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**The State of Washington**



**Washington State Department of Information Services**

**Project Title: Data Center Consolidation**

**Analysis Date: June 2010**

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## Scope and Assumptions

### Objectives

The overall objective is to assist the State of Washington and the Department of Information Services (DIS) in gathering information, providing analysis and planning processes, and providing guidelines for acquisition and physical relocation of most State of Washington agency data centers located in Thurston County. This project will assist the State in its preparations to move to the new State Data Center and position the department and the State for consolidation of agency IT asset management.

### Analysis Focus Areas

This engagement includes assisting DIS and the State of Washington in budgeting, planning and identifying pre-move activities for State Data Center consolidation. They include:

#### Planning

The planning segment should involve the transition from strategic to operational-level planning for the migration.

- Review existing migration strategy documentation together with relevant documents from Excipio, Computer Performance Management Information(CPMI), INX and other sources.
- Validate choices around consolidation, business recovery and asset management.
- Develop draft partnership agreements and global service level agreements for analysis of funding streams for operations.
- Refine backup and recovery plans for critical applications.
- Develop staffing plans and space requirements for the new State Data Center.

#### Pre-move

The pre-move segment involves working with DIS, selected other consultants and agency staff to determine the specific requirements that must be met in the new State Data Center.

- Review project criteria and planning documents.
- Act as liaison and facilitator for decision making by State IT executive staff and other stakeholders.
- Help establish data center decision criteria in terms of facility, environmental controls, power, space footprint, and capabilities.
- Provide project progress, milestones, and targets.
- Develop deliverables with help from agencies and relocation consultant, including:
  - Strategy for the State Data Center Consolidation Project
  - Integrated management and business model
  - Service strategy and metrics
  - Service level agreement management
  - Executive presentations for IT transformation governance teams (CAB, ESC and ISB)

## Process and Approach

This engagement included a due diligence effort to review current information and documentation from DIS, agency representatives, and other externally provided information such as Excipio, CPMI and INX. The objective is to gather key information regarding existing data centers and machine rooms, agency and technology complexity, identifiable risks, agency peak periods, service level requirements, and significant incidents which could increase risk. Data gathering and analysis techniques included inventory reviews and validation, data center visits, and identification of required resources.

The approach includes the following deliverable phases.

### **Phase I: Integrated Management and Business Model**

Develop with management, a new comprehensive business plan for a State Data Center and supporting business continuation centers to include: staffing plan, supervisory requirements and skill identification, business procedures, and internal control and change management procedures.

### **Phase II: Service Strategy Management and Metrics**

Identify Data Center and related service performance targets, with measurement methodologies and operating metrics for operating procedures, change management, uptime and throughput measures and measures of operating efficiency. The Service Strategy and Metrics document is a separate deliverable and is not a part of this report.

### **Phase III: Enterprise Data Center Integration Project Plan**

Furnish a by-agency report with details on staging, physical relocation and re-establishment of remote and OB-2 agency related assets and systems. This includes contract requirements for move contractors, schedules sensitive to agency's business needs, and contingencies for delays and interruptions.

### **Phase IV: Operational Plan and Budget Proposal**

A report with details and budgets for data center consolidation preparation, an acquisition plan for new equipment, data center management software, specialist consulting, staging, migration and initial operation of the new State Data Center.

## Out of Scope

- Disaster recovery planning and operations.
- Virtual Machine - software and hardware related to design, planning and implementation.

## Assumptions

### General

- Excipio used ITIL and supporting frameworks (COBIT) as the basis for many of the recommendations.
- Freeze on new equipment purchases in place at least 30 days before first move and/or in accordance with governance policies.

- Of the approximately 4017 servers that exist today:
  - 2479 or 62% have reached the end of their useful life and would ordinarily need to be replaced in 2010
  - 3815 or 95% should reach their end of life in 2011 and would ordinarily need to be replaced
  - Budgetary constraints commencing in 2010 have caused a freeze on new equipment purchases
  - The new State Data Center already will have a prepared infrastructure in place before any equipment moves take place and all switches/routers/sans brocade will be in place
- All new servers and storage in the new State Data Center (may be exceptions for legacy systems)
- Per industry standard, rack utilization rates are assumed at approximately 60% to accommodate cooling and weight considerations
- Servers should have 3 NIC cards and 2 Fiber Channel Cards (may change once final architecture is in place)
- There is a centralized State Data Center budget in effect for all State Data Center purchases
- Racks should have separate doors and card key locks

#### **Financial**

- All costs assume that a single entity or vendor is responsible for the physical move, thus allowing the vendor to achieve economies of scale across the entire population. Otherwise, smaller sites would likely incur higher costs on a per unit basis
- Costs are exclusive of equipment disposal costs, which would typically net out against any recovered value of the servers
- Costs are exclusive of any remediation or decommissioning costs required to abandon or return current data centers to rentable space
- All financial information used to establish the staff baseline costs was based upon information obtained from interviews and templates provided by agencies as well as from best in class third party service providers
- Financial escalation procedures should be established with appropriate authority to mitigate project risks that may require financial resolution

## Phase I: Integrated Management and Business Model

### Background

Develop a business plan for a centralized State Data Center with supporting business continuation centers. This includes a staffing plan, supervisory requirements, skill identification, related business procedures, and internal control and change management procedures.

### Agency Interview Process

#### Interview Process

The process of data gathering included interviews with appropriate groups and functional areas to understand the State's requirements and current infrastructure. Excipio consultants interviewed each of the functional managers, who were asked to include appropriate staff as well as subject matter experts (SME) that had pertinent information or perspectives.

The following individuals were interviewed from the represented agencies.

**Figure P1-1: Agency Interviewees/CIO's**

Agency	Interviewee or CIO	Agency	Interviewee or CIO
AGR	Carl Harris	HCA	Michael DeAngelo
ATG	Andy Hill	LIQ	Roger Deming
DEL	Gene Thomas	LNI	Christy Ridout
DFI	Ron Seymour	LOT	Terry Rudeen
DFW	Jim Eby	OAH	Don Chase
DIS	Cammy Webster	OFM	Stan Marshburn
DNR	Pat Gebhardt	OIC	Dave Marty
DOC	Kit Bail	OSPI	Peter Tamayo
DOH	Frank Westrum	PARKS	Linda Gee
DOL	Bill Kehoe	PDC	Michael Smith
DOP	Steve Young	PRT	Pam Derkacht
DOR	Vikki Smith	RCO	Ed Heiser
WSDOT	Grant Rodeheaver	SAO	Gary McIntosh
DRS	Chris Lamb	SIB	James Mackison
DSHS	Rob St. John	SOS	Bill Teed
ECY	Debbie Stewart	OST	Marla Kentfield
ESD	Mike McVicker	WSGC	Tom Means
GA	Keith Kawamura	WSP	Marty Knorr

### Data Sources

All the information for this analysis was acquired from the following sources:

- State internal Subject Matter Experts (SMEs) in each functional area assessed. These SME's provided:
  - Electronic documents
  - Physical documents
  - Participation in interviews
  - Anecdotal and experiential information
- Additional interviews were conducted with state SME's to finalize and validate the data to be used in the analysis.
- Industry standard information and engineering analysis from past Excipio clients was also used to analyze and validate the data.

