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The State of Washington



2009 Data Center Assessment

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Executive Summary

Background

The State of Washington has centralized data center capacity, as well as independent data processing capabilities in numerous agency data centers reviewed and represented in this report; it shows ranges in capability from servers placed in office space to full-fledged facilities with dedicated cooling, power, and staff.

The intent of this study was to collect information on the capabilities of each participating agency's data center and identify both potential financial opportunities and efficiencies related to agency consolidation into the state's new State Data Center under construction in Olympia.

Unisys and Excipio completed an expedited assessment for the state which included technical data collection and interviews with 21 participating agencies, supplemented with on-site data center visits at five data center sites. This engagement reviewed both data center operations and facilities. The first component involved establishing the current environment for each of the state agencies and their associated data center locations.

Agencies were selected to participate in this study if they were first, located in Thurston County and second, if they reported an IT Portfolio spend of \$5 million or more per year.

The following is a list of agencies participating in the assessment; the locations reviewed included only those facilities located in Thurston County. These locations are defined as "in scope" agencies throughout the document.

"In Scope" Agencies	
Dept. of Social and Health Services	Dept. of Personnel
Dept. of Information Services	Dept. of Revenue
Dept. of Corrections	Dept. of Ecology
Dept. of Labor & Industries	Dept. of Fish & Wildlife
Dept. of Transportation	Dept. of Natural Resources
Dept. of Employment Security	Liquor Control Board
Dept. of Licensing	Dept. of Retirement Systems
Office of Attorney General	Health Care Authority
Dept. of Health	Dept. of Financial Institutions
Washington State Patrol	Office of Public Instruction
Office of Financial Management	

Current Data Center Environment

What is the current Data Center environment at the State of Washington?

The assessment reviewed many areas within the “in scope” data centers. While there are some exceptions, the summary statements can be applied to current data center facilities and fall into two broad categories – facility inefficiencies and technology risk.

Technology Risk:

Security: The current data centers pose significant security risks in the protection of state data and operations.

Current Risks: The infrastructure was built on 40-year-old standards (Tier I – 1965 standard), making them vulnerable to failure. The risk of continuing to operate in the current data centers is significant; multiple major failures are probable in the next few years.

Lack of True Data Centers: The majority of the data centers are in locations designed as office buildings, not data centers.

Agency Infrastructure: Some critical agency infrastructure is effectively “run out of someone’s garage” due to the types of power, cooling, security, etc. in use.

Fire Systems: Fire and leak detection systems, where present, are generally outdated.

Critical Missing Components: In general, the vast majority of the power components do not have the redundant critical elements to meet the business requirements:

Insufficient Cooling Redundancy: Many of the facilities do not have proper redundancy built into the design of the cooling systems.

Advanced Fire Systems: While nearly all of the facilities had building smoke detection and proper fire suppression systems, the systems were designed for general office building codes.

Leak Detection Systems: While fluid leaks from HVAC systems and water pipe breaks in adjacent areas are common, most of the facilities visited did not appear to have water detection systems.

Required Space: Participating agency data centers represent 118,000 square feet in data center space which could be consolidated into approximately 20,000 - 25,000 square feet.

Green Initiatives: The existing facilities cannot meet “green” statutes set by current environmental standards. As a result, energy use and cost are higher than they would be in a contemporary design.

Technology Inefficiencies:

Operating Systems: The number of operating systems in the current environment is managed more efficiently than peers.

Servers: The current in scope agency state hardware standards of HP, Compaq, Dell, IBM, and Sun are broad and allow numerous model variations, making standardization significantly more complex.

Storage: The state hardware standards for storage are broad with numerous model variations; the environment is significantly more complex as well as driving costs above the norm.

Cost per Server: Current cost per server is low, but only because of a lack of appropriate infrastructure investment and acceptance of higher risk at the data centers. This risk is increasing due to the lack of on-going investment required in order to provide proper data center infrastructure to meet agency needs which are increasingly technology dependent.

Value Proposition

What is the value of the new State Data Center to the State of Washington?

A technical review of the plans for the new Washington State Data Center confirmed that it meets DIS intended functionality requirements. The first phases will accommodate the consolidation of the Thurston County environment in the initial two data halls. In addition, the availability of physical expansion space, coupled with planned future expansion of the power and mechanical components, will provide for expansion and allow for long-term use.

Data center costs are based upon an average 15-year life, to reflect a typical amortization/depreciation schedule. This comparison includes the cost of the facility as well as maintenance costs to maintain data center-specific equipment.

