people. The technical aspects of most consolidations are easier to manage than the cultural and operational dynamics of the organization. As we discuss in this report, the underlying assumption for this assessment is that, with some exceptions, all the data center functions will be transferred to a new organizational structure *(logical consolidation)* responsible for a consolidated data center system within Florida. This provides the State with the strengthened capability to capture the economies of scale necessary to achieve the projected savings and enhance the effectiveness of the State's IT infrastructure. Creating an entity that will effectively manage and oversee this initiative is the single biggest critical success factor.

Key factors that the State must keep in mind in moving forward with data center consolidation include:

- Addressing and overcoming past consolidation experiences
- Applying the "lessons learned" regarding ineffective or nonexistent governance
- Avoiding cost reduction goals that are overly aggressive or unrealistic
- Ensuring the engagement, participation and ownership leadership across the State's departments and agencies
- Allocating sufficient investment funding
- Establishing strong and confident project management oversight

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- Developing the internal capacity and skills necessary for success
- Building a governance and management structure that builds a high level of trust in the data center host agency
- Making tough decisions regarding staffing levels
- Ensuring the ownership and buy-in by State departments and agencies

1.4 Critical Success Factors and Next Steps

As the State of Florida begins the process of moving forward with data center consolidation as articulated in *Scenario 2: Leverage Existing Facilities,* several critical success factors need to be considered as a part of the planning and implementation process. These factors are described below:

- **Meets the Unique Needs of Florida**—Although other states have implemented or are in the process of implementing a data center consolidation initiative, Florida cannot take whole cloth their approaches and apply them to Florida. The State of Florida can benefit from the lessons learned from these national efforts, but Florida will need to tailor its approach to the unique context, strengths and challenges inherent in its operations and governance structure.
- **Planning and Ownership**—Most of the State's departments and agencies have a level of comfort and satisfaction with the services they are receiving from their data centers under the current structure. Any proposed change will be a cause for concern. No State department or agency wants to see degradation in the level of services or responsiveness it is currently receiving from its data center, or face possible sanctions if its data center operations or standards fail to meet legal or regulatory requirements under which it operates. It will be critically important for the State to continue to employ a participatory process, such as was initiated through the Stakeholder Advisory Committee formed for this project. This process needs to support planning and implementation of the data consolidation initiative by continuing to promote the awareness, understanding, ownership and participation of key department managers and agency stakeholders regarding the benefits to be achieved through data center consolidation for their organization and, importantly, for the State as a whole.
- **Organizational Leadership**—Three levels of leadership will be required. *First,* there will need to be strong leadership from the Governor, Cabinet and the Legislature in establishing the directives, legislation and policies essential to support the implementation and sustainability of the data center consolidation effort. *Second,* the executive leadership of the State's departments and agencies need to be actively involved in the initiative and provide leadership for their organization's role in ensuring success through policy development, compliance and accountability oversight. *The third* critical leadership level must be created through the identification a lead entity to assume the responsibility for overseeing and managing the data center migration plan and sustaining the operations of the State's consolidated data center system. Through the strengthening of the State's Agency for Enterprise Information Technology (AEIT), an entity exists that can assume responsibility for managing the data center consolidation plan and working with State departments and agencies in creating the infrastructure, staffing, standards, governance and operations necessary to begin to make real the vision for data center consolidation in the State of Florida.
- **Realistic Action Plan**— As with any complex initiative, it is critical that time be invested in developing a detailed action plan. Based on the direction of the State's leadership, the

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budgetary constraints facing Florida and the input from key stakeholders, the State needs to develop a realistic migration plan—including clear guidelines for future budget requests and procurements during the migration process.

- **Effective Governance Structure**—Although not a primary focus of this engagement, Gartner Research and lessons learned from the experience of other states that have undertaken the consolidation of IT operations demonstrate the critical importance of establishing a strong governance structure during any IT consolidation initiative to ensure that the client agencies receive the level of service they need to fulfill their mission and to meet their legal and regulatory mandates. The governance structure needs to have a clear charter that codifies the purpose, goals and objectives of the consolidated data center model, the governance role of the participants, and the process used for decision making and conflict resolution.
- **Service-Level Agreements (SLAs) Aligned with Business Objectives and Needs**—Clearly defined SLAs need to be developed that identify the performance goals and service outcomes required of specific business processes that, in aggregate, will meet each agency or department's objective through a consolidated approach to data centers.

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Summary Report

2.0 Summary Report

2.1 Background

2.1.1 Current Situation

The State of Florida information technology (IT) infrastructure is large and complex and, in IT investments, ranks third in the nation with the allocation of more than $2 billion annually. More than 4,700 FTE staff, both State employees and contractors are allocated to support the IT infrastructure of the State. The size, complexity and financial investment being made by the State in its IT infrastructure and operations, and the critical role IT plays in supporting the State in fulfilling its mission, require thoughtful review to ensure the continual efficiency, effectiveness and improvement of the State's IT operations.

As a critical component for improving the investment and effectiveness of the State's IT infrastructure, the Florida State Senate engaged Gartner, Inc. to conduct a study of the existing data center operations of State departments and agencies. Currently, there are more than 40 data center/computing facilities serving State departments and agencies. The Florida Senate has requested an assessment to:

- Analyze current departmental data center costs
- Determine areas where future savings can be achieved
- Study the feasibility of consolidating State data centers

The envisioned goals for data center consolidation focused both on improving the return on IT investments through achieving long-term cost avoidance and savings, and in developing a stronger IT infrastructure that will provide a more viable IT foundation for the modernization and enhanced responsiveness of IT support across State departments and agencies.

2.1.2 Project Goals and Objectives

Project Goals

The assessment and feasibility study of the State's data centers was guided by four main goals:

- Develop a current-state baseline assessment of the State's data center operations aligned with comparable peer organizations
- Conduct a feasibility study to identify the viability of data center consolidation that could achieve cost savings and strengthen the State's data center operations
- Conduct an alternative analysis of potential approaches for data center consolidation
- Identify the most viable approach to data center consolidation that is aligned with the State's current budgetary constraints

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Project Objective

The overall objective for the assessment and feasibility study focused on the analysis necessary to answer the following strategic questions for the Florida Senate regarding the State's data center operations:

1. How many data centers are required to meet the State's needs?
2. What options exist for:
   a. Reducing unnecessary costs in the current status quo data center environment?
   b. Consolidating State data centers to reduce unnecessary cost to improve long-term efficiency and strengthen the State's IT infrastructure?
3. When, where and at what level can expected savings be realized?

2.1.3 Project Approach

To achieve the project goals and answer the critical questions necessary to support data-driven decisions, Gartner employed the following approach:

- Developed a baseline assessment of the State's largest data centers, which included:
  - Quality, capacity and utilization of facilities
  - Modeled workloads and staffing levels for each data center
  - Anticipated workload growth rates
  - Identified potential barriers to consolidation
- Developed two alternative models for data center consolidation to be compared to the existing unconsolidated status quo approach, which included:
  - Estimated the potential cost, financial savings and benefits that the State can expect to achieve from each consolidation scenario
  - Identified qualitative benefits (lower risk, strengthened IT infrastructure and improvements in data center services across the State enterprise) associated with executing a consolidation vs. the current status quo data center strategy
  - Identified critical success factors, challenges and key next steps that the State will need to address to achieve the identified benefits of data center consolidation if the State chooses to move forward, including:
    - Developing a detailed road map for implementation of the recommendation
    - Establishing the organizational structure, staffing, standards, accountability and operations essential to manage and support the new approach to data center operations
    - Creating a governance structure and SLAs to ensure the business needs of State departments and agencies are met, consistent with and better than the current support provided by the status quo approach
    - Providing mechanisms for change management that ensure that key stakeholders are aware, understand and have appropriate opportunities to participate in and support the successful implementation of the selected data center consolidation alternative

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2.1.4 Project Scope

For this report, Gartner assessed 15 agencies or departments and 43 data center facilities. Additionally, the Gartner team investigated two organizations from a facility basis only. These organizations were:

- The Northwest Regional Data Center (NWRDC)
- The Florida Lottery Data Center

Gartner's treatment of the Department of Management Services (DMS) SRC differed from its treatment of many other state data centers, in that the SRC is primarily established as a shared-use utility. To compare this facility to other data centers, it was important to combine the workload from the client agencies residing in the SRC so that a single consolidated view of the SRC data center could be developed. The intent was to compare and analyze the composite workload supported by the SRC. This approach presents a combined workload and costs of the client agencies and DMS. In this report when we use the term SRC we are referring to the DMS-SRC

As a result, the in-scope data center facilities were those listed below.

Table 1. In-Scope Data Center Facilities

In-Scope Computer Facilities				
#	Agency	Computer Facility Name	Computer Facility Address	Sq. Ft.
1	DACS	Division of Licensing Data Center #2	2520 North Monroe Street Tallahassee, FL 32303	488
2	DACS	Agriculture Management Information Center	407 South Calhoun Street Tallahassee, FL	2,318
3	DBPR	DBPR Server Room	1940 North Monroe Street Tallahassee, FL 32399	715
4	DCF	Florida Abuse Hotline	1317 Winewood Blvd., Bldg 6, 4th Floor Tallahassee, FL 32399	590
5	DCF	Florida State Hospital	100 N. Main Street, Building 1235 Room 209-A Chattahoochee, FL 32324	648
6	DCF	DCF Northwest Region Circuit 1 Computer Room	Chappie James Building, Suite 712 160 Governmental Center Pensacola, FL	640
7	DCF	Northwood Data Center	1940 N. Monroe Street Tallahassee, FL 32303	42,719
8	DCF	Southern Regional Data Center	401 NW 2nd Avenue S407 Miami, FL 33032	480
9	DCF	Sun Coast Regional Data Center	9393 N. Florida Avenue Tampa, FL 33629	528
10	DCF	Winewood Data Center		3,262
11	DOC	Department of Corrections Data Center ("CDC")	2601 Blair Stone Road Tallahassee, FL 32399	4,836
12	DOE	Division of Blind Services Data Center	Turlington Building 325 West Gaines Street, Room 1301-C Tallahassee, FL	700

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In-Scope Computer Facilities				
13	DOE	Division of Vocational Rehabilitation	2002 Old St. Augustine Road, Building A Tallahassee, FL	3,910
14	DOE	Education Data Center	325 West Gaines Street, Suite B2-44B Ralph D. Turlington Building	3,360
15	DOE	OSFA-DCF Data Center	1940 N. Monroe Street, Suite 70 Tallahassee, FL 32333	400
16	DEP	Bob Martinez Center/Data Center	2600 Blairstone Road Tallahassee, FL 32399-4000	350
17	DEP	Commonwealth Complex Annex/Data Center	3900 Commonwealth Boulevard Tallahassee, FL 32303	3,800
18	DFS	Fletcher Building	101 East Gaines Street, Tallahassee, FL 32399	16,328
19	HSMV	DHSMV Kirkman Data Center	Neil Kirkman Building 2900 Appalachee Parkway, Room DB-8 Tallahassee, FL 32399	11,562
20	HSMV	DHSMV C-103 Phone/Comm Room	Neil Kirkman Building 2900 Appalachee Parkway, Room C-103 Tallahassee, FL 32399	600
21	DMS	Shared Resource Center	2585 Shumard Oak Blvd. Tallahassee, FL 32399-0950	29,232
22	DOR	Revenue Data Center	501 South Calhoun Room G4/B4 Carlton Building Tallahassee. FL	7,738
23	DOR	Tax world Building L Imaging Center	5050 West Tennessee Street, Building L Tallahassee, FL 32399	2,184
24	DOS	Northwood Centre	1940 North Monroe Street Tallahassee, FL 32399	42,719
25	DOT	OIS Location 10—CO OIS	605, Suwannee Road Tallahassee, FL	6,440
26	DOT	TranStat Server Room	Burns Building, Room 217	400
27	FDLE	FDLE Data Center	2331 Phillips Road Tallahassee, FL 32308	9,900
28	AWI	Caldwell Server Room	107 E. Madison Street, Caldwell Bldg. Basement Floor Tallahassee, FL	2,040
29	DFS	Larson Computer Room	200 East Gaines Street Tallahassee, FL	528
30	DFS	Hartman Data Center		378
31	DOH	4052 Server Room	4052 Bald Cypress Way Tallahassee, FL 32399-1733	
32	DOH	Pinellas County Health Department	205 Dr. MLK Street N. Tallahassee, FL	3,600
33	DOH	Pinellas County Health Department	205 Dr. MLK Street N. Tallahassee, FL	3,600
34	DOH	Bureau of Laboratories	1217 Pearl Street Jacksonville, FL	190

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In-Scope Computer Facilities				
35	DOH	Broward County Health Department	2421 SW 6th Avenue Ft. Lauderdale, FL	384
36	DOH	MICC Data Center	Doral, FL	98
37	DOH	8600—Kodak	Doral, FL	750
38	DOH	Admin Bldg—Duval CHD	515 W 6th Street Jacksonville, FL 32206	465
39	DOH	Hillsborough County Health Department	1105 East Kennedy Boulevard Tampa, FL 33602	593
40	DOH	Palm Beach CHD	910 Evernia Street West Palm Beach, FL 33401	364
41	DOH	Bartow Administration Complex—Polk CHD	1290 Golfview Avenue Bartow, FL 33830	750
42	DOH	Volusia County Health Department	1845 Holsonback Drive Daytona Beach, FL 32117	224
43	DOH	Orange County Health Dept IT Server Room	6101 Lake Ellenor Drive Orlando, FL 32809	342

There were several facilities considered as not suitable for consolidation, for a variety of reasons, and other remote centers that, based on time and the ongoing consolidation work, were not considered in this assessment. These included:

- Those centers not considered as suitable for consolidation:
  - The Florida Lottery
  - The DOT Tolls facilities at:
    - Boca Raton
    - Turkey Lake
- Other facilities or groups of facilities that were excluded due to time constrains and/or other considerations:
  - The remaining DOT remote facilities
  - The data center facilities from out-of-scope agencies
- The NWRDC is considered out-of-scope for consolidation; however, it was considered as a potential site for receiving consolidated workload.
- The Department of Management Services (DMS) – Shared Resource Center (SRC)
  - For the SRC, Gartner combined the workload that is hosted and supported by DMS with the agency workloads that are co-located at the SRC. The intent was to compare and analyze the composite workload supported by the SRC. This approach presents a combined workload and costs of the client agencies and DMS. In this report when we use the term SRC we are referring to the DMS-SRC

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2.2 Benchmark Analysis

2.2.1 Benchmarking Overview

The purpose of the benchmarking portion of this project was three-fold:

1. Provide Gartner with an overall understanding of the cost and staffing required to support Florida's data center environments.
2. Provide a factual basis for identifying and validating possible savings that could result from data center consolidation. The benchmarking data are the basic input for the data center consolidation scenario models.
3. To provide a factual basis for identifying possible short-term savings opportunities.

2.2.2 Current-State Analysis

The current-state analysis is defined by a comparison of the workload supported by individual agencies or the SRC to similar peers contained within the Gartner benchmarking database. For a complete description of the peers and the benchmarking methodology, please see Section 4.0 of this report.

As shown in Table 2, of the 15 agencies benchmarked:

- Eleven agencies have differences from the Gartner peer group that offer short-term savings opportunities of $3,255,089. These opportunities are based on the differences from the individual agency peers and are discounted by 75%. This level of discounting was required to establish what Gartner believes to be an achievable level of short-term savings.
  - A result that indicates that an agency is lower-cost than the Gartner peer does not indicate that cost savings opportunities are impossible. The peer cost is an "average" cost, and financial performance better than average may still deliver cost savings.
  - Also, this study did not perform a detailed examination of the "effectiveness'' of any particular data center. It is sometimes the case that data centers with costs significantly below the peer groups are data centers with low effectiveness or data centers where the services delivered typically do not meet their clients' business requirement.
  - Florida may wish to further investigate those agencies that reported costs significantly lower than peer averages to better understand the underlying reasons for this

Table 2. Short-Term Savings by Agency

Agency	Short-Term Savings	Short-Term Savings PCT
DACS	$—	0%
DCF	$359,231	11%
DEP	$301,573	9%
DFS	$1,181,478	36%
DMS	$117,713	4%
DOC	$—	0%
DOR	$287,560	9%

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Agency	Short-Term Savings	Short-Term Savings PCT
DOS	$127,758	4%
DOT	$67,889	2%
DBPR	$—	0%
FDLE	$366,550	11%
HSMV	$114,975	4%
DOE	$108,685	3%
DOH	$221,677	7%
AWI	$—	0%
Total	**$3,255,089**	**100%**

2.2.3 Future-State Benchmark Analysis vs. the Consolidated Peer

The future-state analysis compared Florida's total or aggregated workload for the in-scope agencies and departments to a single large peer group from the Gartner database. This single entity was selected to represent the efficiencies possible if Florida's data center environment were to be logically consolidated into one organization and physically consolidated into one system of data centers.

This comparison is considered to be theoretical, and the actual savings are developed from this peer comparison in the financial modeling scenarios discussed later in this report.

The main observations from this comparison were:

- Significant annual theoretical savings are possible; the comparison generated a delta of greater than $17,000,000
- The savings are generated mostly from the X86 Windows environment
- The principle source of the savings are personnel expenditures
- The personnel savings would be generated by a significant reduction in data center staffing

2.3 Workload

Workload data were gathered in both the cost and staffing survey, and the separate workload and facility assessment. The workload drives the benchmarking assessment in that it forms the basis for the peer selection and was a primary focus for the workload study, in that servers, storage and mainframes are the primary consumers of space, power and cooling capacity.

2.3.1 Current-State Workload Analysis

The workload examined by this assessment was:

- 10 IBM mainframes with 7,126 MIPS of processing capacity
- 3,456 X86 physical servers
- 437 physical Unix servers
- 4,620 logical servers (all technologies)
- 14 iSeries (AS/400)

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- 4 Unisys mainframes with 368 MIPS

The majority of the State's data center workload is in the area of X86-Windows. However, significant cost is associated with both the Unix and Mainframe workload, even though in relative terms the workload is lower.

2.3.2 Co-location

The State of Florida has several locations that are used for co-locating the workload of one agency at the data center facility that is maintained and operated by another agency. Gartner Research defines co-location as one of the options commonly found associated with Web hosting or disaster recovery in the commercial environment. Gartner has observed co-location less frequently employed as a cost-effective option for general-purpose computing.

As utilized by agencies in the State of Florida, co-location is employed to provide one agency's workload at another agency or organization's data center facility, with the hosted agency paying a monthly fee but retaining control of the operation, architecture, configuration and services provided by the system.

The main advantage of co-location is that an agency can utilize the high-quality data center facility offered by another organization and retain operational control of its own infrastructure.

The main organizations providing co-location services in Tallahassee are:

- The SRC
- The NWRDC
- The DCF Northwood data center facility

The main disadvantage for the State of Florida is that co-location fragments the control of data center facilities and prevents the State of Florida from achieving the potential economies of scale for an organization of its size.

2.3.3 Workload Characteristics

There are several other characteristics of Florida's workload:

- The age of the server devices is in line with Gartner observation of other organizations. The majority of Florida's devices are less than five years old.
- From Gartner's experience with data center benchmarks and assessments, Florida is behind other organizations in virtualization. Most of the agencies seem to be in the early stages of virtualization.
  - Virtualization is a software technique that allows one computer to run the workload of several systems on the same hardware by employing "virtual" systems. This capability makes systems easier to manage and deploy, and makes it possible to utilize more of the hardware capacity.
- A significant portion of Florida's server workload is dedicated to non-strategic IT Services (as defined in the Florida Legislative Budget Request Instructions) workloads, i.e., electronic-mail and shared file and print services vs. strategic systems such as applications or database systems needed to support primary agency missions.
  - This is the type of workload that lends itself to consolidation and rationalization, since it is common to most of the agencies and is not differentiated by the business function of the agency.

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- A full 20% of the servers are utilized for application development and testing work. Gartner typically sees less than 10% of server infrastructures utilized for this purpose.

  Further analysis of state agencies' application development and testing infrastructure and staffing should be undertaken to assess and accurately determine the need for application development testing infrastructure and associated resources.

2.4 Facilities Assessment

2.4.1 Current-State Facilities Analyzed

For this report, Gartner assessed 15 agencies or departments and 43 data center facilities. Additionally, the Gartner team investigated two organizations from a facility basis only. These organizations were:

- The NWRDC
- The Florida Lottery Data Center

2.4.2 Gartner Facility Assessment

To assess Florida's data centers, Gartner examined both the floor space and the power capacity and utilizations. In previous times, floor space may have been enough to determine capacity, but in today's environment, with denser server environments, space is becoming less of a constraint than heat, cooling and the power required to facilitate this type of architecture. In particular:

- With Moore's Law, equipment is getting smaller and smaller, and more powerful
  - Moore's Law—The idea that computing power doubles every 18 months, originally conceived by Intel co-founder Gordon Moore in 1965.
- However, it also uses more and more power
  - A rack of current computer equipment today may consume 1.5kW (kilowatts) to 3kW
  - Power consumption for a rack of new servers can range from 10kW–40kW
- Power needs, including cooling, typically account for 60–70% of data center facility costs
- The typical situation today is:
  - Plenty of space
  - Always running out of power and cooling

2.4.3 Floor Space Analysis

Florida is in a position where there is sufficient raised floor space for current computer operations. In the past, facilities were built to house water-cooled IBM Mainframe and storage configurations. These facilities required both large quantities of raised floor space and significant cooling infrastructure for the water-cooled mainframe processors and the large air-cooled storage farms. Additionally, there were large space requirements for print operations, console operations and tape handling. The Year 2000 event, with the shift to smaller air-cooled mainframes and smaller-footprint servers, Redundant Arrays of Inexpensive Disks (RAID) arrays and virtual tape systems, coupled with the off-loading of print services to contractors or distributed multi-function printers, drastically reduced the space requirements of yesterday's

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data centers but led to a proliferation of servers in many organizations, including the State of Florida.

Even the proliferation of servers has not been enough to overwhelm Florida's data center space. Most of the agencies have converted the individual form factor server cabinets to rack-based systems and have managed to reclaim space from the tape and print rooms. Even with minimal implementation of server virtualization techniques, Florida does not suffer from a lack of raised floor space. In fact, the State could look to the monetization of unused space (remaining or not used for data center consolidation) as it moves forward with data center consolidation. The return on this investment could help to support the planning and implementation of data center consolidation.

2.4.4 Floor Space Characteristics

The important characteristics of Florida's floor space environment are:

- There are 134,778 sq. ft. of raised floor space contained in the 43 in-scope data centers reviewed in the 15 in-scope agencies or departments.
- The vast majority of the space, 96%, is conditioned raised floor space. This represents space that is ready to accept computing equipment. It is provisioned with access to proper power and cooling. A more detailed analysis of the space is provided in Section 6.0 of the study.
- The three largest facilities—DCF, DMS and the NWRDC—contain 44% of the raised floor space.
- The same three facilities contain the majority, 53%, of unoccupied raised floor space.
- Thirteen of the top 20 largest facilities are less than 60% occupied.
- There are two agencies with floor space capacity issues: Department of Highway Safety and Motor Vehicles (DHSMV) and the Florida Department of Law Enforcement (FDLE).

2.4.5 Power Analysis

The evolution of data center technologies may have helped the floor space situation, but the higher-density computing environments, rack-mounted X86 and Unix servers and smaller, denser RAID arrays have not been as easy on Florida's power capacity. In aggregate, Florida appears to have adequate power capacity; however, this capacity is distributed across a number of centers and, other than the Northwood data center, no single data center facility has substantial unused power capacity.

2.4.6 Power Characteristics

Florida is in a position where power capacity rather than floor space is the limiting factor influencing the potential for data center consolidations at any given facility. If we utilize Uninterruptible Power Supply (UPS) capacity as a proxy for power consumption and usage, then currently:

- Florida's data centers consume 2.6 megawatts
- Florida's data centers have available capacity of 5.4 megawatts
- The potential unused capacity is spread across the existing data centers:

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- ❑ Nine of the largest data center facilities are at or greater than 70% of capacity
- ❑ Eleven of the data centers are at or greater than 50% of capacity
- ❑ More than one-third of the unused capacity is located at the Northwood data center
- ❑ The majority of the unused capacity is spread across multiple data centers

2.4.7 Future-State Data Centers Selection Criteria

Gartner's analysis focused on 12 critical data center systems that directly impact the reliability of the facility:

1. Power Distribution to the Building
2. Power Distribution Within the Building
3. Backup Generators
4. Heating, Ventilation and Air Conditioning (HVAC) Systems
5. Raised Floor Height
6. UPS
7. Power Distribution Units (PDUs)
8. Computer Racks
9. Fire Protection Systems
10. Water and Fire Detection Systems
11. Security and Surveillance
12. Monitoring and Notification Processes

In addition to those factors, Gartner also considered four main factors:

- Risk and Location

  Risk factors inherent in the facility or location (e.g., proximity to potential disaster, design flaws, suitability of structure and infrastructure).

- Quality and Reliability

  Quality and age of data center infrastructure (power, cooling, network and other critical systems). Age and expected life of infrastructure can also be a factor.

  Level of redundancy and fault built into the facility and its supporting systems.

- Current Capacity

  Unutilized capacity (absolute, not percentage) available for growth or consolidation of other departments. Considers raised floor, power and cooling utilization.

- Expansion Potential

  Potential (absolute, not percentage) to cost-effectively and efficiently expand capacity power/cooling, as well as raised floor).

In addition, the following key factors were also considered in our analysis:

- Security and Safety of Facility
- Cooling Capacity

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- Power Capacity and Density
- Current Layout and Available Capacity
- Age and Condition of Facility and Key Systems
- Facility Expansion Potential

Gartner also utilized the guidelines from the "Uptime Institute" to categorize the data centers according to their probable "tier rating." Summaries of those ratings are included in the table below.

Table 3. Tier Rating Summary

Description	Redundancy	Downtime	Cost	Florida DCs
Tier 4 Fault-Tolerant	"N+2" for all components	0.8 hours PY 1 unplanned event per 5 years (HE)	$17–19M	None in this category
Tier 3 Concurrently Maintainable	"N+1" capacity and distribution paths	1.6 hours PY 1 unplanned per 2.5 years	$15–17M	SRC is close
Tier 2 Redundant Capacity	"N+1" capacity Single distribution path	20 hours PY 0.5 planned and 1 unplanned	$9.5–11M	DFS Fletcher, DCF Northwood, NWRDC
Tier 1 Basic Site Infrastructure	No redundant components	30 hours PY 2 planned and 1.2 unplanned	$8.5–10M	Most other FL data centers
Tier 0 Less than a Data Center	No generator, Limited UPS, "building" cooling	40+ hours PY Many unplanned outages	N/A	Field offices, server rooms

Based on our assessment of the most significant State data center facilities that we have visited, we grouped facilities into three categories based on their ability to become a target data center for a State-wide consolidation effort.

- Those with a solid infrastructure and either idle capacity or the potential to be significantly upgraded are listed in Figure 1 as Green/Yes. The State should strongly consider these as potential consolidated data centers.
- Those in the Yellow/Maybe category generally exhibit a good infrastructure. However, most of these sites exhibit certain risk factors or considerations such as poor site location, aging facilities infrastructure or unique operational or policy requirements. These sites can be potential sites for data center consolidation, if necessary, once the State has conducted a review and addressed the site's risk factors or other business or policy issues that impact their potential as a data center consolidation site.
- Those in the Red/No category do not have the capacity or infrastructure to become a consolidation target. The State should not consider these data centers as potential consolidated data centers unless it is prepared to accept significant additional outage risks and/or make significant investments in upgrading these facilities.

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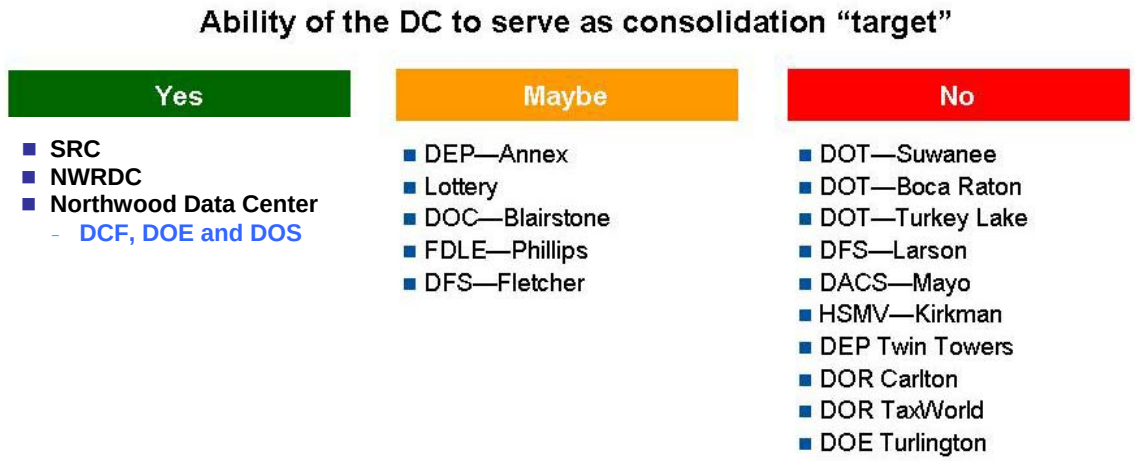
Figure 1. Consolidation "Targets"



2.4.8 Target Data Centers—Gartner Recommendation

To complete the financial analysis for *Scenario 2: Leverage Existing Facilities,* Gartner was required to select a minimum set of existing data centers which either had the capacity (power, space and cooling) to support the entire in-scope "to be" consolidated workload or which we believed could be cost-effectively upgraded or expanded to be able to do so.

Based on the required workload and the facilities analysis, Gartner believes that the entire workload can be accommodated by the SRC, the NWRDC and the Northwood Center. To provide a level of contingency, we added the DEP Annex data center to this list of consolidated centers included in the Scenario 2 financial analysis. We included the DEP Annex largely because of its potential to be expanded to be a 15,000–20,000 sq. ft. facility if the existing warehouse located on the second floor of the Annex building were to be displaced to another location.

2.5 Future-State Consolidation Scenarios

This section describes key attributes of the three scenarios which Gartner included in the financial modeling analysis undertaken by the Gartner team. The three scenarios are:

- **Scenario 1: Status Quo**

  The status quo scenario represents the "no change" option and is also presented as a baseline for comparison of savings or cost avoidance from the current situation. As used in this report, savings are calculated from the baseline 2008–2009 Fiscal Year budget. Cost avoidances are the difference between the status quo modeled cost and any of the other alternatives. It is anticipated that the majority of "savings" from either consolidation strategy are in fact cost avoidance.

- **Scenario 2: Leverage Existing Facilities**

  In the Leverage Existing Facilities consolidation scenario, the workload will be housed in three existing computer facilities—DCF (Northwood data center), DMS (Shumard Oak) and NWRDC. Under this scenario, the State would end up with three or four consolidated data centers housing all the in-scope workload. Note: According to Gartner's analysis, with upgrades, the three largest surviving data centers can handle all the workload. The current DEP center is assumed to be reserved to provide a level of

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contingency in case the upgrades are not feasible or do not yield all the anticipated extra capacity.

- **Scenario 3. Leverage New Data Center Consolidation**

  This scenario assumes all in-scope workload will be consolidated in two sites. In this scenario, the workload would be housed in an upgraded/expanded SRC facility and a new Tier 2+ data center (to be built).

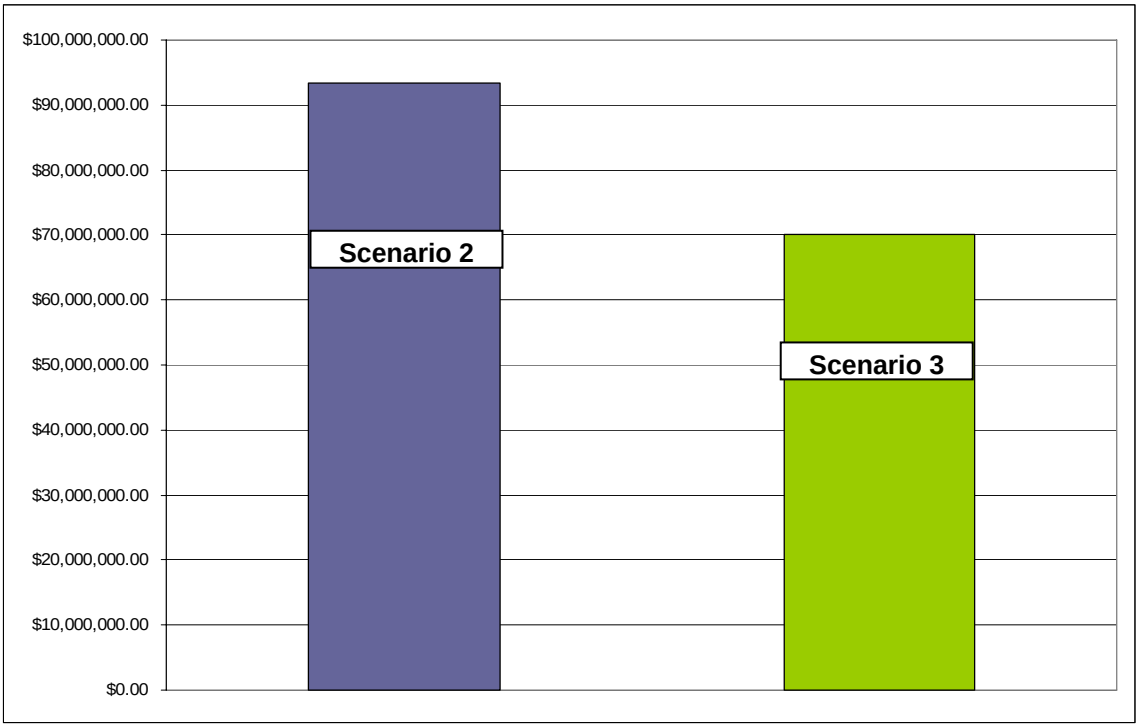
2.5.1 Financial Analysis Summary

Both consolidation scenarios show significant long-term cost avoidance when compared to the Status Quo.

Assuming a discount rate of 6% over the 11-year period modeled by Gartner, the Net Present Value (NPV) of the savings is shown below and in Figure 2:

- Scenario 2: $93.3 million
- Scenario 3: $70.0 million

Figure 2. Net Present Value of the Savings Associated with Consolidations Over 11 Years (6% discount rate)



In Gartner's opinion, the NPV associated with Scenario 2 is understated, because the timing of when the savings could be achieved has been pushed off an additional two years as a result of the Senate's desire to avoid investment spending for the next three (3) budget years. If we calculate the NPV of the savings starting in Fiscal Year 2010–11 rather than Fiscal Year 2008–09, the savings increase by approximately $11M (~11%) to $103.8M. This is simply a result of looking at the savings over the period where consolidation activities are occurring. If you have the same savings across a shorter period, the NPV will be higher.

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2.5.2 Savings Analysis

Figure 3 shows a comparison of the savings potential of the two different consolidation scenarios. We can see from this graph that the long-term savings potentials are similar, but that there are significant differences in the initial outlays required to achieve these savings.

Figure 3. Comparison of Savings Potential of the Consolidation Scenarios

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Scenario 2	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810
Scenario 3	(633,856)	(11,721,548)	(12,355,404)	(11,345,072)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

2.5.3 Spending Analysis

This section focuses on analyzing the financial data produced by the Gartner financial model from a total spending vs. a net savings perspective. By examining the information in this section, the State can compare current costs to projected future costs under any of the three scenarios: Status Quo or either of the two (2) consolidation scenarios.

Figure 4 shows a comparison of the spending levels projected by the Gartner financial model for the three scenarios. We can see from this graph that the Status Quo scenario is not a flat line. In fact, it rises at approximately 3% per year during the 11 years analyzed. This is due to projected growth in IT workload volume provided by the departments, as well as to factors such as salary increases for staff. We can see that, in the long term, spending levels for the two consolidation scenarios is similar, but that in the short term significantly more investment is required to buy Scenario 3. This is largely because it calls for a new data center to be constructed, while Scenario 2 leverages existing facilities. For a more detailed discussion of how any of the scenarios were modeled, please see Section 9.0 of this report.

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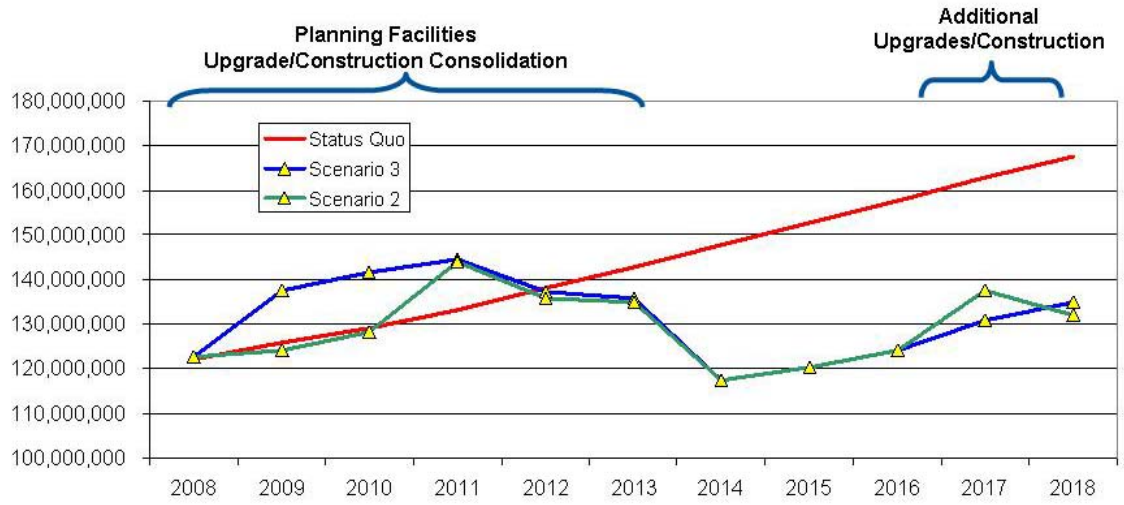
Figure 4. Comparison of Spending by Scenario



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	122,058,189	125,942,041	129,160,612	133,265,379	137,970,329	142,797,849	147,643,293	152,560,821	157,554,543	162,749,792	167,499,090
Scenario 2	122,692,045	124,271,593	128,124,020	144,059,118	135,696,397	134,803,009	117,532,044	120,482,745	124,219,789	137,398,531	131,896,280
Scenario 3	122,692,045	137,663,590	141,516,017	144,610,451	137,179,330	135,805,400	117,532,044	120,482,745	124,219,789	130,898,531	134,771,280

2.5.4 Investment Analysis

This section looks at the financial analysis from the perspective of isolating and understanding the one-time investments required for achieving the savings. The one time investments will be discussed in Section 8, and the detailed expenditures by year are included on the savings figures. In general, the one-time costs include:

- Mainframe transition costs
- Data center build-out costs
- IT equipment relocation and build-out cost
- Data center consolidation PMO costs

Figure 5 shows that there is a significant difference in the amount and timing of one-time cost that will be required to pursue the different scenarios. It is worth noting that these are net one-time costs which have been netted against the estimated $3,255,089 in short-term annual savings which Gartner has identified. A detailed discussion of the investments is found in the Financial Analysis section of the report. Assuming a 6% discount rate, the NPV of the one-time costs for the different scenarios are as follows:

- **Scenario 1: Status Quo—$17.9M**

  This cost consists mainly of costs related to refurbishing existing data centers, as well as a small number of facility-related capacity upgrades, which the Gartner model predicts will be required during the next 11 years.