### Interview Questions

Each of the interviewees listed in Figure P1-1 were asked a series of questions designed to gather the information necessary to create a comprehensive Data Center Consolidation Strategy. The objective of this strategy was to address the risks of the current Data Centers related to delivery of the services to the citizens of the State of Washington. The questions listed below were used to help gather data about actual versus perceived risks for each agency's Data Center.

- How many State employees are serviced by your Data Center?
- How long could you afford to be down internally for support of State employees? (Hours)
- What are the citizen services you provide?
- How many citizens are serviced on a monthly basis by your agency?
- How many citizens are serviced on a monthly basis with business information that passes through your agency Data Center?
- What is an acceptable time frame for a loss of citizen services by your agency?
- Do you have any transaction-based activities within your agency?
- How many transactions pass through your Data Center on a monthly basis?
- Does your agency generate revenue? How much on an average monthly basis?
- What is the total annual budget for your agency?
- When you have had maintenance, upgrades, transitions, or loss of services, how does this impact your Data Center resources time and effort?
- Please describe any outages you have experienced with your current Data Center in the past ten years (outage type, cause, approximate date/year)
- Do you have a spare resource pool to draw from when needed, related to support for your Data Center?
- Please describe any agency compliance, potential penalties, or financial impacts related to the delivery of your services to citizens.
- How frequently do you test your Data Center Disaster Recovery plan?
- When was the last time you tested the Data Center Disaster Recovery plan?
- What risks were exposed when the plan was tested?
- What were the costs for the test and costs to mitigate the identified risks?
- Who would you like to have as a representative from your agency to make recommendations related to State Data Center Consolidation Strategy?
- Please provide or describe any major projects, in process or planned, in the next three years.

- In terms of a centralized agency data center strategy, what would you consider the top three, or more, benefits from your perspective?
- Please describe the top three, or more, risks or concerns for your agency?
- Do you believe these risks can be mitigated?
- Please describe the different types of funding used in your agency related to IT and are there any specific requirements related to the use of these funds specifically for DC equipment?
- What is the current life cycle of the following:
  - Windows Servers
  - Midrange servers
  - Storage, SAN, Back-up restoration equipment
  - WAN/LAN equipment
  - Telecomm equipment
  - Software in the DC, monitoring, etc.
  - Facilities equipment, Generators, UPS, HVAC,
  - Security Equipment
- What is the current depreciation schedule for the following:
  - Windows Servers
  - Midrange servers
  - Storage, SAN, Back-up restoration equipment
  - WAN/LAN equipment
  - Telecomm equipment
  - Software in the DC, monitoring, etc.
  - Facilities equipment, Generators, UPS, HVAC,
  - Security Equipment
- What is your current policy in regards to expense versus capitalization of purchases/equipment?
- What issues do you see with the consolidation of Agency DC assets into a future consolidated DC?
- What are the benefits of consolidation of these assets?
- Is there a mechanism to transfer these assets midterm to a new centralized IT organization within the state for your Agency?
- Are there any tax implications to the purchases of your IT equipment? Costs of capital?
- Are there any financial penalties for "Lack of Delivery" of citizen services specific to your Agency?

#### **Pros for Consolidation**

- Allows agencies to focus on their core business rather than dedicated internal personnel or contractors to do data center work
- Limited funding has made full utilization of technology impossible on an agency by agency basis
- Utilizes a more redundant, lower risk facility to meet agency and governance demands
- Mitigates the risk of fines for failure to perform in accordance with state and federal requirements by consolidating into a state of art facility that has higher redundancy, fault tolerance, and availability
- A more centralized IT budget will allow for a gain in efficiencies and economies of scale
- All appropriate servers can now be connected to a high availability and high capacity SAN

#### **Cons against Consolidation**

- Agencies may have a perception of loss of control over their information technology

- Individual agency risks or outages may not always appear to have top priority as compared to the overall facility requirements
- Inherent risks exist with moving any Data Center relating to applications, equipment, and unforeseen configuration issues

## Staffing Skill Plan for New Data Center

The following are staffing skill recommendations for the new State Data Center and supportive information for any planned business continuation centers. These staffing skill levels are based on industry best practices and comparisons with existing Excipio customers of similar size and technology requirements. The goal is to achieve the proposed staffing skill levels within a six month period.

## Staffing

The following are staffing recommendations for the new State Data Center and supportive information for any planned business continuation centers. These staffing levels are based on industry best practices and comparisons with existing Excipio customers of similar size and technology requirements. The goal is to achieve the proposed staffing levels within a six month period of occupancy of the new SDC.

It should also be noted that the staffing levels used below are the same for both the current and the future state. Ordinarily, the impact of additional efficiencies and cost savings would be reflected in the future state. However, determining staffing ratios based on future efficiency improvements have yet to be determined and the data was not available at the time of this report.

### Recommended Staffing Levels

- Unix Server (remote staff) staffing standards
  - 345 Servers
  - Range of 1 system administrator for every 30 to 40 servers
  - Staffing recommendation per 8 hour shift(9 to 12 FTEs)
- Wintel Server (remote staff)
  - 3542 Servers
  - Range of 1 system admin to every 40 to 50 servers
  - Staffing recommendation per 8 hour shift- 70 to 88 FTEs
- Shared Storage
  - Total TB of shared storage
  - 1 staff per 20 Terabytes
  - Staffing recommendation per 8 hour shift - 25FTEs
- Network (LAN/WAN)
  - Number of ports 16,500
  - Ratio of 2500 ports per 1 FTE
  - Staffing recommendation per 8 hour shift – 7 FTEs
  - Data Center Infrastructure Service level requirements
  - Every other week-end processing of payroll, food stamps, etc.
  - Medicaid could be anytime – 24x7x365
  - Hours of operation are 24x7x365
  - On-site per shift, 3 shifts staff 3 FTEs for days off, holidays and paid time off.
- Physical Security
  - The level of security staffing required is dependent on the location and the facility

- Minimum of three FTEs per shift during peak hours, one additional FTE may be desirable due to planned or unplanned escort demand. Security would be located as follows:
  - One FTE at the main entrance
  - One rover
  - One FTE for receiving and possible escort to locations within DC
  - One additional FTE if extra work is scheduled
    - New lines (Telco or electric work)
    - Escort during multiple deliveries in receiving
    - Escort for vendors during delivery hours
- Minimum of two FTEs during off peak hours per shift
  - One FTE at the main entrance
  - One rover

### **Retention**

Retention of key staff is critical to the success of the Data Center Consolidation Project. A retention plan should be in place to mitigate the risk against key subject matter experts leaving the organization. Such retention plans should include:

- Retention bonus if appropriate
- Additional vacation
- Competitive salaries
- Possible salary increases
- Additional training
- Technical certifications

### **Recruiting**

Staff Recruiting

- Use the best of existing State of Washington FTE's to fulfill staffing needs
- Hire staffing expertise needed from open market sources
- Contract short time staff for specific expertise not in existence at present
- Use Washington's Colleges and Universities to identify potential new staff

### **Staff Skill Sets**

The skill sets defined are the basic levels of understanding to manage the day to day operations of a data center. The levels of responsibilities required are listed below and reflect the degree of autonomy and complexity of tasks that can be assigned. The staff skill sets identify specific areas of experience or expertise necessary to manage data center operations.