There are significant differences in the requirements, power and cooling equipment, advances in technology and overall demands on data centers today. Due to the age and original design of the current data centers, the costs to operate them today (except for power) may be low, but the risks are high. The new State Data Center will meet the need for operational improvements, risk reduction, and greater efficiencies as well as provide additional significant benefits.

The cost to upgrade, maintain and manage the current agencies' distributed data center environments* to a level that approximates current industry standards is approximately \$9.1M annually. This includes costs to maintain the facilities including cost of space, maintenance of equipment including generators, UPS, HVAC, fire suppression and facility and security monitoring. It does not include utilities costs or FTE costs. Comparable costs for the new State Data Center are estimated at \$10.2M which was determined based upon a 15-year depreciation/amortization of the construction costs of the new data center plus the estimated annual facility operations and maintenance costs.

Annual Cost Savings Comparison

Annual net savings to staff and operate a new data center are estimated at \$3.2M. This is the difference between an annual operational cost savings of \$4.4M due to optimized and shared staffing (estimated at \$3.9M) and utility cost savings from reduced power and cooling (estimated at \$465K) offset by the estimated higher facility costs of a new data center of \$1.1M as noted above.

One Time Cost Savings Opportunity

There is a onetime savings of \$1.4M related to additional virtualization of approximately 700 servers within the server environment; this includes the savings of \$5.2M for eliminating 700 server purchases against the costs of virtualization including software, of \$4.2M.

Future Cost Avoidance Opportunity

And finally, there is an estimated \$65M of cost avoidance over a five-year period related to implementation of a managed storage environment.

*Based upon the State's 2009 IT Portfolio data (Agency Budgets, Employees, etc.), participating agencies represent approximately 67% of the total. Study results reported here have been extrapolated to represent the "out of scope" or non-participating agencies in order to provide a more complete analysis.

Standardization

What are the benefits of standardization in the data center environment?

The current environment has evolved through independent agency decisions. While this autonomous environment is not uncommon, as an organization grows, the benefits of standardization become more evident. In some areas the current environment is fairly well standardized. Server operating systems for example have 88% of the servers using Microsoft operating systems.

However, other areas are more diverse and are creating a complex situation which is difficult to maintain, and cost ineffective. If standardization begins now, it will allow the state to leverage technologies, manufacturers, capacities, and capabilities across the state to achieve superior economies of scale, while reducing costs. It will also allow for a more efficient transition to the new State Data Center.

IT Operations: The first component involves centralizing key IT operations into an enterprise environment. This includes standardizing equipment but also such primary areas as common server naming conventions, processes, inventory tools, asset management, equipment purchases and standardization of future technology direction.

Server Purchases: Discontinue individual agency server purchases. All server purchases need to be managed to follow the enterprise server standard for consolidation/virtualization. The recommendation would be to establish two server manufacturers (one Intel, one midrange) with a maximum of two or three models per manufacturer. As an example, there are currently over 240 server models, instead of the typical range of 30 to 50 models.

Virtualization Standards: There are currently multiple virtualization software tools in use and several versions. This will create compound problems in the future upon consolidation into the new data center. It is recommended a standard be implemented immediately and all agencies adhere to this new standard moving forward.

Server Consolidation: The state needs to continue to implement state-wide server consolidation and virtualization prior to moving into the new data center. Ideally, this would be executed in preparation for data center consolidation. Focus initially on consolidation of outdated servers that need to be refreshed, as these instances will likely be the most viable candidates.

Storage Standardization: The state should also establish storage standards as soon as possible. Each agency has varied storage requirements, equipment, resources and multiple variations in implementation of data retention policies. Currently there are over 195 different storage devices across the in-scope agencies data centers. This current decentralized environment is already complex; this level of complexity and support cost will only continue to increase over time.

Cost Savings Opportunities

Where are the cost savings opportunities?

In the current environment, immediate opportunities to reduce costs and improve operations are as follows:

Capital Spending: Place a hold on all capital spending in the current agency data center facilities. Only spend money to keep the facilities operational, not for refresh or expansion. This needs to happen without delay, as some of the agencies are already planning to make expenditures.

Virtualization Reduction in Power and Cooling Consumption: Excluding any server growth from new processing demands, the facilities within scope could reduce the number of physical servers by up to 1,000 servers. This equates into a potential cost reduction of \$350K - \$400K in annual operating expenses.

Virtualization increase in Raised Floor Capacity: Reducing the footprint of physical equipment increases the capacity of data center raised floor space. The benefits are flexibility to provide for future rack space, storage, and backup equipment growth extending the life of the data center.