- **Scenario 2: Leverage Existing Facilities—$33.2M**

  This cost relates primarily to upgrade and expansion of the four surviving data centers identified as primary consolidation sites (i.e., SRC, Northwood data center, NWRDC and

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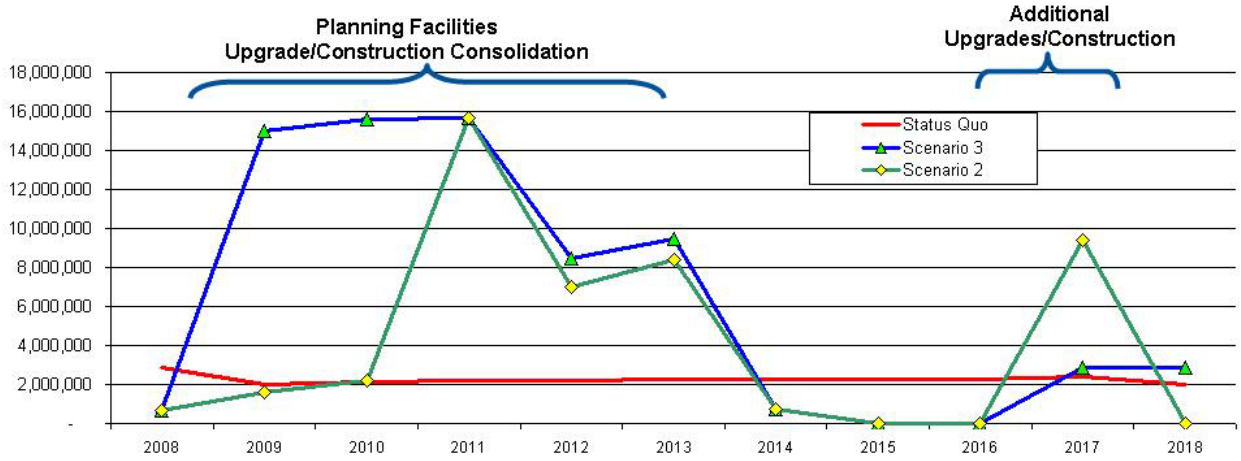
DEP Annex) to provide them with sufficient capacity to house the portion of the in-scope workload that they do not currently contain. This cost also includes the costs required to transition these workloads into the new data centers.

- **Scenario 3: Leverage New Data Center Consolidation—$56.0M**

  This cost consists mainly of costs related to upgrading and expanding SRC and building the new data center. This cost also includes the costs required to transition these workloads into the new data centers.

Figure 5. Investment Analysis for the Three Scenarios



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	2,842,884	2,025,200	2,101,731	2,221,830	2,218,750	2,270,638	2,270,638	2,270,638	2,272,402	2,398,846	2,000,000
Scenario 2	633,856	1,584,640	2,218,496	15,676,555	6,985,634	8,431,691	721,882	-	-	9,375,000	-
Scenario 3	633,856	14,976,637	15,610,493	15,685,312	8,468,567	9,434,083	721,882	-	-	2,875,000	2,875,000

2.6 Financial Model Methodology

Gartner's financial analysis is based on a model that forecasts workload and workload-driven costs out to Year 2018. Three scenarios are modeled:

- Scenario 1: Status Quo
- Scenario 2: Leverage Existing Facilities
- Scenario 3: Leverage New Data Center

Potential cost avoidance is estimated through the differential in costs from the Status Quo and each consolidation scenario.

A 6% discount rate is used in the NPV calculations.

2.7 Recommendation

Gartner recommends that Florida utilize the consolidation scenario identified as *Scenario 2: Leverage Existing Facilities* for moving forward with consolidating data centers. The recommendation is based on the following criteria:

- There are significant savings to warrant data center consolidation. Depending on whether the State begins counting the savings from the time the decision to consolidate

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is made, or if the State begins counting savings when the first investments occur, the savings are estimated to be between $93.3 million and $103.9 million.

- Florida has sufficient raised floor space to perform the consolidation without building a new data center. While significant upgrades will be required to the existing Florida data center facilities, Gartner's model predicts that, after one year of investment and transition, Florida will begin seeing net savings as early as the second transition year.
- Florida is somewhat familiar with the operation of a consolidated data center, since three of the "surviving "data centers are currently hosting multiple agencies.
- Florida knows the "lessons learned" regarding developing effective governance models.
- The initiation of a new IT organizational structure provides opportunity for a successful transformation.
- This approach is well-aligned with the current constraints the State is facing.

At their heart, successful data center consolidation projects are built around a decision to transform the organization—not just move the "machines" and people. The technical aspects of most consolidations are easier to manage than the cultural and operational dynamics of the organization. As we discuss in the detailed report, the underlying assumption for this assessment is that, with some exceptions, all the data center functions will be transferred to a single organization (logical consolidation). This provides the State with the strengthened capability to capture the economies of scale necessary to achieve the projected savings and enhance the effectiveness of the State's IT infrastructure. Creating an entity that will effectively manage and oversee this initiative is the single biggest critical success factor.

Key factors that the State must keep in mind in moving forward with data center consolidation include:

- Addressing and overcoming past consolidation experiences
- Applying the "lessons learned" regarding ineffective or nonexistent governance
- Avoiding cost reduction goals that are overly aggressive or unrealistic
- Ensuring the engagement, participation and ownership leadership across the State's departments and agencies
- Allocating sufficient investment funding:
- Establishing strong and confident project management oversight
- Developing the internal capacity and skills necessary for success
- Building a governance and management structure that builds a high level of trust in the data center host agency
- Making tough decisions regarding staffing levels
- Ensuring the ownership and buy-in by State departments and agencies

2.7.1 Vision and Benefits

Gartner's future vision for Florida under the recommended scenario is that, through an effective centralized approach to data center operations, the State can achieve improvements in IT product and service cost of operations that result in future savings that will offset the cost associated with consolidation and chargeback administration. In addition, moving to a

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consolidated model for data center operations will strengthen the State's IT infrastructure through a common management approach that provides:

- Leadership and direction for the application of hardware and software standards
- IT operations best practices; and a higher level of rigor, discipline and accountability in IT planning, investments, procurement and operations.

The analysis of the alternatives for data center consolidation has been guided by the current constraints that exist in Florida, as well as current strengths and opportunities. It is clear that a major constraint in pursuing data center consolidation and the full realization of savings sooner is the significant revenue shortfall that the State is facing—and is estimated to be facing for three years. The State is not in a position to invest significant dollars upfront to move to a full data center consolidation model for at least three years. An option for the State could be to move to an outsourcing approach to data center operations, which would have a third-party vendor take the responsibility for the capital investments essential for creating a full data center consolidation model that would be funded through a lease arrangement with the State—avoiding the need for major upfront investment of State funds. The State is not confident that it is in the best interest of the State to outsource these critical IT operations.

In the areas of strengths and opportunities, the assessment did find that the State has resident strengths and capacity in some data centers that provide immediate opportunities to begin the process of data center consolidation. In addition, through the strengthening of the State's AEIT, an entity exists that can assume responsibility for working with State departments and agencies in creating the infrastructure, staffing, standards, governance and operations necessary to begin to make real the vision for data center consolidation in the State of Florida.

In considering the future state of Florida's data centers through consolidation, the following benefits can be expected:

- Savings of approximately $93.3 million through 2018 are expected from Scenario 2
- Streamlining of both IT and business processes
- Ensuring a higher standard of IT services
- Improving the supportability, agility, flexibility, responsiveness, strategic focus and sustainability of the State's IT infrastructure
- Establishing a solid IT infrastructure for enterprise initiatives such as ERP and Customer Relationship Management (CRM) solutions
- Strengthening the State's IT planning, budget and appropriations processes
- Improving the quality of government operations and services
- Maximizing the State's return on IT investments
- Improving State departments and agencies' ability to focus on their core business—which is not IT

As the State moves forward with the data center consolidation model, it will be important to see this initiative as a component of potential future steps, through IT consolidation, that can be taken strengthen the State's IT infrastructure and achieve further cost efficiencies. Many states have moved toward a federated model for IT consolidation as illustrated in Figure 6.

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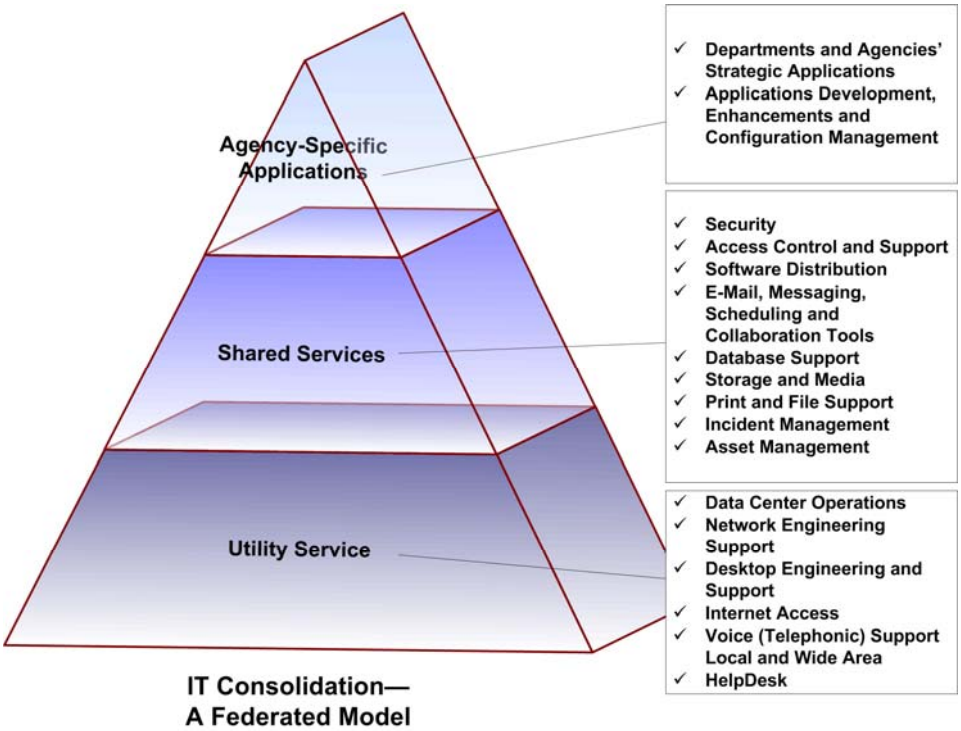
Figure 6. IT Consolidation—A Federated Model



In the federated model of IT consolidation, the State's departments and agencies continue to maintain responsibility for their strategic IT applications—those applications that are mission-critical and unique in supporting the State department or agency in fulfilling its mission and mandates. Although, in the graphic, the agency-specific applications appear to be the smallest piece of the triangle—in actuality they often represent the most significant and intense component of the IT infrastructure for each agency in the performance of its mission. The graphic is meant to illustrate that the foundational pieces of the IT infrastructure—shared services and utility service—are focused on meeting the needs of the client agencies and their strategic operations. As can be seen in the graphic, the consolidation of data centers is only one component of an IT consolidation model.

Lessons can be drawn for Florida from these consolidated models by looking at their critical core elements, including:

- Establishment of a State-wide set of standards, practices and processes for setting IT priorities and making budget appropriations
- Strong and representative governance structure, including executive leadership of the State's departments, as an executive steering body and a CIO council of departmental IT managers to provide technical guidance
- Rigorous IT project planning, management, procurement and oversight for all major IT initiatives through a disciplined process employing industry standards for developing business cases; feasibility studies; alternative analysis; cost-benefit analysis; and detailed procurement and project management plans
- Developing effective SLAs that ensure:
  - IT services that agencies need are provided
  - A diversity of service levels to meet the different levels of State agencies' needs

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- Chargeback system and related costs are linked to agreed-upon SLAs for each agency

2.7.2 Critical Success Factors and Next Steps for Florida

As the State of Florida begins the process of moving forward with the initial steps for data center consolidation as articulated in *Scenario 2: Leverage Existing Facilities,* several critical success factors need to be considered for the identification, planning and implementation of the actions necessary to enact Scenario 2. These are described below.

- **Meets the Unique Needs of Florida—**Although other states have implemented or are in the process of implementing a data center consolidation model, Florida cannot take whole cloth their approaches and apply them to Florida. The State of Florida can benefit from the lessons learned from these national efforts, but Florida will need to tailor its approach to the unique context, strengths and challenges inherent in its operations and governance structure.
- **Planning and Ownership—**Most of the State's departments and agencies have a level of comfort and satisfaction with the services they are receiving from their data centers under the current structure. Any proposed change will be a cause of concern. No State department or agency wants to see degradation in the level of services or responsiveness it is currently receiving from its data center, or face possible sanctions if its data center operations or standards fail to meet legal or regulatory requirements under which it operates. It will be critically important that the State employ a participatory process, such as was modeled through the Stakeholder Advisory Committee for this project, to support planning and implementation of the data consolidation initiative. This process needs to promote the awareness, understanding, ownership and participation of the key department and agency stakeholders regarding the benefits to be achieved through data center consolidation for their organization and, importantly, for the State as a whole. These efforts need to focus on:
  - **Awareness—**Transparency of the initiative including the key drivers, scope of each phase of the initiative, what is negotiable and non-negotiable, and the expectations for the State's departments in participating in the success of the initiative.
  - **Understanding—**Providing timely and accurate information to support success through open communications and regularly scheduled stakeholder meetings during the life cycle of the initiative.
  - **Ownership—**Clear identification of roles and responsibilities for the participants and the benefits to be achieved for the State and each participating department.
  - **Participatory Actions for Success—**Opportunities for meaningful participation in setting standards, identifying potential challenges to success, establishing a detailed road map and timelines for implementation, and in supporting the development of the organizational and governance structure essential for the success of the initiative.
- **Organizational Leadership—**Three levels of leadership will be required. *First,* there will need to be strong leadership from the Governor, Cabinet and the Legislature in establishing the directives, legislation and policies essential to support the implementation and sustainability of the data center consolidation effort. *Second,* the executive leadership of the State's departments and agencies need to be actively involved in the initiative and provide leadership for their organization's role in ensuring success through policy development, compliance and accountability oversight. *The third* critical leadership level must be created through the identification a lead entity to assume

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the responsibility for overseeing and managing the data center migration plan and sustaining the operations of the State's consolidated data center system. Through the strengthening of the State's AEIT, an entity exists that can assume responsibility for managing the data center consolidation plan and working with State departments and agencies in creating the infrastructure, staffing, standards, governance and operations necessary to begin to make real the vision for data center consolidation in the State of Florida.

- **Realistic Action Plan—**As with any complex initiative, it is critical that time be invested in developing a detailed action plan. This will be true also for the data center consolidation initiative. Based on the direction of the State's leadership, the budgetary constraints facing Florida and the input from key stakeholders, the State needs to develop a realistic and detailed migration plan—including clear guidelines for future budget requests and procurements during the migration process. The detailed work plan needs to identify the project timelines; key tasks; responsible entities/people; critical interdependencies; milestones; and deliverables/results to be achieved. The plan needs to be actively managed, reviewed and updated.
- **Effective Governance Structure—**Although not a primary focus of this engagement, from Gartner Research and lessons-learned from the experience of other states that have undertaken the consolidation of IT operations, it is important to include in this report the critical importance of establishing a strong governance structure during any IT consolidation initiative. A strong governance structure, it has been found, ensures that the client agencies impacted by IT consolidation continue to receive the level of service they need to fulfill their mission and to meet their legal and regulatory mandates. The governance structure needs to have a clear charter that codifies the purpose, goals and objectives of the consolidated data center model, the governance role of the participants, and the process used for decision making and conflict resolution. The governance structure needs to have two critical components. One represents the executive leadership of the State's departments and agencies served through the consolidated data center model to assist in establishing policies, standards and accountability mechanisms. A second component of an effective governance structure for the data center consolidation model will be the establishment of an IT advisory group (similar to the current CIO Council) that will provide IT advice and counsel to the entity responsible for the planning and policy development related to the State's consolidated data center initiative.
- **SLAs Aligned with Business Objectives and Needs—**Service levels identify the performance goals and service outcomes required of specific business processes that, in aggregate, will meet each agency or department's objective. A written Statement of Work (SOW) or Memorandum of Understanding (MOU) is the foundation for creating, monitoring and analyzing service levels and agreements. It sets forth the organization's requirements for the outcomes expected from the relationship.

  The MOU document sets forth requirements such as:

  - **Service Level Objectives (SLOs):** The performance requirements and associated metrics, jointly defined by the provider and the organization
  - **Key Performance Indicators (KPIs):** Quantifiable measurements of success
  - **SLAs:** The agreements of accomplishments to achieve business objectives; set requirements for products/services delivered; and establish contact personnel and specific metrics of effectiveness for measurement, management and control

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- **Operating Level Agreements (OLAs):** Define the interdependent relationships between internal and external suppliers working to supply interrelated services; describes the rules of engagement between suppliers and the responsibilities of each supplier, including where dependencies and interfaces exist
- **Service Level Management:** The continuous management of the provision of products and services to adjust to changing needs and to produce efficient and effective functions, activities and processes

SLAs are usually most successful when all parties have the same vision of the project and when the relationship supports the MOU to make the service levels effective. Also, the SLA should be structured so that customers using the service levels will be satisfied. Agencies can most effectively manage service levels through four processes:

- **Measure:** Gather data and compare them to see whether service-level objectives match results. Report the results to the proper personnel at the appropriate time. Seek follow-up for feedback and proposed adjustments.
- **Examine:** Identify and understand the causes of problems. Confirm the problem and its cause, and then develop solutions. Requirements to achieve goals should be economically feasible. Seek follow-up for feedback and further adjustment.
- **Correct:** Generate and validate the solution, and implement improvements.
- **Guide:** Monitor the effectiveness of the solution, document procedures and provide feedback for further adjustment.

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Project Overview

3.0 Project Overview

3.1 Background

The State of Florida information technology (IT) infrastructure is large and complex, and ranks third in the nation with its allocation of more than $2 billion annually to IT. Additionally, Florida has more than 4,700 Full Time Equivalent (FTE) staff, both State employees and contractors, allocated to support the IT infrastructure of the State. The size, complexity and financial investment being made by the State in its IT infrastructure and operations, and the critical role IT plays in supporting the State in fulfilling its mission, require periodic review to ensure the continual efficiency, effectiveness and improvement of the State's IT operations.

Florida is a fast-growing state, and Florida State Government is facing numerous and increasing demands in responding to the needs of its residents while fulfilling both State and federal mandates. It is essential that the State implement the actions necessary to ensure that the IT infrastructure is both efficient in providing the greatest return on investment and delivering effective service levels to the State's departments and agencies. This requires rigor and discipline in making decisions for both current and future IT spending, as well as providing leadership to strengthen the structure, governance, standards and accountability of the State's IT investments and operations.

As a critical component for improving the investment and effectiveness of the State's IT infrastructure, the Florida State Senate engaged Gartner, Inc. to conduct a study of the current data center operations of State departments and agencies.

3.1.1 Current Situation

Adding urgency for the assessment of existing data center operations and the need to improve the cost-efficiency and effectiveness of the State's data center operations is the current significant revenue shortfall the State is facing. Actions will be taken by the Florida Senate, the Florida House of Representatives and the Florida Governor's Office to find areas for cost reductions. The Senate wants to consider the findings and recommendations from the data center consolidation study to support decisions and actions that will be cost-effective in strengthening the operations of the data centers in meeting the needs of State departments and agencies.

3.1.2 Background for the Data Center Cost Analysis and Consolidation Feasibility Study

- Forty-three data center facilities serve the State—many are small and do not benefit from economies of scale. Others are not fully utilized.
  - Some of these data centers may require expensive power/facility upgrades during the next few years to house the increasingly power-hungry servers and storage devices that are required to support business users
  - Many data centers do not meet standards for redundancy, reliability and disaster recovery, and are not staffed 24/7, although that level of service may be expected by business customers
  - There is significant duplication of effort among data centers

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- The current revenue shortfall has furthered the need for the State to find opportunities for achieving cost savings and for enhancing effectiveness of IT operations.
  - Through data center consolidation, the State believes that it can establish a strong infrastructure to realize IT cost savings and can leverage a more effective approach to meeting customer agencies' data center and IT needs

3.2 Project Goals, Objective and Scope

3.2.1 Project Goals

The assessment and feasibility study of the State's data centers was guided by four main goals:

- Develop a current-state baseline assessment of the State's data center operations
- Conduct a feasibility study to identify the viability of data center consolidation that could achieve cost savings and strengthen the State's data center operations
- Conduct an alternative analysis of potential approaches for data center consolidation
- Identify the most viable approach to data center consolidation that is aligned with the State's current budgetary constraints

3.2.2 Project Objective

The overall objective for the assessment and feasibility study focused on the analysis necessary to answer the following strategic questions for the Florida Senate regarding the State's data center operations:

1. How many data centers are required to meet the State's needs?
2. What options exist for:
   a. Reducing unnecessary costs in the current status quo data center environment?
   b. Consolidating State data centers to reduce unnecessary cost, improve long-term efficiency and strengthen the State's IT infrastructure?
3. When, where and at what level can expected savings be realized?

3.2.3 Project Approach

To achieve the project goals and answer the critical questions necessary to support data-driven decisions, Gartner employed the following approach:

- Developed a baseline assessment of the State's largest data centers, which included:
  - Analysis of the quality, capacity and utilization of facilities
  - Modeled workloads and staffing levels for each data center
  - Anticipated workload growth rates
  - Identified potential barriers to consolidation
- Developed two alternative models for data center consolidation to be compared to the current unconsolidated status quo approach, which included:
  - Estimated the potential cost, financial savings and benefits that the State can expect to achieve from each consolidation scenario

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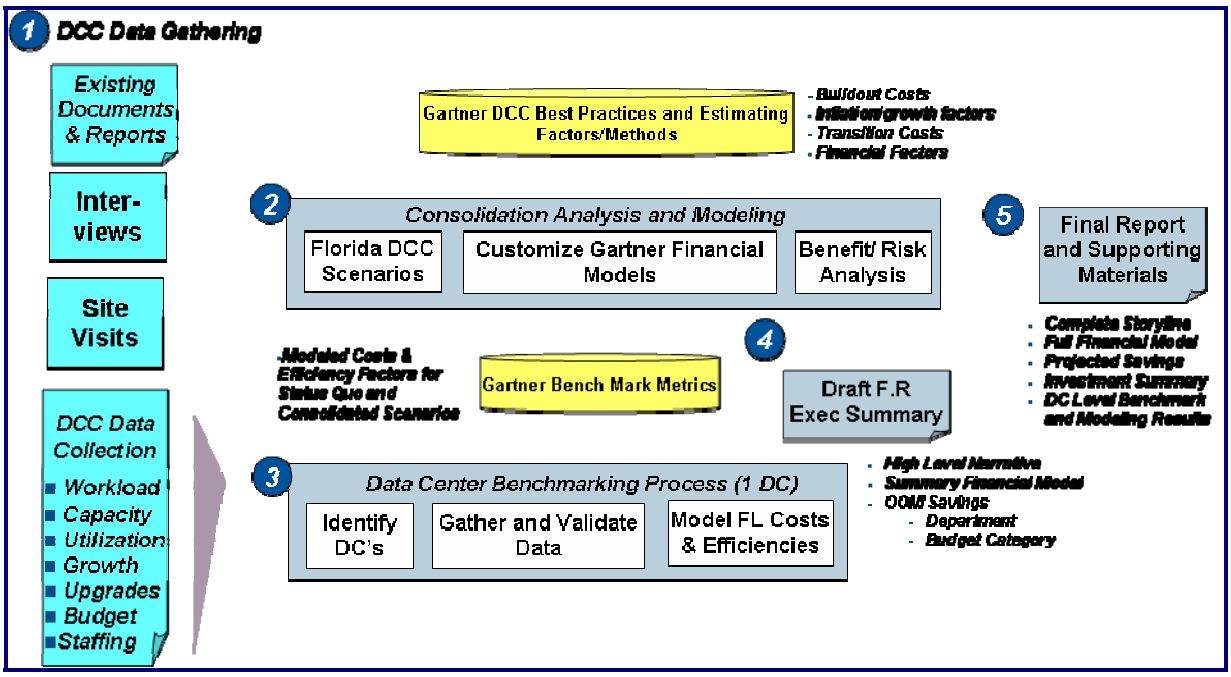
- Identified qualitative benefits (lower risk, strengthened IT infrastructure and improvements in data center services across the State enterprise) and risks associated with executing a consolidation vs. the current status quo data center strategy
- Identified challenges that the State will need to address to achieve the identified benefits of data center consolidation if the State chooses to move forward, including:
  - Developing a detailed road map for implementation of the recommendation
  - Establishing the organizational structure, staffing, standards, accountability and operations essential to manage and support the new approach to data center operations
  - Creating a governance structure and SLAs to ensure the business needs of State departments and agencies are met, consistent with and better than the current support provided by the status quo approach
  - Providing mechanisms for change management that ensure that key stakeholders are aware, understand and have appropriate opportunities to participate in and support the successful implementation of the selected data center consolidation alternative

3.3 Methodology

Gartner's methodology for conducting the assessment and feasibility study is illustrated in Figure 7 and is explained in more detail below.

Figure 7. Gartner's Methodology



The Gartner team performed five major activities: 1) Data Center Consolidation (DCC) Data Gathering; 2) Data Center Benchmarking; 3) Consolidation Analysis and Modeling; 4) Interim Report; and 5) Final Report Preparation.

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1. **DCC Data Gathering.** This part of the project provided the Gartner team the data it required to define the status quo or "as is" data center operations of the State and the potential consolidation scenarios for modeling both consolidated and unconsolidated costs in order to project savings. Data gathering focused on two areas:

    a. Managing the collection of specific data elements required by the Gartner financial model for each of the in-scope data centers. Gartner performed this via a "fill in the blank" survey instrument that State data center managers at each location were required to complete. The Gartner team also validated the information provided by comparing it to our benchmark databases for reasonableness (such as cost per server or FTEs per server) and by comparing it with information previously provided to the Legislature. Where anomalies were identified, we worked with the Florida Senate to obtain updated information from the various State data center owners. These data were collected and validated for in-scope data centers. In addition, Gartner distributed the survey to all other agency data centers and collected any provided results for later use by the State of Florida.

    b. Gartner conducted on-site surveys of the in-scope data centers. During these tours, our data center specialists assessed the quality, capacity and upgrade potential of each surveyed data center. The data centers were graded 0–4 in a number of different categories, with rankings roughly based on the data center tier classifications created by the Uptime Institute, a generally accepted industry standard.

2. **Consolidation Analysis and Modeling.** The team used the results of the Data Center Survey, Site Visits and input from the Senate, along with Gartner Research and best practices, to develop two viable consolidation scenarios. The team customized the Gartner DCC financial model to reflect these scenarios, as well as a "status quo" unconsolidated scenario. The costs associated with the "status quo" scenario were based on the costs reported as described in the previous step. These costs were adjusted for future years to reflect anticipated workload growth, inflation and similar factors. The costs associated with the consolidated scenario were modeled using this same data, but after modeling we applied the consolidation scenario parameters and the information contained in the Gartner benchmark databases. The team also defined non-quantitative benefits and risks associated with each scenario and created an easy-to-understand quantitative and qualitative comparison between the scenarios. The consolidation scenarios analysis is heavily based on modeling of data center cost and staffing from the Gartner benchmarking database. Every effort was made to validate and normalize the model to actual conditions in the State of Florida; however, within the budget and time parameters of the project, we were not able to perform detailed verification and validations, so differences between the model results and the actual situation may be expected. Gartner's goal for each model was to be accurate to within plus or minus 20%. Gartner does not believe that any differences are material to decisions regarding opportunities for individual data center cost savings or data center consolidation.

3. **Data Center Benchmark.** The team used Gartner's benchmark process to understand the actual costs, staffing and productivity in place across 43 data center facilities operated by 15 agencies. Our data collection specialists validated this information with the State's departmental data center personnel. These metrics were used as key inputs in the modeling process for the in-scope data centers.

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a. The Data Center Benchmark was based on Gartner's consensus cost models. Each observation within the database adheres to the same model. This allowed our team to perform comparisons on an "apples-to-apples" basis and also allowed us to model scenarios in a DCC assessment with a higher degree of confidence.

b. Gartner benchmarked and modeled the in-scope data centers. The accuracy of the models is directly dependent on the accuracy of the data supplied by the participating State agencies.

c. Our benchmarking process looked at data across technology towers. It is important to understand that these towers are different from the service towers tracked by the State of Florida. For example, we did not capture separate costs for "file and print" or for "e-mail." The towers that were benchmarked for the feasibility study were:

   i. Unix servers

   ii. Windows servers (X86)

   iii. Mainframe

d. For each technology tower supported by the data center, the benchmarking activity captured the following elements:

   i. Hardware cost

   ii. Software cost

   iii. Personnel FTE cost

   iv. Occupancy floor space and cost

   v. Workload: MIPS, physical servers

   vi. Elements that are out of scope for the benchmark but that need to be considered for consolidation include:

      - Physical plant configuration
      - Network connectivity

   vii. Each of these data elements is derived from the annual operating and capital expenses and the average annual workload managed by each individual data center

4. **Interim Report.** The team prepared an Interim Report that described for the Senate and the project's Stakeholder Advisory Committee the following:

   a. Status of the Data Center Consolidation Study Project on 25 February 2008

   b. Preliminary data summarizing the data collected through agency surveys for agency validation through the Stakeholder Advisory Committee

   c. Critical Success Factors (CSFs) for data center consolidation within the context of the State of Florida and the constraints faced by the State

5. **Final Report.** This Final Report deliverable refines the information provided in the Interim Report and develops detailed status quo and two alternative models to achieve the goals and objective of this study.

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3.4 Project Schedule

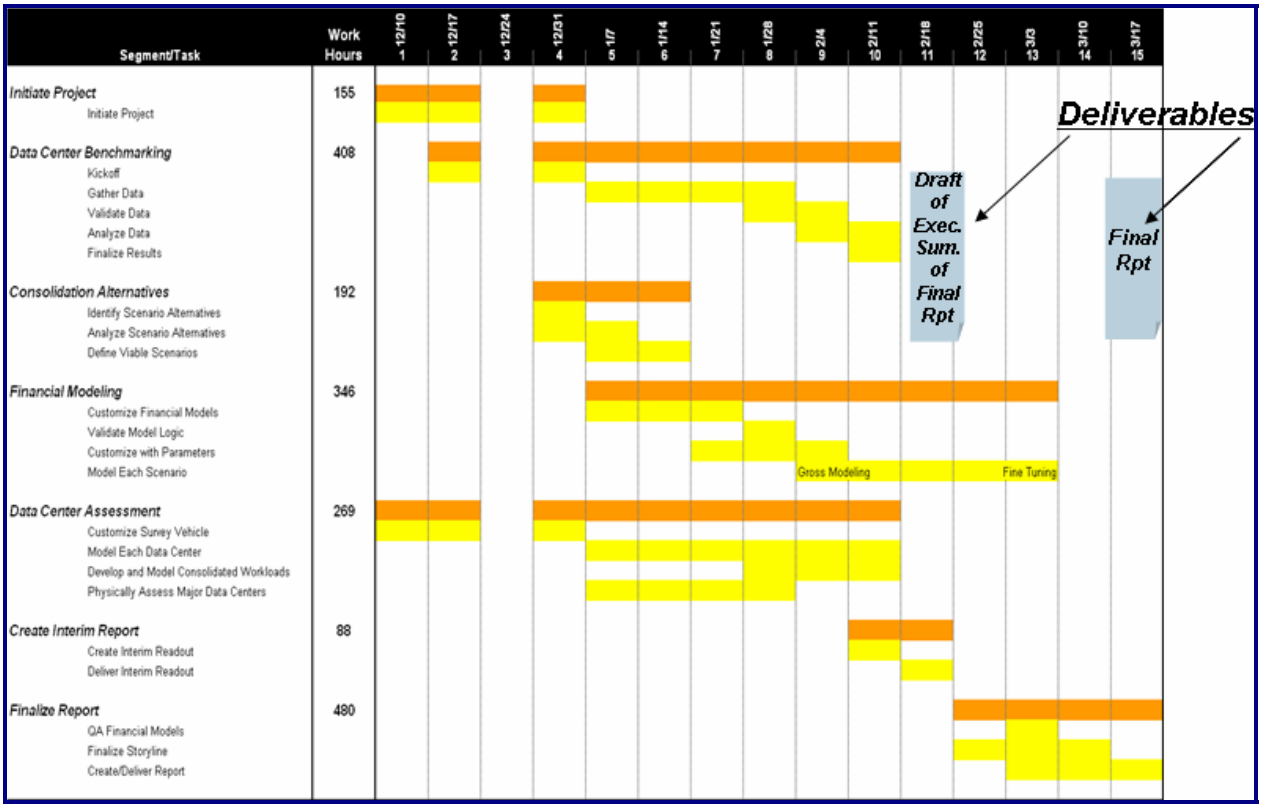
The project schedule was very aggressive, and the need for accuracy and completeness was always balanced against the need to develop the results in a very timely manner.

The major milestone dates for the project were:

Table 4. Project Milestones

Major Milestones	
Project Initiation	3 January 2008
Data Collection Training	15 through 22 January 2008
Data Collection Ends	1 February 2008
Data Center Visitation Completed	8 February 2008
Stakeholders' Meeting No. 1	5 February 2008
Data Returned to Agencies for Validation	21 February 2008
Stakeholders' Meeting No. 2	25 February 2008
Data Returned to Gartner	3 March 2008
Draft Final Report	24 March 2008
Stakeholders' Meeting No. 3	25 March 2008

Figure 8. Project Schedule



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Benchmark Analysis

4.0 Benchmark Analysis

4.1 Benchmarking Comparisons

Gartner's benchmarking activities involved a comparison of Florida's data vs. "peer" groups of multiple observations from Gartner's benchmarking database. Peers are a collection of recent benchmarking observations with similar workload characteristics. Peers typically represent many observations and are selected from a variety of industries and geographies. The geographies used in this assessment are primarily North America, with some Western European observations.

Peer groups are independent views. Observations selected for the X86-Windows technology are not the same as observations for the Unix or Mainframe technologies.

For this assessment, peers were selected for the X86-Windows, Unix and Mainframe technologies. There were no observations for "other" or Unisys technologies. The iSeries technology's cost was too small to warrant this type of analysis.

For purposes of this analysis, we developed two sets of peers: Agency Cost Peers and Consolidated Peers. The Agency Cost Comparison Peers were constructed by selecting three peers for each technology. For X86-Windows and the Mainframe technologies, the peer was selected based on the workload size. Gartner drew comparisons from one of three peers: small, medium and large. It is important to note that, in this context, small, medium and large are relative terms specific to the State of Florida workloads—not Gartner's benchmarking database. The appropriate peer was selected using the workload: physical servers or MIPS. For Unix, the peers were developed based on the number of processors per physical device. The peers were then combined to match the workload of the agency in the same proportion as the agencies' workload of small, medium and large Unix physical servers.

The Consolidated Peers were selected by building peers from the Gartner benchmarking database with the same economies of scale as the aggregated or total workload for all in-scope agencies.

The tables that follow list the key attributes of the peer groups employed in this assessment by computing towers—X86-Windows, Unix and Mainframes.

Table 5. Agency Windows Peer Profiles

X86-Windows Peer Profile			
	Small	**Medium**	**Large**
Workload Range—Physical Servers	1–200	201–700	701–5,000
Peer Average Workload—Physical Servers	110	401	1,536
Peer Productivity—Physical Servers per FTE	12.2	20.4	23.5
Cost per FTE (Adjusted for SLG*)	$73,293	$73,293	$73,293
Total Peer Members	**29**	**26**	**30**

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X86-Windows Peer Profile			
Peer Industry Classification	**Number of Peers**	**Number of Peers**	**Number of Peers**
Communications	0	1	2
Consumer Goods	1	2	3
Financial Services	6	4	5
Insurance	3	3	3
Manufacturing	2	2	3
Oil and Gas	0	1	3
Public Administration	6	5	2
Publishing	1	1	1
Retail Trade	2	2	1
Transportation	2	1	1
Utility	6	4	6
Total	**29**	**26**	**30**

* The Peer Cost per FTE was adjusted to the average Cost per FTE for State and Local Governments in the Gartner database.

Table 6. Agency Unix Peer Profiles

Unix Peer Profile			
	Small	**Medium**	**Large**
Workload Range—Processors per Physical Server	1–2	3–4	5+
Peer Average Workload—Processors per Physical Server	1.7	2.9	6.3
Peer Productivity—Physical Servers per FTE	7.3	6.6	4.8
Cost per FTE (Adjusted for SLG*)	$73,307	$73,307	$73,307
Total Peer Members	28	28	26
Peer Industry Classification	**Number of Peers**	**Number of Peers**	**Number of Peers**
Communications	0	2	2
Consumer Goods	2	1	2
Financial Services	4	5	6
Insurance	3	3	4
Manufacturing	4	2	1
Oil and Gas	0	3	3
Public Administration	6	4	2
Publishing	0	1	1
Retail Trade	3	1	1
Transportation	2	1	0
Utility	4	5	4

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Unix Peer Profile			
Total	**28**	**28**	**26**

* The Peer Cost per FTE was adjusted to the average Cost per FTE for State and Local Governments in the Gartner database.

Table 7. Agency Mainframe Peer Profiles

Mainframe Peer Profile			
	Small	**Medium**	**Large**
Workload Range—MIPS	100–600	601–2,000	2,001–7,500
Peer Average Workload—MIPS	286	1,049	3,873
Peer Productivity—MIPS per FTE	21.6	38.9	58.1
Cost per FTE (Adjusted for SLG*)	$70,360	$70,360	$70,360
Total Peer Members	24	31	30
Peer Industry Classification	**Number of Peers**	**Number of Peers**	**Number of Peers**
Communications	0	1	2
Consumer Goods	2	1	4
Financial Services	4	6	4
Insurance	2	3	3
Manufacturing	1	3	3
Oil and Gas	0	1	4
Public Administration	3	5	4
Publishing	2	1	1
Retail Trade	4	2	1
Transportation	2	2	1
Utility	4	6	3
Total	**24**	**31**	**30**

* The Peer Cost per FTE was adjusted to the average Cost per FTE for State and Local Governments in the Gartner database.

The benchmarking results are comparisons for: total cost; cost by technology (X86-Windows, Unix and Mainframe) staffing; and productivity. Productivity, shown below, is the product of workload divided by the FTE count. The specific metrics analyzed were: Servers per FTE, for X86-Windows and Unix; and MIPS per FTE for Mainframe.