- Levels of responsibilities required
  - Level 1: Contributes and is under management instruction to system operations. This level of responsibility needs close management supervision.
  - Level 2: Carries out agreed operational procedures of a routine nature. Contributes to maintenance, installation and problem resolution. Routine management oversight is required and use of minor discretion in resolving problems on their own before asking management guidance. At this level they should be able to carry out a range of work activities.
  - Level 3: Carries out agreed operational procedures. Contributes to the implementation of maintenance and installation work. Identifies operational problems and contributes to

their resolution. Conducts a broader range of work activities that are sometimes complex and non-routine.

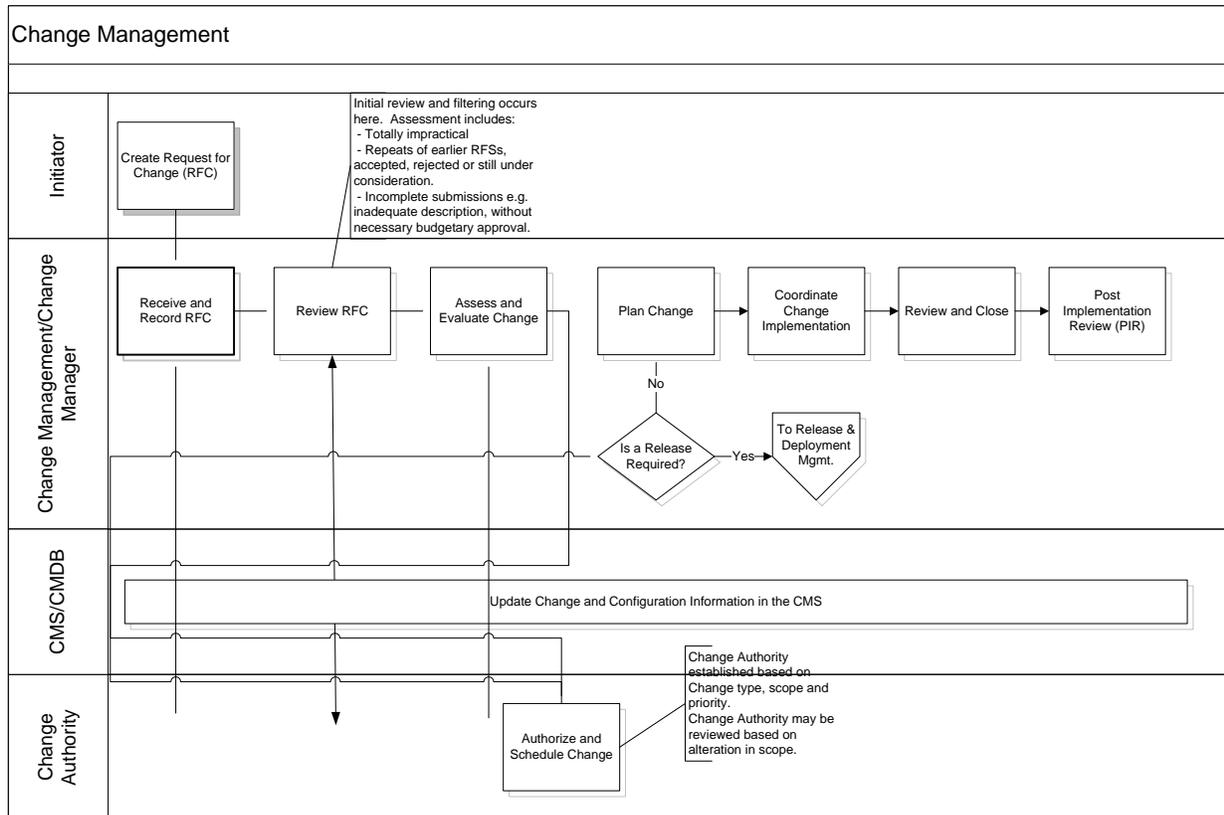
- Specific Staff Skill Sets
  - Knowledgeable in basic system administration duties.
  - Cabling and cabling management experience.
  - Rack and stack capable.
  - Strict attention to detail.
  - Knowledgeable in shipping and receiving.

## **Business Procedures**

Physical security is as important as electronic security. It is critical to distinguish between who has full authorization from those with temporary access to the Data Center. These activities need to be documented with an audit trail, in the event of an issue or incident. The following are guideline procedures that address how access is requested and authorized into the Data Center by non-Data Center personnel. All Data Center access should occur during normal business hours unless prior arrangements have been made through established procedures:

- Conform to State of Washington regular business hours for:
  - Deliveries
  - Telecommunications work
  - Equipment installation, repair, or disposition
- Emergency Work
  - Implement disaster recovery emergency procedures
  - A data center should never have normal operational activities performed as emergency work, with the following exceptions:
    - Sabotage
    - Acts of God (flood, tornado, etc.)
    - Unforeseen events with severe consequences, either technical, financial, or political
- The following is not considered emergency work
  - Release Management activities such as patching or virus pattern updates
  - Console management
  - Job scheduling
  - Standard backup and restore
  - Print and output management
  - Routine or reoccurring maintenance tasks
- Access Requirements
  - What You Have – employee with an authorized badge
  - Who You Are – biometrics (e.g. eye scan, fingerprint, etc.)
  - What You Know – password(s)

## Control and Change Management Processes



The following are activity definitions that apply to Change Management:

### Create Request for Change (RFC)

- The change is raised by a request from the initiator – the individual or organizational group that requires that change. For example, this may be a business unit that requires additional facilities, or problem management staff instigation of an error resolution from many other sources.
- For major change with significant organizational and/or financial implications, a change proposal may be required, which should contain a full description of the change together with a business and financial justification for the proposed change. The change proposal should include sign-off by appropriate levels of business management.

### Record the RFC

- The procedures for logging and documenting RFCs should be decided. RFCs might be able to be submitted on paper forms, through email or using a web-based interface.
- All RFCs received should be logged and allocated an identification number (in chronological sequence). Where change requests are submitted in response to a trigger, such as a resolution to a problem record, it is important that the reference number of the triggering document is retained to provide traceability.

- The change record holds the full history of the change, incorporating information from the RFC and subsequently recording agreed parameters such as priority and authorization, implementation and review information. There may be many different types of change records used to record different types of change. The documentation should be defined during the process design and planning stage.
- Any authorized personnel may create, or add reports of progress to an RFC (through the support tool should keep Change Management aware of such actions), only Change Management staff should have permission to close an RFC.

#### **Review RFC**

- As changes are logged, Change Management should briefly consider each request and filter out any that seem to be
  - Totally impractical.
  - Repeats of earlier RFCs, accepted, rejected or still under consideration.
  - Incomplete submissions, e.g. inadequate description, without necessary budgetary information.
- Rejected RFCs should be returned to the initiator, together with brief details of the reason for the rejection, and the log should record this fact. A right of appeal against rejection should exist, via normal management channels, and should be incorporated within the procedures.

#### **Assess and Evaluate the Change**

- Impact and resource assessments should include:
- The impact that the change should make on the Customer's business operation.
- The effect on the infrastructure and customer service, as defined in the service requirements baselines, service model, SLA, and on the capacity and performance, reliability and resilience, contingency plans, and security.
- The impact on other services that run on the same infrastructure (or on projects).
- The impact on non-IT infrastructures within the organization – for example security, office services, transport, or Customer helps desks.
- The effect of not implementing the change.
- The IT, business and other resources required to implement the change, covering the likely costs, the number and availability of people required, the elapsed time, and any new infrastructure elements required.
- The current schedule and projected service outage.
- Additional ongoing resources required if the change is implemented.
- Impact on the continuity plan, capacity plan, security plan, regression test scripts and data and test environment, Service Operations practices.