Maintenance on Facilities: The state could consider elimination of data center-specific maintenance contracts in those centers where an interim migration to another data center (OB-2 as an example) is more effective than maintaining the current location. As an example, one data center reviewed could cancel these agreements and gain an immediate benefit of a savings of \$19,980 annually.

Data Center Infrastructure Staffing: Through the consolidation, the new State Data Center will require approximately 117 server administration personnel; this represents an increase in efficiency and a reduction in required FTEs by 31. In the storage area, this represents an estimated reduction of 2 FTEs for a total reduction of approximately 33. This is a function of the efficiencies for the data center consolidation as well as the use of virtualization.

Annual savings is projected at over \$2.9M in the server and storage environments based upon resource optimization.

NOTE: There are likely additional saving associated with staffing; this analysis focused only on the data center-specific infrastructure resources mentioned above.

Cost Avoidance Opportunities

Where are opportunities to avoid future costs?

Storage Opportunities: The area of greatest opportunity is in the standardization and reorganization of the current storage environment. During each of the interviews, agencies were asked about storage management areas including:

- Storage limitations for users
- Data retention policies
- Administration of data retention
- Limitation on electronic mail storage and mail box sizes
- Alternatives to single storage, lower costs alternatives, tiered or storage categorization.

In almost all cases the standard for the agencies is to retain data and information for lengthy times. In addition, every agency is maintaining the data in the standard or most expensive storage environments.

The total project storage costs through 2014 under the current structure are \$223M.

Through the implementation of storage management practices, the state has the opportunity to reduce these future expenditures over the next five years by 30 to 50%, which represents cost avoidance from \$64M to \$108M.

Server Purchases: Discontinue server purchases and virtualize wherever possible. There is a variation within the agencies related to "Life Cycle" management for the servers and other related equipment. In most cases, servers were on a five-year refresh rate, while others were more frequent at four years. Based upon the current server inventory of the in scope agencies, this represents approximately 704 servers of the 3500+ in operation today.

Virtualization Reduction in Power Equipment: Excluding any server growth from new processing demands, the facilities within scope could reduce the number of physical servers by up to 1,000 servers. This equates into a potential cost avoidance of \$700K in capital for additional power and cooling equipment.

Recommendations

What are the key recommendations and next steps to ensure the State of Washington maximizes the benefits?

While there are several recommendations from this assessment, the following are the key areas which should be addressed in the near time frame.

Storage Environment: Storage is one of the greatest cost components to the overall IT investment. The State of Washington should consider a detailed evaluation of their storage environment. The current growth and future costs are beyond what is traditionally common in the marketplace. There are multiple vendors that can assist with the state's detailed storage needs.

Capital Spending: Place a hold on all capital spending in the current agency data center facilities. Only spend money to keep the facilities operational, not for refresh or expansion. This needs to happen immediately, as some of the agencies are already planning to make expenditures.

Detailed Data Center Analysis: This analysis included a sampling of the agencies which could potentially take advantage of the new State Data Center. For the state to have a successful data center consolidation, migration and to ensure a high level of future operations, a complete assessment of all State of Washington Data Center facilities is required.

This assessment would include facilities, operational and business requirements specific to the all agency data centers. It would also provide a priority ranking of all current data centers for the consolidation based upon technical, financial and physical risks. In addition, verification and review of agency-reported data regarding staffing, equipment and software should be conducted.

Upon completion of this additional assessment, the data centers could be scheduled for migration. The examples provided in the detailed document should be considered as examples of the process and documentation which would need to be produced specifically for the consolidation.

Standardization: Standardization will allow the state to leverage technologies, manufacturers, capacities, and capabilities across the state to achieve superior economies of scale, while reducing costs. It will also allow for a more efficient transition to the new State Data Center. The key areas to focus on include:

- IT operations
- Server purchases
- Virtualization software, tools and processes
- Server consolidation
- Storage standardization

Data Center Move Prioritization: This engagement involved a sampling of the total data center locations in the state. During the assessment, several factors were identified which will require detailed evaluation to determine the move groups for the final data center consolidation. The key factors identified for determination include: Citizen services provided, criticality of service, current facility risk, technology requirements, technology risk, citizen risk and financial impact. Of the five sample data centers reviewed, it was determined two of the facilities are in the high risk category and should be moved as soon as possible, one is in the medium risk and would move second, while the other two would be moved at a later date.

Sample move project plans, checklists, and daily documents are provided in the attached detailed documentation.