Table 8. Peer Average Productivity

Technology	Peer Average Productivity
X86-Windows	20 servers per FTE
Unix	7 servers per FTE
Mainframe	39 MIPS per FTE

To ensure that Gartner performs objective comparisons, the Florida data and the peer's data are based on the same cost model and workload models. The cost categories, personnel

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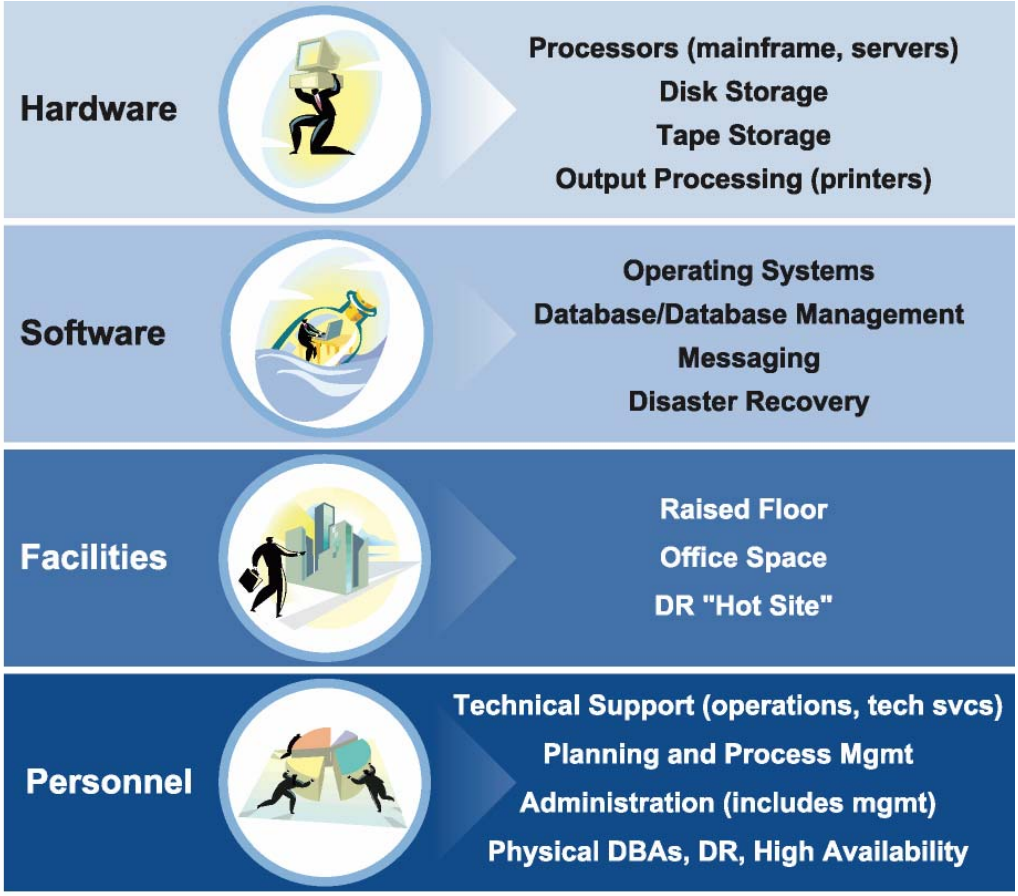
definitions and workload measures collected in the cost survey conform to the Gartner Consensus Cost model for Enterprise Computing (Data Centers). Figure 9, which follows, depicts the Gartner Consensus Cost model.

Figure 9. Computing Gartner Consensus Model for Enterprise Computing Enterprise



In addition to restricting the cost to the same elements for every observation, Gartner employed some specific normalization techniques for this analysis to ensure a better peer comparison. Specifically:

> For all comparisons, the cost per peer data center FTE was normalized to the average State and Local Government FTE cost in the Gartner database—approximately $72,154. The individual peer group cost is shown in the preceding peer group tables.

For the SRC, Gartner combined the workload that is hosted and supported by DMS with the agency workloads that are co-located at the SRC. The intent was to compare and analyze the composite workload supported by the SRC. This approach presents a combined workload and costs of the client agencies and DMS. In this report when we use the term SRC we are referring to the DMS-SRC

4.2 Current-State Analysis

The Current-State Analysis represents an individual agency's comparison to the appropriate Gartner workload peers. The "delta" represents the difference between the Gartner peer cost

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and the agency's cost. A positive number indicates that the agency's cost is higher than the peer group cost and that there is potentially an opportunity for cost savings. Similarly, a negative number indicates that the agency's current cost is lower than the peer groups and that an opportunity for cost savings is not readily apparent. Any significant deltas should be further analyzed by the individual agencies to gain an understanding of potential cost savings.

A result that indicates that an agency is lower-cost than the Gartner peer does not indicate that cost savings opportunities are impossible. The peer cost is an "average" cost, and financial performance better than average may still deliver cost savings. Also, this study did not perform a detailed examination the "effectiveness'' of any particular data center. It is sometime the case that data centers with costs significantly below the peer groups are data centers with low effectiveness or data centers where the services delivered typically do not meet their clients' business requirement. Florida may wish to further investigate those agencies that reported costs significantly lower than peer averages to better understand the underlying reasons for this. For Florida, the short-term savings opportunities that were identified are listed in the following table.

Table 9. Short-Term Savings Opportunities

Agency	Short-Term Savings	Short-Term Savings PCT
DACS	$—	0%
DCF	$359,231	11%
DEP	$301,573	9%
DFS	$1,181,478	36%
DMS	$117,713	4%
DOC	$—	0%
DOR	$287,560	9%
DOS	$127,758	4%
DOT	$67,889	2%
DBPR	$—	0%
FDLE	$366,550	11%
HSMV	$114,975	4%
DOE	$108,685	3%
DOH	$221,677	7%
AWI	$—	0%
Total	**$3,255,089**	**100%**

For the purposes of this study, Gartner characterized "short-term savings" as the positive difference between the agency peer group and the agency cost reduced by a factor of 4. This level of discounting was required to establish what Gartner believes to be an achievable level of short-term savings.

So for Florida, with a data center system that has measured annual data center spending at greater than $112 million, Gartner estimates that short-term savings of 3% can be achieved. If the State performs detailed reviews of the data center spending and looks at the long-term spending associated with cost drivers, e.g., software licenses and personnel productivity, Gartner would expect a higher portion of the peer delta could be saved.

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There are several cost characteristics that Gartner has observed during benchmarks of state governments. These observations may help to understand specific agency cost profiles:

1. State governments typically utilize more personnel. The productivity metric will inform you if this is the case.
2. State government personnel typically have lower compensation. Gartner normalized this factor in this assessment so that any difference would be minor.
3. State governments typically have lower hardware cost due to formal purchasing requirements and a higher percentage of older equipment.
4. State governments typically have higher software cost due to a higher number of packages deployed.

4.2.1 Benchmarking Data

Additional detailed Current-State benchmarking data have been supplied in the Appendix of this report.

4.2.2 Current-State Agency Peer Comparisons

The next several tables detail the agencies' current-state cost compared to the appropriate agency workload peer. In aggregate, the sum of the differences is negative, which would imply that overall there are no apparent savings. If you look at this on an agency-by-agency and technology basis, savings opportunities do appear, and the aggregation of the agencies with negative differences in this non-consolidated environment is really not appropriate. That analysis is left for the comparison to the consolidated peer group.

In summary, the total of all the positive differences between the workload peer and the agency cost equals $13,020,355 of savings opportunities. Discounting that by 75% yields the short-term savings opportunity of $3,255,089.

The first table below is the total agency comparison for X86-Windows, Unix and Mainframe. The subsequent tables are the individual technology comparisons by each agency.

Table 10. Agency Total Cost Comparison

Agency Total Cost Comparison to Peer Group (X86-Windows, Unix, IBM Mainframe)			
Agency	**Agency Total Cost**	**Peer Total Cost**	**Delta**
DACS	$1,899,822	$2,507,642	($607,820)
DCF	$22,795,310	$21,500,912	$1,294,399
DEP	$3,195,951	$1,989,658	$1,206,293
DFS	$16,696,401	$13,018,762	$3,677,639
DMS	$19,144,145	$18,762,900	$381,246
DOC	$7,100,575	$9,190,376	($2,089,802)
DOR	$2,140,882	$1,369,947	$770,935
DOS	$2,229,351	$2,014,004	$215,348
DOT	$7,818,761	$9,743,430	($1,924,669)
DBPR	$327,741	$622,778	($295,037)
FDLE	$5,424,937	$7,948,673	($2,523,736)
HSMV	$4,868,694	$5,899,210	($1,030,516)

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Agency Total Cost Comparison to Peer Group (X86-Windows, Unix, IBM Mainframe)			
DOE	$6,873,997	$11,012,661	($4,138,664)
DOH	$4,504,385	$3,961,169	$543,216
AWI	$760,770	$1,019,523	($258,753)
Total	**$105,781,723**		

Table 11. Agency X86-Windows Comparison

Agency X86-Windows Cost Comparison to Peer Group			
Agency	**X86-Windows**	**X86-Windows Peer**	**Delta**
DACS	$672,559	$1,081,667	($409,108)
DCF	$4,480,126	$3,542,632	$937,494
DEP	$2,872,350	$1,748,149	$1,124,201
DFS	$3,715,654	$2,480,707	$1,234,946
DMS	$5,608,263	$5,137,411	$470,852
DOC	$976,358	$1,016,112	($39,753)
DOR	$746,067	$1,125,371	($379,304)
DOS	$1,070,058	$1,365,741	($295,683)
DOT	$3,179,682	$2,908,127	$271,556
DBPR	$327,741	$622,778	($295,037)
FDLE	$4,625,749	$3,159,550	$1,466,200
HSMV	$1,285,460	$2,349,075	($1,063,615)
DOE	$2,696,679	$2,731,483	($34,803)
DOH	$2,650,213	$2,993,705	($343,492)
AWI	$602,024	$633,704	($31,680)
Total	**$35,508,984**		

As Table 11 Agency X86-Windows Comparison above indicates, significant savings opportunities for X86 can be achieved for the following agencies: DCF, DEP, DFS and FDLE.

Table 12. Agency Unix Comparison

Agency Unix Cost Comparison to Peer Group			
Agency	**Unix**	**Unix Peer**	**Delta**
DACS	$1,227,263	$1,425,975	($198,712)
DCF	$44,725	$187,251	($142,526)
DEP	$323,601	$241,510	$82,092
DFS	$5,493,203	$2,002,236	$3,490,968
DMS	$9,148,101	$9,223,553	($75,452)
DOC	$—	$—	$—
DOR	$1,394,815	$244,576	$1,150,238
DOS	$1,159,293	$648,262	$511,031
DOT	$—	$—	$—

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Agency Unix Cost Comparison to Peer Group			
DBPR	$—	$—	$—
FDLE	$799,188	$4,789,123	($3,989,935)
HSMV	$771,990	$1,198,790	($426,800)
DOE	$824,608	$389,869	$434,740
DOH	$1,854,172	$967,464	$886,708
AWI	$158,746	$385,819	($227,073)
Total	**$23,199,706**		

As Table 12 Agency Unix Comparison above shows, significant savings opportunities in Unix can be achieved for DFS, DOR, DOH and DOS.

Table 13. Agency IBM Mainframe Comparison

Agency IBM Mainframe Cost Comparison to Peer Group			
Agency	**Mainframe—IBM**	**Mainframe—IBM Peer**	**Delta**
DACS	$—	$—	$—
DCF	$18,270,460	$17,771,029	$499,431
DEP	$—	$—	$—
DFS	$7,487,544	$8,535,819	($1,048,275)
DMS	$4,387,781	$4,401,935	($14,155)
DOC	$6,124,216	$8,174,265	($2,050,049)
DOR	$—	$—	$—
DOS	$—	$—	$—
DOT	$4,639,079	$6,835,304	($2,196,225)
DBPR	$—	$—	$—
FDLE	$—	$—	$—
HSMV	$2,811,244	$2,351,344	$459,899
DOE	$3,352,709	$7,891,310	($4,538,600)
DOH	$—	$—	$—
AWI	$—	$—	$—
Total	**$47,073,033**		

Table 13 Agency IBM Mainframe Comparison above demonstrates that significant savings opportunities in Mainframe Tower can be achieved for the following agencies: DCF and HSMV.

Other agencies have reported costs that are significantly less than the peer group averages; DOE's Mainframe services are provided by the NWRDC acting as an external service provider, while DOT has negotiated a favorable hardware and software lease agreement with its supplier, as well as demonstrating higher productivity (27 MIPS per FTE compared to the peer group average at 22 MIPS per FTE.) DOC also benefits from higher productivity at 53 MIPS per FTE compared to the peer group average at 39 MIPS per FTE.

The following tables, much like the cost comparison tables, compare an agency's staffing level to that of the appropriate workload peer. Again, the total of all agencies vs. all the peers in this

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case would be misleading. Rather, it is the individual agency comparison that helps identify any potential staff reduction opportunity.

As with the cost comparisons, a lower head count value than the peer does not necessarily indicate that no head count reduction is possible. The comparison is to an average, and performance above the average is possible. Also, this study did not examine the "effectiveness'' of any particular data center.

It is sometimes the case that data centers with cost or staffing levels significantly below the peer groups are data centers with low effectiveness or data centers where the services delivered typically do not meet their clients' business requirement. The State of Florida may wish to further analyze significant deviations in order to better understand the underlying reasons for this deviation.

Table 14. Agency Total FTE Comparison

Agency Total FTE Comparison to Peer Group (X86-Windows, Unix, IBM Mainframe)			
Agency	**Agency Total FTEs**	**Peer Total FTEs**	**Delta**
DACS	12.4	13.6	-1.2
DCF	85.7	75.2	10.4
DEP	10.7	14.1	-3.4
DFS	70.8	49.7	21.1
DMS	102.7	74.3	28.4
DOC	23.9	34.3	-10.4
DOR	10.9	9.3	1.6
DOS	11.3	12.6	-1.3
DOT	44.8	40.2	4.6
DBPR	1.2	4.7	-3.5
FDLE	5.3	31.4	-26.1
HSMV	38.7	30.4	8.3
DOE	22.8	47.9	-25.2
DOH	20.1	26.6	-6.5
AWI	4.8	5.9	-1.1
Total	**466.0**		

As Table 14 Agency Total FTE Comparison shows, there are significant positive differences observed for DFS and DMS. Significant negative differences occurred for FDLE and DOE. Some of the significant negative differences in head count can be attributed to outsourcing the workload or shifting the workload to out-of-scope entities such as the NWRDC.

4.3 Future-State Consolidated Analysis

The Future-State Consolidated Analysis is based on a comparison of the aggregated cost and workload for the in-scope agencies to a set of consolidated peers that represents the economies of scale that Florida could realize if it were operating as a single enterprise by establishing an effective management system of data centers. To model this, Gartner selected three technology peers: X86-Windows, Unix and Mainframe, with the same scope and scale as the sum of all the in-scope agency workloads.

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The following tables detail the consolidation savings opportunity by technology, cost category and staffing levels. These savings are only theoretically possible, and the peers were primarily developed as input to the financial model that is described in subsequent sections of this report.

These types of savings opportunities are best captured by some form of consolidation, and the subsequent financial model is designed to measure the ability of Florida to capture this savings in two different scenarios.

Table 15. Aggregated Agency Cost Comparison by Technology

Total Agency Cost Comparison to Consolidated Peer—Technology			
Technology	**Agency Cost**	**Peer Cost**	**Delta**
X86-Windows	$35,508,984	$27,380,565	$8,128,419
Unix	$23,199,706	$18,856,553	$4,343,154
IBM Mainframe	$47,073,033	$42,183,994	$4,889,039
Total	$105,781,723	$88,421,112	$17,360,612

Table 15 Aggregated Agency Cost Comparison by Technology indicates, there are significant savings in all technologies

Table 16. Aggregated Agency Cost Comparison by Cost Category

Total Agency Cost Comparison to Consolidated Peer Group			
Cost Category	**Agency Cost**	**Consolidated Peer Cost**	**Delta**
Hardware	$29,650,298	$32,393,257	($2,742,959)
Software	$30,214,279	$25,355,409	$4,858,870
Facilities	$4,316,192	$6,883,686	($2,567,494)
Unallocated Non-personnel	$6,407,152	$—	$6,407,152
Personnel	$33,549,218	$23,788,760	$9,760,458
Unallocated Total	$1,644,585	$—	$1,644,585
Total	**$105,781,723**	**$88,421,112**	**$17,360,612**

As Table 16 Aggregated Agency Cost Comparison by Cost Category indicates, Software and Personnel make up the majority of the cost savings opportunity.

Table 17. Aggregated Agency FTE Comparison by Technology

Total FTE Opportunities vs. Consolidated Peer			
	Total Agencies	**Consolidated Peer**	**Delta**
X86-Windows	201.8	147.4	54.5
Unix	81.7	59.5	22.2
IBM Mainframe	182.6	122.6	60.0
Total	466.0	329.5	136.6

Table 17 Aggregated Agency FTE Comparison by Technology indicates FTE opportunities exist for all technology areas, more significantly in Windows and Mainframe.

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Workload Analysis

5.0 Workload Analysis

5.1 Workload

Workload data were gathered in both the Cost and Staffing Survey and the separate Workload and Facility Assessment. The workload drives the benchmarking assessment in that it forms the basis for the peer selection and was a primary focus for the workload study, in that servers, storage and mainframes are the primary consumers of space, power and cooling capacity.

5.2 Current-State Workload Analysis

The workload examined by this assessment was:

- 10 IBM mainframes with 7,126 MIPS
- 3,456 X86 physical servers
- 437 physical Unix servers
- 4,620 logical servers (all technologies)
- 14 iSeries (AS/400)
- 4 Unisys mainframes with 368 MIPS
- The majority of the workload is in the area of X86-Windows
- Significant cost is associated with both the Unix and Mainframe workload, even though in relative terms the workload is lower

5.2.1 Current-State Agency Workload

The following table shows the aggregated workload for in-scope computer facilities.

Table 18. Agency x86, Unix and Mainframe Workload

Workload by Agency and Technology			
Agency	Total Agency X86 (Physical Servers)	Total Agency Unix (Physical Servers)	Total Agency Mainframe (MIPS)
DACS	99	37	NA
DCF	394	6	3,002
DEP	160	7	NA
DFS	296	47	1,086
DMS	87	48	322
DOC	93	NA	1,040
DOR	206	67	NA
DOS	138	32	NA
DOT	347	NA	500
DBPR	57	0	NA
FDLE	377	64	NA
HSMV	233	45	172
DOE***	254	12	1,004

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Workload by Agency and Technology			
DOH	533	53	NA
AWI**	77	19	NA
APD*	12	NA	NA
DCA*	37	NA	NA
DEM*	15	NA	NA
DJJ*	2	NA	NA
DOEA*	22	NA	NA
EOG*	17	NA	NA
Total	**3,456**	**437**	**7,126**

* Out-of-scope agencies with servers managed by the SRC
** AWI mainframe workload is included with the SRC workload.
*** Significant DOE workload is located at the NWRDC

5.2.2 Co-located Workloads

The state of Florida has several locations that are used for co-locating the workload of one agency at the data center facility that is maintained and operated by another agency. Gartner Research defines co-location as one of the options commonly found associated with Web hosting or disaster recovery in the commercial environment. Gartner has seen co-location less frequently employed as an option for general-purpose computing.

- Hosting/Co-location Services

  Co-location is the provisioning of data center facilities, together with Internet and private Wide-Area Network (WAN) connectivity. Additional basic services, such as monitoring, remote hands and backup tape rotation, may be offered. This segment excludes more-complex server management; co-location customers will do this themselves or outsource to a third party. In this model, the customer is responsible for the hardware architecture and design, but the service provider manages the facility where the hardware will be located and supported. There is usually a monthly usage fee associated with the facility.

As utilized by agencies in the State of Florida, co-location is employed to provision one agency's workload at another agency or organization's data center facility, with the sending agency paying a monthly fee but retaining control of the operation, architecture, configuration and services provided by the system.

The main advantage of co-location is that an agency can utilize the high-quality data center facility offered by another organization and retain operational control of its own infrastructure.

The chief organizations providing co-location services in Tallahassee are:

- The SRC
- The NWRDC
- The DCF Northwood data center facility

The main disadvantage for the State of Florida is that co-location fragments the control of data center facilities and prevents the State of Florida from achieving the potential economies of scale of an organization of its size. Consolidation activities derive the majority of their savings from personnel and software savings, and this is largely driven by capturing these types of unrealized economies of scale.

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The largest provider of co-location services for the State of Florida is the SRC. In this assessment, Gartner treated the SRC as if it were one data center facility. We did this by capturing the cost and workload from each in-scope agency and several out-of-scope agencies, and then aggregating both the cost and the workload.

In the table below, it is apparent that the SRC workload is concentrated in three agencies: DMS, DOH and DOR. These three make up approximately 75% of the workload.

Table 19. SRC Workload Profile

SRC Workload Profile			
Agency	**X86-Windows (Physical Servers)**	**Unix (Physical Servers)**	**Mainframe (MIPS)**
DMS	87	48	322
APD*	12	NA	NA
AWI**	19	13	NA
DCA*	37	NA	NA
DCF	5	NA	NA
DEM*	15	NA	NA
DJJ*	2	NA	NA
DOE	4	NA	NA
DOEA*	22	NA	NA
DOH	259	22	NA
DOR	103	61	NA
DOS	13	16	NA
EOG*	17	NA	NA
HSMV	18	11	NA
Total	**613**	**171**	**322**

* These agencies submitted data for the study but were out-of-scope agencies
** AWI MIPS is part of the 322 MIPS reported by DMS

5.2.3 Workload Characteristics

There are several other characteristics of Florida's workload:

- The age of the server devices is in line with other organizations. The majority of Florida's devices are less than five years old.
- From Gartner's experience with data center benchmarks and assessments, Florida is behind other organizations in virtualization. Most of the agencies seem to be in the early stages of virtualization.
  - Virtualization is a software technique that allows one computer to run the workload of several systems on the same hardware by employing "virtual" systems. This capability makes systems easier to manage and deploy, and makes it possible to utilize more of the hardware capacity.
- A significant portion of Florida's server workload is dedicated to non-strategic workloads.

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- This is the type of workload that lends itself to consolidation and rationalization, since it is the type of workload that is common to most of the agencies and is not differentiated by the business function of the agency.

- A full 20% of the servers are utilized for application development and testing work. Gartner typically sees less than 10% of the servers utilized for this purpose.

  Further analysis of state agencies' application development and testing infrastructure and staffing should be undertaken to assess and accurately determine the need for application development testing infrastructure and associated resources.

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Facilities Analysis

6.0 Data Center Facilities Analysis

6.1 Current-State Analysis

For this report, Gartner assessed 15 agencies or departments and 43 data center facilities. Additionally, the Gartner team investigated two organizations from a facility basis only. These organizations were:

- The NWRDC
- The Florida Lottery Data Center

6.1.1 Gartner Facility Assessment

To assess Florida's data centers, Gartner examined both the floor space and the power capacity and utilizations. In previous times, floor space may have been enough to determine capacity, but in today's environment, with denser server environments, space is becoming less of a constraint than heat, cooling and the power required to facilitate this type of architecture. In particular:

- With Moore's Law, equipment is getting smaller and smaller

  Moore's Law—The idea that computing power doubles every 18 months, originally conceived by Intel co-founder Gordon Moore in 1965.
- However, it also uses more and more power:
  - A rack of computer equipment today may take 1.5kW to 3.0kW
  - A rack of new servers can range from 10kW–40kW
- Power needs (including cooling) typically account for 60–70% of data center facility costs
- The typical situation today is:
  - Plenty of space
  - Always running out of power and cooling

6.1.2 Floor Space Analysis

Florida is in a position where there is sufficient raised floor space for current computer operations. In the past, facilities were built to house water-cooled IBM Mainframe configurations. These facilities required both large raised floor space for the computing facilities as well as cooling infrastructure for the water-cooled processors and the large air-cooled storage farms. Additionally, there were large space requirements for print operations, console operations and tape handling. The Year 2000 event, with the shift to smaller air-cooled mainframes, RAID arrays and virtual tape systems, coupled with the off-loading of print services to contractors or distributed multi-function printers, drastically reduced the space requirements of yesterday's data centers.

Even the proliferation of servers has not been enough to overwhelm Florida's data center space. Most of the agencies have converted the individual form factor server cabinets to rack-based systems and have managed to reclaim space from the tape and print rooms. Even with minimal implementation of server virtualization techniques, Florida does not suffer from a lack of raised floor space. In fact, the State could look to the monetization of unused space (remaining or not used for data center consolidation) as it moves forward with data center consolidation.

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The return on this investment could help to support the planning and implementation of data center consolidation.

6.1.3 Floor Space Characteristics

The important characteristics of Florida's floor space environment are:

- There are 134,778 sq. ft. of raised floor space
- The vast majority, 96% of the space, is conditioned raised floor space. This represents space that is ready to accept computing equipment. It is provisioned with access to proper power and cooling. A more detailed analysis of the space is provided in the detailed study.
- The three larges facilities—DCF, DMS and the NWRDC—contain 44% of the raised floor space
- The same three facilities contain the majority, 53%, of unoccupied raised floor space
- Thirteen of the top 20 largest facilities are less than 60% occupied
- There are two agencies with floor space capacity issues: DHSMV and FDLE

As we look at consolidation and at the factors that impact consolidation, the present capacity and future capacity needs must be taken into consideration. In particular, some of the trends that will impact the future floor space capacity are:

- Infrastructure Growth

  During the next five to 10 years, most organizations will experience a significant increase in the deployment of new infrastructure equipment (servers, storage and networking equipment). This may result in a 5% to 7% compound annual growth rate (CAGR) increase for data center floor space.

  New infrastructure deployment takes weeks and is relatively easy. However, changes in a data center's facilities often take many months and are far more complex. Moreover, such infrastructure deployment may result in many new data centers being commissioned.

- Power and Cooling Facilities Issues

  The type of new infrastructure that will be installed during the next five years will be high-density, resulting in a noticeable increase in energy requirements. Agencies will have to manage the increase in costs by resorting to a wide set of possible solutions. These may include delaying installation of new servers to creating "hot aisles." The decisions will involve complex calculations, balancing actual and future compute power, floor space, and power and cooling requirements against costs and meeting the needs of the business.

- Data Center Environmental Issues

  The next-generation data centers need to be designed with key environmental protection features. This will typically include some form of alternative power sources, such as solar panels, use of recyclable materials and better use of the heat generated from the IT equipment. The large server and storage vendors are looking at ways to design and build hardware that is more "green"—that is, meets environmental emissions standards.

- Disaster Recovery/Business Continuity

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With global terrorist attacks a risk in many large cities, new data centers have to be designed to a higher level of resilience and must be located in places that are as safe as possible. Established data centers need to be enhanced to have a high level of security and contingency in the event of any sort of disaster.

Figure 10 shows that the in-scope data centers currently have more than 134,778 sq. ft. of raised floor space and that only 62% of it is currently occupied by data center equipment. More than 50% of the unused raised floor space is contained by three data centers: NWRDC, Northwood and the SRC.

Figure 10. Analysis of In-Scope Computer Facilities Raised Floor

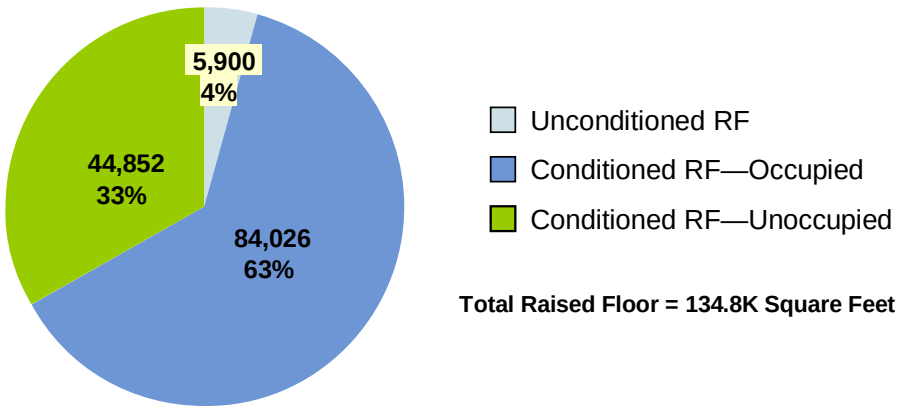

Figure 11 shows data center space utilization rates by department. More than one-half of the departments have a utilization rate that is less than 60%. This is attributable to the fact that equipment in use today typically takes up far less space than the equipment that it replaced.

Figure 11. Data Center Space Utilization by Department

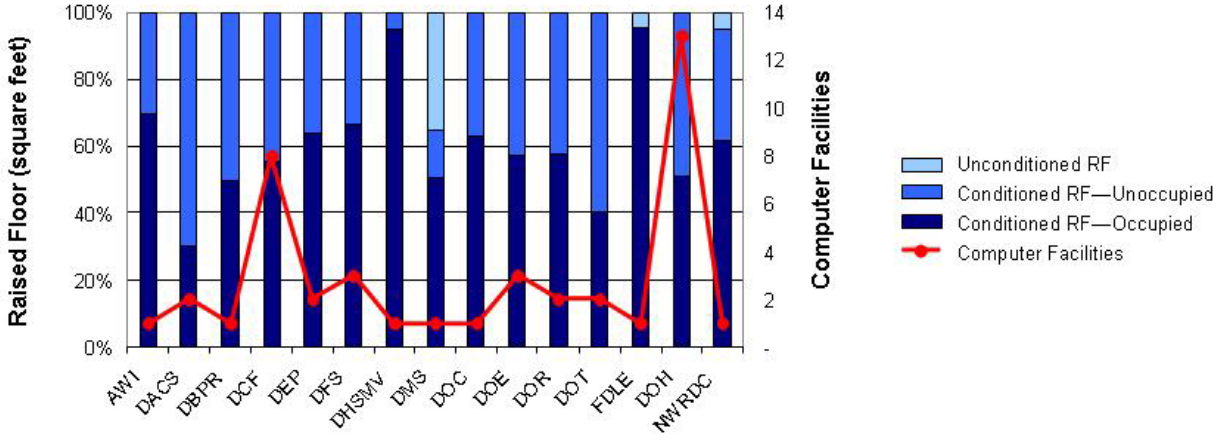

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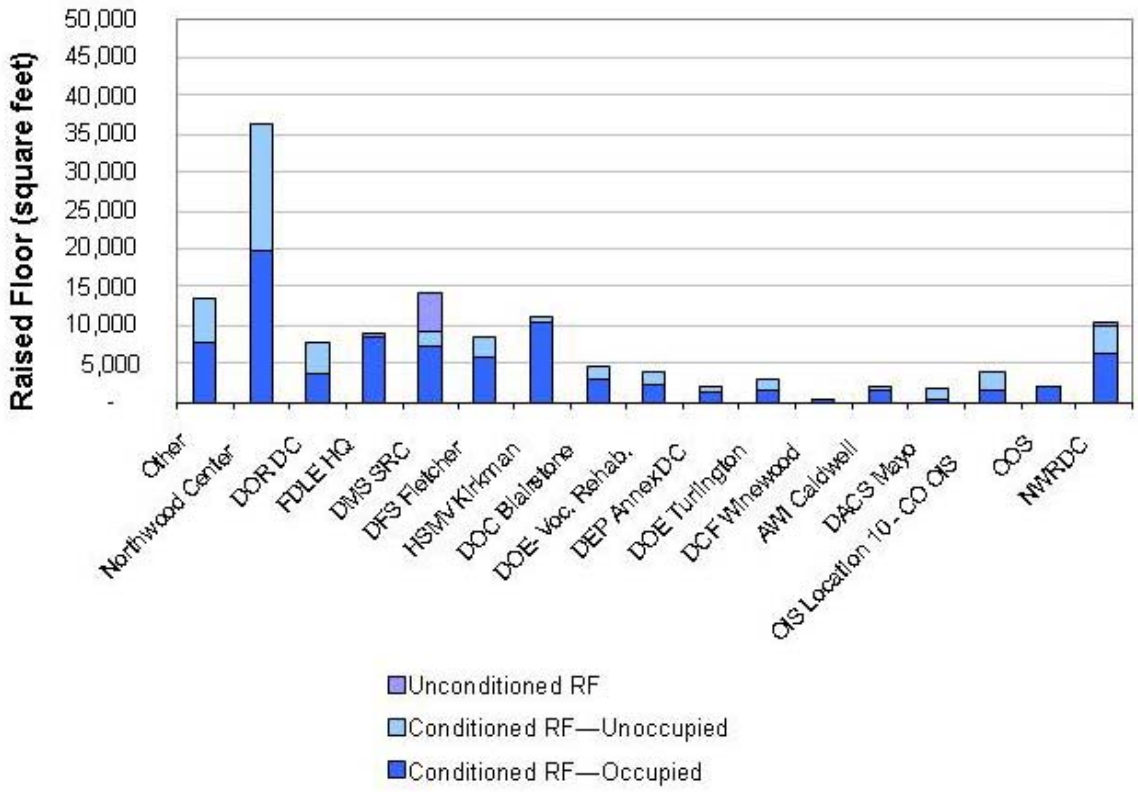
Figure 12 shows that most of the unused data center space is available in the following agency computer facilities: DCF, NWRDC and SRC.

Figure 12. Unused Data Center Space



More than 50% of the unused raised floor space is contained by three data centers: Northwood data center, NWRDC and the SRC.

6.1.4 Power Analysis

The evolution of data center technologies may have helped the floor space situations, but the higher-density computing environments, rack-mounted X86 and Unix servers, and smaller denser RAID arrays have not been as easy on Florida's power capacity. In aggregate, Florida appears to have adequate power capacity; however, this capacity is distributed across a number of centers and, other than the Northwood data center, no one facility has much unused power capacity. In addition to the current capacity when building out capacity for consolidation, other factors may impact power and cooling infrastructure. Specifically noted in Gartner's research are the following:

- Server Cooling Can Be a Bigger Problem Than Server Power
  - High-density blade and rack-optimized servers require considerably more power to run than traditional low-density servers. A fully populated rack of high-density servers will need from 10kW to 40kW of electricity.
  - Although this configuration provides considerable computing power, traditional data centers were designed to provide about 2kW to 3kW of power per rack/sq. ft. The increase in power requirements will mean that most data centers will struggle to

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house new technologies and that, where they do, they could face increased operational costs—specifically, electrical costs for IT equipment and HVAC systems.

- However, a second and more significant problem also exists—that of heat generated by the new range of servers. Because high-density servers are packed tightly into a rack and each generates a large amount of heat, cooling the racks is difficult. Without adequate cooling, the servers will shut down.
- Many data centers can accommodate the power issue by spreading the power load over a larger number of server racks, each running at a relatively low level of server population (from 20% to 40% full).
- Electrical cost for cooling has risen from a ratio of 0.5× of equipment power to 1.5× to 2× equipment power, resulting in a significant increase in overall electrical costs.

- Projecting the Effects of Server Growth on Power and Cooling Requirements and the Effects of Virtualization
  - The overall effects of server virtualization are difficult to predict. It is reasonable to assume that virtualization will improve server use from an average of from 10% to 20% for X86 machines to at least 50% to 60% during the next three to five years. This should indicate a need for fewer servers.
  - One way to examine virtualization is to compare the effects of virtualization with the effects of server consolidation programs.
    - An analysis of server rationalization programs during the past five years indicates that for virtualization, use-based volume growth has had a greater effect than a reduction in the number of servers through consolidation. Generally, organizations have reduced the number of servers for a set of applications, and the demand for new workloads has meant that the number of servers running has increased.
    - Although virtualization is a different consideration and will probably lead to a smaller number of servers needed for a set of applications, Gartner believes that lessons learned from consolidation programs indicate that users will still experience a net increase in data center servers.
- Effects of Power and Cooling Problems on Consolidation Strategies
  - Server power and cooling problems will affect consolidation strategies, and users must be aware of the concerns. Server rationalization and the replacement of legacy X86 machines with new high-density servers initially may appear to reduce spatial issues and volume, but users must calculate whether there is sufficient power and cooling in data centers to run the new server infrastructures. Moreover, moving equipment from one data center into another targeted site must take into account power and cooling capacity at the target site. Using virtualization technology will help manage the problem, but projected volume growth of servers should be included in the scenario.

6.1.5 Power Characteristics

Florida is in a position where power capacity, rather than floor space, is the limiting factor influencing the potential for data center consolidations at any given facility. If we utilize UPS capacity as a proxy for power consumption and usage, then currently:

- Florida's data centers consume 2.6 megawatts

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- Florida's data centers have a capacity of 5.4 megawatts
- The potential unused capacity is spread across the existing data centers:
  - Nine of the largest data center facilities are at or greater than 70% of capacity
  - Eleven of the data centers are at or greater than 50% of capacity
  - More than one-third of the unused capacity is located at the Northwood data center
  - The majority of the unused capacity is spread across multiple data centers

Figure 13 show that the majority of the data centers are above 50% power utilization

Figure 13. Power Utilization by Agency

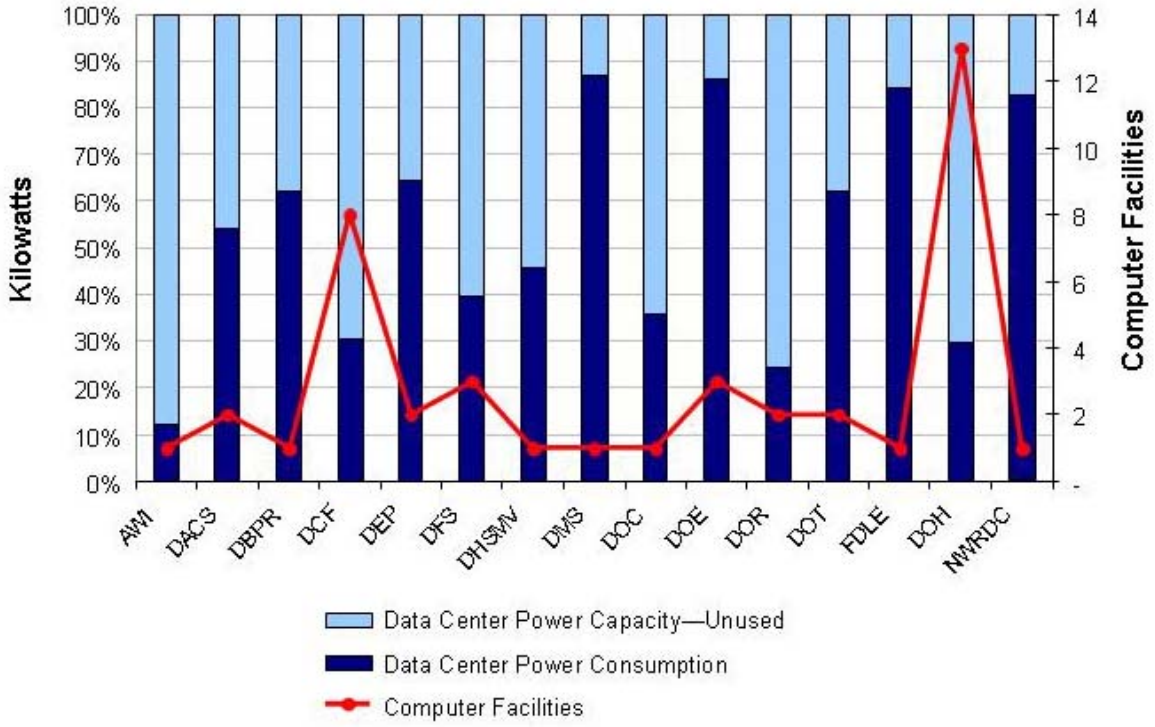

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Figure 14 shows the power capacity by department and also highlights the proportion of that capacity that is currently utilized. The DMS computer facility and the DCF computer facility, Northwood data center, have the most capacity, and Northwood alone accounts for a significant percentage of the unused capacity.