#### **Authorize Change**

- The levels of authorization for a particular type of change should be judged by the type, size or risk of the change, e.g. changes in a large enterprise that affect several distributed sites may need to be authorized by a higher-level change authority such as a Change Advisory Board (CAB) or the Board of Directors.
- Should disputes arise over change authorization or rejection, there should be a right of appeal to the higher level.

### **Plan Updates**

Authorized RFCs should be passed to the relevant technical groups for building of the changes. It is best practice to do this in a formal manner that can be tracked, e.g. using work orders.

### **Coordinating Change Implementation**

- Change Management has an oversight role to ensure that all changes that can be, are thoroughly tested. In all cases involving changes that have not been fully tested, special care needs to be taken during implementation.
- Change Management has responsibility for ensuring that changes are implemented as scheduled. This is largely a coordination role, as the actual implementation should be the responsibility of others (e.g. hardware technical specialists should implement hardware changes).
- Remediation procedures should be prepared and documented in advance, for each authorized change, so that if errors occur during or after implementation, these procedures can be quickly activated with minimum impact in service quality. Authority and responsibility for invoking remediation is specifically mentioned in change documentation.

### **Review and Close Change Record**

- On completion of the change, the results should be reported for evaluation to those responsible for managing changes, and then presented as a completed change for stakeholder agreement (including the closing of related incidents, problems, or known errors).
- A review should also include any incidents arising as the result of the change, if they are known at this stage. If the change is part of a service managed by an external provider, details of any contractual service targets should be required (e.g. no priority 1 incidents during first week after implementation).
- A change review (e.g. post-implementation review should be carried out to confirm that the change has met its objectives, that the initiator and stakeholders are satisfied with the results and that there have been no unexpected side-effects).
- Change Management must review new or changed services after a pre-defined period has elapsed. This process should involve CAB members, since change reviews are a standard CAB agenda item.

## Phase III: Enterprise Data Center Integration Project Plan

### Project Scope

The project scope defines two key areas: 1) the operational activities involved in the State Data Center (SDC) consolidation, and 2) the budgetary considerations for the consolidation project. The SDC consolidation information below identifies the key operational areas that must be considered in the planning, development, testing, implementation and closing phases of the operational project plan.

The budgetary considerations are detailed further in the document under Phase IV. The following is a list of the operational activities to create the data center consolidation project plan.

- Create Working Project Plan
  - Deliverable: Business Requirements
  - Deliverable: Technology Requirements
  - Deliverable: Capacity Planning
  - Deliverable: State WAN Sheet information update
  - Deliverable: Agency Interconnectivity
  - Deliverable: Final Router Information
  - Deliverable: Firewall Equipment Information
  - Deliverable: IPT
  - Deliverable: Agency Sites (all information)
  - Deliverable: Coordinate Meetings with Agency
- Development/Planning
  - Deliverable: Project Plans
  - Deliverable: Project Management Plan
  - Deliverable: Internal Project Definition Review / Approval
- All Agency Connections
  - Development
  - Deliverable: WAN Connections (Identification)
  - Deliverable: Circuit By State Agency/Vendor
  - Deliverable: Agency Existing Connections
  - Deliverable: Implement
  - Deliverable: Software Procurement
  - Deliverable: Circuit Procurement
  - Deliverable: Deploy Equipment
  - Deliverable: As Built Site Specific Documentation
    - Task: Identify Software Configuration
    - Task: Identify Hardware Configuration
    - Task: Identify Validate and Finalize IP Map (Schema)
  - Tasks for Move Day 1
  - Deliverable: Technical Specifications
  - Deliverable: Quality Assurance Plan
  - Deliverable: Risk and Issues Log
- Closing
  - Deliverable: Lessons Learned Document
  - Settle Vendor Invoices

- Deliverable: Project Closing Statement
- Deliverable: Project Closing Celebration
- Milestone: Closing Phase Complete
- Milestone: Project Closeout

## Objective

Provide a report detailing the facility pre-move process, staging, physical relocation and re-establishment of agency and DIS data center assets and systems. This includes contract requirements for move contractors, schedules which are sensitive to customer business needs, and contingency plans for delays and interruptions.

## Move Groups

Following is a list of agency move groups listed in the order recommended to move. Determination of priority is based on findings from this study as well from findings from the previous study of agency facilities. These recommendations are based upon information provided by agencies at a specific point in time. Since situations and circumstances evolve over time, agency information and the recommended move group should be reviewed and updated at least 90-120 days prior to any agency move. Recommendations are subject to approval by the state's governance groups.

In the chart below, multiple aspects were considered to create a prioritization recommendation across the various agencies. These include factors at each site as well as the consequences for non-delivery of services. Each of the components below is assigned a value based on a three-point scale, one being the lowest or worst score and three being the best score. Each of the components was weighted equally to create the overall ranking, which was used to suggest the order in which agencies should be moved.

### Rating Definitions

- A score of one (1) is indicative of a high risk, high cost, or low efficiency
- A score of two (2) indicates a moderate risk, cost, or efficiency
- A score of three (3) indicates a low risk, low cost, or high efficiency

### Component Definitions

- Average Industry Standard Technical Risk – This is the overall average of the data center facilities components determined in the previous study, Data Center Consolidation January 2010, completed for the twenty-one larger agencies. Where detailed assessments were not performed for an agency, or if the agency is hosted within another data center, the values were set to “N/A” and are omitted from the Overall Rating.
- Business Risk – Excipio used anecdotal information provided from the agencies to assign a value that represents the relative impact should the agency lose its data center for more than 48 hours.
  - A score of one indicates that life/safety issues are at risk
  - A score of two indicates that the agency services are important, but not life threatening
  - A score of three indicates that the impact is minimal, meaning that the agency could continue to function for days or weeks until the data center was back online.
- Transition Risk – This value is indicative of the complexity involved in moving the current environment to the SDC.

- Upgrade Cost Rating – For the agencies that participated in the Data Center Consolidation study, Excipio provided cost estimates to address infrastructure defects. Based on the design of the data center, the costs range from minimal to moderate to extensive.
- Cost per Server – For the agencies that participated in the Data Center Consolidation study, this is a metric that was calculated to show the comparative efficiencies across the various facilities. Excipio used the metric to translate the values to the three point scale.

**Move Groups**

Location	Avg Industry Standard Technical Risk	Business Risk	Transition Risk	Upgrade Cost Rating	Cost Per Server (current)	Overall Ranking
<b>Move Group 1</b>						
DIS/OB2 Olympia	1.38	2.00	1.00	3.00	1.00	1.68
LOT Olympia	N/A	1.00	1.00	N/A	N/A	1.00
DOR Tumwater	1.24	1.00	1.00	1.00	1.00	1.05
DOC Tumwater	1.26	1.00	1.00	2.00	1.00	1.25
DOT Olympia/Tumwater	1.24	1.00	1.00	2.00	2.00	1.45
SAO Olympia	N/A	1.00	2.00	N/A	N/A	1.50
<b>Move Group 2</b>						
DOL (Hosted at DIS)	N/A	1.00	2.00	N/A	N/A	1.50
DOH Tumwater	1.31	1.00	2.00	1.00	3.00	1.66
ECY Lacey	1.31	2.00	1.00	1.00	3.00	1.66
ESD Olympia	1.31	3.00	2.00	1.00	1.00	1.66
ATG Olympia	1.24	1.00	3.00	2.00	2.00	1.85
DFI Tumwater	1.25	1.00	2.00	3.00	2.00	1.85
OSPI Olympia	1.25	2.00	1.00	2.00	3.00	1.85
DNR Olympia	1.28	2.00	2.00	1.00	3.00	1.86
HCA Lacey	1.31	2.00	2.00	1.00	3.00	1.86
LNI Tumwater	1.34	3.00	1.00	1.00	3.00	1.87
OAH Olympia	N/A	1.00	3.00	N/A	N/A	2.00

**Move Groups – Cont'd**

Location	Avg Industry Standard Technical Risk	Business Risk	Transition Risk	Upgrade Cost Rating	Cost Per Server (current)	Overall Ranking
<b>Move Group 3</b>						
OST Olympia	N/A	2.00	2.00	N/A	N/A	2.00
PRT Tumwater	N/A	1.00	3.00	N/A	N/A	2.00
SIB Olympia	N/A	2.00	2.00	N/A	N/A	2.00
WSGC Olympia	N/A	2.00	2.00	N/A	N/A	2.00
DFW (Hosted at DNR and DIS)	N/A	3.00	1.00	N/A	N/A	2.00
DRS (Hosted at DIS)	N/A	1.00	3.00	N/A	N/A	2.00
DSHS Olympia/Lacey	1.28	1.00	3.00	3.00	3.00	2.26
<b>Move Group 4</b>						
OFM Olympia	1.24	3.00	3.00	2.00	2.00	2.25
DOP Olympia	1.24	3.00	3.00	2.00	2.00	2.25
WSP Tumwater	1.31	3.00	3.00	1.00	3.00	2.26
LIQ Olympia	1.24	3.00	3.00	2.00	3.00	2.45
AGR Olympia	N/A	3.00	2.00	N/A	N/A	2.50
PDC Olympia	N/A	2.00	3.00	N/A	N/A	2.50
RCO Olympia	N/A	3.00	2.00	N/A	N/A	2.50
SOS Olympia	N/A	2.00	3.00	N/A	N/A	2.50
DEL Lacey	N/A	3.00	3.00	N/A	N/A	3.00
GA Olympia	N/A	3.00	3.00	N/A	N/A	3.00
OIC Olympia	N/A	3.00	3.00	N/A	N/A	3.00
Parks Olympia	N/A	3.00	3.00	N/A	N/A	3.00

**Move Group 1**

Six agencies are recommended to be in the first group moved to the new State Data Center. Security issues may exist at a couple agency data centers. (Yet to be determined is the impact on this move group of the recently announced co-tenants of the adjacent new State office building.)

**Group 1.1 – DIS/OB2**

For strategic and business reasons, the OB2 data center, including DIS and agencies occupying ala carte and hosted spaces, has been identified by the State as the first to move. In addition, DIS hosts disaster recovery for a number of agencies. This requires DIS/OB2 to be part of the first move group to ensure they can deliver full agency support as consolidation in the new SDC progresses. It also allows processes established during the move of DIS/OB2 to be perfected.

**Group 1.2 – LOT and DOR**

Technologically LOT has a stable infrastructure and would present little risk during the move. They would also benefit from the redundancy afforded by the new DC. These groups are also less susceptible to any seasonal disruptions.

DOR has maturing processes and infrastructure. The benefits to the agency from a technical and business risk perspective would allow their personnel to further bring along their methodologies

- The current facilities equipment is nearing end of life

- There is a single generator and single power points of failure which do not meet current typical standards; this agency will have unique security requirements

### **Group 1.3 – DOC, WSDOT, and SAO**

This group represents higher business risk due to the secure and essential nature of their businesses and their requisite need of more robust capabilities during any adverse phenomena, whether natural or manmade. Some of these agency sites could be considered possible 3<sup>rd</sup> layer DR sites, behind a primary DR site.

DOC is a newer facility and has some more current design components; example is the cooling use of ambient air. The concerns are:

- The single points of failure in the construction of the center; it is adequate for the environment today, but should there be a failure redundancy is not at expected levels
- There is a generator, but there are single failure points in the power design

One of WSDOT's remote machine rooms is located in an office type room on the second level converted to a center.

- There is no raised floor
- There are small internal air cooling units and limited redundancy

SAO would benefit from the redundancy and stability of the new data center and the DR capabilities it would furnish.

### **Group 1.4 - All Mainframe Services**

All mainframe service should be moved together to ensure continuity of service, maintenance, and operational activity. This maximizes efficiency and better utilizes the limited funds available while mitigating the high risk.

### **Move Group 2**

- Group 2.1 – DOL, ATG, DOH

These groups represent moves of a more complex nature. The experience gained by the staff and teams in moving Group One should facilitate and mitigate most issues anticipated for these Groups.

Technologically, Group 2 represents agencies that are essential to the public infrastructure in the State of Washington. They could cause pressure on the credibility of State services if they were not available. The business risk of these services in their present locations is higher than would normally be tolerated for these types of offerings.

DOL will be mostly moved into the new data center with the move of DIS and would benefit from the redundancy and stability of the new SDC.

ATG This location has raised floor, it is a small center with a single UPS and single power to the racks, there is no generator and overall has very little redundancy.

DOH is a new Data Center with a solid design, there are good policies in place, the issues include a single point of failure in the power design with a single generator.

- Group 2.2 – ECY, ESD, DFI

ECY data center has multiple rooms within the data center raised floor space (network room, server room, staging room, tear-down room) All rooms are cooled by the two 20T HVAC units. Server room is not as cool, but the distribution is good. They have a shared generator in a 20 Year old building, located on lower level. Overall this space is relatively solid, but would benefit from the increased redundancy and security at the new State Data Center

ESD is a Test and Development environment in an old Data Center. It would be recommended to move this equipment to another location for more efficient use.

DFI will be mostly moved into the new data center with the move of DIS and would benefit from the redundancy and stability of the new SDC

- Group 2.3 – OSPI, DNR, HCA

OSPI is a small room with a single point of failure related to the power and UPS systems. The cooling is adequate, however it does not allow for expansion. This is a very old building and the center has been constructed very effectively given the conditions of the overall structure.

DNR's data center includes three different agencies. The power is good, but the current cooling is suspect. There is a single point of power failure in the wiring of the UPS as they are connected in a serial wiring pattern.

HCA is a small facility with no raised floor and all rack mounted UPS systems. There is no generator and a small internal HVAC unit. This is a converted office space, which would be relatively easy to move.

- Group 2.4–LNI, OAH

LNI Data Center appears to have been constructed under outdated Mainframe design requirements; it is currently inefficient for space utilization. Power is appropriate, it has a single generator. There are only 23 racks in 9,000+ square feet of room; it would need HVAC to be updated to become a usable future site. It does not meet the minimum distance requirements as a Disaster Recovery site. Additional issues include water in the data center; unsure about proper sump and drainage for a lower level. There is some older NOC equipment in the center which is not being utilized.

OAH is a highly virtualized, mature, process driven environment that would present few if any problems moving into the new data center.

These groups represent moves of a more complex nature. Experience gained by of the staff and teams in moving Group One should facilitate and mitigate most issues anticipated for Group 2.