Figure 14. Power Capacity vs. Utilization

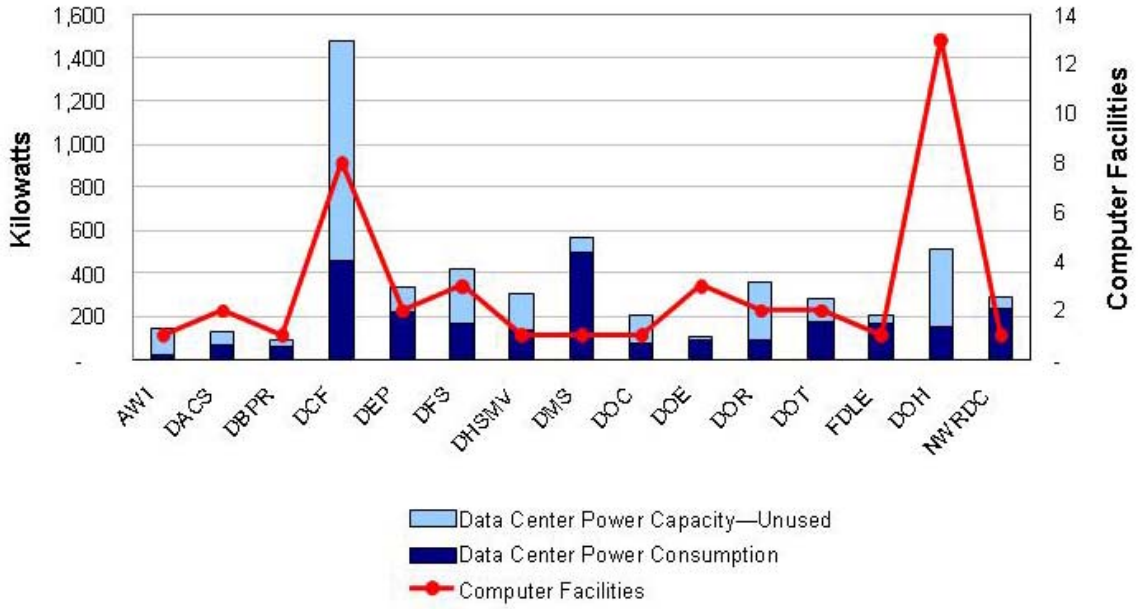

Figure 15 shows the breakdown of power capacity by department. Note that DMS DC, DCF Northwood and the NWRDC contain almost 50% of the power capacity.

Figure 15. Total Power Capacity

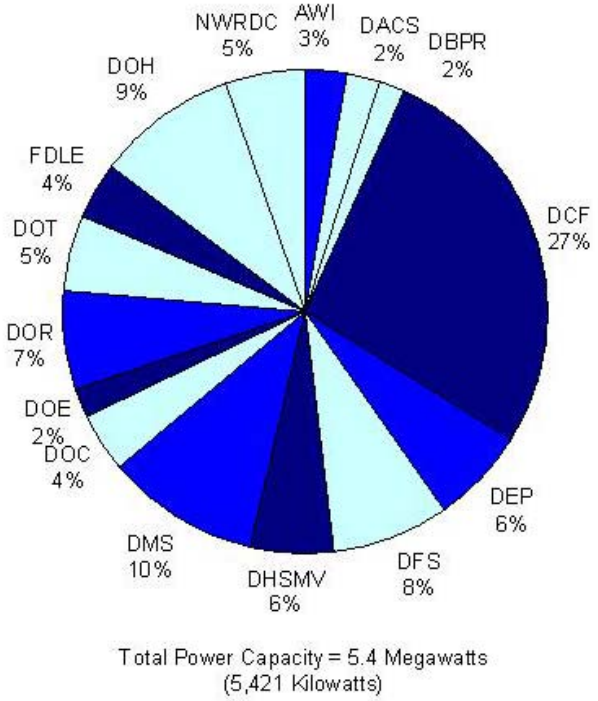

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Figure 16 shows the breakdown of power consumption by departments.

Figure 16. Total Power Consumption

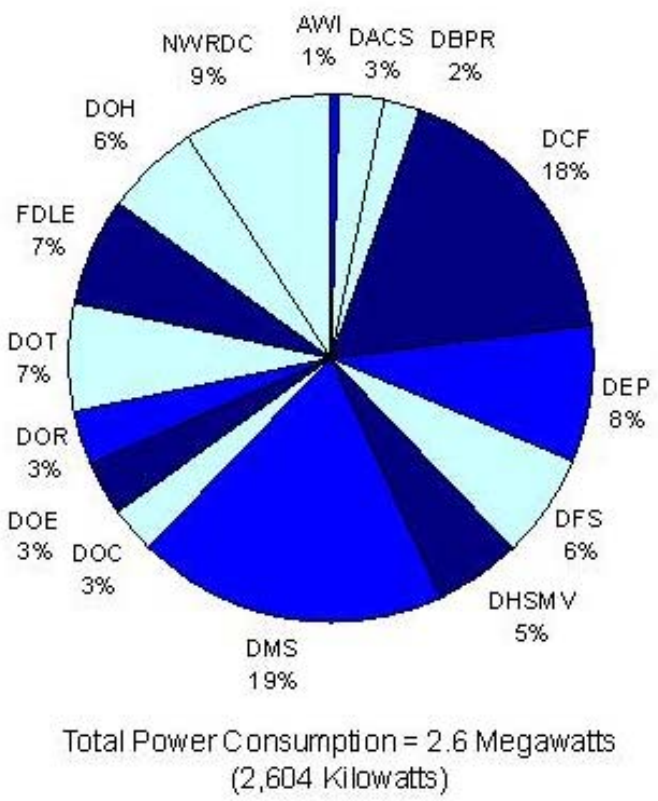

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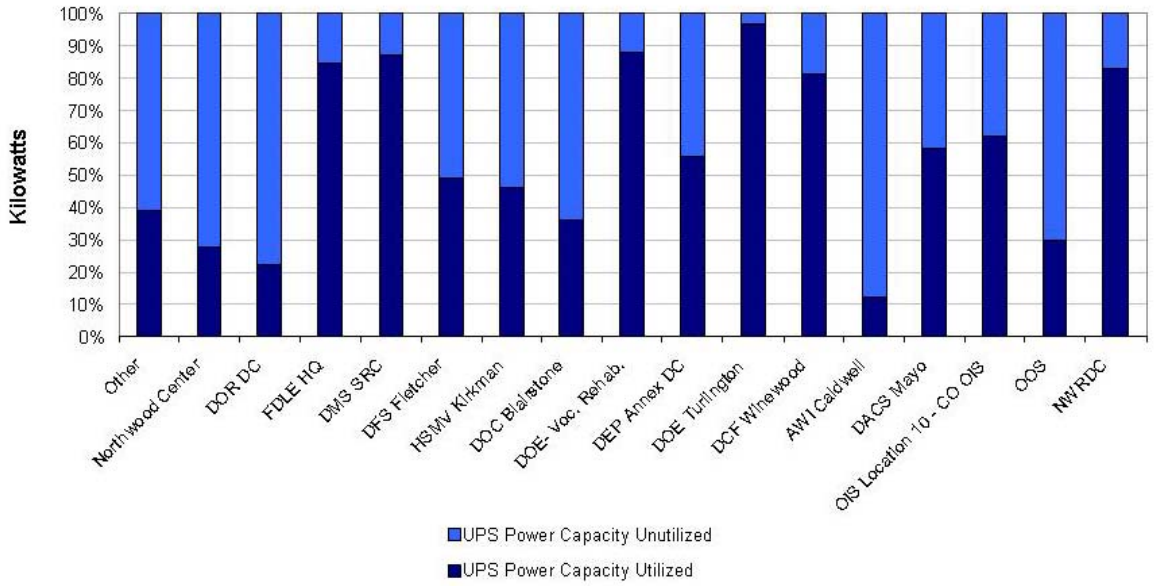
Figure 17 shows the power utilization rates by department. Figure 18 shows power utilization rates in absolute terms. Note that, while power utilization rates are generally higher than space utilization rates, some agencies do a better job than others in matching their capacity to their needs. The SRC is a good example of a data center which is running very efficiently from a power perspective. The DCF Northwood data center, on the other hand, has significant excess capacity.

Figure 17. Data Center Power Capacity in Terms of Percentage



Please note that Northwood data center and the SRC are the largest data centers from a power capacity perspective.

Figure 18. Data Center Power Capacity in Terms of Absolute Numbers

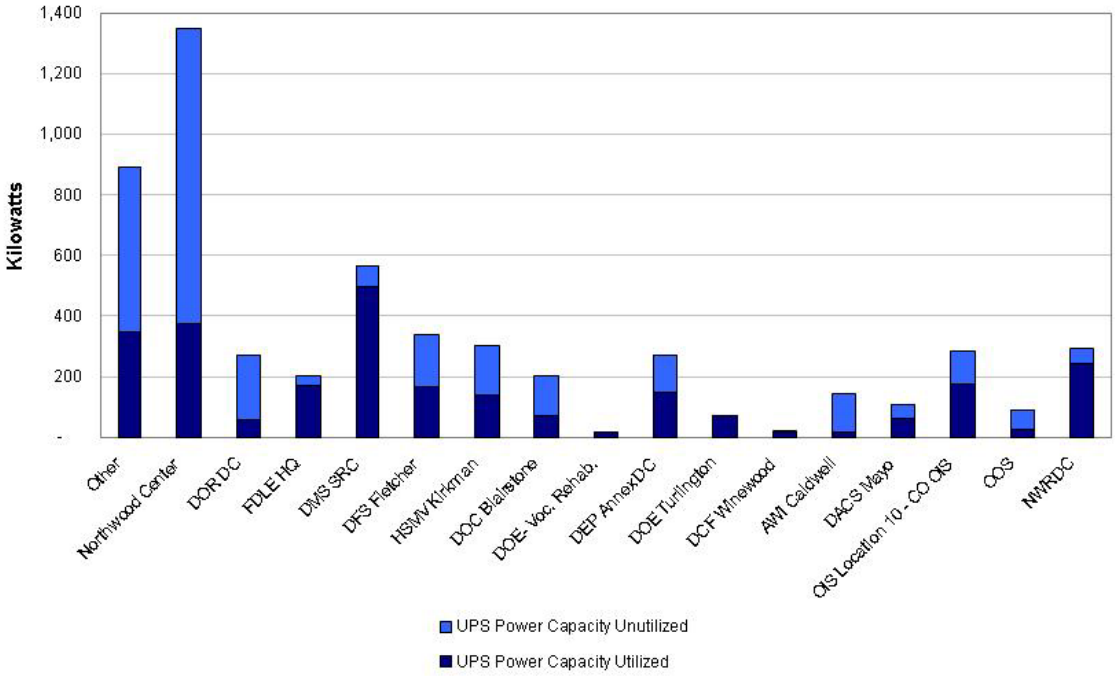


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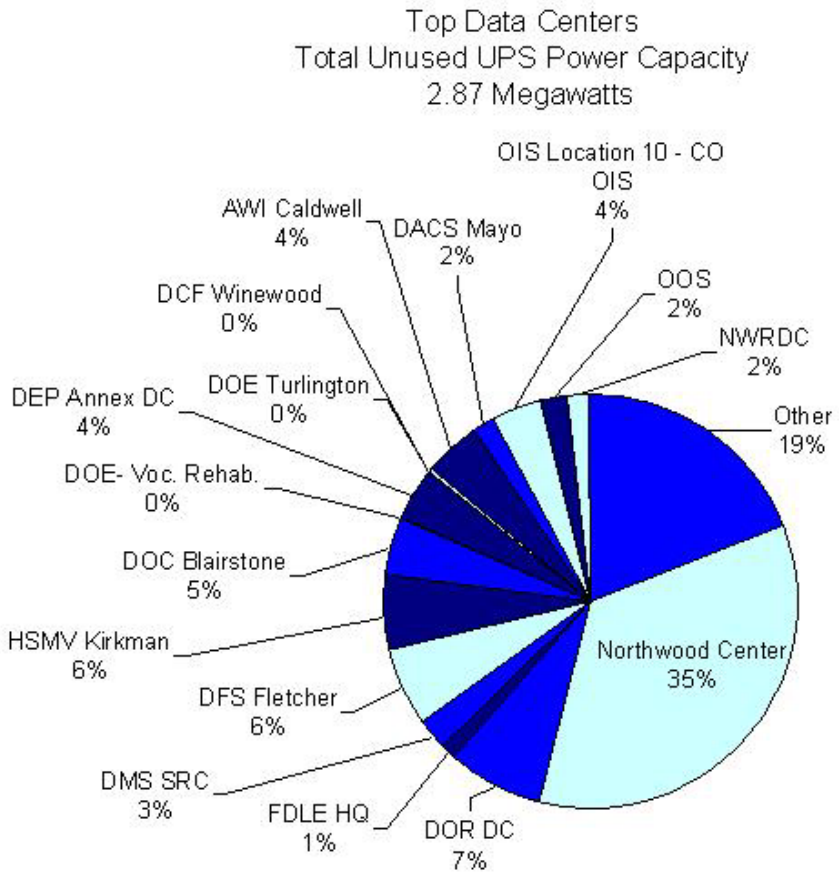
Figure 19 shows how the unused power capacity is distributed among the numerous data center facilities. More than one-third of the unused capacity is at the Northwood data center. More than 40% of it is at the four (4) data centers that Gartner modeled as consolidation targets in Scenario 2.

Figure 19. Unused Power Capacity



6.2 Potential Target Data Centers

6.2.1 Target Center Analysis Methodology

As illustrated in Figure 20, Gartner's data center analysis included an assessment of the 12 most critical data center systems that directly impact the reliability of the facility:

1. Power Distribution to the Building
2. Power Distribution Within the Building
3. Backup Generators
4. HVAC Systems
5. Raised Floor Height
6. UPS
7. PDUs

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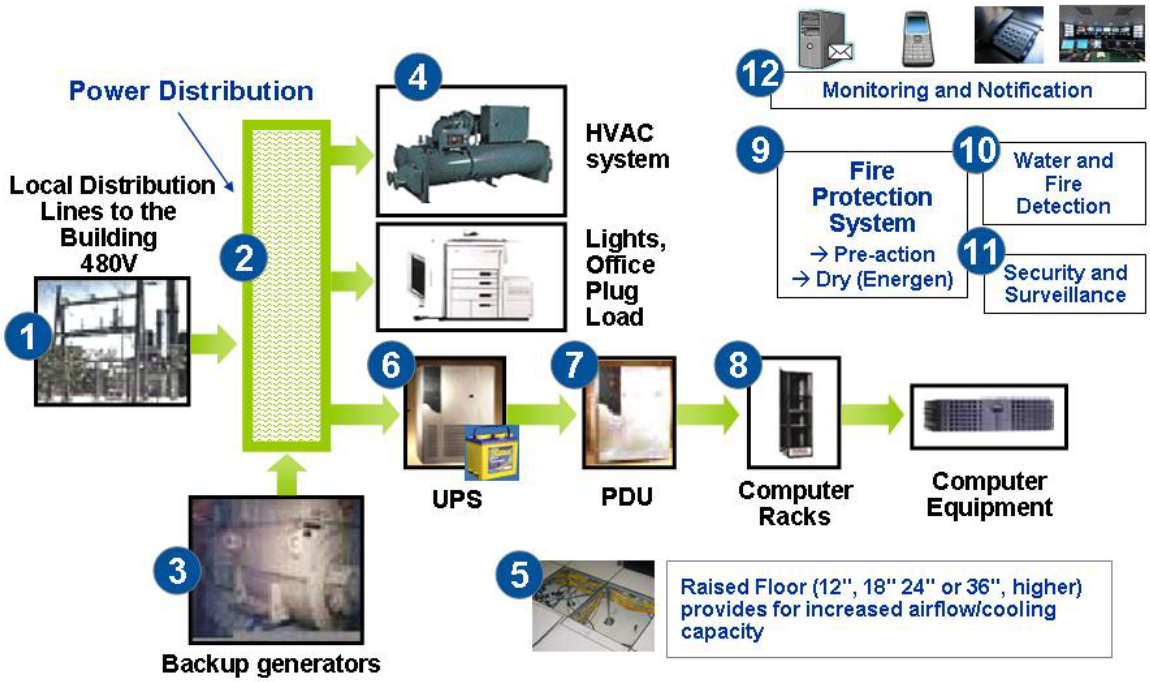
8. Computer Racks
9. Fire Protection Systems
10. Water and Fire Detection Systems
11. Security and Surveillance
12. Monitoring and Notification Processes

Figure 20. Critical Data Center Systems Covered by Gartner's Assessment



In addition to the factors listed above, Gartner also evaluated the major State data centers against the following four criteria in Figure 21.

- Risk and Location
  - Risk factors inherent in the facility or location (e.g., proximity to potential disaster, design flaws, suitability of structure and infrastructure).
  - Age of the building that houses the data center.
  - Security and safety of the facility.
- Quality and Reliability
  - Quality of data center infrastructure (power, cooling, network and other critical systems). Age and expected life of infrastructure can also be a factor.
  - Level of redundancy and fault tolerance built into the facility and its supporting systems. Minimum of Tier 2 required to be a potential consolidated data center.
- Current Capacity
  - Capacity was considered from three dimensions: power, cooling and floor space.

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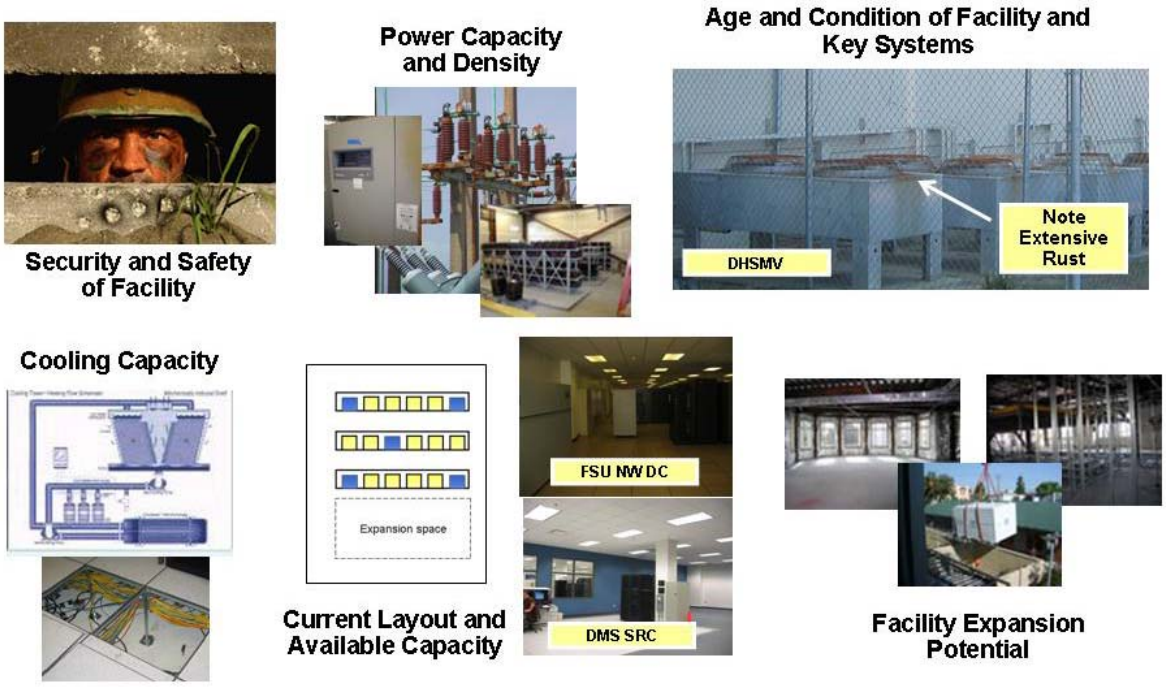
- ❑ Unutilized capacity (absolute, not percentage) available for growth or consolidation of other departments. Considers raised floor, power and cooling utilization.
  - — Current layout and available capacity

- Expansion Potential
  - ❑ Potential (absolute, not percentage) to cost-effectively and efficiently expand capacity power/cooling, as well as raised floor.
  - ❑ Age and condition of facility and key systems.
  - ❑ Facility expansion potential.

Figure 21. Other Factors Considered by Gartner's Data Center Analysis



6.2.2 Target Data Center Analysis Results

Figure 22 and Table 20 below show the results of the Gartner data center analysis. This analysis considered three primary sources of information:

- Information gathered by Gartner data center experts as they toured each facility
- Information provided by the department as part of the data center workload survey
- Additional follow-on information provided by the department

It is worth noting that the purpose of this evaluation was not to determine the suitability of the data center to meet the individual departments' needs and requirements. The purpose instead was to determine the potential of the particular data center facility to take on the role of a State-wide, multi-agency consolidated data center. Gartner makes no comment on the suitability of the data center vis-à-vis the owning agencies' requirements.

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Figure 22. Results of Gartner's Data Center Analysis

Agency	Data Center	City	Square Ft.	Risk and Location	Quality and Reliability	Current Capacity	Expansion Potential	Overall
DFS	Fletcher Building	Tallahassee	16,328					Some Potential
DFS	Larson Building	Tallahassee	2,300					No Potential
DMS	Shared Resource Center	Tallahassee	29,232					High Potential
DCF	Northwood Center	Tallahassee	42,579					High Potential- Northwood
DOT	Suwanee	Tallahassee	6,440					Limited Potential
DOT	Turnpike- Boca Raton	Boca Raton	2,280					Limited Potential
DOT	Turnpike- Turkey Lake	Ocoee	1,200					Very Limited Potential
DOC	Blair Stone Road	Tallahassee	4,836					Some Potential
FDLE	2331 Phillips Rd	Tallahassee	9,900					Some Potential
HSMV	2900 Apalachee Pkwy	Tallahassee	11,562					Very Limited Potential
DOS	Northwood Center	Tallahassee	See above					High Potential-- Northwood
DEP	Twin Towers Lab	Tallahassee	3,268					No potential
DEP	Annex Building	Tallahassee	3,800					High Potential with Investment
DOE	Northwood Center	Tallahassee	See above					High Potential-- Northwood
DOE	Turlington	Tallahassee	3,360					Limited Potential
DACS	Mayo	Tallahassee	3,685					No Potential
DOR	Carlton	Tallahassee	7,738					No Potential
DOR	Tax World	Tallahassee	2,184					No Potential
FSU	Northwest Data Center	Tallahassee	20,000					High Potential
Lottery	Lottery DC	Tallahassee	5,000					High Potential with Investment
	Total for 20 Facilities		175,892					

Table 20. Key to Understanding the Results of Gartner's Data Center Analysis

	Reliability	Risk and Location	Capacity	Expansion
	Tier 3	No critical risk identified	Not used	Significant potential with light investment
	Tier 2+, little or no investment	Risks mitigated by moderate investment	Significant available capacity	Significant potential with moderate investment
	Tier 2, moderate investment	Requires acceptance of moderate risks	Some available capacity	Significant potential with heavy investment
	Tier 1, heavy investment	Requires acceptance of significant risks	Little available capacity	Limited potential with moderate investment
	Tier 1, cost effective upgrade	Unacceptable risks	No available capacity	Little or no potential

The following table is a summary of the key points which Gartner considered when determining the rating for the 11 most significant data centers. The data centers that support the Florida Lottery and the Florida Turnpike are not mentioned here, because Gartner and the Senate determined early in the process that it made sense to exclude these centers from the analysis because they are dedicated to supporting State-owned "enterprises" rather than general government functions. In the future, the State may wish to encourage one or more of these entities to consider using State data centers, once they have been established. In addition, the Lottery data center facility is in a two-story building with 15,000–20,000 sq. ft. of warehouse space that could be a potential for expansion, if the State needed to consider this facility a candidate for a consolidated site.

Table 21. Gartner Rating for the 11 Most Significant Data Centers

Facility		Comment
DMS SRC	Pro's	Large Tier 3 facility Well-maintained infrastructure/only 8–9 years old 5,000+ sq. ft. of expansion potential
	Con's	Currently near maximum power capacity Current managed services model not well-received by departments

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Facility		Comment
DCF Northwood	Pro's	Very large facility; great deal of expansion capability Rehabilitated former shopping mall suitable for purpose Very low utilization of both power and space Tier 2+ infrastructure Leasehold improvement money available
	Con's	Leased facility: 10–12 years remaining Roof leaks and needs to be fixed Wet fire suppression system needs to be upgraded Some portions of raised floor require refurbishment
NWRDC	Pro's	Tier 2 Infrastructure in purpose-built building Participatory customer-based governance board Desire and willingness to house additional State workload
	Con's	Just getting into Windows and Unix space
DOC	Pro's	Well-run and well-maintained center Significant unused floor space Potential for expansion to about 6,000 sq. ft.
	Con's	Located in leased State office building on second floor Would require additional power capacity and construction to expand Tier 1 infrastructure
FDLE	Pro's	Well-maintained center; Tier 1+ Infrastructure (UPSs not redundant) Excellent focus on physical/logical security 24/7 operations staff support
	Con's	Very limited expansion capability Expansion would require construction and would most likely not be contiguous Very little unused capacity (power or space)
DFS Fletcher	Pro's	Well-maintained, older mainframe-centric data center Some unutilized capacity (space and power)
	Con's	Located in downtown area, very close to railroad tracks Located in >30-year-old building Many elements of building infrastructure are 25–30 years old
DOT HQ	Pro's	Well run facility, capacity aligned to agency's needs In process of consolidating servers with a two-year plan for completion Excellent DR plan for catastrophic events
	Con's	Older data center; UPSs are past expected life Very full; limited room for another agency's equipment
DEP Annex	Pro's	Bunker-type building with significant set-back from other structures Two walls of data center abut a records warehouse, which could be relocated to provide up to 15,000 sq. ft. of expansion space Most of the existing data center infrastructure is new—purchased within the past several years
	Con's	Flywheel UPS Smallish current footprint (2,200 sq. ft.)

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Facility		Comment
HSMV	Pro's	8,000+ sq. ft. facility 24/7 operations staff
	Con's	Very old infrastructure, which has not been well-maintained Much of the existing data center infrastructure has reached end of life and will need to be replaced Communications room is 150+ feet away from data center Electrical room is co-located with >25-year-old oil-fired boilers; this space is also utilized by facilities personnel as a machine shop Boiler room is adjacent to data center floor as well
DOR Carlton	Pro's	Significant unutilized space and power capacity
	Con's	Building is slated for shutdown and possible sale in 2–3 years
DACS Mayo	Pro's	None noted
	Con's	Very full from a space perspective, although there is a second raised floor space which was removed from data center use several years ago; approximately one-half of raised floor space is filled with office cubicles Very old infrastructure and building Utilized non-enterprise-class UPS, which resides on the data center floor

In addition to the Gartner-developed criteria, Gartner also utilized the guidelines from the Uptime Institute to categorize the data centers according to their probable "tier rating." A summary of those ratings is presented in Table 22. Also, please refer to www.uptimeinstitute.com for more information on its "tier" standards and specifications.

Table 22. Uptime Institute Standards

Description	Redundancy	Downtime	Relative Cost	Florida DCs
Tier 4 Fault Tolerant	"N+2" for all components	0.8 hours PY 1 unplanned event per five years (HE)	$17–19M	None in this Category
Tier 3 Concurrently Maintainable	"N+1" capacity and distribution paths	1.6 hours PY 1 unplanned per 2.5 years	$15–17M	SRC is close
Tier 2 Redundant Capacity	"N+1" capacity Single distribution path	20 hours PY 0.5 planned and 1 unplanned	$9.5–11M	DFS Fletcher, DCF Northwood, NWRDC
Tier 1 Basic Site Infrastructure	No redundant components	30 hours PY 2 planned and 1.2 unplanned	$8.5–10M	Most other FL data centers
Tier 0 Less than a Data Center	No generator, limited UPS, "building" cooling	40+ hours PY Many unplanned outages	N/A	Field offices, server rooms

Based on our assessment of the most significant State data center facilities that we have visited, we grouped facilities into three categories based on their ability to become a target data center for a State-wide consolidation effort.

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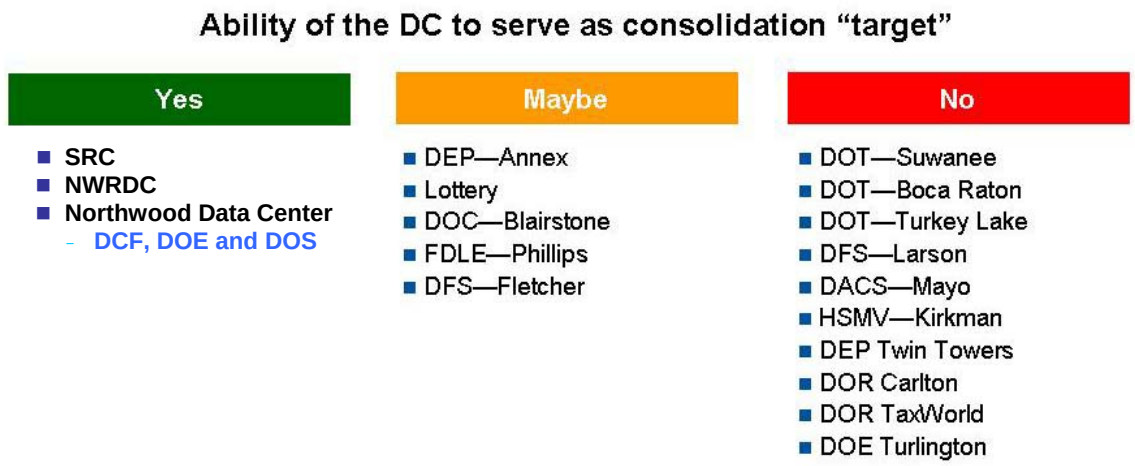
- Those with a solid infrastructure and either idle capacity or the potential to be significantly upgraded are listed in Figure 23 as Green/Yes. The State should strongly consider these as potential consolidated data centers.
- Those in the Yellow/Maybe category generally have a good infrastructure; some of these sites have risk issues such as a poor location, aging infrastructure or other issues such as the uniqueness of their operations or policy and mandate issues. These sites can be potential sites for data center consolidation, if necessary, once the State has conducted a review and addressed the site's risk factors or other business or policy issues that impact their potential as a data center consolidation site.
- Those in the Red/No category do not have the capacity or infrastructure to become a consolidation target. The State should not consider these data centers as potential consolidated data centers unless it is prepared to accept significant additional outage risks and/or make significant investments in upgrading these facilities.

Figure 23. Consolidation "Targets"



6.3 Target Data Centers—Gartner Recommendation

To complete the financial analysis for *Scenario 2: Leverage Existing Facilities*, Gartner was required to select a minimum set of existing data centers which either had the capacity (power, space and cooling) to support the entire in-scope "to be" consolidated workload or which we believed could be cost-effectively upgraded or expanded to be able to do so.

Based on the required workload and the facilities, Gartner believes that the entire workload can be accommodated by the SRC, the NWRDC and the Northwood data center. To provide a level of contingency, we added the DEP Annex data center to this list of consolidated centers included in the Scenario 2 financial analysis. We included the DEP Annex largely because of its potential to be expanded to be a 15,000–20,000 sq. ft. facility if the existing warehouse located on the second floor of the Annex building were to be displaced to another location.

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6.4 Target Data Centers—Other Comments

During the data center facility evaluation process, most of the departments made a concerted effort to convince the Gartner team that they had special requirements which made them wholly unsuitable to be housed in a consolidated State data center. While some of the departments' concerns around funding, staffing, level of control, service levels, flexibility and security may be justified based on Florida's recent history with State data center consolidation efforts, Gartner feels that most of these are based on fear or uncertainty, and can be addressed during the consolidation planning process. There were a few potential exceptions.

Gartner agrees that the Florida Lottery data center and the data centers supporting the Florida Turnpike are different in that they support revenue-generating "enterprises" rather than general government functions, and therefore have different requirements. We further noted that there are some advantages to having the Turnpike data centers located alongside the Turnpike (improved access to the Turnpike's fiber-based network and the ability to use this network to replicate data to an off-site location that is also located along the Turnpike. Neither of these existing data centers should be considered for initial consolidation targets. However, once a network of State data centers has been established, the State may wish to consider whether the added cost of maintaining separate data centers for these enterprises is justified. In addition, the Lottery data center facility is in a two-story building with 15,000–20,000 sq. ft. of warehouse space that could be a potential for expansion, if the State needed to consider this facility a candidate for a consolidated site.

Among the other government agencies reviewed, only the FDLE made a convincing argument that it had critical requirements which **might** make it problematic for it to participate in a shared data center environment.

As part of its core law enforcement mission, FDLE is the major provider of sensitive criminal justice information to most State and local law enforcement agencies within the State of Florida. In essence, FDLE provides a criminal justice "extranet" that connects police departments, sheriff's offices and other State agencies together and allows them to securely share local, State and federal criminal justice data. While it is possible to do this in a shared data center environment, it is likely that FDLE will have special needs that will need to be accommodated by the State data center. Today FDLE utilizes the MyFlorida.net network for connectivity, but (unique among agencies) administers its own routers to ensure tight control over security and compliance with FBI and other federal regulations. A similar model in a State data center may be possible.

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Alternative Analysis

7.0 Alternative Scenarios Considered

This section describes key attributes of the three scenarios which Gartner included in the financial modeling analysis undertaken by the Gartner team across the scenarios. The three scenarios are:

- Scenario 1: Status Quo
- Scenario 2: Leverage Existing Facilities
- Scenario 3. Leverage New Data Center Consolidation

Following a brief description of each scenario, there is a comparison of key metrics that highlight some differences and similarities among the various scenarios. For a discussion of the detailed financial modeling assumptions that differentiate the scenarios, please refer to the Appendix of this report.

Before discussing the differences between the three scenarios, it is important to understand a foundational assumption that is critical to the achievement of the savings described by the financial analysis.

Figure 24 on the next page describes Gartner's view of the different types of data center and server workload consolidation that are possible. In general, Gartner recognizes six different types of consolidation. These are briefly described as:

1. **Logical Consolidation—**this is the consolidation of the people responsible for managing the different workloads into a common organization structure which will allow them to achieve economies of scale and to coalesce around a common set of hardware, software, management tool and operational process standards and practices.
2. **Physical Consolidation—**this is the physical consolidation of different IT workload currently located in many physical facilities into a smaller number of data center facilities. Physical consolidation benefits are often difficult to achieve until a logical consolidation has been completed. The experience that the State has had with the operation of the SRC is a good example of what can happen when physical consolidation occurs without also consolidating the people and organizations that own the IT workload.
3. **Storage Consolidation—**this typically involves migrating storage from server-attached disk arrays to large collections of network-based storage devices. It also typically involves standardizing methodologies, policies and tools used for backup, archiving and replication of critical data.
4. **Virtualization—**this typically involves introducing a new virtualization layer into the data center architecture which allows multiple "logical severs" or operating system instances to share a single physical (hardware) server. Typically this type of consolidation is done to reduce future hardware expenditures and to increase agility.
5. **Non-strategic Server Rationalization—**this typically involves reducing the number of e-mail, file/print, collaboration, intranet and infrastructure servers by combining "like" workloads from different organizations onto the same hardware platform.
6. **Strategic Server Rationalization—**this typically involves consolidating application and database servers onto common hardware platforms.

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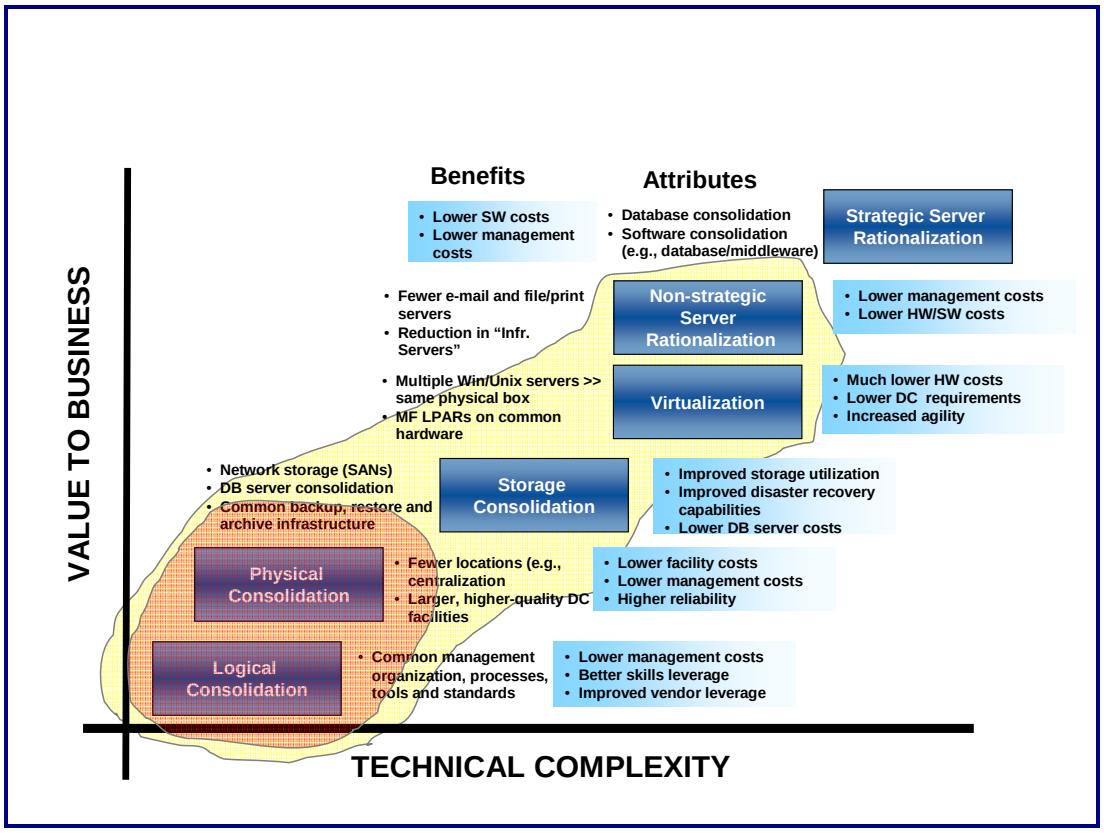
Figure 24. Conceptual Gartner Diagram Describing the Different "Levels" of Consolidation



The primary focus of the State of Florida consolidation effort is on logical and physical consolidation. There is a secondary focus on virtualization, storage consolidation and non-strategic server rationalization. The physical consolidation should be used as an inflection point for making progress in all three of these areas.

Figure 25 below illustrates how both physical and logical consolidations are required to achieve the savings outlined in the financial analysis. Both consolidation scenarios presume that the staff resources from the in-scope department who were identified by the departments as being responsible for the management of the in-scope data center facilities and the IT equipment (servers, storage, security, network and so on) contained within them will be consolidated into a centralized shared services organization that will take on responsibility for providing data center services currently provided by each department's IT organization.

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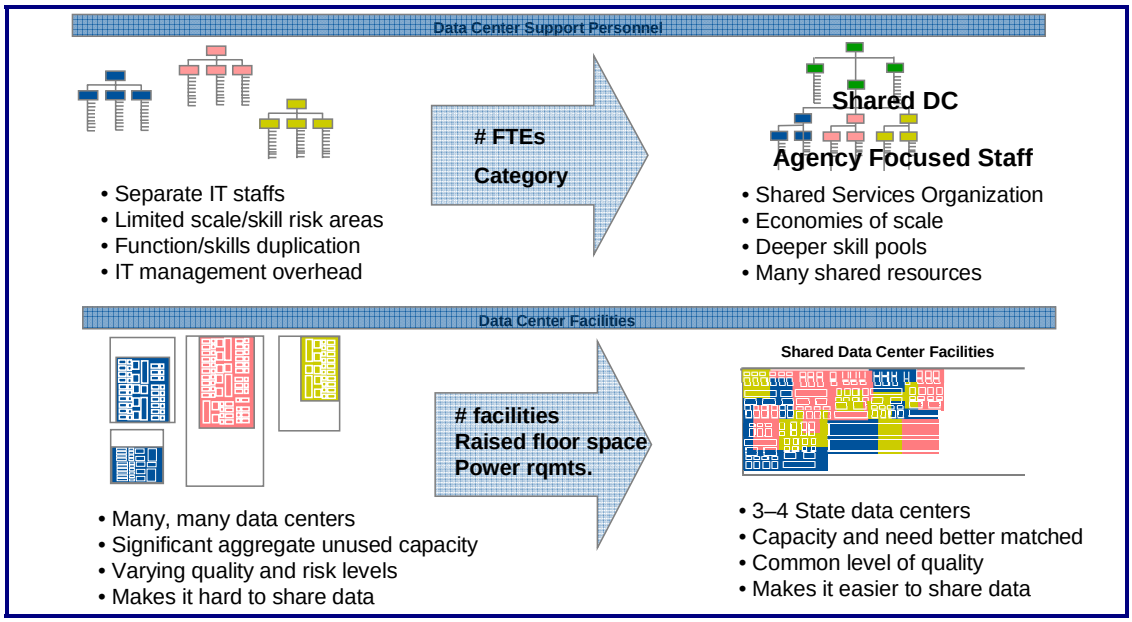
Figure 25. Conceptual Diagram Describing Logical and Physical Consolidation Concepts



7.1.1 Status Quo—Scenario 1

The status quo scenario represents the "no change" option and is also presented as a baseline for comparison of savings or cost avoidance from the current situation. As used in this report, savings would be savings from the baseline 2008–2009 Fiscal Year budget. Cost avoidances are the difference between the status quo modeled cost and any of the other alternatives. It is anticipated that the majority of "savings" from either consolidation strategy are in fact cost avoidance.

The following pages include:

- Figure 26, which provides a conceptual overview of the scenario from a data center facilities perspective.
- Figure 27, showing the relationship between estimated spending and the projected server workload. When reviewing this information, keep in mind that Mainframe and other legacy server platforms are not included in the server count.
- Figure 26 displays the amount of data center capacity that will be maintained under the scenario and contrasts this with the projected power consumption.

Under Scenario 1, it is worth noting that very little additional build-out is required. <u>However, under this scenario, the State will be required to maintain approximately 70% more data center capacity than will be required during the next 11 years</u>. It is also worth noting that a significant portion of this data center capacity is of low quality.

The status quo model is not a static snapshot of a specific point-in-time. Factors such as workload growth, virtualization, capacity build-out and salary inflation are all assumed to continue in the Status Quo model.

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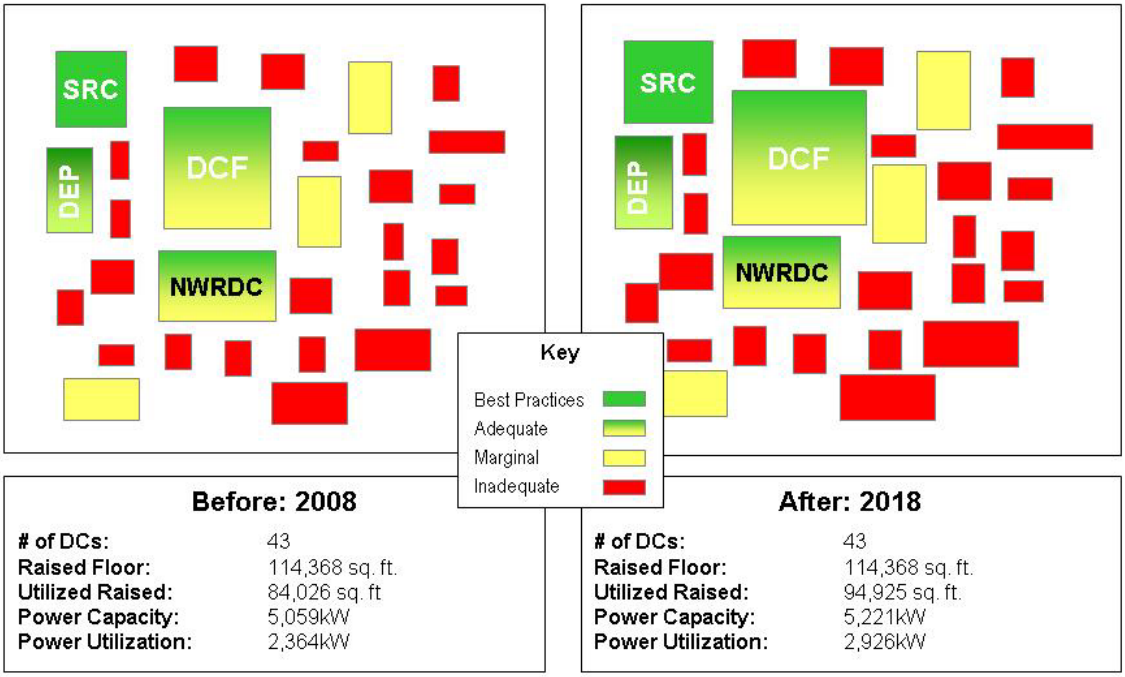
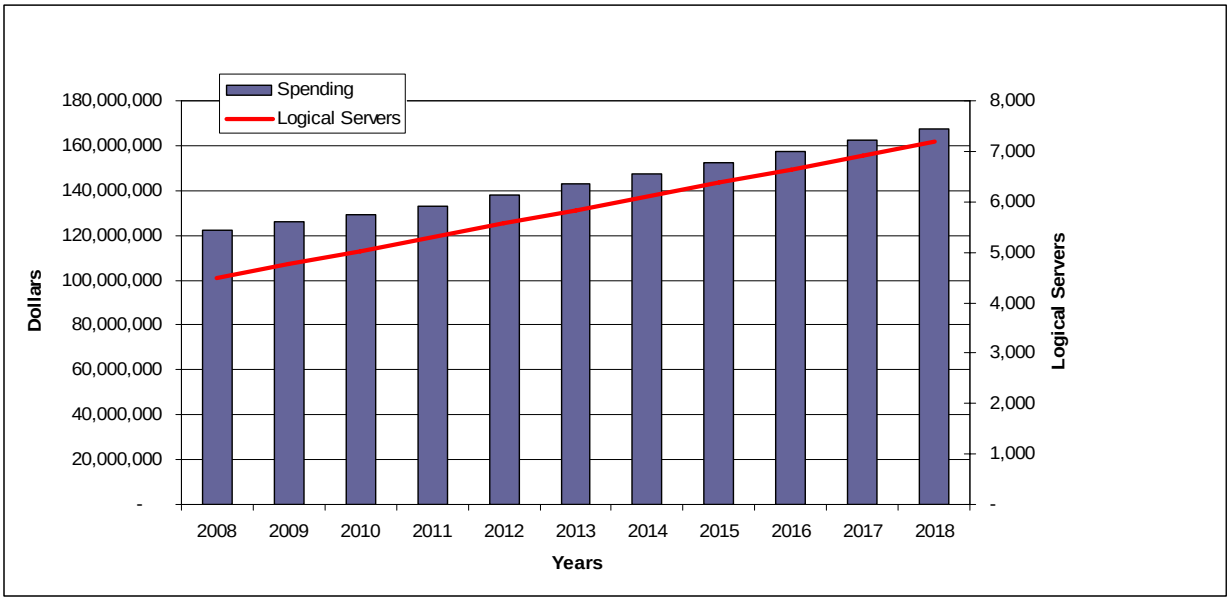
Figure 26. Conceptual Model of Scenario 1: Status Quo



Note: Data provided above did not include power and space for NWRDC and power capacity for DEP BMC (DEP BMC is moving over to DEP Annex).

Figure 27. Comparison of Spending and Logical Server Growth



Note: The spending shown covers all workload such as X86, Unix, Mainframe, etc. It differs slightly from results in the Benchmarking section due to Network cost.

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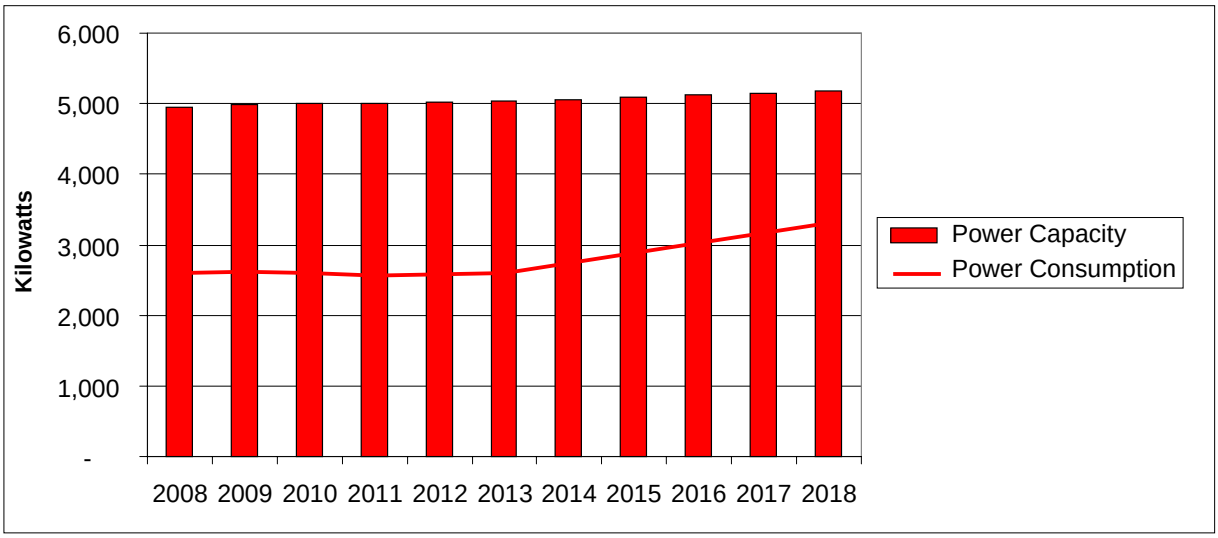
Figure 28. Scenario 1: Power Capacity vs. Power Utilization



7.1.2 Leverage Existing Facilities Consolidation—Scenario 2

In the Leverage Existing Facilities Consolidation scenario, the workload will be housed in three existing computer facilities—DCF (Northwood data center), SRC and NWRDC. Under this scenario, the State would end up with three, or possibly four, consolidated data centers housing all the in-scope workload. **Note:** According to Gartner's analysis, with upgrades, the three largest surviving data centers can handle current and projected workload through 2018. The current DEP center is assumed to be reserved to provide a level of contingency in case the upgrades are not feasible or do not yield the anticipated extra capacity.

Figure 29 provides a conceptual overview of the scenario from a data center facilities perspective. Figure 30 shows the relationship between estimated spending and the projected server workload. The total number of legacy servers not included in Figure 29 is 18; this includes nine "other servers" reported by three agencies and nine "iSeries" servers reported by two agencies. Figure 31 illustrates the amount of data center capacity that will be maintained under the scenario and contrasts this with the projected power consumption. Under Scenario 2, it is worth noting that the consolidation effort will bring data center capacity more in line with consumption patterns. It is also worth noting that, under this scenario, the quality of data center facilities will be raised significantly. The consolidation facilities will all have been upgraded to Tier 2+ data centers and the power and cooling capabilities will have been raised above those available at the current computing facilities.

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Figure 29. Conceptual Model of Scenario 2: Leverage Existing Facilities

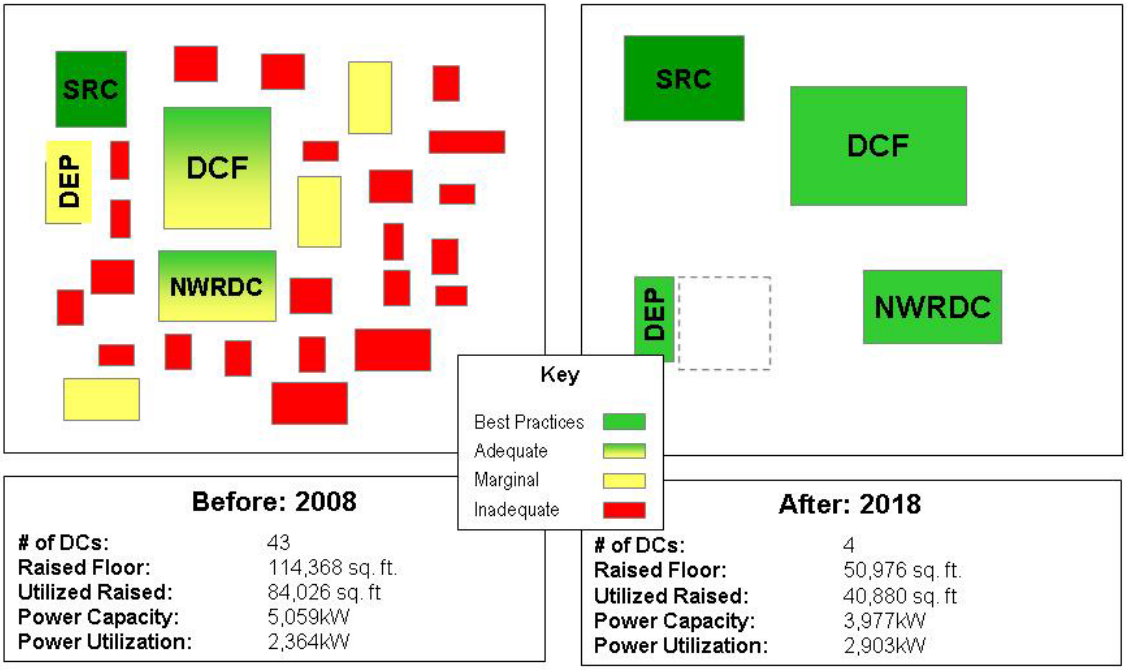

Figure 30. Scenario 2: Leverage Existing Facilities

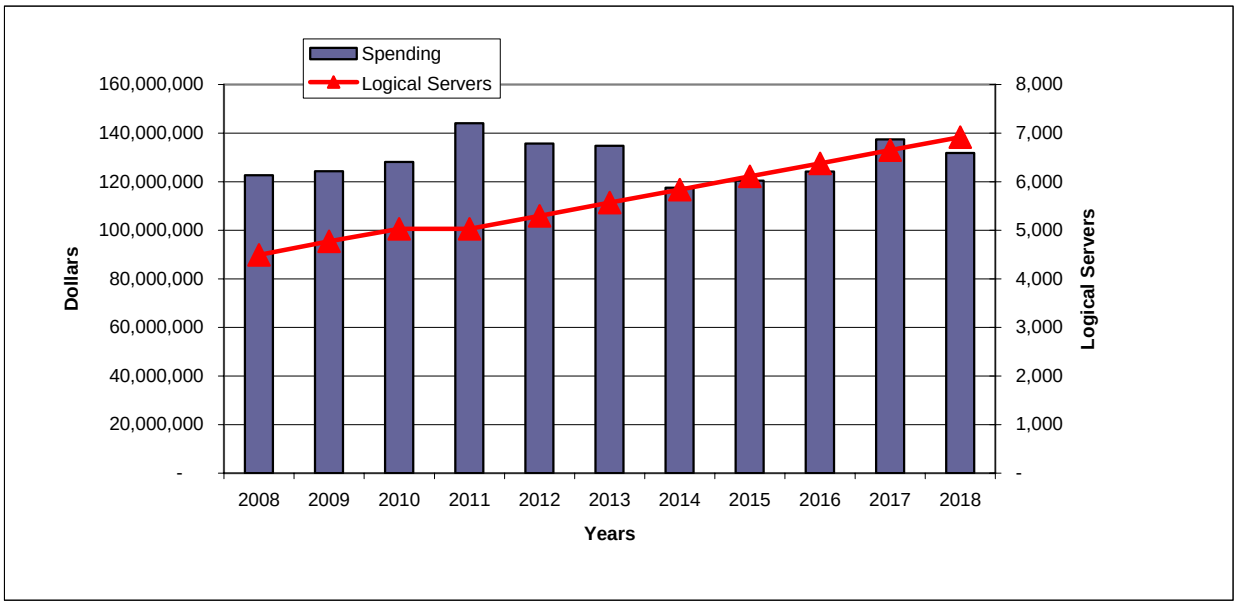

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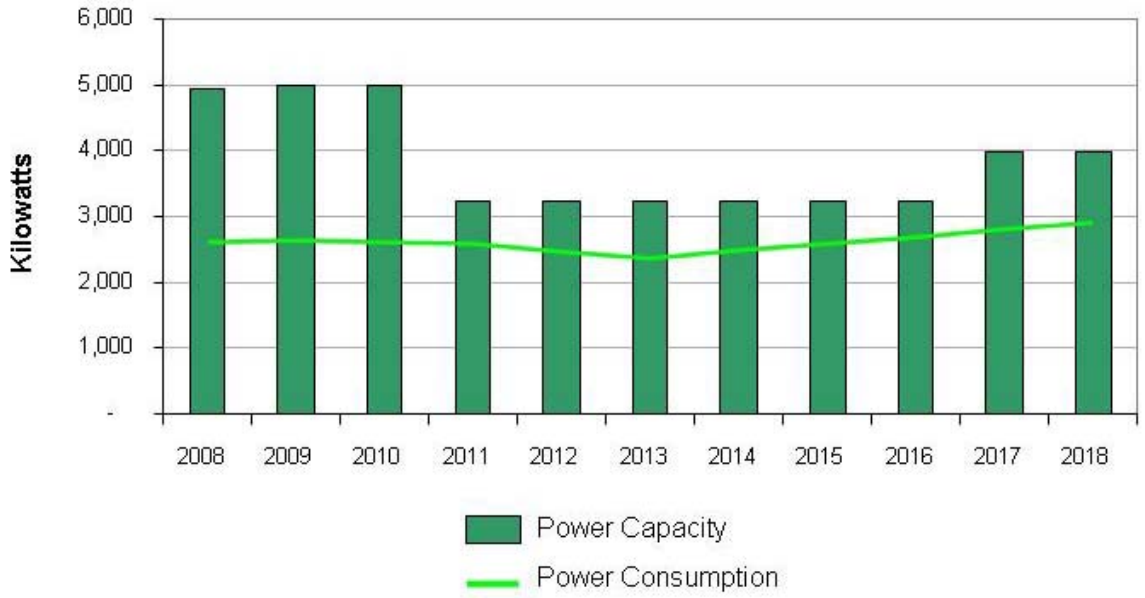
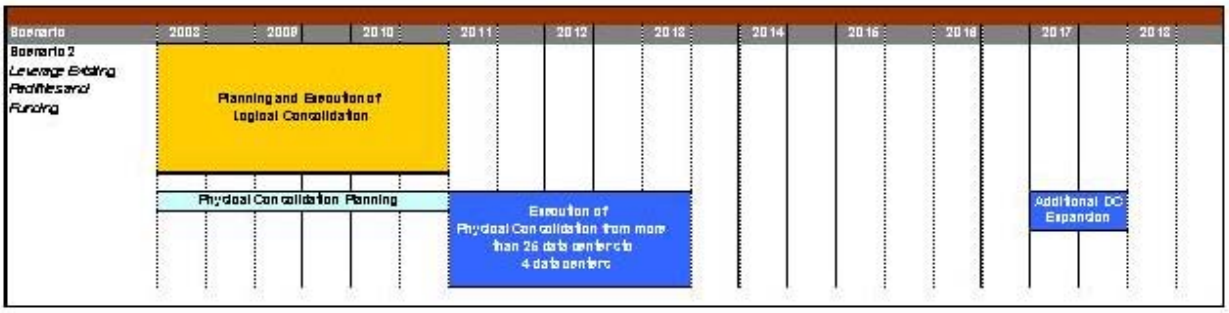
Figure 31. Scenario 2: Power Capacity vs. Power Utilization



Timing is an important element of any consolidation. Figure 32 illustrates the timing that was assumed by the Gartner model. Those assumptions are further documented below and in the Appendix of this report.

- At the request of the Senate, Gartner assumed that no major spending on consolidation would occur for the next three budget years. The first significant spending will not occur until FY 2011–12.
- Gartner assumes that the State will form a consolidation planning effort and Program Management Office, and will engage in planning for the consolidation effort.
- Gartner assumes that it will take the State approximately three years to complete the consolidation and that upgrades to the four (4) surviving data centers can be accomplished during the same period.
- Based on these factors, the consolidation will not be fully completed for six years, or until FY 2014–15. This is the first year that the Gartner financial model accrues full consolidation savings.

Figure 32. High-Level Timing and Phasing of Scenario 2 Consolidations



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7.1.3 Leverage a New Data Center—Scenario 3

The Leverage New Data Center Consolidation environment is modeled assuming all in-scope workload will be consolidated in two sites. In this scenario, the workload will be housed in an upgraded/expanded SRC facility and a new Tier 2+ data center (to be built).

Figure 33 provides a conceptual overview of the Scenario from a data center facilities perspective. Figure 34 shows the relationship between estimated spending and the projected server workload. When reviewing this information, keep in mind that Mainframe and other legacy server platforms are not included in the server count. The total number of legacy servers not included in Figure 33 (below) is 18; this includes nine "other servers" reported by three agencies and nine "iSeries" servers reported by two agencies. Figure 35 illustrates the amount of data center capacity that will be maintained under the scenario and contrasts this with the projected power consumption. Under Scenario 3, it is worth noting that the consolidation effort will bring data center capacity more in line with consumption patterns. It is also worth noting that, under this scenario, the quality of data center facilities will be raised to a "best practice" level.

Figure 33. Conceptual Model of Scenario 3: Leverage New Data Center Consolidation

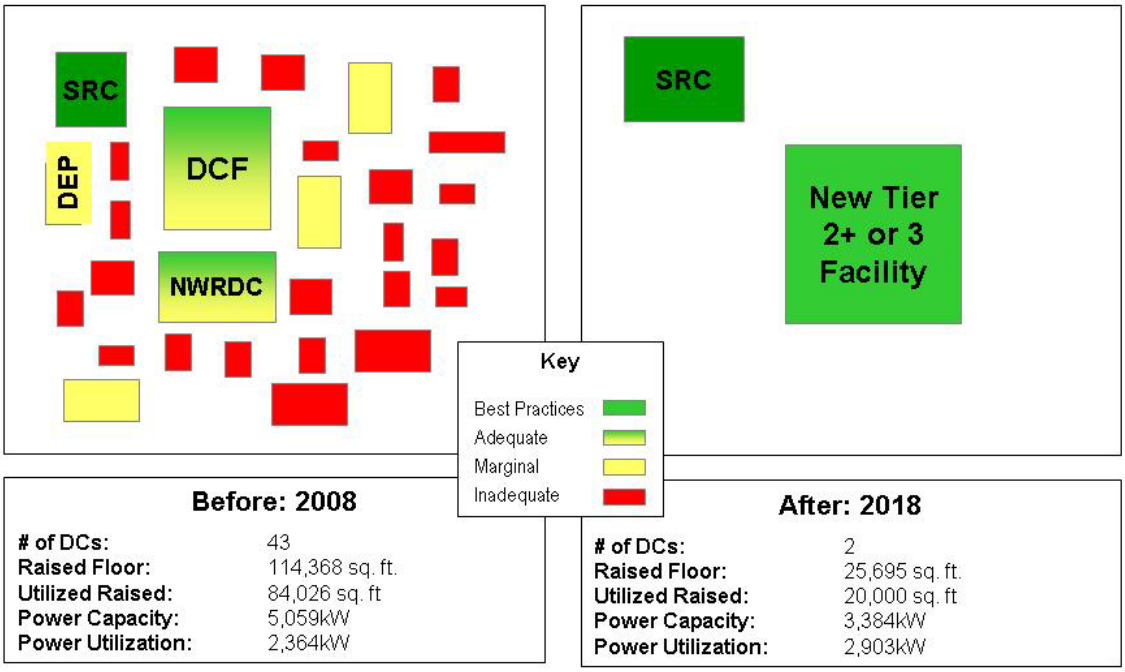

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Figure 34. Scenario 3: Leverage New Data Center Consolidation—Comparison of Spending and Logical Server Growth

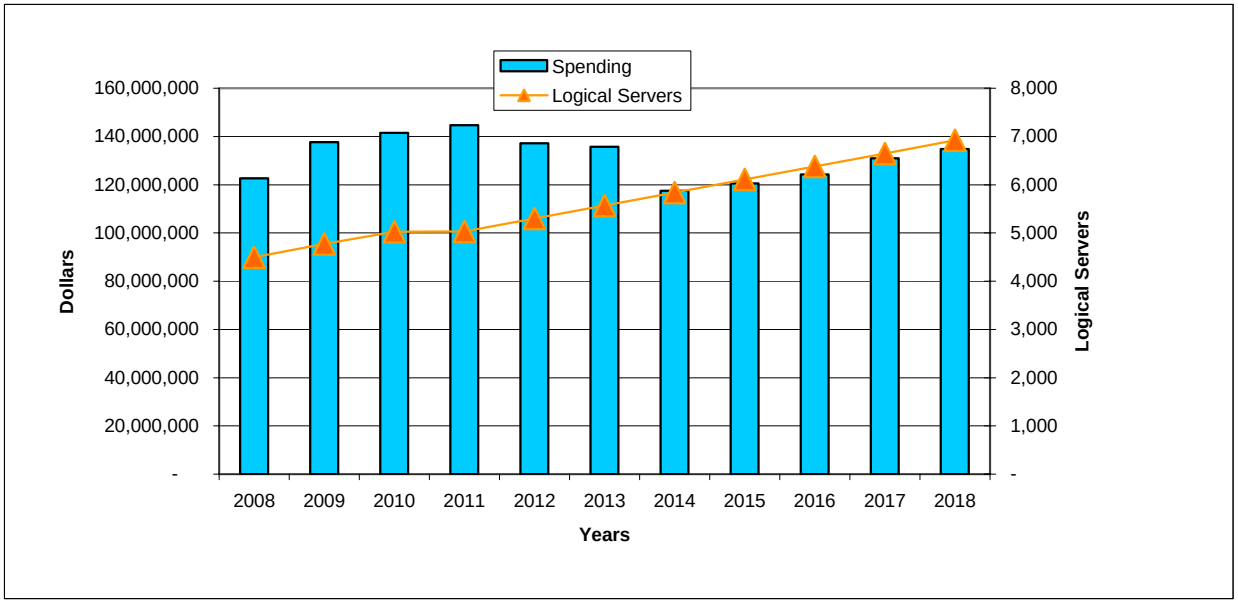
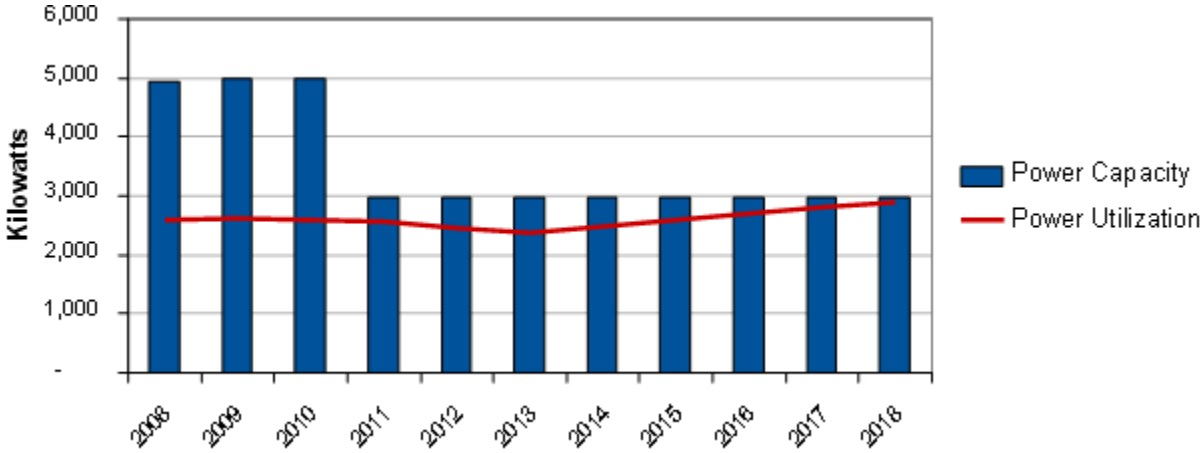


Figure 35. Scenario 3: Power Capacity vs. Power Utilization



Timing is an important element of any consolidation. Figure 36 illustrates the timing that was assumed by the Gartner model. Those assumptions are further documented below and in the Appendix of this report.

- Under this scenario, Gartner did not assume that there was a limitation on investment spending during the next three budget years.
- Gartner assumes that the State will require the rest of this FY and all of FY 2008–9 for planning, including picking a site for the new data center and arranging to acquire the land. Beginning in 2009–10, Gartner assumes that the State will break ground on construction and that the construction process will take 24 months. At the end of the construction process, Gartner assumes that an additional six months will be required to build out and test the IT infrastructure (Local-Area Network [LAN] and WAN, wiring and

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security elements) that is required to be operational before workload can be consolidated into the new data center.

- Gartner assumes that power and space upgrades to the SRC will be done in parallel with the build-out of the new data center.
- Under this schedule, the new center and SRC are assumed to be operational and ready to begin receiving consolidated workloads starting in FY 2011–12.

Figure 36. High-Level Timing and Phasing of Scenario 3 Consolidations

7.1.4 Comparison of Key Workload and Financial Metrics Across Scenarios

The charts in this section of the report highlight key differences and similarities among the three scenarios. Scenarios 2 and 3 are very similar in terms of their assumptions regarding how workload grows and is consolidated. Even the timing of the consolidations (coincidentally) is very similar.

Figure 37 shows that there is not much difference in the growth rates associated with the workload or the level of virtualization that is planned across the three scenarios. As can be seen from below, the Status Quo scenario and both consolidation scenarios assume that a high degree of server virtualization will occur during the next five to 10 years.

Figure 37. Comparison of Server and Virtualization Rates

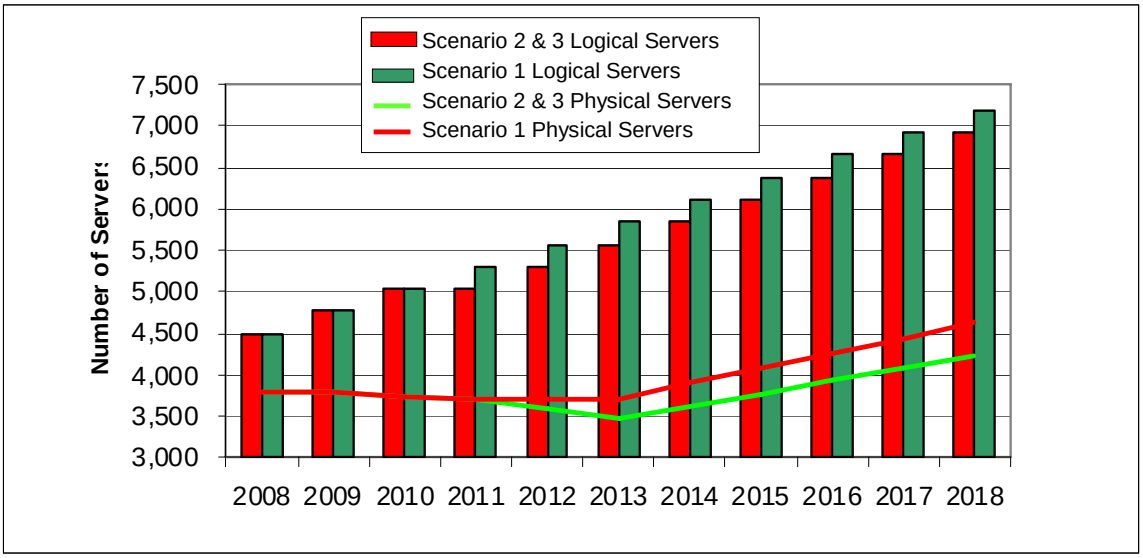

Figure 38 below shows that there is a significant difference in the amount of IT spending that will be required under the Status Quo scenario than would be required under either of the

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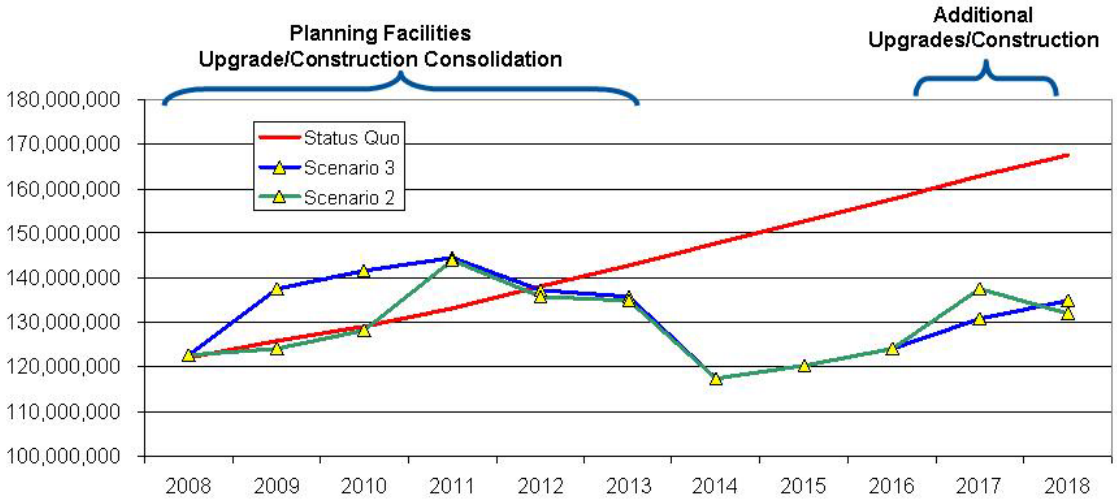
consolidation scenarios. This figure also illustrates that investment is required to get to the lower spending levels. However, the amount of savings available after the consolidation has been completed (2014) is significant.

Figure 38. Spending Comparison by Scenario



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	122,058,189	125,942,041	129,160,612	133,265,379	137,970,329	142,797,849	147,643,293	152,560,821	157,554,543	162,749,792	167,499,090
Scenario 2	122,692,045	124,271,593	128,124,020	144,059,118	135,696,397	134,803,009	117,532,044	120,482,745	124,219,789	137,398,531	131,896,280
Scenario 3	122,692,045	137,663,590	141,516,017	144,610,451	137,179,330	135,805,400	117,532,044	120,482,745	124,219,789	130,898,531	134,771,280

From this analysis it is clear that, through data center consolidation, the State can achieve savings, through direct savings and cost avoidance, in the operations of the State's data centers and can strengthen the State's IT infrastructure to support more-efficient and effective enterprise operations. Spending less than the Status Quo and providing for the optimization of the State's IT operations makes data center consolidation a viable option for Florida.

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Financial Analysis

8.0 Financial Analysis

This section of the report describes the results of the financial modeling analysis that was applied by the Gartner team. We leveraged existing data center consolidation models which were significantly customized and extended for the State of Florida to produce these results. The results are explained in this section. The models used to create the results, along with critical inputs and assumptions, are described in more detail in the Appendix of this report.

Gartner's financial analysis is based on a model that forecast workload and workload-driven costs out to Year 2018. Three scenarios are modeled:

- Scenario 1: Status Quo
- Scenario 2: Leverage Existing Facilities
- Scenario 3: Leverage New Data Center
- The different scenarios are described in more detail in Section 7.

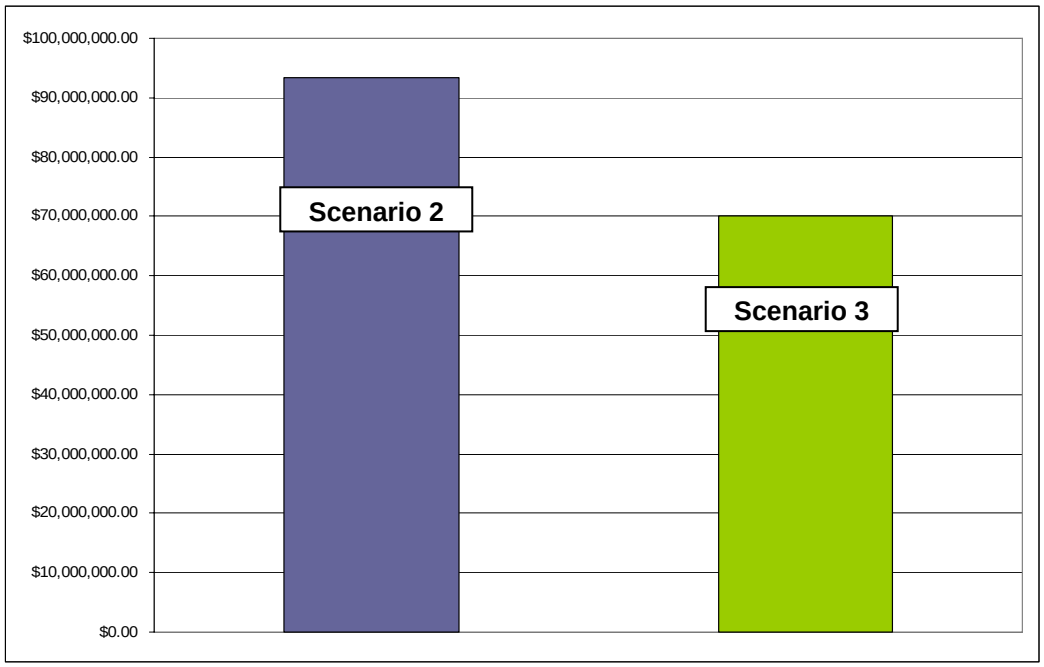
8.1 Financial Analysis Summary

Both consolidation scenarios show significant long-term cost avoidance when compared to the Status Quo model.

Assuming a discount rate of 6% over the 11-year period modeled by Gartner, the NPV of the savings is shown below and in Figure 39:

- Scenario 2: $93.3 million
- Scenario 3: $70.0 million

Figure 39. NPV of the Savings Associated with Consolidations Over 11 Years (6% discount rate)



In Gartner's opinion, the NPV associated with Scenario 2 is understated, because the timing of when the savings could be achieved has been pushed off an additional two years as a result of

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the Senate's desire to avoid investment spending for the next three (3) budget years. If we calculate the NPV of the savings starting in 2010-11 rather than 2008-9, the savings number increases by approximately $11 million (~11%) to $103.87 million.

If the time frame of the NPV is reduced to seven (7) years, some of the results change. The seven-year NPV of savings associated with Scenario 2 is $20.5 million. A positive value indicates that this is still a good investment. The seven-year NPV of savings associated with Scenario 3 is a negative $4.8 million. A negative value indicates that this is **not** a good investment over this time period. The reason for this is mainly based on timing required to plan the actual consolidation implementation. In Gartner's model, it takes one year to plan for the consolidation, three years to build the new center and three years to complete the consolidation. It is not until the seventh year that the full savings from the consolidation are realized.