Technologically Group 2 represents agencies that are essential to the public infrastructure in the State of Washington. They could cause pressure on the credibility of State services if they were not

available. The business risk of these services in their present locations is higher than would normally be tolerated for these types of offerings.

### **Move Group 3**

- Group 3.1 - OST, PRT, SIB

OST would benefit from the redundancy and stability of the new SDC.

PRT would benefit from the redundancy and stability of the new SDC.

SIB would benefit from the redundancy and stability of the new SDC.

- Group 3.2- WSGC, DFW, DRS

WSGC would benefit from the redundancy and stability of the new SDC.

DFW would benefit from the redundancy and stability of the new SDC.

DRS would benefit from the redundancy and stability of the new SDC.

- Group 3.3– DSHS

DSHS is in this group due to the fact that when DIS is moved DSHS will for all practical purposes be moved in the first migration; very few of their services will need to be moved at this stage. This center is relatively small, but very clean and functional, there is available space. It would provide a good location for those services which are not deemed critical. It has the facilities capability to be a potential Disaster Recovery site, but does not meet the minimum mileage requirement from the new State Data Center.

The other agencies in this group, essential to the operation of the State, will benefit from consolidation of resources, but their technological and business circumstances do not represent overly adverse conditions.

### **Move Group 4**

The agencies in this group are essential to the State and eventually need to be in a redundant facility with DR capabilities. However, they are placed in the last move group because moving into a consolidated environment has legal or political implications that need to be explored further, or they are of a somewhat less critical nature for State functionality and public safety than those in other move groups. Some agencies in this group could be considered for moves during seasonal periods where it is not feasible to move groups with a higher risk factor.

- Group 4.1 - OFM, DOP, LIQ

OFM equipment is mostly at OB-2. It would be recommended to move the balance of the equipment. There is a new UPS and generator at the building which could support the telecom in the building long term.

DOP has a small amount of infrastructure at this location and it will continue to get smaller through virtualization. Most of the Agency infrastructure is at OB-2. There is limited redundancy with no generator and a single UPS. This location would be low cost to move.

LIQ has already consolidated two server rooms to one through the use of virtualization. This is office space converted to a Data Center; it is a relatively small room. There is a small dedicated generator, single UPS with redundant modules and three cooling units.

- Group 4.2- AGR, PDC, RCO

AGR would benefit from the redundancy and stability of the new SDC.

PDC would benefit from the redundancy and stability of the new SDC.

RCO would benefit from the redundancy and stability of the new SDC.

- Group 4.3- SOS, DEL, GA,

SOS would benefit from the redundancy and stability of the new SDC.

DEL would benefit from the redundancy and stability of the new SDC.

GA would benefit from the redundancy and stability of the new SDC.

- Group 4.4- OIC, Parks, WSP

OIC would benefit from the redundancy and stability of the new SDC.

Parks center is relatively small, but very clean and functional, there is available space. It could be used for Parks services which are not deemed critical, or as a Parks backup facility.

WSP occupies a data center with aging infrastructure including the UPS/Generator. There is carpet on the raised floor. The telecom wiring is very outdated. WSP would ordinarily be in the first move group due to the criticality of its service, but there is a substantial monetary penalty connected to its present facility if vacated early. It is therefore prudent to wait before moving this agency.

The agencies in this group are essential to the State and eventually need to be in a redundant facility with DR capabilities. Except as otherwise noted, they generally have less of an adverse effect on State functionality and public safety than those in other move groups. Some of agencies in this group might even be considered for moves during seasonal times that it is not feasible to move groups at a higher risk factor.

### **Move Group Chart – Migration Days by Agency**

The chart below summarizes, alphabetically by move group, the number of days estimated to make the physical transition between facilities. This does not take into account upfront preparation, planning, status updates, change management authorizations, etc. associated with migrations of this nature. In addition, the chart reflects the number of days required for each agency as if it were a standalone project.

If moved in a sequential manner, the migration days would be the total of all agencies in each group. In reality, multiple agencies could be moved in parallel. If all of the agency projects are worked in parallel, then the amount of time to move each group is equivalent to the agency with the highest number of migration days from the chart below. Final move dates are determined by the progress of previous moves.

**Migration Days by Agency**

Agency	Move Group	Project Plan Total Days to Migrate	Agency	Move Group	Project Plan Total Days to Migrate
DIS-OB2	1	136	DFW	3	22
DOC	1	53	DRS	3	22
DOR	1	31	DSHS	3	199
DOT	1	105	OST	3	23
LOT	1	22	PRT	3	23
SAO	1	22	SIB	3	22
Mainframe Svcs	1		WSGC	3	23
ATG	2	23	AGR	4	36
DFI	2	24	DEL	4	23
DNR	2	41	DOP	4	22
DOH	2	44	GA	4	22
DOL	2	42	LIQ	4	22
ECY	2	30	OFM	4	22
ESD	2	48	OIC	4	23
HCA	2	22	PARKS	4	23
LNI	2	67	PDC	4	22
OAH	2	22	RCO	4	22
OSPI	2	23	SOS	4	23
			WSP	4	24

## Risks

### Approach

Gartner states, "a data center move or relocation plan requires diligent and seamless integration between the data center facilities plan and the IS organization plan, and ensuring coordinated project management and execution." Most difficulties (in data center moves and relocations) can be traced to a breakdown between two major functional components -- IS requirements and data center facilities location and design specifications. For example, miscalculations in locations, equipment densities, power and heating and HVAC capacities can severely damage IT operations and service availability.

### Governance Recommendations

- Finalize contracts before the move begins. Once the move has begun, there is less likelihood of negotiating changes.
- Augmented levels of financial authority should be established. This is required to cover any contingencies that may occur. The faster additional expenses can be authorized to address some unforeseen event the less risk of time delays.
- Insurance needs to be established with whatever riders are necessary to cover any damaged equipment. Insurance should also cover any resulting business losses. It is suggested that a definition and list of the potential business losses be established prior to moving any single agency. If possible this list should include the potential financial risks.

### **Project Plan Risks and Mitigation**

- Establish a phased approach to the move. Do not move everything at once. Place the move activities into a logical order.
  - Identify the point when a "back out" or remediation plan would not be feasible. This point must be understood and documented in the overall project plan.
  - The guideline for establishing this point is when backing out may be financially undesirable, technically difficult or impossible without a total rebuild. Additionally backing out may consume too much time and outweigh the approach to just move forward and address the risks as they occur.
- Establish a different risk mitigation plan once the critical remediation milestone discussed above is achieved. This should include any additional resources, financial authority, equipment, or logistics to mitigate the risks as they occur.
- Establish multiple go or no-go milestones in each project to ensure the best decisions are made based on real time project activities.
- Ensure an experienced migration team is dedicated to the project.
- Schedule the work on a regular workday when resources are likely to be available to deal with unexpected problems.
- Review move plans with equipment vendors.
- Establish any need for special shipping containers or vendor resources to address any handling requirements necessary to maintain equipment warranties.
- Ensure that application Interdependency has been established.
  - Identify applications that need special performance tuning.
  - Analyze problems and validate potential fixes for failing applications.
- Ensure that equipment Interdependency has been established.
  - Analyze problems
  - Validate potential fixes for failing equipment.
- Address any seasonal considerations. Do not move agencies during peak periods of demand.
  - Example. WSDOT should not be moved during winter demand.
  - Example. DSHS should not be moved at the end of month when checks or account reconciliation takes place.
  - Example. Some agencies should not be moved during a legislative session.
- Establish and validate the interconnectivity between "old" or existing site and the new site.
- Set up an office-to-office VPN tunnel if the new site has Internet connectivity.
- Establish a user communication plan and an early life support structure to set user expectations on possible latency or other issues at new site.

### **Service Acceptance**

It is important to establish service acceptance criteria with every agency prior to any move activity. The objective is to establish a clear understanding of what constitutes the service being available after the move is completed. This is an agreed upon acceptance criteria between the DIS and the agency and is part of the project closing statement.

Some elements to consider are:

- Connectivity to specific applications, equipment or services.
- Access to a service through the supported clients e.g. web or full client.
- Security requirements are met.
- Application functionality is established.
- Output capabilities are available like printing and file transfers.

- Acceptance criteria should be simple and validation should not require special equipment or expertise.

### **Facility Not Ready**

The following defines conditions where the data center facility should be considered not ready and any move activity cannot begin until these conditions have been addressed.

- No decision on a course of action for the data center facility has been made. No move can occur until the facility is ready to receive the equipment and connectivity has been established.
- Time frame for move too short or trouble providing resources for the move.
- Security:
  - Back-ups (on-site, during move, during restore)
  - Access, different trades unknown personnel
- Demarc:
  - Telco's not ready
  - Connectivity not ready
- Air conditioning not available.
- Backup electrical power not available.
- Power conditioning not available.
- Grounding plane not installed.
- High voltage cabling not installed.
- Low voltage cabling not installed.
- Fire suppression not installed.
- Racks not installed or completed.
- Floor Tiles not completed.
- Cable Hangers not installed or completed.
- Strain Reliefs not installed or completed.
- Equipment: (not ready conditions)
  - Design not sanctioned.
  - Label and required documentation of everything not completed.
  - Security not in place.
    - Before move
    - During move
    - On-site
  - Not ordered in time to be completed and available.
  - No standards set.
  - Not shipped or back ordered.
  - Not available.
  - Training not completed.
  - Legacy damaged in move.
  - Cabling not ordered or back ordered or late.
  - Dual Licensing for move not completed.
  - Verify that you can reboot servers before you move them.

## **Move Plan**

### **Sample Document Overview**

A detailed project plan has been prepared for each agency in electronic format, pending insertion of move start dates. For demonstration purposes, a sample high level plan is included as Appendix B. Only the major categories are depicted in the plan contained within this document. The electronic version of the by-agency plan has significant detail under each of the major tasks to provide execution steps.

### **Move Transition**

The move plan also includes estimations for resources required to execute the move from each agency's current data center to a new facility. These estimates can be found in the Financials and Move Transition section of the move plan.

### **Contingency Plans**

Instructions for the moves are described in detail and have been included throughout all documents. These instructions contain but are not limited to retention of old equipment during move to new data center (no less than 30 days). Data backups should be done on the day of the move to insure information integrity and transported under strict security protocols. Any existing equipment that can be re-purposed should be done so using the State of Washington's processes and decommissioning should follow the policies the State of Washington uses today.

### **Project Plan**

A sample project plan is included in Appendix B

## Phase IV: Operational Plan and Budget Proposal

### Objective

To create a detailed plan for consolidation preparation, acquisition of new equipment, data center management software, specialist consulting, staging, migration and initial operation of the data center, and to address any possible short term increases in facilities costs.

### Financial Plan

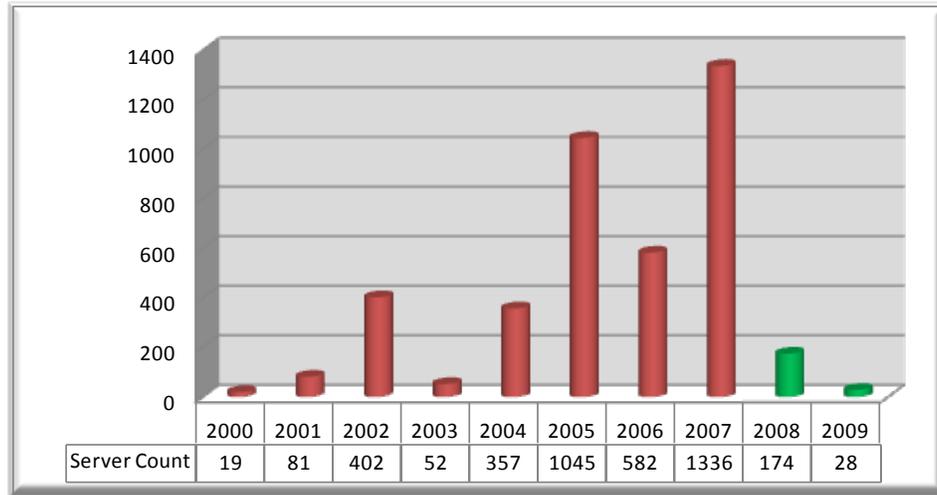
A complete financial plan has been produced and is listed in the sections below. These sections contain:

- Move Cost Report: Move costs by agency by planned move group
- Resource Schedule: Estimated cost of resources including service administration, data center staff, and managers
- Estimated on-going operational costs
- Total enterprise project costs

### Financial Assumptions

- All costs assume that a single entity or vendor is responsible for the physical move, thus allowing the vendor to achieve economies of scale across the entire population. Otherwise, smaller sites would likely incur higher costs on a per unit basis.
- Costs are exclusive of equipment disposal costs, which would typically net out against any recovered value of the servers.
- Costs are exclusive of a remediation or decommissioning costs required to abandon or return data center space back into rentable space.
- All financial information used to establish staff baseline costs was provided by agencies and validated by comparing to best in class third party service providers.
- Financial escalation procedures should be established with appropriate authority to mitigate project risks that may require financial resolution.
- Of the 4,076 SoWA servers, 3,580 were purchased before 2008 and would qualify them for the SoWA established refresh policy at the time of entering the new State Data Center.
- Items not represented in replacement cost are blade chassis, appliances and management consoles.
- Agency server purchases should be restricted and reviewed whenever possible, and the costs should be allocated for servers to be purchased under a new Shared Services organization at the new State Data Center.

**State of Washington Current Server Age Report**



NOTE: Those servers identified in Red represent the servers which will require replacement at the time of migration to the new State Data Center.