8.2 Savings Analysis

Figure 40 shows a comparison of the savings potential of the two different consolidation scenarios. We can see from this graph that the long-term savings potentials are similar, but that there are significant differences in the initial outlays required to achieve these savings.

Figure 40. Comparison of Savings Potential of the Consolidation Scenarios

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Scenario 2	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810
Scenario 3	(633,856)	(11,721,548)	(12,355,404)	(11,345,072)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

Figure 41 shows the savings associated with *Scenario 2: Leverage Existing Facilities.* As requested by the Senate, consolidation activities requiring significant outlays of incremental funding are avoided for budget years 2008–9, 2009–10 and 2010–11. Because this scenario leverages existing State data center facilities that currently have significant excess capacity, it is possible to assume that the cost of upgrading these facilities to support the "to be" consolidated workload can be spread over the three-year consolidation period. It is also reasonable to assume that transition-related costs (e.g., equipment moves, LAN build-out, mainframe rationalization) can be spread over this period as well). In this scenario, savings are assumed to begin to accrue as workload is converted to the lower-cost consolidated model. The model's

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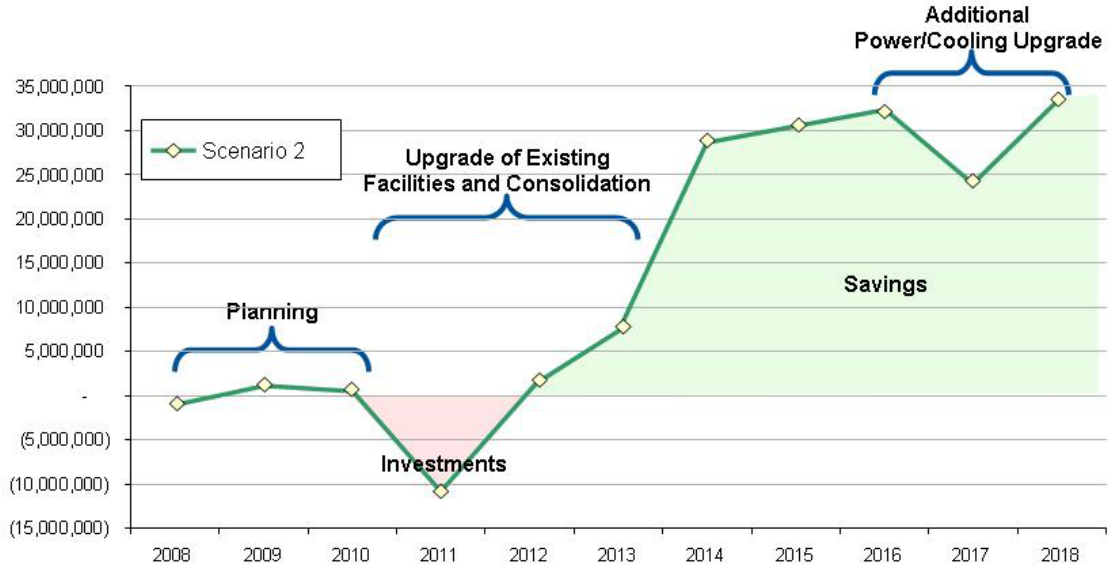
conservative assumption is that 15% will be moved over by the end of the first year, 50% by the end of the second year and the remainder by the end of the third year. There is a brief dip in savings in 2017 because this is the year that the model predicts additional power and cooling capacity will need to be built out in one of the four consolidated facilities.

Figure 41. Savings for Scenario 2



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Scenario 2	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810
Scenario 3	(633,856)	(11,721,548)	(12,355,404)	(11,345,072)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

Table 23 shows the breakdown of savings by department. The savings represent the difference between the scenario recurring cost and the status quo recurring cost. It also shows a breakdown of one-time expenses and other items that affect the net savings that can be realized. In looking at the breakdown of spending by department, it appears that some departments may not realize cost savings from the consolidation. This is to be expected, as we described in the Benchmarking section; some agencies have costs that are significantly less than the peer groups and, as a result, they will not participate in savings to the same extent as the agencies with higher cost.

The items broken out at the bottom of Table 23 fall into two categories: the first is short-term savings, the second is one-time costs. Short-term savings refers to savings that the Gartner benchmark revealed when each department was compared with a “peer group” running a similar workload. The benchmark analysis revealed a $13,020,355 savings potential. The financial analysis assumes that 25% of this is realizable starting in 2008–9. This amounts to less than 3% of the total in-scope data center budget.

The one-time costs are broken down into four categories: mainframe transition costs, surviving data center build-out costs, IT equipment relocation/build-out cost, and data center PMO cost. These items are defined at a high level below. The identified savings provide a significant return on investment for these four categories of costs through the DCC life cycle. For a more detailed understanding of the specific calculations and inputs, please refer to Section 9 of this report.

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- Mainframe transition costs—these are the people and hardware costs associated with consolidating the existing 10 mainframe environments down to one or two environments.
- Surviving data center build-out costs—these are the costs associated with upgrading and expanding the power, cooling and space capacity of the four (4) consolidated data centers.
- IT equipment relocation/build out cost—these are labor costs associated with executing the move of the in-scope equipment from its current data center to one of the four (4) consolidated data centers. It also includes the cost of building out a LAN infrastructure at the consolidated data centers to support the new equipment.
- Data center PMO cost—these are labor costs associated with planning and managing the overall consolidation effort. A mixture of internal and external (contract) resources is assumed.

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Table 23. Savings for Scenario 2 Summarized by Department

Agency or Transition Cost Element	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DACS	0	0	0	(29,789)	(88,910)	(158,491)	(314,355)	(311,602)	(306,958)	(293,114)	(302,576)
DBPR	0	0	0	(22,577)	(74,128)	(146,728)	(307,931)	(322,742)	(337,900)	(353,417)	(369,305)
DCF	0	0	0	406,841	1,478,069	3,200,768	6,800,526	7,202,828	7,608,501	8,017,873	8,430,204
DEP	0	0	0	122,490	464,831	1,042,767	2,278,226	2,471,144	2,664,295	2,857,684	3,051,319
DFS	0	0	0	678,030	2,389,595	5,036,649	10,475,244	10,882,133	11,294,121	11,711,367	12,134,037
DMS	0	0	0	160,531	572,654	1,218,784	2,507,175	2,578,836	2,652,609	2,779,785	2,806,735
DOC	0	0	0	65,240	241,337	529,909	1,129,913	1,200,978	1,273,036	1,346,112	1,420,230
DOE	0	0	0	(95,688)	(334,101)	(699,833)	(1,527,164)	(1,652,761)	(1,776,392)	(1,897,779)	(2,042,695)
DOR	0	0	0	73,066	258,801	546,627	1,096,806	1,100,544	1,104,465	1,134,851	1,112,854
DOS	0	0	0	106,810	384,523	824,958	1,717,298	1,785,434	1,854,346	1,930,203	1,994,594
DOT	0	0	0	152,822	556,414	1,205,971	2,505,052	2,603,097	2,706,239	2,814,650	2,928,502
DOH	0	0	0	(68,200)	(184,570)	(286,718)	(542,101)	(510,840)	(479,671)	(427,294)	(417,686)
FDLE	0	0	0	29,270	168,304	498,537	1,114,705	1,225,268	1,328,508	1,424,164	1,266,528
HSMV	0	0	0	76,713	264,360	544,145	1,047,364	1,004,732	960,319	918,758	865,843
AWI	0	0	0	(27,834)	(92,701)	(185,903)	(402,717)	(434,060)	(465,854)	(492,672)	(530,863)
Savings before Consolidation Costs	0	0	0	1,627,727	6,004,477	13,171,443	27,578,042	28,822,987	30,079,665	31,471,172	32,347,721
Short-Term Savings	0	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089
Mainframe Transition Cost	0	0	0	(816,480)	(1,905,120)	(2,721,600)	0	0	0	0	0
Surviving Data Centers Build Out Cost	0	0	0	(11,415,000)	0	0	0	0	0	(9,375,000)	0
IT Equipment Relocation/Build Out Cost	0	0	0	(1,226,579)	(2,862,018)	(4,088,598)	0	0	0	0	0
Data Center PMO Cost	(633,856)	(1,584,640)	(2,218,496)	(2,218,496)	(2,218,496)	(1,621,494)	(721,882)	0	0	0	0
Total One-Time Cost	(633,856)	(1,584,640)	(2,218,496)	(15,676,555)	(6,985,634)	(8,431,691)	(721,882)	0	0	(9,375,000)	0
Total Savings	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810

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Table 24 shows the savings for Scenario 2 summarized by Schedule IV-C Category. They are broken out by strategic (e.g., mission- or program-specific services) vs. non-strategic (e.g., common IT services such as e-mail, file/print, etc.).

Table 24. Savings for Scenario 2 Summarized by Schedule IV Category

Schedule IV-C Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Strategic IT Spending	0	0	0	1,079,557	3,941,015	8,571,413	17,972,038	18,815,311	19,674,277	20,632,626	21,297,883
Non Strategic IT Spending	0	0	0	548,170	2,063,462	4,600,031	9,606,004	10,007,676	10,405,388	10,838,546	11,049,838
Savings before Consolidation Costs	0	0	0	1,627,727	6,004,477	13,171,443	27,578,042	28,822,987	30,079,665	31,471,172	32,347,721
Short-Term Savings	0	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089
Mainframe Transition Cost	0	0	0	(816,480)	(1,905,120)	(2,721,600)	0	0	0	0	0
Surviving Data Centers Build Out Cost	0	0	0	(11,415,000)	0	0	0	0	0	(9,375,000)	0
IT Equipment Relocation/Build Out Cost	0	0	0	(1,226,579)	(2,862,018)	(4,088,598)	0	0	0	0	0
Data Center PMO Cost	(633,856)	(1,584,640)	(2,218,496)	(2,218,496)	(2,218,496)	(1,621,494)	(721,882)	0	0	0	0
Total One-Time Cost	(633,856)	(1,584,640)	(2,218,496)	(15,676,555)	(6,985,634)	(8,431,691)	(721,882)	0	0	(9,375,000)	0
Total Savings	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810

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Table 25 shows the savings for Scenario 2 summarized by service technology tower. We can see from this analysis that most of the gains come from the X86 and IBM Mainframe towers. The Unix tower also has significant savings potential. Savings in the data center network area are also relatively high because this is an area where there are economies of scale in the consolidated environment.

Table 25. Savings for Scenario 2 Summarized by Service Tower

Tower	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
x86	0	0	0	689,162	2,556,99	5,634,052	11,629,896	11,983,983	12,331,092	12,705,131	12,784,951
Unix	0	0	0	312,580	1,125,878	2,422,103	5,093,569	5,347,475	5,606,046	5,929,963	6,131,916
iSeries	0	0	0	1,126	4,551	10,758	24,944	28,485	32,136	35,897	39,770
Other	0	0	0	2,081	8,779	21,342	50,452	58,425	67,419	82,029	83,614
Mainframe (IBM + Unisys)	0	0	0	477,941	1,639,127	3,375,607	6,956,908	7,173,844	7,402,287	7,663,655	7,894,798
LAN	0	0	0	180,410	775,956	1,893,076	4,142,846	4,499,297	4,855,525	5,212,745	5,541,967
Savings before Consolidation Costs	0	0	0	1,627,727	6,004,477	13,171,443	27,578,042	28,822,987	30,079,665	31,471,172	32,347,721
Short-Term Savings	0	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089
Mainframe Transition Cost	0	0	0	(816,480)	(1,905,120)	(2,721,600)	0	0	0	0	0
Surviving Data Centers Build Out Cost	0	0	0	(11,415,000)	0	0	0	0	0	(9,375,000)	0
IT Equipment Relocation/Build Out Cost	0	0	0	(1,226,579)	(2,862,018)	(4,088,598)	0	0	0	0	0
Data Center PMO Cost	(633,856)	(1,584,640)	(2,218,496)	(2,218,496)	(2,218,496)	(1,621,494)	(721,882)	0	0	0	0
Total One-Time Cost	(633,856)	(1,584,640)	(2,218,496)	(15,676,555)	(6,985,634)	(8,431,691)	(721,882)	0	0	(9,375,000)	0
Total Savings	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810

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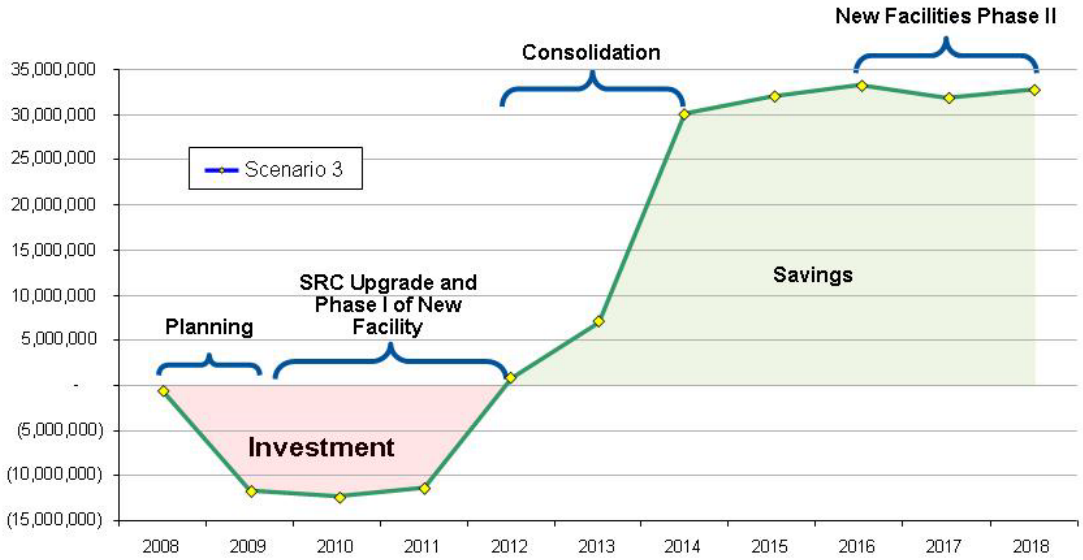
Figure 42 shows the savings associated with *Scenario 3: Leverage New Data Center Consolidation.* Unlike in Scenario 2, the financial analysis does not artificially limit expenditures for budget years 2008–9, 2009–10 and 2010–11. This scenario does not leverage existing facilities to the same extent as Scenario 2. It assumes, in addition to upgrades to the capacity of the SRC, that a large new facility similar to but larger than the SRC is constructed. This drives the need for larger upfront expenditures. These expenditures are the principal difference between Scenario 2 and Scenario 3. As with Scenario 2, a three-year consolidation period assumes that transition-related costs (e.g., equipment moves, LAN build-out, mainframe rationalization) are spread over this period as well. In this scenario, savings are assumed to begin to accrue as workload is converted to the lower-cost consolidated model. The model's conservative assumption is that only10% of the servers will be moved over by the end of the first year, 50% by the end of the second year and the remainder by the end of the third year. There is a brief and shallow dip in savings in 2017–18 and 2008–19, because this is the year that the consolidation model predicts additional power and cooling capacity will need to be built out in the new data center facility.

Figure 42. Savings for Scenario 3



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Scenario 2	(633,856)	1,670,449	1,036,593	(10,793,739)	2,273,932	7,994,841	30,111,249	32,078,076	33,334,754	25,351,261	35,602,810
Scenario 3	(633,856)	(11,721,548)	(12,355,404)	(11,345,072)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

Error! Reference source not found. shows the breakdown of savings by department. It is very similar to the results from Scenario 2. The principal differences are the timing and size of the upfront investments required to construct a new high-quality State data center.

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Table 26. Savings for Scenario 3 Summarized by Department

Agency or Transition Cost Element	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DACS	0	0	0	(19,859)	(88,910)	(158,491)	(314,355)	(311,602)	(306,958)	(293,114)	(302,576)
DBPR	0	0	0	(15,051)	(74,128)	(146,728)	(307,931)	(322,742)	(337,900)	(353,417)	(369,305)
DCF	0	0	0	271,228	1,478,069	3,200,768	6,800,526	7,202,828	7,608,501	8,017,873	8,430,204
DEP	0	0	0	81,660	464,831	1,042,767	2,278,226	2,471,144	2,664,295	2,857,684	3,051,319
DFS	0	0	0	452,020	2,389,595	5,036,649	10,475,244	10,882,133	11,294,121	11,711,367	12,134,037
DMS	0	0	0	107,021	572,654	1,218,784	2,507,175	2,578,836	2,652,609	2,779,785	2,806,735
DOC	0	0	0	43,493	241,337	529,909	1,129,913	1,200,978	1,273,036	1,346,112	1,420,230
DOE	0	0	0	(63,792)	(334,101)	(699,833)	(1,527,164)	(1,652,761)	(1,776,392)	(1,897,779)	(2,042,695)
DOR	0	0	0	48,711	258,801	546,627	1,096,806	1,100,544	1,104,465	1,134,851	1,112,854
DOS	0	0	0	71,207	384,523	824,958	1,717,298	1,785,434	1,854,346	1,930,203	1,994,594
DOT	0	0	0	101,882	556,414	1,205,971	2,505,052	2,603,097	2,706,239	2,814,650	2,928,502
DOH	0	0	0	(45,466)	(184,570)	(286,718)	(542,101)	(510,840)	(479,671)	(427,294)	(417,686)
FDLE	0	0	0	19,514	168,304	498,537	1,114,705	1,225,268	1,328,508	1,424,164	1,266,528
HSMV	0	0	0	51,142	264,360	544,145	1,047,364	1,004,732	960,319	918,758	865,843
AWI	0	0	0	(18,556)	(92,701)	(185,903)	(402,717)	(434,060)	(465,854)	(492,672)	(530,863)
Savings before Consolidation Costs	0	0	0	1,085,151	6,004,477	13,171,443	27,578,042	28,822,987	30,079,665	31,471,172	32,347,721
Short-Term Savings	0	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089
Mainframe Transition Cost	0	0	0	(544,320)	(2,177,280)	(2,721,600)	0	0	0	0	0
Surviving Data Centers Build Out Cost	0	(13,634,228)	(13,634,228)	(12,025,414)	0	0	0	0	0	(2,875,000)	(2,875,000)
IT Equipment Relocation/Build Out Cost	0	0	0	(1,018,198)	(4,072,791)	(5,090,989)	0	0	0	0	0
Data Center PMO Cost	(633,856)	(1,584,640)	(2,218,496)	(2,218,496)	(2,218,496)	(1,621,494)	(721,882)	0	0	0	0
Total One-Time Cost	(633,856)	(15,218,868)	(15,852,724)	(15,806,428)	(8,468,567)	(9,434,083)	(721,882)	0	0	(2,875,000)	(2,875,000)
Total Savings	(633,856)	(11,963,779)	(12,597,635)	(11,466,187)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

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Table 27 shows the breakdown of savings by service tower. It is very similar to the results from Scenario 2. The principal differences are the timing and size of the upfront investments required to construct a new high-quality State data center.

Table 27. Savings for Scenario 3 Summarized by Service Tower

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
x86	0	0	0	459,441	2,556,999	5,634,052	11,629,896	11,983,983	12,331,092	12,705,131	12,784,951
Unix	0	0	0	208,387	1,125,878	2,422,103	5,093,569	5,347,475	5,606,046	5,929,963	6,131,916
iSeries	0	0	0	750	4,551	10,758	24,944	28,485	32,136	35,897	39,770
Other	0	0	0	1,387	8,779	21,342	50,452	58,425	67,419	82,029	83,614
Mainframe (IBM + Unisys)	0	0	0	318,628	1,639,127	3,375,607	6,956,908	7,173,844	7,402,287	7,663,655	7,894,798
LAN	0	0	0	120,273	775,956	1,893,076	4,142,846	4,499,297	4,855,525	5,212,745	5,541,967
Savings before Consolidation Costs	0	0	0	1,085,151	6,004,477	13,171,443	27,578,042	28,822,987	30,079,665	31,471,172	32,347,721
Short-Term Savings	0	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089
Mainframe Transition Cost	0	0	0	(544,320)	(2,177,280)	(2,721,600)	0	0	0	0	0
Surviving Data Centers Build Out Cost	0	(13,634,228)	(13,634,228)	(12,025,414)	0	0	0	0	0	(2,875,000)	(2,875,000)
IT Equipment Relocation/Build Out Cost	0	0	0	(1,018,198)	(4,072,791)	(5,090,989)	0	0	0	0	0
Data Center PMO Cost	(633,856)	(1,584,640)	(2,218,496)	(2,218,496)	(2,218,496)	(1,621,494)	(721,882)	0	0	0	0
Total One-Time Cost	(633,856)	(15,218,868)	(15,852,724)	(15,806,428)	(8,468,567)	(9,434,083)	(721,882)	0	0	(2,875,000)	(2,875,000)
Total Savings	(633,856)	(11,963,779)	(12,597,635)	(11,466,187)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

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Error! Reference source not found. shows the breakdown of savings by Schedule IV-C category. It is very similar to the results from Scenario 2. The principal differences are the timing and size of the upfront investments required to construct a new high-quality State data center.

Table 28. Savings for Scenario 3 Summarized by Schedule IV-C Category

Schedule IV-C Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Strategic IT Spending	0	0	0	719,704	3,941,015	8,571,413	17,972,038	18,815,311	19,674,277	20,632,626	21,297,883
Non Strategic IT Spending	0	0	0	365,447	2,063,462	4,600,031	9,606,004	10,007,676	10,405,388	10,838,546	11,049,838
Savings before Consolidation Costs	0	0	0	1,085,151	6,004,477	13,171,443	27,578,042	28,822,987	30,079,665	31,471,172	32,347,721
Short-Term Savings	0	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089	3,255,089
Mainframe Transition Cost	0	0	0	(544,320)	(2,177,280)	(2,721,600)	0	0	0	0	0
Surviving Data Centers Build Out Cost	0	(13,634,228)	(13,634,228)	(12,025,414)	0	0	0	0	0	(2,875,000)	(2,875,000)
IT Equipment Relocation/Build Out Cost	0	0	0	(1,018,198)	(4,072,791)	(5,090,989)	0	0	0	0	0
Data Center PMO Cost	(633,856)	(1,584,640)	(2,218,496)	(2,218,496)	(2,218,496)	(1,621,494)	(721,882)	0	0	0	0
Total One-Time Cost	(633,856)	(15,218,868)	(15,852,724)	(15,806,428)	(8,468,567)	(9,434,083)	(721,882)	0	0	(2,875,000)	(2,875,000)
Total Savings	(633,856)	(11,963,779)	(12,597,635)	(11,466,187)	790,999	6,992,449	30,111,249	32,078,076	33,334,754	31,851,261	32,727,810

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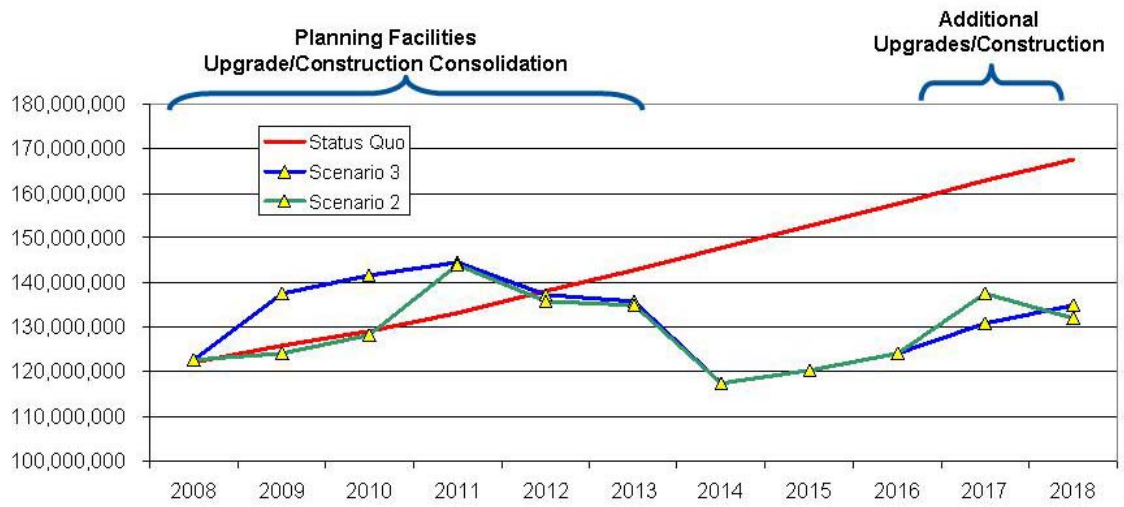
8.3 Spending Analysis

This section focuses on analyzing the financial data produced by the Gartner financial model from a total spending vs. a net savings perspective. By examining the information in this section, the State can compare current costs to projected future costs under any of the three scenarios: Status Quo or either of the two consolidation scenarios.

Figure 43 shows a comparison of the spending levels projected by the Gartner financial model for the three scenarios. We can see from this graph that the Status Quo scenario is not a flat line. In fact, it rises at approximately 3% per year over the 11 years analyzed. This is due to projected growth in IT workload volume provided by the departments as well as to factors such as salary increases for staff. We can see that, in the long term, spending levels for the two consolidation scenarios is similar, but that in the short term significantly more investment is required by Scenario 3. This is largely because it calls for a new data center to be constructed, while Scenario 2 leverages existing facilities. For a more detailed discussion of how any of the scenarios were modeled, please see Section 9.0 of this report.

Figure 43. Comparison of Spending by Scenario



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	122,058,189	125,942,041	129,160,612	133,265,379	137,970,329	142,797,849	147,643,293	152,560,821	157,554,543	162,749,792	167,499,090
Scenario 2	122,692,045	124,271,593	128,124,020	144,059,118	135,696,397	134,803,009	117,532,044	120,482,745	124,219,789	137,398,531	131,896,280
Scenario 3	122,692,045	137,663,590	141,516,017	144,610,451	137,179,330	135,805,400	117,532,044	120,482,745	124,219,789	130,898,531	134,771,280

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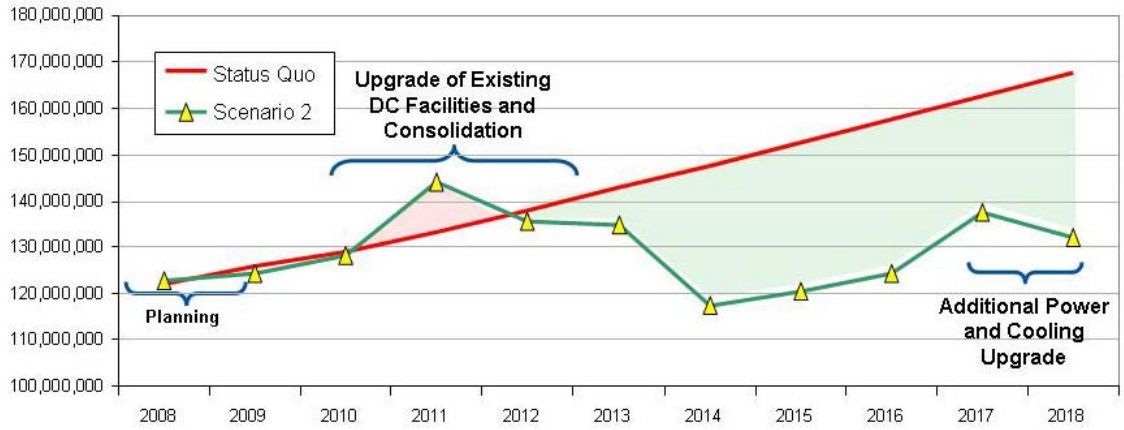
Figure 44 isolates Scenario 2 spending and compares it directly to the Status Quo projections associated with Scenario 1. From this diagram it is possible to see the direct correlation between the required one-time investments and the spikes in spending.

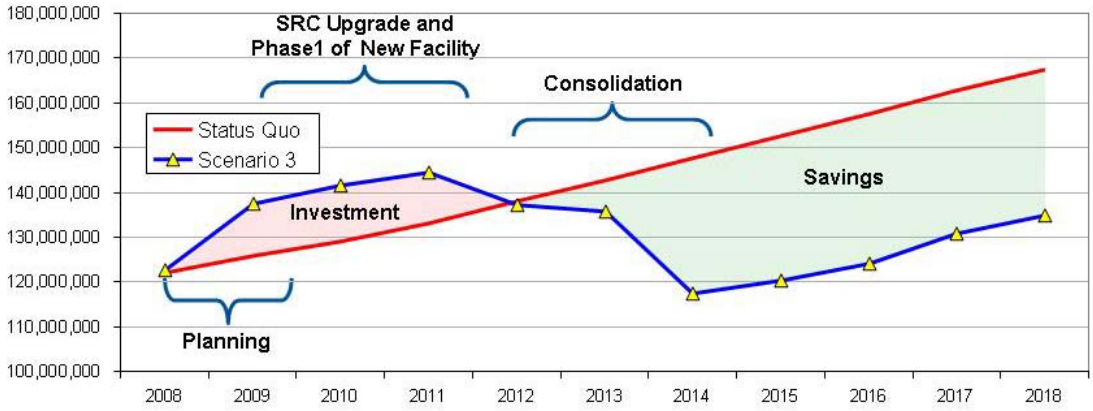
Figure 44. Scenario 2 Spending vs. Status Quo



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	122,058,189	125,942,041	129,160,612	133,265,379	137,970,329	142,797,849	147,643,293	152,560,821	157,554,543	162,749,792	167,499,090
Scenario 2	122,692,045	124,271,593	128,124,020	144,059,118	135,696,397	134,803,009	117,532,044	120,482,745	124,219,789	137,398,531	131,896,280
Scenario 3	122,692,045	137,663,590	141,516,017	144,610,451	137,179,330	135,805,400	117,532,044	120,482,745	124,219,789	130,898,531	134,771,280

Figure 45 isolates Scenario 3 spending and compares it directly to the Status Quo projections associated with Scenario 1. From this diagram it is possible to see the direct correlation between the required one-time investments and the spikes in spending. Also, it is clear in this diagram that three years of sustained investment will be required. This is two more years that are required under Scenario 2.

Figure 45. Scenario 3 Spending vs. Status Quo



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	122,058,189	125,942,041	129,160,612	133,265,379	137,970,329	142,797,849	147,643,293	152,560,821	157,554,543	162,749,792	167,499,090
Scenario 2	122,692,045	124,271,593	128,124,020	144,059,118	135,696,397	134,803,009	117,532,044	120,482,745	124,219,789	137,398,531	131,896,280
Scenario 3	122,692,045	137,663,590	141,516,017	144,610,451	137,179,330	135,805,400	117,532,044	120,482,745	124,219,789	130,898,531	134,771,280

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8.4 Investment Analysis

This section looks at the financial analysis from the perspective of isolating and understanding the one-time investments required to realize the savings.

Figure 46 shows that there is a significant difference in the amount and timing of one-time cost that will be required to pursue the different scenarios. It is worth noting that these are net one-time costs which have been netted against the estimated $3.26 million in short-term annual savings which Gartner has identified. Assuming a 6% discount rate, the NPV of the one-time costs for the different scenarios is as follows:

- **Scenario 1:** Status Quo—$17.9 million

  This cost is mainly related to the refurbishing of existing data centers, as well as a small number of facility-related capacity upgrades which the Gartner model predicts will be required during the next 11 years.

- **Scenario 2:** Leverage Existing Facilities–$33.2 million

  This cost is mainly related to upgrading and expanding the four main surviving data centers to provide them with sufficient capacity to contain the portion of the in-scope workload that they do not currently contain. This cost also includes the costs required to transition these workloads into the new data centers.

- **Scenario 3:** Leverage New Data Center Consolidation–$56.0 million

  This cost is mainly related to upgrading and expanding SRC and building the new data center. This cost also includes the costs required to transition these workloads into the new data centers.

The detail for the investment cost was discussed earlier in the Savings Analysis, and the detailed expenditures by year are included on the savings figures. In general, the one-time costs include:

- Mainframe transition costs
- Data center build-out costs
- IT equipment relocation and build-out cost
- Data center consolidation PMO costs

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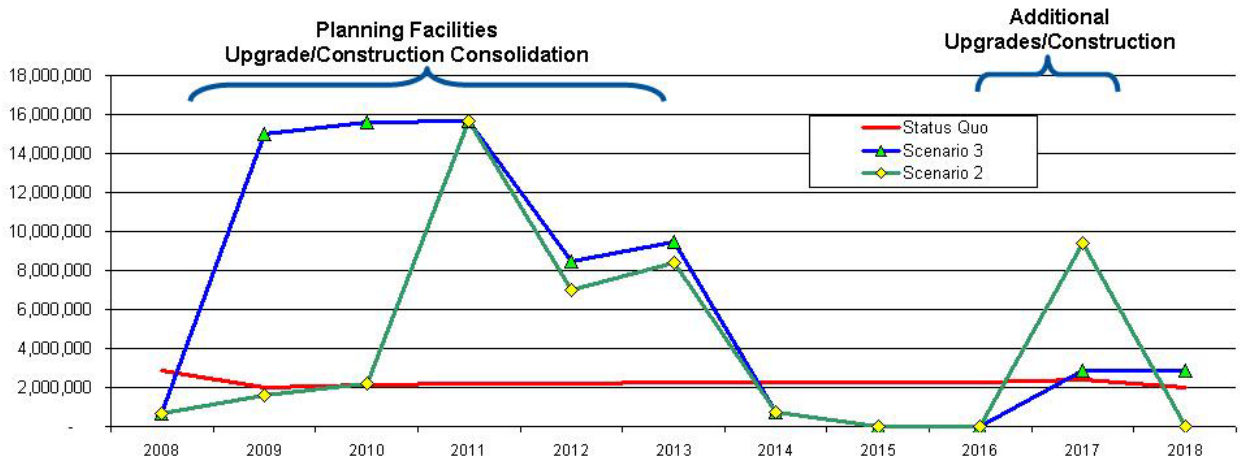
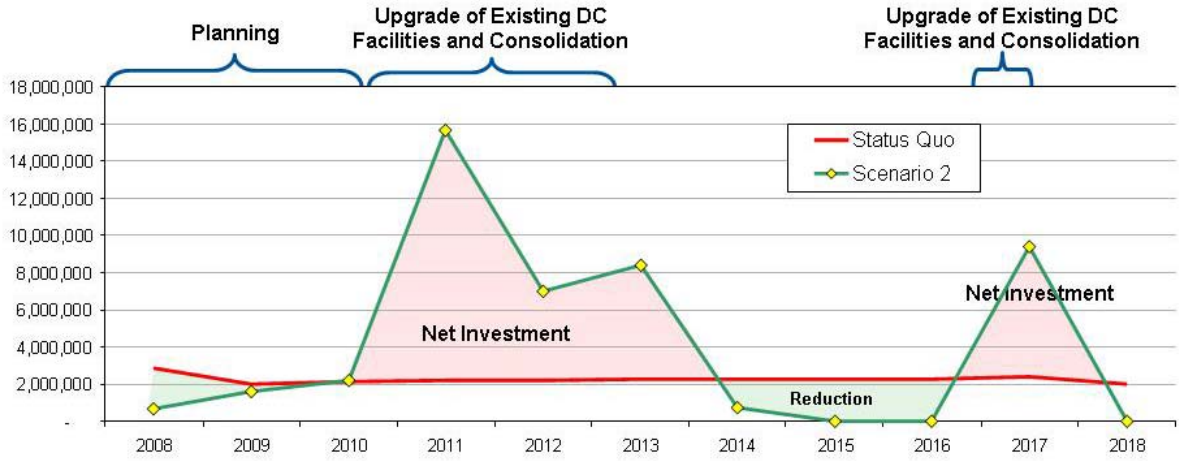
Figure 46. Investment Analysis for the Three Scenarios



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	2,842,884	2,025,200	2,101,731	2,221,830	2,218,750	2,270,638	2,270,638	2,270,638	2,272,402	2,398,846	2,000,000
Scenario 2	633,856	1,584,640	2,218,496	15,676,555	6,985,634	8,431,691	721,882	-	-	9,375,000	-
Scenario 3	633,856	14,976,637	15,610,493	15,685,312	8,468,567	9,434,083	721,882	-	-	2,875,000	2,875,000

Figure 47 illustrates net one-time investments required for *Scenario 2: Leverage Existing Facilities.*

Figure 47. One-Time Investments for Scenario 2



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	2,842,884	2,025,200	2,101,731	2,221,830	2,218,750	2,270,638	2,270,638	2,270,638	2,272,402	2,398,846	2,000,000
Scenario 2	633,856	1,584,640	2,218,496	15,676,555	6,985,634	8,431,691	721,882	-	-	9,375,000	-
Scenario 3	633,856	14,976,637	15,610,493	15,685,312	8,468,567	9,434,083	721,882	-	-	2,875,000	2,875,000

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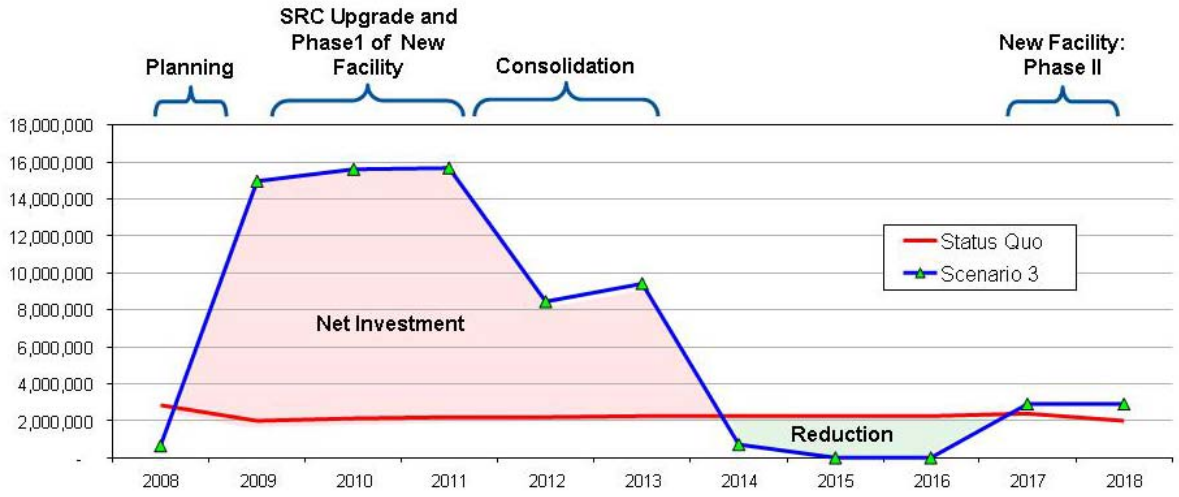
Figure 48 illustrates net one-time investments required for *Scenario 3: Leverage New Data Center Consolidation.*

Figure 48. One-Time Investment Costs for Scenario 3



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Status Quo	2,842,884	2,025,200	2,101,731	2,221,830	2,218,750	2,270,638	2,270,638	2,270,638	2,272,402	2,398,846	2,000,000
Scenario 2	633,856	1,584,640	2,218,496	15,676,555	6,985,634	8,431,691	721,882	-	-	9,375,000	-
Scenario 3	633,856	14,976,637	15,610,493	15,685,312	8,468,567	9,434,083	721,882	-	-	2,875,000	2,875,000

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Financial Model Overview

9.0 Financial Model Overview

This section of the report describes the model and the modeling process. It does not describe the results of the modeling process. The purpose of this section is to provide the State with an understanding of the key inputs and assumptions that supported the study's analysis and resulting recommendations. This section of the report consists of two major sections:

- Summary Financial Model—this section provides an overview of the Gartner financial model and the modeling process that was used for this engagement
- Financial Model Assumptions and Notes—this section describes the major inputs, assumptions and logic which were used to model the three scenarios

9.1 Summary Financial Model

9.1.1 General Methodology

Gartner's financial analysis is based on a model that forecast workload and workload-driven costs out to Year 2018. Three scenarios are modeled:

- Scenario 1: Status Quo
- Scenario 2: Leverage Existing Facilities
- Scenario 3: Leverage New Data Center Consolidation

Potential cost avoidance is estimated through the difference in costs from the Status Quo and each consolidation scenario.

A 6% discount rate is used in the NPV calculations.

9.1.2 Overview of the Modeling Process

The financial model for the three data center consolidation scenarios employed the methodology depicted in Figure 49.

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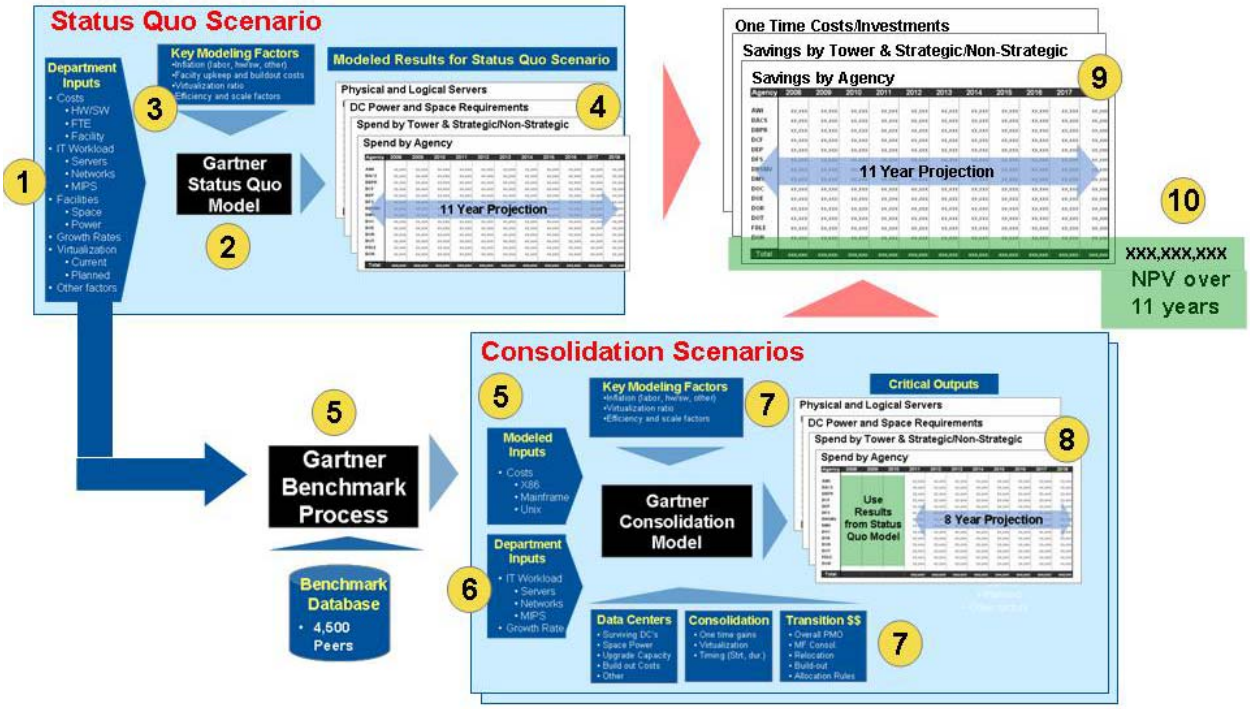
Figure 49. Financial Model Methodology



Step 1: Data Gathering

Gartner requested State of Florida departments and agencies participating in the study to provide cost, workload and facility data. The Gartner team also validated the information provided by comparing it to our benchmark databases for reasonableness (such as cost per server or FTEs per server) and by comparing it with information previously provided to the Legislature. Where anomalies are identified, we worked with the Florida Senate to obtain updated information from the various data center owners. Gartner identified key inputs for the Status Quo scenario. The data requested include the following:

- Costs—hardware, software, personnel and facility costs
- IT workload—servers, networks and MIPS
- Facilities—space and power
- IT workload growth rates
- Virtualization—current and planned

Step 2: Develop Key Modeling Factors

Gartner identified key drivers that will have an impact on the Status Quo model. The key modeling factors include:

- Inflation for labor and hardware/software
- Facility upkeep and build-out costs needed to support the Status Quo model
- Virtualization ratio
- Efficiency and scale factors

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Step 3: Model Status Quo Scenario

Gartner assumed the time horizon to be 11 years for the Status Quo scenario. Gartner developed the growth rates provided by departments in developing the logical server growth. The Gartner team arrived at the physical server growth using the virtualization ratios and refresh rates provided by the departments. Gartner applied the status quo costs to identify costs associated with the identified workload.

Gartner identified the space and power requirements needed to support the incremental workload. Where applicable, we allocated costs to upgrade space and power to support the workload

The Modeled Cost Schedule is used to identify spend by agency, tower, and strategic and non-strategic workloads.

Step 4: Develop Benchmark Costs

Gartner used the workload and cost data received in Step 1 to identify peers from the Gartner benchmark database. The benchmark costs are developed using the peers applicable for State of Florida computer facilities. This information is used in the consolidation scenarios.

Step 5: Key Inputs for Consolidation Scenarios

We used the workload and cost data received in Step 1 to identify key inputs for consolidation scenarios.

Step 6: Key Drivers for Consolidation Scenarios

The Gartner team identified key drivers that will have an impact on the consolidation scenarios. The key modeling factors include:

- Inflation for labor and hardware/software
- Facility upkeep and build-out costs needed to support the consolidation model
- Virtualization ratio
- Efficiency and scale factors

Step 7: Consolidation Scenarios Analysis

We analyzed the State of Florida to identify surviving data centers. Critical factors used in identifying surviving data centers are: space and power capacity, space and power upgrade capacity and build-out costs. Our team analyzed the impact of virtualization and timing, and made necessary assumptions to support the consolidation scenarios. We developed transition costs to support the consolidation scenarios.

Step 8: Model Consolidation Scenarios

Gartner assumed a time horizon of 11 years for the consolidation scenarios. Our team developed the growth rates provided by the departments in developing the logical server growth. We arrived at the physical server growth using the virtualization ratios and refresh rates provided by the departments. We applied the benchmark costs to identify costs associated with workload.

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Gartner identified the space and power requirements needed to support the incremental workload. We allocated costs to upgrade space and power for surviving data centers to support the workload.

The Modeled Cost Schedule is used to identify spend by agency, tower, and strategic and non-strategic workloads.

Step 9: Model Savings for Consolidation Scenarios

Gartner developed savings for the two consolidation scenarios based on the cost schedules developed in Step 3 and Step 8.

The Modeled Savings Schedule was created to identify savings by agency, tower, and strategic and non-strategic workloads.

Step 10: Identify NPV for Consolidation Scenarios

Gartner developed NPV for the two consolidation scenarios based on the savings schedules developed in Step 9.

9.1.3 Status Quo Model Highlights

The Status Quo environment is modeled assuming all in-scope computer facilities continue to operate in their current environment and follow growth projections provided to Gartner by the individual departments. It is assumed that it is feasible to expand the present facilities (power and space) to accommodate growth needs. Any expansionary build-out is assumed to be feasibly done in an incremental manner. The reality of this scenario is that only a small amount of incremental facility and power build-out is required, because the State currently has much excess capacity. However, because these facilities are older, higher maintenance and upkeep costs are expected.

9.1.4 Consolidation Model Highlights

The consolidation environment is modeled assuming all in-scope workload will be consolidated in several sites. In *Scenario 3: Leverage New Data Center Consolidation,* the workload will be housed in an upgraded SRC facility and a new Tier 2+ data center (to be built). In *Scenario 2: Leverage Existing Facilities* and Funding, the workload will be housed in four existing computer facilities—DCF (Northwood data center), DMS (Shumard Oak) and NWRDC.

The consolidation scenarios assume that consolidation activities start with a logical server rationalization analysis. This process identifies the non-strategic server workload and makes a 10% reduction in logical server count. It is assumed that only servers hosting non-strategic workload are candidates for this consolidation study and analysis. Only X86 and Unix servers are involved, with all other servers considered not suitable for rationalization.

9.1.4.1 Scenario 2: Leverage Existing Facilities Consolidation

In this scenario, the consolidated workload is housed in four existing data centers. Gartner assumes that significant transition activities will only begin in early 2011, and that it will take up to three years to complete. The reason for this delay is current and near-term budget constraints that are facing the State of Florida, and the critical need to avoid large new spending on consolidation for the next three years.

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9.1.4.2 Scenario 3: Leverage New Data Center Consolidation

This scenario, which does not fit within the State's budget constraints, would have the State work with the agencies to plan for the consolidation throughout this year. By the end of 2008, construction would need to begin on the new Tier 2+ data center. Construction would take 24 months to complete. By early 2011, construction would be completed and transition into the new data center would begin.

9.1.5 Transition, One-Time and Incremental Modeling Highlights

Transition is the process of moving from Status Quo to the consolidation environment—regardless of which alternative is selected by the State. The Gartner financial model assumes that it will take the whole of fiscal year 2008–9 to complete the necessary planning work. Transition will start in fiscal year 2009–10 for both Scenario 2 and Scenario 3. Both these scenarios will take approximately three years to complete their transition process. While transition is in progress, the workload-related cost for either consolidated model will partially bear the Status Quo cost, with the remainder reflecting the fully consolidated cost. Gartner uses a 15%, 35%, 50% progressive allocation for the consolidated cost.

The one-time transition cost we analyzed includes the cost of moving servers and storage equipment into the new environment. It also includes the cost of building out the network equipment in the new consolidated data centers. We also factored in $5.4 million for IBM Mainframe transition cost and spread it out evenly among the agencies that utilize IBM mainframes (DCF, DFS, DMS, DOC, DOT and HSMV).

- In *Scenario 2: Leverage Existing Facilities*, workload associated with surviving computer facilities, e.g., DCF Northwood, DEP Annex and SRC, will not be moved, and hence will not incur one-time transition cost.
- In *Scenario 3: Leverage New Data Center Consolidation,* only workload already in the SRC will not require any move.

Other one-time costs considered in the model include power and space build-out for the consolidated environment and a PMO to guide the transition process.

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Future-State Vision, Benefits, Critical Success Factors and Next Steps

10.0 Recommendation, Future-State Vision, Critical Success Factors and Next Steps

10.1 Recommendation

Gartner recommends that Florida utilize the consolidation scenario identified as *Scenario 2: Leverage Existing Facilities* for moving forward with consolidating data centers. The recommendation is based on the following criteria:

- Significant savings are available to warrant data center consolidation. Depending on whether the State begins counting the savings from the time the decision to consolidate is made, or if the State begins counting savings when the first investments occur, the savings are estimated to be between $93.3 million and $103.9 million.
- Florida has the raised floor space to perform the consolidation without building a new data center. While significant upgrades will be required to the existing Florida data center facilities, Gartner's model predicts that, after one year of investment and transition, Florida will begin seeing net savings as early as the second transition year.
- Florida is somewhat familiar with the operation of a consolidated data center, since three of the "surviving "data centers are current hosting multiple agencies.
- Florida knows the "lessons learned" regarding developing effective governance models.
- The initiation of a new data center organizational structure that provides opportunity for a successful transformation.
- This approach is well-aligned with the current constraints the State is facing.

At their heart, successful data center consolidation projects are built around a decision to transform the organization—not just move the "machines" and people. The technical aspects of most consolidations are easier to manage than the cultural and operational dynamics of the organization. As we discussed in an earlier section, the underlying assumption for this assessment is that, with some exceptions, all the data center functions will be transferred to a single organization (logical consolidation). This provides the State with the strengthened capability to capture the economies of scale necessary to achieve the projected savings and to enhance the effectiveness of the State's IT infrastructure. Creating an entity that will effective manage and oversee this initiative is the single biggest critical success factor.

Key factors that the State must keep in mind in moving forward with data center consolidation include:

- Addressing and overcoming past consolidation experiences
- Applying the "lessons learned" regarding ineffective or nonexistent governance
- Avoiding cost reduction goals that are overly aggressive or unrealistic
- Ensuring the engagement, participation and ownership leadership across the State's departments and agencies
- Allocating sufficient investment funding
- Establishing strong and confident project management oversight
- Developing the internal capacity and skills necessary for success

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- Building a governance and management structure that builds a high level of trust in the data center host agency
- Making tough decisions regarding staffing levels
- Ensuring the ownership and buy-in by State departments and agencies

10.2 Vision and Benefits

Gartner's future vision for Florida is that, through an effective centralized approach to data center operations, the State can achieve improvements in IT product and service cost of operations that result in future savings that will offset the cost associated with consolidation and chargeback administration. In addition, moving to a consolidated model for data center operations will strengthen the State's IT infrastructure through a common management approach that provides:

- Leadership and direction for the application of hardware and software standards; IT operations best practices
- Higher level of rigor, discipline and accountability in IT planning, investments, procurement and operations

The analysis of the alternatives for data center consolidation has been guided by the current constraints that exist in Florida, as well as current strengths and opportunities. It is clear that a major constraint in pursuing data center consolidation and the full realization of savings sooner is the significant revenue shortfall the State is facing—and, it is estimated, may be facing for three years. The State is not in a position to invest significant dollars upfront to move to a full data center consolidation model for at least three years. An option for the State could be to move to an outsourcing approach to data center operations which would have a third-party vendor take the responsibility for the capital investments essential for creating a full data center consolidation model that would be funded through a lease arrangement with the State—avoiding the need for major upfront investment of State funds. The State is not confident that it is in the best interest of the State to outsource these critical IT operations.

In the areas of strengths and opportunities, the assessment did find that the State has resident strengths and capacity in some data centers that provide immediate opportunities to begin the process of data center consolidation. In addition, through the strengthening of the State's AEIT, an entity exists that can assume responsibility for working with State departments and agencies in creating the infrastructure, staffing, standards, governance and operations necessary to begin to make real the vision for data center consolidation in the State of Florida.

In considering the future state of Florida's data centers through consolidation, the following benefits can be expected:

- Savings of approximately $93 million through 2018
- Streamlining of both IT and business processes
- Ensuring a higher standard of IT services
- Improving the supportability, agility, flexibility, responsiveness, strategic focus and sustainability of the State's IT infrastructure
- Establishing a solid IT infrastructure for enterprise initiatives such as ERP and CRM solutions
- Strengthening the State's IT planning, budget and appropriations processes

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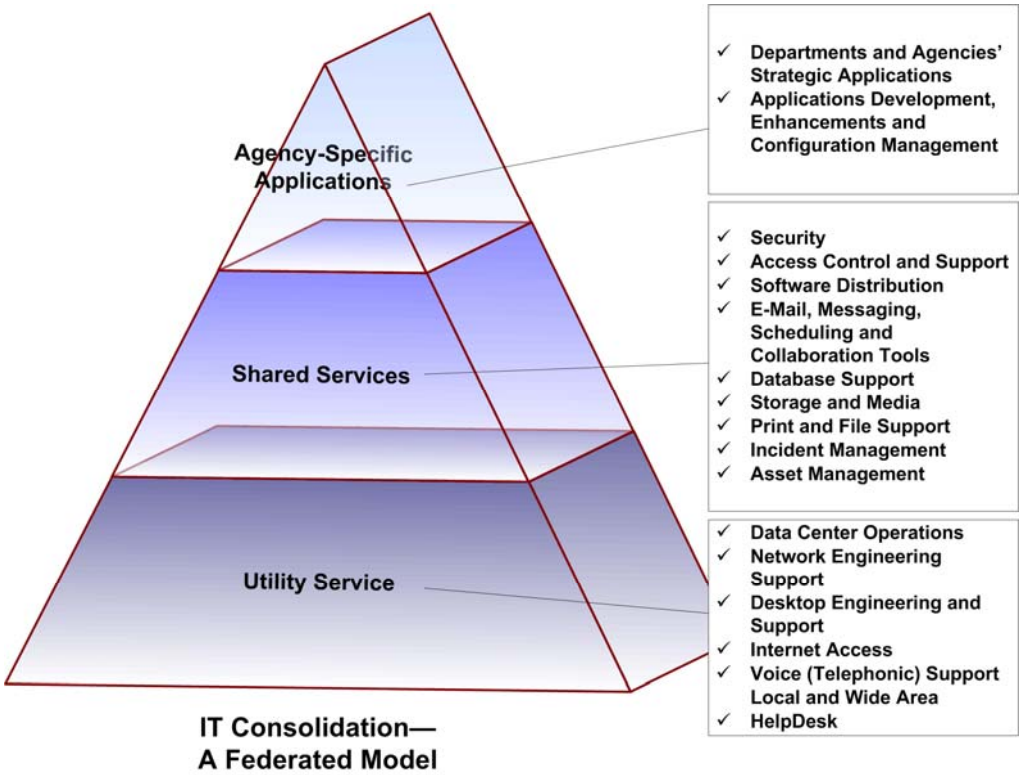
- Improving the quality of government operations and services
- Maximizing the State's return on IT investments
- Improving the State departments and agencies' ability to focus on their core business—which is not IT

As the State moves forward with the data center consolidation model, it will be important to see this initiative as a component of potential future steps, through IT consolidation, that can be taken to strengthen the State's IT infrastructure and achieve further cost efficiencies. Many states have moved toward a federated model for IT consolidation, as illustrated in Figure 50.

Figure 50. IT Consolidation—A Federated Model



In the federated model of IT consolidation, the State's departments and agencies continue to maintain responsibility for their strategic IT applications—those applications that are mission-critical and unique in supporting the State department or agency in fulfilling its mission and mandates. Although, in the graphic, the agency-specific applications appear to be the smallest piece of the triangle—in actuality they often represent the most significant and intense component of the IT infrastructure for each agency in the performance of its mission. The graphic is meant to illustrate that the foundational pieces of the IT infrastructure—shared services and utility service—are focused on meeting the needs of the client agencies and their strategic operations. As can be seen in the graphic, the consolidation of data centers is only one component of an IT consolidation model.

Lessons can be drawn for Florida from these consolidated models by looking at their critical core elements, including:

- Establishment of a State-wide set of standards, practices and processes for setting IT priorities and making budget appropriations

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- Strong and representative governance structure including executive leadership of the State's departments as an executive steering body and a CIO council of departmental IT managers to provide technical guidance
- Rigorous IT project planning, management, procurement and oversight for all major IT initiatives through a disciplined process employing industry standards for developing business cases; feasibility studies; alternative analyses; cost-benefit analyses; and detailed procurement and project management plans
- Developing effective SLAs that ensure:
  - IT services that agencies need are provided
  - A diversity of services levels to meet the different level of needs of State agencies
  - That chargeback system and related costs are linked to agreed-upon SLAs for each agency

10.3 Critical Success Factors and Next Steps for Florida

As the State of Florida begins the process of moving forward with the initial steps for data center consolidation as articulated in *Scenario 2: Leverage Existing Facilities,* several critical success factors need to be considered for the identification, planning and implementing the actions necessary for Scenario 2. These are described below.

- **Meets the Unique Needs of Florida—**Although other states have implemented or are in the process of implementing a data center consolidation initiative, Florida cannot take whole cloth their approaches and apply them to Florida. The State of Florida can benefit from the lessons learned from these national efforts, but Florida will need to tailor its approach to the unique context, strengths and challenges inherent in its operations and governance structure.
- **Planning and Ownership—**Most of the State's departments and agencies have a level of comfort and satisfaction with the services they are receiving from their data centers under the current structure. Any proposed change will be a cause of concern. No State department or agency wants to see a degradation in the level of services or responsiveness it is currently receiving from its data center, or face possible sanctions if its data center operations or standards fail to meet legal or regulatory requirements under which it operates. It will be critically important that the State employ a participatory process, such as was modeled through the Stakeholder Advisory Committee for this project, to support planning and implementation of the data consolidation initiative. This process needs to promote the awareness, understanding, ownership and participation of the key department and agency stakeholders regarding the benefits to be achieved through data center consolidation for their organization and, importantly, for the State as a whole. These efforts need to focus on:
  - **Awareness—**Transparency of the initiative including the key drivers, scope of each phase of the initiative, what is negotiable and non-negotiable, and the expectations for the State's departments in participating in the success of the initiative.
  - **Understanding—**Providing timely and accurate information to support success through open communications and regularly scheduled stakeholder meetings during the life cycle of the initiative.
  - **Ownership—**Clear identification of roles and responsibilities for the participants and the benefits to be achieved for the State and each participating department.

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- **Participatory Actions for Success—**Opportunities for meaningful participation in setting standards, identifying potential challenges to success, establishing a detailed road map and timelines for implementation, and in supporting the development of the organizational and governance structure essential for the success of the initiative.

- **Organizational Leadership—**Three levels of leadership will be required. First, there will need to be strong leadership from the Governor, Cabinet and the Legislature in establishing the directives, legislation and policies essential to support the implementation and sustainability of the data center consolidation effort. Second, the executive leadership of the State's departments and agencies need to be actively involved in the initiative and provide leadership for their organization's role in ensuring success through policy development, compliance and accountability oversight. The third critical leadership level must be created through the identification a lead entity to assume the responsibility for overseeing and managing the data center migration plan and sustaining the operations of the State's consolidated data center system. Through the strengthening of the State's AEIT, an entity exists that can assume responsibility for managing the data center consolidation plan and working with State departments and agencies in creating the infrastructure, staffing, standards, governance and operations necessary to begin to make real the vision for data center consolidation in the State of Florida.

- **Realistic Action Plan—**As with any complex initiative, it is critical that time be invested in developing a detailed action plan. This will be true also for the data center consolidation initiative. Based upon the direction of the State's leadership, the budgetary constraints facing Florida and the input from key stakeholders, the State needs to develop a "doable" and detailed migration plan—including clear guidelines for future budget requests and procurements during the migration process. The detailed work plan needs to identify the project timelines, key tasks, responsible entities/people, critical interdependencies, milestones, and deliverables/results to be achieved. The plan needs to be actively managed, reviewed and updated.

- **Effective Governance Structure—**Although not a primary focus of this engagement, Gartner Research and lessons learned from the experience of other states that have undertaken the consolidation of IT operations demonstrate the critical importance of establishing a strong governance structure over any IT consolidation initiative to ensure that the client agencies receive the level of service they need to fulfill their mission and to meet their legal and regulatory mandates. The governance structure needs to have a clear charter that codifies the purpose, goals and objectives of the consolidated data center model, the governance role of the participants, and the process used for decision making and conflict resolution. The governance structure needs to have two critical components. One represents the executive leadership of the State's departments and agencies served through the consolidated data center model to assist in establishing policies, standards and accountability mechanisms. A second component of an effective governance structure for the data center consolidation model will be the establishment of an IT advisory group (similar to the current CIO Council) that will provide IT advice and counsel to the entity responsible for the planning and policy development related to the State's consolidated data center initiative.

- **SLAs Aligned with Business Objectives and Needs—**Service levels identify the performance goals and service outcomes required of specific business processes that, in aggregate, will meet each agency or department's objective. A written SOW or MOU is the foundation for creating, monitoring and analyzing service levels and agreements. It

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sets forth the organization's requirements for the outcomes expected from the relationship.

The MOU document sets forth requirements such as:

- **SLOs:** The performance requirements and associated metrics, jointly defined by the provider and the organization
- **KPIs:** Quantifiable measurements of success
- **SLAs:** The agreements of accomplishments to achieve business objectives; set requirements for products/services delivered; and establish contact personnel and specific metrics of effectiveness for measurement, management and control
- **OLAs:** Define the interdependent relationships between internal and external suppliers working to supply interrelated services; describes the rules of engagement between suppliers and the responsibilities of each supplier, including where dependencies and interfaces exist
- **Service Level Management:** The continuous management of the provision of products and services to adjust to changing needs and produce efficient and effective functions, activities and processes

SLAs are usually most successful when all parties have the same vision of the project and when the relationship supports the MOU to make the service levels effective. Also, the SLA should be structured so that customers using the service levels will be satisfied. Agencies can most effectively manage service levels through four processes:

- **Measure:** Gather data and compare them to see whether SLOs match results. Report the results to the proper personnel at the appropriate time. Seek follow-up for feedback and proposed adjustments.
- **Examine:** Identify and understand the causes of problems. Confirm the problem and its cause, and then develop solutions. Requirements to achieve goals should be economically feasible. Seek follow-up for feedback and further adjustment
- **Correct:** Generate and validate the solution, and implement improvements.
- **Guide:** Monitor the effectiveness of the solution, document procedures and provide feedback for further adjustment.

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Appendix

Appendix

In any of the Tables the term NA indicates that Not Available. Data was not available for that combination of Agency, Department and technology.

Current-State Staffing

The top five agencies are responsible for approximately 74% of the data center staffs: SRC, DFS, DCF, DOT and DHSMV. Note that SRC includes other agencies' workload including: DMS, DOH, DOR, etc.

Table 29. Data Center Personnel

Data Center Personnel by Agency and Technology				
Agency	**X86**	**Unix**	**IBM-Mainframe**	**Total**
DACS	3.4	9.0	0	12.4
DCF	28.5	0.6	56.6	85.7
DEP	9.3	1.4	0	10.7
DFS	26.3	11.6	33.0	70.8
DMS	41.5	39.1	22.1	102.7
DOC	4.4	0.0	19.5	23.9
DOR	4.2	6.7	0	10.9
DOS	8.0	3.3	0	11.3
DOT	26.2	0.0	18.6	44.8
DBPR	1.2	0.0	0	1.2
FDLE	3.9	1.3	0	5.3
DHSMV	5.3	2.8	30.7	38.7
DOE	19.8	1.0	2.0	22.8
DOH	15.9	4.2	0	20.1
AWI	4.1	0.7	0	4.8
Total	**201.8**	**81.7**	**182.6**	**466.0**

The top three agencies; DMS, DOR and DOH, are responsible for almost 90% of the total SRC personnel.

Table 30. SRC Personnel

SRC Staffing Profile				
Agency	X86-Windows FTEs	Unix FTEs	Mainframe FTEs	Total FTEs
DMS	8.6	13.2	22.2	44.0
APD	1	NA	NA	1.0
AWI	0.9	0.7	NA	1.6
DCA	0.8	NA	NA	0.8

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SRC Staffing Profile				
DCF	0.3	NA	NA	0.3
DEM	1.5	NA	NA	1.5
DJJ	0.1	NA	NA	0.1
DOE	0.7	NA	NA	0.7
DOEA	1.5	NA	NA	1.5
DOH	13.6	6.1	NA	19.7
DOR	10	17	NA	27.0
DOS	0.3	1.3	NA	1.6
EOG	1.7	NA	NA	1.7
HSMV	0.6	0.8	NA	1.4
Total	**41.6**	**39.1**	**22.2**	**102.9**

For all technologies, the majority of the agencies are less productive than the peer. Some agencies have inflated productivity factors due to outsourced support agreements, e.g., FDLE.

Table 31. Productivity by Agency and Technology

Productivity by Agency and Technology			
Agency	**X86-Windows (Physical Servers per FTE) Average Value = 20**	**Unix (Physical Servers per FTE) Average Value = 7**	**Mainframe (MIPS per FTE) Average Value = 39**
DACS	30	4	NA
DCF	14	11	53
DEP	17	5	NA
DFS	11	4	33
DMS	15	4	15
DOC	21	NA	53
DOR	25	1	NA
DOS	16	5	NA
DOT	13	NA	27
DBPR	48	NA	NA
FDLE	96	49	NA
DHSMV	41	12	6
DOE	13	12	502
DOH	17	7	NA
AWI	14	9	NA
Average	**17**	**5**	**39**

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Current-State Cost

Even though the majority of the workload is X86-related, the mainframe represents the largest spending area, and Unix spending is significant.

Table 32. Total Cost by Agency and Technology

Total Cost by Agency and Technology Area							
Agency	X86-Windows	Unix	Mainframe IBM	Mainframe Unisys	iSeries	Other	Total
DACS	$672,559	$1,227,263	NA	NA	NA	$151,822	$2,051,644
DCF	$4,480,126	$44,725	$18,270,460	$2,617,615	NA	NA	$25,412,925
DEP	$2,872,350	$323,601	NA	NA	$259,122	NA	$3,455,074
DFS	$3,715,654	$5,493,203	$7,487,544	NA	$377,625	NA	$17,074,026
DMS	$5,608,263	$9,148,101	$4,387,781	$254,225	NA	$284,853	$19,683,223
DOC	$976,358	NA	$6,124,216	NA	NA	NA	$7,100,575
DOR	$746,067	$1,394,815	NA	$1,163,845	NA	$17,386	$3,322,113
DOS	$1,070,058	$1,159,293	NA	NA	NA	$252,589	$2,481,940
DOT	$3,179,682	NA	$4,639,079	NA	NA	NA	$7,818,761
DBPR	$327,741	NA	$0	NA	NA	NA	$327,741
FDLE	$4,625,749	$799,188	$0	$1,209,175	NA	NA	$6,634,112
DHSMV	$1,285,460	$771,990	$2,811,244	NA	NA	NA	$4,868,694
DOE	$2,696,679	$824,608	$3,352,709	NA	NA	NA	$6,873,997
DOH	$2,650,213	$1,854,172	$0	NA	NA	NA	$4,504,385
AWI	$602,024	$158,746	$0	NA	NA	NA	$760,770
Total	**$35,508,984**	**$23,199,706**	**$47,073,033**	**$5,244,860**	**$636,747**	**$706,650**	**$112,369,980**
% of Total Cost	**31.6%**	**20.6%**	**41.9%**	**4.7%**	**0.6%**	**0.6%**	**100.0%**

The four largest agencies at the SRC represent 90% of the cost: DMS, DOR, DOH and DOS.

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Table 33. SRC Cost Profile

DMS Cost Profile—DMS and Client Agency Costs						
Agency	**Total Cost**	**X86-Windows**	**Unix**	**MF**	**MF-UNISYS**	**Other**
SRC	$8,230,444	$1,039,772	$2,376,991	$4,387,781	$254,225	$171,675
APD	$206,274	$206,274	$ –	$ –	$ –	$ –
AWI	$262,140	$114,188	$147,952	$ –	$ –	$ –
DCA	$146,649	$146,649	$ –	$ –	$ –	$ –
DCF	$62,191	$62,191	$ –	$ –	$ –	$ –
DEM	$166,572	$166,572	$ –	$ –	$ –	$ –
DJJ	$2,894	$2,894	$ –	$ –	$ –	$ –
DOE	$54,850	$54,850	$ –	$ –	$ –	$ –
DOEA	$272,246	$272,246	$ –	$ –	$ –	$ –
DOH	$3,462,908	$2,147,044	$1,315,864	$ –	$ –	$ –
DOR	$5,387,363	$1,148,092	$4,239,271	$ –	$ –	$ –
DOS	$845,033	$23,297	$708,558	$ –	$ –	$113,178
EOG	$135,400	$129,000	$ –	$ –	$ –	$ –
DHSMV	$454,661	$95,195	$359,466	$ –	$ –	$ –
Total	**$19,689,625**	**$5,608,264**	**$9,148,102**	**$4,387,781**	**$254,225**	**$284,853**

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Status Quo Spending by Department

Table 34. Status Quo Spending Summarized by Department

Agency	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DACS	2,241,975	2,274,297	2,307,407	2,341,328	2,376,081	2,411,691	2,448,181	2,485,576	2,523,901	2,563,183	2,603,447
DBPR	329,717	348,796	368,238	388,057	408,265	428,876	449,903	471,362	493,267	515,633	538,476
DCF	27,587,436	28,582,647	29,349,359	30,127,232	30,915,565	31,715,208	32,526,510	33,349,827	34,185,530	35,033,998	35,895,622
DEP	4,008,382	3,230,312	3,569,983	3,912,814	4,258,917	4,608,409	4,961,409	5,318,041	5,678,435	6,042,721	6,411,036
DFS	18,872,519	21,170,595	21,849,104	22,537,117	23,234,953	23,942,936	24,661,403	25,390,700	26,131,185	26,883,226	27,647,203
DMS	8,389,725	8,940,114	9,230,675	9,626,090	9,928,938	10,237,622	10,552,328	10,873,249	11,200,585	11,534,542	11,875,329
DOC	7,809,230	7,931,892	8,036,285	8,142,345	8,250,119	8,359,657	8,471,011	8,584,234	8,699,379	8,816,503	8,935,662
DOE	7,525,216	7,787,800	8,083,902	8,384,192	8,687,975	8,995,792	9,307,780	9,624,078	9,944,831	10,270,189	10,600,307
DOR	7,818,252	7,442,540	6,170,251	5,506,833	5,675,577	5,847,420	6,022,459	6,200,798	6,382,540	6,567,795	6,756,672
DOS	3,930,499	4,227,951	4,412,290	4,611,288	4,801,336	4,994,309	5,190,307	5,389,429	5,591,781	5,797,469	6,006,604
DOT	7,849,274	8,281,006	8,720,764	9,168,825	9,625,474	10,091,003	10,565,716	11,049,925	11,543,953	12,048,132	12,562,805
DOH	8,413,889	8,927,504	9,351,017	9,823,460	10,262,853	10,710,328	11,166,149	11,630,590	12,103,932	12,586,467	13,078,493
FDLE	7,031,316	6,979,485	7,479,974	7,981,517	8,484,149	8,987,905	9,492,824	9,998,943	10,506,302	11,014,942	11,524,905
HSMV	5,662,175	5,923,664	6,164,160	6,417,273	6,664,952	6,916,340	7,171,556	7,430,722	7,693,962	7,961,407	8,233,190
AWI	1,745,700	1,868,238	1,965,473	2,075,179	2,176,425	2,279,716	2,385,119	2,492,708	2,602,557	2,714,741	2,829,339
Total Spending	119,215,305	123,916,841	127,058,882	131,043,549	135,751,579	140,527,212	145,372,655	150,290,183	155,282,141	160,350,946	165,499,090
Short-Term Savings											
Mainframe Transition Cost	-	-	-	-	-	-	-	-	-	-	-
Data Center Upkeep and Build out	2,842,884	2,025,200	2,101,731	2,221,830	2,218,750	2,270,638	2,270,638	2,270,638	2,272,402	2,398,846	2,000,000
IT Equipment Relocation/Build Out Cost	-	-	-	-	-	-	-	-	-	-	-
Data Center PMO Cost	-	-	-	-	-	-	-	-	-	-	-
Total One-Time Cost	2,842,884	2,025,200	2,101,731	2,221,830	2,218,750	2,270,638	2,270,638	2,270,638	2,272,402	2,398,846	2,000,000
Total Spending	122,058,189	125,942,041	129,160,612	133,265,379	137,970,329	142,797,849	147,643,293	152,560,821	157,554,543	162,749,792	167,499,090

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Note: Chart shows DMS spending allocated out to itself and hosted agencies.

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Table 35 shows spending for *Scenario 2: Leverage Existing Facilities* summarized by department. (Note: 2008–9 spending differs slightly from data in the Benchmarking section, due to Network cost.)

Table 35. Scenario 2 Spending Summarized by Department

Tower	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DACS	2,279,248	2,311,563	2,344,673	2,408,382	2,502,257	2,607,448	2,799,801	2,834,443	2,869,889	2,906,163	2,943,289
DBPR	342,221	361,299	380,742	423,138	494,896	588,107	770,338	806,608	843,670	881,553	920,284
DCF	28,263,150	29,256,426	30,023,137	30,394,481	30,111,587	29,188,531	26,400,074	26,821,090	27,251,120	27,690,483	28,139,509
DEP	4,046,854	3,268,785	3,608,456	3,828,796	3,832,559	3,604,114	2,721,655	2,885,370	3,052,612	3,223,509	3,398,189
DFS	19,022,806	21,320,882	21,999,390	22,009,374	20,995,645	19,056,573	14,336,446	14,658,855	14,987,351	15,322,146	15,663,453
DMS	8,832,999	9,011,842	9,302,403	9,597,251	9,487,977	9,150,530	8,176,845	8,426,106	8,679,669	8,937,680	9,200,286
DOC	7,887,923	8,010,585	8,114,979	8,155,798	8,087,475	7,908,441	7,419,791	7,461,949	7,505,036	7,549,084	7,594,125
DOE	7,661,080	7,942,881	8,238,982	8,635,210	9,177,407	9,850,956	10,990,275	11,432,169	11,876,553	12,323,512	12,773,132
DOR	8,219,160	7,652,846	6,380,557	5,539,517	5,522,526	5,406,542	5,031,403	5,206,005	5,383,825	5,564,975	5,749,568
DOS	3,983,671	4,236,555	4,420,894	4,520,275	4,432,610	4,185,148	3,488,806	3,619,793	3,753,232	3,889,208	4,027,808
DOT	7,920,413	8,352,144	8,791,903	9,087,142	9,140,198	8,956,171	8,131,803	8,517,968	8,908,852	9,304,621	9,705,442
DOH	8,695,304	9,054,303	9,477,816	10,043,412	10,599,176	11,148,799	11,860,002	12,293,182	12,735,356	13,186,833	13,647,932
FDLE	7,179,959	7,128,128	7,705,148	8,297,520	8,658,038	8,883,449	8,772,199	9,167,756	9,571,874	9,984,858	10,407,020
HSMV	5,894,928	6,122,269	6,362,764	6,544,675	6,604,707	6,576,311	6,328,308	6,630,105	6,937,758	7,251,473	7,571,463
AWI	1,828,473	1,911,534	2,008,769	2,152,680	2,318,794	2,515,286	2,837,503	2,976,436	3,118,078	3,262,523	3,409,869
Total Spending	122,058,189	125,942,041	129,160,612	131,637,652	131,965,852	129,626,406	120,065,251	123,737,833	127,474,878	131,278,620	135,151,369
Short-Term Savings	-	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)
Mainframe Transition Cost	-	-	-	816,480	1,905,120	2,721,600	-	-	-	-	-
Surviving Data Centers Build Out Cost	-	-	-	11,415,000	-	-	-	-	-	9,375,000	-
IT Equipment Relocation/Build Out Cost	-	-	-	1,226,579	2,862,018	4,088,598	-	-	-	-	-
Data Center PMO Cost	633,856	1,584,640	2,218,496	2,218,496	2,218,496	1,621,494	721,882	-	-	-	-
Total One-Time Cost	633,856	1,584,640	2,218,496	15,676,555	6,985,634	8,431,691	721,882	-	-	9,375,000	-
Total Spending	122,692,045	124,271,593	128,124,020	144,059,118	135,696,397	134,803,009	117,532,044	120,482,745	124,219,789	137,398,531	131,896,280

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Table 36 shows spending for *Scenario 3: Leverage New Data Center Consolidation* summarized by department. Note: 2008–9 spending should correspond with data provided by the departments as part of the benchmarking analysis.

Table 36. Scenario 3 Spending Summarized by Department

Tower	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DACS	2,279,248	2,311,563	2,344,673	2,398,453	2,502,257	2,607,448	2,799,801	2,834,443	2,869,889	2,906,163	2,943,289
DBPR	342,221	361,299	380,742	415,612	494,896	588,107	770,338	806,608	843,670	881,553	920,284
DCF	28,263,150	29,256,426	30,023,137	30,530,095	30,111,587	29,188,531	26,400,074	26,821,090	27,251,120	27,690,483	28,139,509
DEP	4,046,854	3,268,785	3,608,456	3,869,626	3,832,559	3,604,114	2,721,655	2,885,370	3,052,612	3,223,509	3,398,189
DFS	19,022,806	21,320,882	21,999,390	22,235,384	20,995,645	19,056,573	14,336,446	14,658,855	14,987,351	15,322,146	15,663,453
DMS	8,832,999	9,011,842	9,302,403	9,650,762	9,487,977	9,150,530	8,176,845	8,426,106	8,679,669	8,937,680	9,200,286
DOC	7,887,923	8,010,585	8,114,979	8,177,545	8,087,475	7,908,441	7,419,791	7,461,949	7,505,036	7,549,084	7,594,125
DOE	7,661,080	7,942,881	8,238,982	8,603,314	9,177,407	9,850,956	10,990,275	11,432,169	11,876,553	12,323,512	12,773,132
DOR	8,219,160	7,652,846	6,380,557	5,563,872	5,522,526	5,406,542	5,031,403	5,206,005	5,383,825	5,564,975	5,749,568
DOS	3,983,671	4,236,555	4,420,894	4,555,878	4,432,610	4,185,148	3,488,806	3,619,793	3,753,232	3,889,208	4,027,808
DOT	7,920,413	8,352,144	8,791,903	9,138,082	9,140,198	8,956,171	8,131,803	8,517,968	8,908,852	9,304,621	9,705,442
DOH	8,695,304	9,054,303	9,477,816	10,020,679	10,599,176	11,148,799	11,860,002	12,293,182	12,735,356	13,186,833	13,647,932
FDLE	7,179,959	7,128,128	7,705,148	8,307,276	8,658,038	8,883,449	8,772,199	9,167,756	9,571,874	9,984,858	10,407,020
HSMV	5,894,928	6,122,269	6,362,764	6,570,246	6,604,707	6,576,311	6,328,308	6,630,105	6,937,758	7,251,473	7,571,463
AWI	1,828,473	1,911,534	2,008,769	2,143,402	2,318,794	2,515,286	2,837,503	2,976,436	3,118,078	3,262,523	3,409,869
Total Spending	122,058,189	125,942,041	129,160,612	132,180,228	131,965,852	129,626,406	120,065,251	123,737,833	127,474,878	131,278,620	135,151,369
Short-Term Savings	-	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)	(3,255,089)
Mainframe Transition Cost	-	-	-	544,320	2,177,280	2,721,600	-	-	-	-	-
Surviving Data Centers Build Out Cost	-	13,634,228	13,634,228	12,025,414	-	-	-	-	-	2,875,000	2,875,000
IT Equipment Relocation/Build Out Cost	-	-	-	1,018,198	4,072,791	5,090,989	-	-	-	-	-
Data Center PMO Cost	633,856	1,584,640	2,218,496	2,218,496	2,218,496	1,621,494	721,882	-	-	-	-
Total One-Time Cost	633,856	15,218,868	15,852,724	15,806,428	8,468,567	9,434,083	721,882	-	-	2,875,000	2,875,000
Total Spending	122,692,045	137,905,820	141,758,247	144,731,566	137,179,330	135,805,400	117,532,044	120,482,745	124,219,789	130,898,531	134,771,280

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Financial Model Assumptions and Notes

Notes and assumptions regarding the model are organized into three sections below:

- **General Assumptions and Notes.** These items apply to the financial model across all three scenarios.
- **Scenario 1: Status Quo** Assumptions and Notes. These items apply to the financial model only for Scenario 1.
- **Scenario 2: Leverage Existing Facilities** Assumptions and Notes. These items apply to the financial model only for Scenario 2.
- **Scenario 3: Leverage New Data Center Consolidation** Assumptions and Notes. These items apply to the financial model only for Scenario 3.

General Assumptions

Use of Benchmark Cost Factor for Consolidated Environments

Gartner analyzed five main cost components: Hardware, Software, Occupancy (facility-related), FTE (loaded labor cost) and other (unallocated cost). The individual agencies reported their costs, which are used to drive the relevant analysis within the Status Quo model. An underlying assumption is that, in the consolidation model, the future-state environment will be able to benefit from the economies of scale and that the costs will mimic those of a comparable peer. Gartner's cost benchmark database supplies the cost estimate used in the consolidation model for X86, Unix and IBM Mainframe. Costs for Unisys, iSeries and other types of server workload are assumed to follow those of the Status Quo environment.

In the Status Quo environment, labor cost is assumed to increase at an average of 2.5%, in line with the labor cost inflation rate for state and local government bodies. Gartner used an average of $73,178 per FTE for the Senate's loaded labor cost and $72,154 for the Consolidated Peer group.

Personnel

Gartner categorizes personnel into five different groups: Facilities, Operations, Technical Services, Planning and Process Management, and Management and Administrative. Some categories, such as Facilities, tend to be more static, and the head count does not rise linearly with workload increase, while others, such as Technical Services, are more dynamic, and head count will grow directly with increasing workload.

Virtualization

Virtualization is the effect of locating multiple server images on one physical host server. The financial model takes into account any virtualization plans individual agencies may have. As technology progresses rapidly, it is assumed that the collective agencies will be able to achieve locating six to eight server images on one host server.

In the Status Quo model, the extent of future virtualization is a direct reflection of individual agencies' virtualization plans; some agencies may have significant virtualization plans and others none.

Only X86 and Unix are included in the virtualization analysis.

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Power Consumption Requirements

Power consumption is driven by the number of physical servers. Power consumption is calculated and then used to forecast build-out requirements. Gartner uses an average of 700 watts per X86 and Unix server.

Gartner assumes that the present power density of the Status Quo environment is at 50 watts per sq. ft. In *Scenario 2: Leverage Existing Facilities*, power density is assumed to be 69 watts per sq. ft., while in *Scenario 3: Leverage New Data Center,* it is assumed to be at 120 watts per sq. ft.

Raised Floor Space Requirements

Gartner considers the conditioned raised floor space to accommodate future space needs with workload growth. Cost of space build-out is calculated from power consumption, using the power density assumption.

Data Center Capacity Build-Out Costs

There are three types of build-out costs:

- Building shell costs—This cost is expressed in cost per usable square foot, and includes the costs of acquiring land and constructing an appropriate building shell and finishing any non-raised floor spaces (e.g., offices, loading docks).
- Raised floor costs—This cost is expressed in cost per raised floor square foot, and includes the cost of building out the raised floor structures, as well as critical building systems other than those related to power and cooling. It also includes the basic cable plant.
- Power build-out costs—This cost is expressed in cost per kilowatt, and includes the cost of building out the power infrastructure (main switch gear, subsidiary switch gear, generator engines, UPSs, PDUs and whips for individual racks) and cooling infrastructure (e.g., chiller, distribution systems and air handlers).

Power and raised floor build-out is assumed to be possible in a phased or incremental manner.

In the Status Quo scenario, build-out is assumed to be done the year prior to when it is needed, and the corresponding spending is recorded as such. Gartner assumes that existing facilities can be built out at current tier levels, costing around $225 per square foot of raised floor and $9,000 per kW of power. The SRC is currently a near-Tier 3 facility. DFS, FDLE, DCF and NWRDC are Tier 2 or Tier 2+ facilities. The rest are Tier 1 facilities. The incremental build-out costs equate to a Tier 2– to Tier 2 facility.

The new Data Center for Scenario 3 is assumed to have a $16,000 cost per kW for build-out for power and cooling. Additional costs for this facility include $100 per building square foot to acquire land and construct an appropriate building shell, and $225 per raised floor square foot for building out raised floor spaces. These three cost components are added together to come up with the total construction cost. The level of build-out is Tier 2+.

The model runs from FY 2008–9 until FY 2018–9 (11 years).

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Workload-Related Assumptions

Workload and cost figures provided by the departments and validated by Gartner are used to represent costs and workload volumes through the end of Fiscal Year 2008–9.

The counts of workload drivers (logical and physical servers for X86/Unix, physical servers for iSeries/other and MIPS for Unisys/IBM Mainframe are summarized in the table below.

Table 37. Workload by Agency and Technology

Workload by Agency and Technology								
Agency	**X86-Windows (Physical Servers)**	**X86-Windows (Logical Servers)**	**Unix (Physical Servers)**	**Unix (Logical Servers)**	**Unisys Mainframe (MIPS)**	**IBM Mainframe (MIPS)**	**iSeries (Physical)**	**Other Servers (Physical)**
DACS	99	100	37	38	0	0	0	3
DCF	389	460	6	6	98	3,002	0	0
DEP	160	181	7	7	0	0	7	0
DFS	296	360	47	57	0	1,086	2	0
DMS	508	600	171	185	40	322	0	2
DOC	93	107	0	0	0	1,040	0	0
DOR	103	109	6	6	30	0	0	0
DOS	125	125	16	16	0	0	0	4
DOT	347	435	0	0	0	500	0	0
DBPR	57	73	0	0	0	0	0	0
FDLE	377	425	64	64	200	0	0	5
HSMV	215	215	34	34	0	172	0	0
DOE	250	290	12	12	0	1,004	0	0
DOH	274	376	31	89	0	0	0	0
AWI	58	115	6	11	0	0	0	0
Total	**3,351**	**3,971**	**437**	**525**	**368**	**7,126**	**9**	**14**

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Growth rates provided by the departments and summarized in the chart below were used to calculate increases in workloads. These growth rates are:

Table 38. Growth Rates (X86, Unix) by Computer Facility

Growth Rates (X86, Unix) by Computer Facility			
Agency	**Computer Facility**	**X86 (Logical Servers)**	**Unix (Logical Servers)**
DACS	Division of Licensing Data Center #2	12%	0%
DACS	Agriculture Management Information Center	0%	0%
DCF	All Remote DCF Facilities	9%	6%
DCF	Northwood Data Center	10%	0%
DEP	Bob Martinez Center/Data Center, Commonwealth Complex Annex/Data Center	10%	0%
DFS	DFS Computer Facilities—Fletcher Building, Larson Computer Room, Hartman Datacenter	5%	5%
DMS	Shared Resource Center	2%	4%
DOC	Department of Corrections Data Center (CDC)	4%	0%
DOE	Office of Student Financial Aid—DCF Data Center	7%	0%
DOE	Division of Vocational Rehabilitation	9%	0%
DOE	Division of Blind Services Data Center, Education Data Center	3%	–7%
DOH	All Remote DOH Facilities (13 computer facilities)	9%	0%
DBPR	DBPR Server Room	5%	0%
DOR	Revenue Data Center	–25%	–25%
DOR	Taxworld Building L Imaging Center	9%	0%
DOS	Northwood Data Center	5%	5%
DOT	DOT Computer Facilities—OIS Location 10—CO OIS, TranStat Server Room	5%	0%
FDLE	FDLE Data Center	10%	0%
DHSMV	DHSMV Computer Facilities—DHSMV Kirkman Data Center, DHSMV C-103 Phone/Comm Room	10%	5%
AWI	Caldwell Server Room	8%	5%

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Treatment for the SRC

The detailed financial model treats SRC as a single data center and does not break out workload by customer. Only workload associated with DMS and the in-scope departments hosted by SRC was included in SRC's workload count.

The growth rate and virtualization rate associated with the SRC represents a weighted average of the growth and virtualization rates reported by the major departments that have workload in the SRC, i.e., DOH, DOR, DMS and DOS.

To make the results of the modeling accurate and to accommodate the Senate's desire to see "cost avoidance" or "savings" by department, several adjustments were required. The following table was used to allocate SRC savings back out to agencies.

The savings associated with the workload contained within the SRC were allocated to the departments based on the percentage contribution calculated from the data provided by the departments.

Table 39. SRC Cost and Savings Allocations

SRC Cost and Savings Allocations	
Agency	**Percentage**
DACS	0%
DBPR	0%
DCF	0%
DEP	0%
DFS	0%
DMS	44%
DOC	0%
DOE	0%
DOR	23%
DOS	5%
DOT	0%
DOH	18%
FDLE	0%
DHSMV	4%
AWI	5%
Total	**100%**

Virtualization and Refresh

Several departments have consolidation or virtualization projects in progress. The model assumes these are completed by the end of 2008–9. These efforts are:

- DEP reported that it intends to virtualize 80% of its X86 servers and to consolidate the workload currently in the Twin Tower Lab data center into the Annex data center
- DFS reported that it intends to consolidate the Larson data center into the Fletcher data center

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Treatment Used When Analyzing Different Departments

Remote facilities (e.g., field offices and non-HQ data centers) for DOH, DCF and DFS were analyzed in aggregate. This means that the workloads and facilities attributes were added together and the aggregate for each department and was treated by the model as though it were a single data center. Growth and virtualization are estimated from the weighted averages of the contributing facilities. All non-HQ data centers associated with the DOT were excluded from the analysis. This includes both field offices and Turnpike-related facilities.

Table 40. DOT Computer Facilities Excluded

DOT Computer Facilities Excluded			
Computer Facility	**Computer Facility Area (sq. ft.)**	**X86 Servers (Physical)**	**Unix Servers (Physical)**
District 6 Regional Transportation Management Center	6,210	22	0
Tolls Data Center	2,280	61	64
District 5 Regional Transportation Management Center—Backup Site	20	24	0
District 5	1,368	52	0
Orlando Data Center	1,352	8	45
District 1	1,345	32	0
Turnpike—Turkey Lake HQ	1,154	29	0
Tampa Bay SunGuide Center	864	20	0
District 2	728	30	0
State Materials Office	726	27	0
Broward County RTMC	687	19	0
District 7	672	24	0
District 3	634	30	0
District 6	536	28	2
Pompano Beach Traffic Management Center Equipment Room	516	8	5
Turkey Lake Traffic Management Center Equipment Room	516	7	4
Turnpike—Pompano Operations	493	22	0
Florida Permanent Reference Network Global Positioning Service\Central Office Surveying and Mapping Office	408	22	0
District 4	397	41	0
Motor Carrier	374	20	0
Engineering/CADD Systems Office	268	6	0
Total	**21,548**	**532**	**120**

The Status Quo model assumes that the DOR Carlton data center will be shut down in 2010 and that this workload will move to the SRC at that time.

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Disaster Recovery

Neither the Status Quo nor the consolidation models address the State's current or future disaster recovery requirements. No disaster recovery data center or extra costs are included in any of the scenarios. No improvement in disaster recovery capabilities is assumed in calculating quantitative or qualitative benefits. It is assumed that existing disaster recovery plans which leverage third-party contracts or additional State-owned facilities/equipment will remain the same.

Transition Cost—PMO

Both consolidation models assume that a program management office will need to be created to manage the consolidation effort. The model assumes that a mixture of contract resources and State employees will be used to manage the transition. The staffing levels and costs associated with the PMO are summarized in the table below. Please note that PMO will not be required for Years 2015–18, as the activities related to consolidation are assumed to be completed by 2014.

Table 41. PMO Cost Schedule

Workload by Agency and Technology							
	2008	2009	2010	2011	2012	2013	2014
# FTEs in PMO	4	10	14	14	14	14	8
% External Resources	0.5	0.5	0.5	0.5	0.5	0.25	0.1
Average Loaded Cost per FTE	$158,464	$158,464	$158,464	$158,464	$158,464	$115,821	$90,235
Cost of PMO	$633,856	$1,584,640	$2,218,496	$2,218,496	$2,218,496	$1,621,494	$721,882

Transition Cost and Move Cost

Both consolidation models assume that equipment not located in the target consolidated data centers will need to be relocated. Equipment that is already located in a target data center does not require move costs. Move costs include all labor and services required to assess move requirements, plan the move, back up the systems/data, disassemble systems, move systems, assemble systems in new data center, reconfigure for new environment and test systems. Cost for new LAN build-out is included in the estimated relocation costs required to move to target data centers. The move costs assumed are as follows:

Table 42. Relocation Costs

Relocation Costs	
Relocation Cost for X86	$2,400
Relocation Cost for Unix	$3,600
Relocation Cost for iSeries	$10,000
Relocation Cost for Others	$10,000
Relocation Cost for IBM Mainframe	$24,000
Relocation Cost for Unisys Mainframe	$24,000
Build-Out Cost for LAN	$200
Build-Out Cost for Storage (per cabinet)	$2,100
Mainframe Transition Cost	$5,443,199

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Pre-consolidation Rationalization

Both consolidation models assume that there will be a one-time rationalization effort done on all non-strategic servers to eliminate server redundancies. Only X86 and Unix servers hosting non-strategic applications are considered candidates for this rationalization effort. The model assumes a conservative view that rationalization will reduce server counts by only 10%. DEP was excluded from this rationalization effort, as it is already undertaking an effort to virtualize and reduce server counts today. The 10% figure is at the low or conservative side of the anticipated range of a 10% to 20% reduction in server counts that is typically seen in rationalization projects.

Short-Term Savings

In the Scenario 2 and Scenario 3 consolidation models, Gartner estimates that there is a short-term savings that is realizable due to the cost differential between the individual department cost and those from the benchmarked peers. Gartner used a conservative amount of $3.26 million for the potential short-term savings realizable. This is only 25% of Gartner's total short-term savings estimates, and represents less than 3% of total Senate cost for all the in-scope computer facilities. Short-term savings are allocated to the individual departments according to an allocation schedule that reflects their savings potential against the benchmarked peers.

Other Financial Assumptions

NPV for cost savings is calculated using a 6% discount rate.

Scenario 1 Status Quo Model Assumptions

The Status Quo model assumes that the computer facilities at present will be able to continue to house the workload and growth over the period of analysis. Logical and Physical server counts are calculated based on the growth rates:

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Table 43. Status Quo: Workload by Agency and Technology Schedule

Status Quo: Workload by Agency and Technology Schedule												
Agency	**X86+ Unix**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
DACS	LS	138	140	142	144	146	148	150	152	154	156	158
	PS	136	130	124	120	116	113	115	117	119	121	123
DCF	LS	466	506	550	595	640	684	729	774	818	863	908
	PS	395	354	343	334	329	327	348	368	389	410	431
DEP	LS	188	143	161	179	197	215	233	251	269	288	306
	PS	167	130	122	116	111	107	113	120	127	134	141
DFS	LS	417	516	536	557	578	599	620	641	662	682	703
	PS	343	416	421	426	431	435	453	470	488	505	523
DMS	LS	785	857	879	931	953	976	998	1,021	1,043	1,066	1,088
	PS	679	696	672	669	647	627	643	659	675	691	706
DOC	LS	107	112	116	120	124	128	132	136	140	144	148
	PS	93	93	91	90	89	87	90	93	96	99	102
DOR	LS	115	101	91	67	72	77	82	87	92	97	102
	PS	109	96	80	47	44	41	43	44	46	48	49
DOS	LS	141	160	167	174	181	188	195	202	209	216	223
	PS	141	141	135	129	123	119	123	127	131	136	140
DOT	LS	435	457	479	500	522	544	566	587	609	631	653
	PS	347	347	347	347	348	348	364	381	397	413	430
DBPR	LS	73	77	80	84	88	91	95	99	102	106	110
	PS	57	58	59	61	62	63	66	69	72	75	78
FDLE	LS	489	482	525	567	610	652	695	737	780	822	865
	PS	441	434	466	498	529	560	599	638	677	716	755
DHSMV	LS	249	272	295	319	342	365	388	411	435	458	481
	PS	249	261	241	224	211	200	209	218	227	236	245
DOE	LS	302	318	330	342	354	367	379	391	403	415	427
	PS	262	248	236	227	220	215	223	232	240	248	256
DOH	LS	465	496	529	562	595	629	662	695	728	761	794
	PS	305	321	336	352	367	381	408	434	461	487	513
AWI	LS	126	136	145	155	165	175	184	194	204	214	223
	PS	64	70	75	81	86	91	99	107	115	123	131
Total	**LS**	**4,496**	**4,771**	**5,027**	**5,297**	**5,567**	**5,837**	**6,107**	**6,378**	**6,648**	**6,918**	**7,188**
	PS	**3,788**	**3,796**	**3,749**	**3,720**	**3,712**	**3,716**	**3,897**	**4,079**	**4,260**	**4,441**	**4,623**

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Virtualization rates provided by the departments and summarized in the chart below were used to calculate the number of physical servers. The model assumes that when new logical servers are added they are virtualized at the rate specified below. The model assumes that as non-virtualized physical servers come up for hardware refresh, they are virtualized at the rate specified below. After all the existing pool of servers is refreshed, future refresh servers will not be virtualized. The rationale is that new batches of servers will already have the maximum planned virtualization instituted in them at the point when they are being introduced, and they do not lend themselves to any further virtualization.

Table 44. Virtualization Rates (X86, Unix) by Computer Facility

Virtualization Rates (X86, Unix) by Computer Facility			
Agency	**Computer Facility**	**X86 (Virtualization)**	**Unix (Virtualization)**
DACS	Division of Licensing Data Center #2	0%	0%
DACS	Agriculture Management Information Center	60%	0%
DCF	All Remote DCF Facilities	9%	0%
DCF	Northwood Data Center	80%	0%
DEP	Bob Martinez Center/Data Center, Commonwealth Complex Annex/Data Center	75%	0%
DFS	DFS Computer Facilities—Fletcher Building, Larson Computer Room, Hartman Data Center	19%	20%
DMS	Shared Resource Center	39%	28%
DOC	Department of Corrections Data Center (CDC)	30%	0%
DOE	OSFA-DCF Data Center	0%	0%
DOE	Division of Vocational Rehabilitation	0%	0%
DOE	Division of Blind Services Data Center, Education Data Center	80%	100%
DOH	All Remote DOH Facilities (13 computer facilities)	24%	0%
DBPR	DBPR Server Room	20%	0%
DOR	Revenue Data Center	75%	0%
DOR	Taxworld Building L Imaging Center	80%	0%
DOS	Northwood Data Center	50%	30%
DOT	DOT Computer Facilities—OIS Location 10—CO OIS, TranStat Server Room	0%	24%
FDLE	FDLE Data Center	10%	0%
DHSMV	HSMV Computer Facilities—Kirkman Data Center, C-103 Phone/Comm Room	80%	0%
AWI	Caldwell Server Room	25%	0%

The Status Quo model assumes that when servers are virtualized, they are virtualized based on a ratio of 1:6. That is, six virtual server images are housed on each physically virtualized host machine. The two consolidation models assume a higher ratio of 1:8, the reason being that

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consolidation brings about potential efficiencies, allowing more virtual server images to be housed on a single virtualized host machine.

The Status Quo model assumes that hardware, software and occupancy costs increase linearly along with logical server counts. Gartner collected personnel cost by functional categories. Each of these personnel cost categories is associated with dynamic staff or static staff. In the Status Quo model, dynamic staffing costs increase linearly with the growth of logical servers. Static staffing costs increase at 10% of the rate of growth in the logical servers.

In the Status Quo model, LAN operating costs are calculated based on their existing cost basis, as given by the various departments. In the two consolidation models, LAN operating cost is calculated by assuming an average annual cost of $400 per LAN port. This number was based on data obtained from Gartner's benchmarking database and networking experts. The number of LAN ports is calculated using the physical servers count. In the Status Quo model, the ratio of LAN ports to physical severs follows that provided by the various departments. In the two consolidation scenarios, the ratio is assumed to be three ports per server.

The Status Quo model assumes that the per unit workload costs for hardware, software and occupancy (non-personnel related costs) reported by the departments for each server tower (X86, Unix, IBM Mainframe, Unisys Mainframe, iSeries, Other and Data Center LAN) remain constant over the period of the analysis. This reflects the fact that while hardware costs decline, software and maintenance costs tend to rise and offset the hardware decreases.

In the Status Quo model we assume that, as more physical servers are deployed, more data center electricity, cooling and space will be required to electrify, chill and house them. The model assumes that each physical server will consume 700W of power on average (accounting for the server itself and any associated incremental shared network or storage gear). The model used as its starting point the capacity and utilization information regarding space and power provided by the departments. It calculated incremental power load based on the growth of physical servers. Additional power and space are assumed to be built out the year before they are needed. The model assumes power as a proxy for space requirements. Additional new raised floor space is calculated at $225 per square foot. Renovation of any unconditioned raised floor space is assumed to be at $60 per square foot. Additional power and cooling is calculated at $9,000 per kilowatt for all facilities except DMS. These numbers are based on industry averages for Tier 2 data centers. The State's data centers range from Tier 1 to Tier 3. Gartner believes that the Tier 2 is an appropriate average metric to use in this case. DMS is calculated at $16,000 per kilowatt, to be consistent with its status as a higher-tier data center.

For the purposes of the modeling analysis, effective power capacity is calculated as 90% of the manufacturer's rated capacity of the UPS that is providing backup power for the IT equipment on the raised floor. In environments that were designed to provide UPS redundancy (e.g., N+1), the model assumes the effective capacity is calculated by adding up the power capacity of all the UPS units, subtracting the power capacity of the largest unit, and taking 90% of the result.

At present, the aggregated amount of effective power capacity available within all the computer facilities is around 5 megawatts (MW), excluding the Northwest data center. Power utilization is around 2.4MW (excluding Northwest). More than 114,000 sq. ft. is available conditioned raised floor space. At the end of the analysis period (Fiscal Year 2018–2019), over 2.9MW is needed to support workload growth. The model does not show any need for substantial new space expansion.

Labor-related costs are increased at 2.5% per year in all scenarios. Gartner originally proposed a 4.45% labor cost inflation, based on the U.S. Department of Labor Index of state and local

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government wage inflation. At the request of the Senate, this was changed to 2.5% (stated as 4% earlier in this document).

The Status Quo model assumes that the State will, on average, spend $2,000,000 per year on facility upgrades. This is based on an estimate provided by the Senate Technology Review Workgroup and Gartner's estimate based on current facility upgrade costs mentioned by agencies during the data center assessment process. This cost is allocated to the different departments (for the purpose of savings calculation) based on the size of their data center.

Scenario 2 Consolidation Model Assumptions

The model assumes that the "target" data centers for consolidation will be DCF-Northwood data center, SRC, NWRDC and DEP-Annex data center.

Logical and physical server counts are calculated based on the growth rates:

Table 45. Scenario 2: Workload by Agency and Technology Schedule

Workload by Agency and Technology												
Agency	**X86+ Unix**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
DACS	LS	138	140	142	137	139	141	143	145	147	149	151
	PS	136	130	124	120	113	106	107	108	110	111	112
DCF	LS	466	506	550	564	609	654	698	743	788	832	877
	PS	395	354	343	334	334	333	359	384	409	434	459
DEP	LS	188	143	161	179	197	215	233	251	269	288	306
	PS	167	130	122	116	117	118	129	139	149	159	169
DFS	LS	417	516	536	522	543	564	585	606	626	647	668
	PS	343	416	421	426	405	387	398	410	422	434	445
DMS	LS	785	857	879	884	906	929	951	974	996	1,018	1,041
	PS	679	696	672	669	636	607	620	633	645	658	671
DOC	LS	107	112	116	115	119	123	127	131	135	139	143
	PS	93	93	91	90	85	80	82	84	87	89	91
DOR	LS	115	101	91	67	71	75	80	84	88	92	96
	PS	109	96	80	47	46	46	49	51	54	57	60
DOS	LS	141	160	167	160	167	175	182	189	196	203	210
	PS	141	141	135	129	123	118	122	125	129	133	137
DOT	LS	435	457	479	467	489	511	533	554	576	598	620
	PS	347	347	347	347	331	316	328	340	353	365	377
DBPR	LS	73	77	80	79	82	86	90	93	97	100	104
	PS	57	58	59	61	58	55	57	59	61	63	65
FDLE	LS	489	482	525	549	592	634	677	719	762	804	847
	PS	441	434	466	498	480	465	488	512	536	560	584
DHSMV	LS	249	272	295	304	327	350	373	396	420	443	466

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Workload by Agency and Technology												
	PS	249	261	241	224	221	219	232	245	258	271	284
DOE	LS	302	318	330	323	335	347	359	371	383	395	407
	PS	262	248	236	227	215	204	211	218	225	232	238
DOH	LS	465	496	529	534	567	600	633	666	699	733	766
	PS	305	321	336	352	343	336	354	373	392	410	429
AWI	LS	126	136	145	149	158	168	178	188	197	207	217
	PS	64	70	75	81	81	81	86	92	97	103	108
Total	**LS**	**4,496**	**4,771**	**5,027**	**5,033**	**5,303**	**5,572**	**5,841**	**6,111**	**6,380**	**6,649**	**6,919**
	PS	**3,788**	**3,796**	**3,749**	**3,720**	**3,587**	**3,470**	**3,622**	**3,774**	**3,926**	**4,078**	**4,230**

In the consolidated environment, the virtualization rate is assumed to be 50% for X86 and 20% for Unix. These are relatively aggressive virtualization rates, but are only slightly higher than the rates projected by the State of Florida's individual agencies. The model also assumes that eight virtual server images can be housed on one physically virtualized host machine.

The cost per workload in the consolidated environment is given by a comparable consolidated peer identified within Gartner's benchmark database. This cost per workload is given by server tower—X86, Unix and IBM Mainframe. iSeries, Unisys and Other server costs are assumed to be similar to that of the Status Quo model.

The model assumes that hardware-, software- and occupancy-related costs do not experience any cost inflation or price decreases. This is in keeping with Gartner's practice of conservatively estimating savings. FTE-related costs experience 2.5% inflation, similar to that used in the Status Quo model.

The model assumes that the actual physical relocation and consolidation of equipment does not begin until 2011 and that this process lasts for three years. The reason for this assumption is due to the Senate's request that significant additional spending not occur in FY 2008–9, 2009–10 or 2011–12.

For the period prior to the start of the consolidation process (e.g., 2008–9, 2009–10 and 2010–11), the model assumes that results calculated using the Status Quo model apply for the Scenario 2 consolidation model.

Beginning in 2011, the Scenario 2 consolidation model assumes that each year a percentage of the total workload moves from the current unconsolidated cost structure to the consolidated cost structure. As this happens, savings start to accrue in the model. Gartner's assumption is that transition would begin slowly and then accelerate. The following summarizes the portion of total workload for all departments that are assumed to have transitioned by the end of the fiscal year:

- 2011–12: 15%
- 2012–13: 50%
- 2013–14: 100%

The model assumes that all servers are refreshed on a five-year basis (20% per year). The model assumes that, as servers are refreshed, they will also be considered for virtualization. For refreshes that occur prior to the consolidation, the virtualization rate provided by the department is utilized (see Status Quo above). After consolidation has occurred, a rate of 50% is applied.

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This virtualization rate is also applied to any growth in logical servers that occurs after the point of data center consolidation.

Similar to the Status Quo model, electricity, cooling and space requirements for the consolidated environment are driven by the number of physical servers deployed, and assuming each server requires 700 watts of power. To accommodate the growing workload in the four target facilities, the model assumes that all available raised floor space in the data centers can be occupied by workload, and that the power and cooling density of each of these facilities can be raised to 69 watts per square foot by adding power and cooling capacity. The following table summarizes the capacity of the facilities before and after the build-out.

Table 46. Scenario 2: Power and Space Build-Out

	Before Build-Out		After Build-Out	
	Rated Capacity	Computer Facility Space	Rated Capacity	Computer Facility Space
SRC	567	14,256	984	14,256
DCF	1,350	36,020	2,485	36,020
NWRDC	290	3,500	690	3,500
DEP	270	2,500	270	2,200

Total required power for the workload in the consolidated environment rises from 2.3MW at the start of the consolidation period to 2.8MW at the end of Year 2018. At the start of consolidation, 2.5MW of power is available from the four target facilities. The model forecast power build-out in two phases: Phase One will build 750kW at the start of the consolidation period and another 750kW in Year 2017. At the start of the consolidation period, the four facilities provide an aggregate 51,000 sq. ft. of raised floor space. This amount of space is sufficient to house all workload through the end of the analysis period in Year 2018.

As part of expanding the four target facilities, it was determined that special upgrades were required for the DCF facility. These are a “dry” fire suppression system ($1.8 million) and floor repairs ($240,000). This is in addition to the capacity upgrades described in the previous assumption.

Savings are calculated by considering ongoing workload-related costs and short-term savings and the non-recurring investments (power and space build-outs, PMO, move cost) between the consolidated scenario and Status Quo. Savings is given by department, by server tower and by strategic/non-strategic IT service, as defined in the Florida Legislative Budget Request Instructions.

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Scenario 3 Consolidation Model Assumptions

The model assumes that the State will consolidate all in-scope data center workload into the SRC and into a second data center facility to be built in the Tallahassee area.

Logical and physical server counts are calculated based on the growth rates:

Table 47. Scenario 3: Workload by Agency and Technology Schedule

Workload by Agency and Technology												
Agency	LS/PS (X86, Unix)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DACS	LS	138	140	142	137	139	141	143	145	147	149	151
	PS	136	130	124	120	113	106	107	108	110	111	112
DCF	LS	466	506	550	564	609	654	698	743	788	832	877
	PS	395	354	343	334	334	333	359	384	409	434	459
DEP	LS	188	143	161	179	197	215	233	251	269	288	306
	PS	167	130	122	116	117	118	129	139	149	159	169
DFS	LS	417	516	536	522	543	564	585	606	626	647	668
	PS	343	416	421	426	405	387	398	410	422	434	445
DMS	LS	785	857	879	884	906	929	951	974	996	1,018	1,041
	PS	679	696	672	669	636	607	620	633	645	658	671
DOC	LS	107	112	116	115	119	123	127	131	135	139	143
	PS	93	93	91	90	85	80	82	84	87	89	91
DOR	LS	115	101	91	67	71	75	80	84	88	92	96
	PS	109	96	80	47	46	46	49	51	54	57	60
DOS	LS	141	160	167	160	167	175	182	189	196	203	210
	PS	141	141	135	129	123	118	122	125	129	133	137
DOT	LS	435	457	479	467	489	511	533	554	576	598	620
	PS	347	347	347	347	331	316	328	340	353	365	377
DBPR	LS	73	77	80	79	82	86	90	93	97	100	104
	PS	57	58	59	61	58	55	57	59	61	63	65
FDLE	LS	489	482	525	549	592	634	677	719	762	804	847
	PS	441	434	466	498	480	465	488	512	536	560	584
DHSMV	LS	249	272	295	304	327	350	373	396	420	443	466
	PS	249	261	241	224	221	219	232	245	258	271	284
DOE	LS	302	318	330	323	335	347	359	371	383	395	407
	PS	262	248	236	227	215	204	211	218	225	232	238
DOH	LS	465	496	529	534	567	600	633	666	699	733	766
	PS	305	321	336	352	343	336	354	373	392	410	429

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Workload by Agency and Technology												
AWI	LS	126	136	145	149	158	168	178	188	197	207	217
	PS	64	70	75	81	81	81	86	92	97	103	108
Total	**LS**	**4,496**	**4,771**	**5,027**	**5,033**	**5,303**	**5,572**	**5,841**	**6,111**	**6,380**	**6,649**	**6,919**
	PS	**3,788**	**3,796**	**3,749**	**3,720**	**3,587**	**3,470**	**3,622**	**3,774**	**3,926**	**4,078**	**4,230**

Scenario 3 treats server virtualization and refresh in exactly the same manner as in Scenario 2. Scenario 3 also has the same virtualization rate and virtualization ratio as in Scenario 2. In addition, cost per workload is also calculated in the same manner as in Scenario 2.

The model assumes that SRC will be upgraded to build out power and space to bring it to a total of 14,256 sq. ft. of raised floor space and a total power capacity of 984kW. This upgrade will raise the power density of the facility from approximately 61 watts per square foot to 69 watts per square foot. Gartner believes this is a conservative assumption and that additional expansion in terms of power density may be achievable.

The model assumes that the new facility will be built out at a Tier 2+ level of capability. The SRC is currently a Tier 3 facility and will continue to be a Tier 3 facility.

There is no room at the SRC to build out additional raised floor space. Currently there is 5,000 sq. ft. of raised floor that is not powered. This will be powered and additional power will be added to the existing SRC space. This upgrade will cost approximately $12,500 per kilowatt.

Table 48. Scenario 3: Power and Space Build-Out

	Before Build-Out		After Build-Out	
	Rated Capacity	**Computer Facility Space**	**Rated Capacity**	**Computer Facility Space**
SRC	270	14,256	984	14,256

The model assumes that the State will construct a second data center facility that will have the capacity to eventually support the in-scope data center workload and its anticipated growth for the expected 15-year life of this facility. Specific assumptions that drove the cost estimate are:

- Size of building shell: 51,000 sq. ft. building
- Maximum size of raised floor to be accommodated within the facility: 25,700 sq. ft.
- Designed power density: 120 watts per sq. ft.
- Maximum power capacity of the facility: 3 megawatts

The model assumes that the entire building shell will be built out upfront, but that raised floor, power, cooling and other critical building systems will be built out in phases as they are required.

- Phase 1 of the build-out will result in the construction of 16,700 sq. ft. of raised floor and 2.0 megawatts of power capacity. Construction of Phase 1 will commence in 2009–10.
- Phase 2 of the build-out will result in the construction of 3,300 sq. ft. of raised floor and 0.4 megawatts of power capacity. Construction of Phase 2 will commence in 2017–18 and will take approximately two years.

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The model uses the following costs when calculating data center build-out costs:

- Cost of land, permits, building shell and finish of any office space: $100 per square foot
- Cost of building out raised floor: $225 per square foot
- Cost of building out power, cooling and related building subsystems: $12,500 per kilowatt

The model assumes that it will be 4.5 years from the start of FY 2008–9 before the new facility is ready for new workload to be moved into it. The explanation for this schedule is as follows:

- It will take approximately 12 months to obtain funding, develop a data center design, select/acquire a site and prepare procurement materials for the build-out of the facility
- It will take the selected contractor approximately 30 months to construct the data center
- It will take the State approximately six months to build out LAN and storage infrastructure required before workload can be moved

The model assumes that the actual physical relocation and consolidation of equipment does not begin until 2011–12 and that this process lasts for three years. The reason for this assumption is the Senate's request that significant additional spending not occur in FY 2008–9, 2009–10 or 2011–12.

The same treatment used in Scenario 2 is used for calculating workload-related spending and associated savings. To realize savings, for the period prior to the start of the consolidation process (e.g., 2008–9, 2009–10 and 2010–11), the model assumes that results calculated using the Status Quo model applies for the Scenario 3 consolidation model.

As was previously discussed, within the three-year transition period, the model assumes the portion of workload transitioned to follow the schedule below:

- 2011–12: 15%
- 2012–13: 50%
- 2013–14: 100%

Once transition is fully completed, the model moves on to the fully consolidated cost structure.

Savings is calculated by considering ongoing workload-related costs and short-term savings and the non-recurring investments (power and space build-outs, PMO, move cost) between the consolidated scenario and the Status Quo model. Savings are given by department, by server tower and by strategic/non-strategic.

Floor Space Comments from the Interim Report

If you look at all the facilities that Gartner reviewed, for 67 computing facilities there were:

Conditioned Raised Floor—Occupied	97,223 sq. ft.
Conditioned Raised Floor—Unoccupied	56,525 sq. ft.
Unconditioned Raised Floor and Non-raised Floor	72,352 sq. ft.
Total from the Interim Report	226,100 sq. ft.

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