**Total Project Costs at Enterprise Level**

A complete financial plan has been produced and is listed below. These sections contain:

- Enterprise Cost Report: Costs by agency organized by planned move group.
- For comparison purposes, two alternative budget plans were considered and are presented here:
  - Schedule A: All labor and equipment are accounted for in the agency budget
  - Schedule B: All move labor is located in the agency budget, all equipment and new State Data Center related labor is accounted for in a Shared Services budget. These costs would be recovered via a Shared Services catalog and service rates over time
- Resource Schedule: Estimated cost of resources including service administration, data center staff, and managers
- Total enterprise project costs

**Budget Cost Assignment Options**

The State has the option to assign capital costs to different budgets. For comparison purposes, the two options assumed here are:

- Assignment of all costs to the individual Agency budgets, Schedule A, where each Agency would independently own its assets located in the new State Data Center. This would be the same as the current Ala Carte model in OB-2. This would not provide any benefit from a cost perspective as the agencies do not have the ability to share equipment costs across multiple agencies based upon actual demand. This should be more expensive than the current budget as it represents nothing more than moving from a lower cost outdated data center or machine room to a brand new higher cost State Data Center.
- The recommended cost option would be to assign the capital budget to a centralized shared services organization within the new State Data Center (Schedule B). This budget is segmented

- into two areas: 1) capital and operational costs for a shared services entity, which would be recovered from agencies over time through a Service Catalog and rate structure and, 2) the second component includes direct move labor, which would be assigned to each Agency. This model provides the opportunity to take advantage of centralized assets, staff and service management. In addition, efficiencies can be realized through a shared organization and environment through assignment of resources, assets, servers, and storage via an "On Demand" basis.
- The Charts below demonstrate how the costs could be allocated based upon each of these two budgetary options. (Please note that the dollar amounts reflected in the two scenarios each total \$43.2M. Ordinarily, the impact of anticipated efficiencies and cost savings in the future state would be included. However, determining staffing ratios based on future efficiency improvements have yet to be determined and the data was not available at the time of this report.) The primary points regarding Schedule A and Schedule B are as follows:
    - In Schedule A, agencies would be responsible for the equipment cost in their direct budgets. In Schedule B, some kind of Shared Services operation would be responsible for the hardware cost in their budget, and these costs would be allocated to the agencies over time through rates charged for such shared services. Hardware costs are identical between the two schedules - regardless of where the equipment is located, equipment costs remain the same.
    - Of the \$43.2M in the two schedules, \$434K for move labor is the additional cost that would be incurred to move to the SDC. The remaining \$42.7M would be incurred by State agencies, due to regular equipment refreshes, whether they move or not.
  - Please note, the second option (Schedule B) does not take into account the significant potential for staffing efficiencies offered in a shared environment. This report represents the most conservative case scenario. Consolidation efforts of this type typically generate cost savings through:
    - Staffing reductions through increased efficiencies (80% of total potential savings)
    - Reduction in data center capital and operating costs by reducing the number of facilities (10-15% of total potential savings)
    - Hardware and software reductions are minimal, as most agencies already purchase from the same state contracts (5-10% total potential savings)

## Virtualization Cost Comparison

The chart below represents source data collected from 21 agencies during the Phase I assessment conducted in late 2009. It represents that particular point in time and is not intended to tie to the inventory totals presented in the main body of this document. The intent of the chart below is to demonstrate a representative savings potential through the use of an assumed level of server virtualization. The calculations relate to hardware only and were made with the following assumptions:

- The cost of a new dual processor server is \$6,235
- All servers have a useful life of five years
- The annual software and maintenance for a virtual server host is \$3,002 per processor
- The industry standard average VM host handles 10 VMs

### Potential Virtualization Scenario

DC Location	Total Server Instances	Virtual Instances	% Virtualized	Future 50% Virtualized	Additional Virtual Sessions	Total Annual Current State Costs	Total Future State Annual Costs	Cost Difference
ATG	69	20	29%	35	15	\$ 73,111	\$ 63,735.30	\$ 9,376
DFI	61	17	28%	31	14	\$ 65,075	\$ 56,346	\$ 8,729
DFW	46	15	33%	23	8	\$ 47,663	\$ 42,490	\$ 5,173
OB-2	1593	398	25%	797	399	\$ 1,729,124	\$ 1,471,454	\$ 257,670
DNR	183	1	1%	92	91	\$ 227,554	\$ 169,037	\$ 58,517
DOC	238	28	12%	119	91	\$ 278,681	\$ 219,841	\$ 58,841
DOH	187	18	10%	94	76	\$ 221,550	\$ 172,732	\$ 48,818
DOL	234	70	30%	117	47	\$ 246,536	\$ 216,146	\$ 30,390
DOP	46	2	4%	23	21	\$ 56,069	\$ 42,490	\$ 13,579
DOR	171	52	30%	86	34	\$ 179,614	\$ 157,953	\$ 21,661
DOT	572	186	33%	286	100	\$ 593,016	\$ 528,356	\$ 64,660
DRS	70	0	0%	35	35	\$ 87,290	\$ 64,659	\$ 22,631
DSHS	397	96	24%	199	103	\$ 432,985	\$ 366,709	\$ 66,277
ECY	160	32	20%	80	48	\$ 178,829	\$ 147,792	\$ 31,037
ESD	378	188	50%	189	0	\$ 349,805	\$ 349,159	\$ 647
HCA	19	0	0%	10	10	\$ 23,693	\$ 17,550	\$ 6,143
LIQ	120	87	73%	N/A	0	\$ 93,386	\$ 93,386	\$ -
LNI	237	108	46%	119	11	\$ 225,706	\$ 218,917	\$ 6,789
OFM	100	70	70%	N/A	0	\$ 79,438	\$ 79,438	\$ -
OSPI	96	51	53%	N/A	0	\$ 86,735	\$ 86,735	\$ -
WSP	153	56	37%	77	21	\$ 154,581	\$ 141,326	\$ 13,255
<b>Annual Totals</b>	<b>5,130</b>	<b>1,495</b>	<b>29%</b>	<b>2,407</b>	<b>1,124</b>	<b>\$ 5,430,443</b>	<b>\$ 4,706,251</b>	<b>\$ 724,192</b>
<b>Total 5-yr Cost</b>						<b>\$ 27,152,215</b>	<b>\$ 23,531,255</b>	<b>\$ 3,620,960</b>

Note: These calculations are based upon the data provided for the above listed agencies only.

Formula to determine Total Annual Current State Costs using DFW as an example:

46 Total Server Instances – 15 Virtual Instances = 31 Instances x (\$6,235 / 5 years) = \$38,657

15 Virtual Instances / 10 Virtual Instances per server = 1.5 Physical Host Servers x (\$3,002 software cost per processor x 2 processor host) = \$9,006.

Total \$38,657 + \$9,006 = \$47,663.

In summary, the total annual cost under the current format is expected to be \$5.4M. If the state continues its virtualization strategy and reaches a level of 50% virtualization, costs could be reduced to \$4.7M, producing an annual cost reduction of approximately \$724K.

In addition to hardware savings, resource requirements for various virtualization scenarios can also be estimated. A 50% virtualized environment such as the one outlined above, can be described as a moderately

virtualized organization. The industry standard metric in a moderately virtualized environment is 50:1 of Server Instances to Server Administrator FTEs. In a minimally virtualized organization, the industry standard metric of Server Instances to Server Administrator FTEs is 35:1.

In the 50% moderately virtualized scenario above, the estimated resource requirement would result in 103 Server Administrator FTEs to manage 5,130 server instances. Based on the current state count of server instances and using a 35:1 ratio, the resource requirements are estimated at 147 Server Administrator FTEs.

## **Budget Model Schedules**

As noted earlier, two alternative budget plans were considered and are presented in the following financial budget analysis.

The Excipio financial cost analysis reflected in Schedules A and B include move cost estimates for the technical infrastructure located in the existing state data center in OB2. This infrastructure includes both DIS supported equipment as well as agency supported "Ala Carte" equipment. The State of Washington also consulted with another partner, INX Inc., to provide a move cost estimate for just the OB2 data center facility. The INX Inc. report is unrelated to this report, and is a separate deliverable isolated to the OB2 facility. The INX Inc. "OB2 Move Cost Estimate" report contains some similar as well as some additional cost estimates, which are independent of this Excipio financial move cost estimate.

**Agency Enterprise Financial Chart – Schedule A**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget A Agency Estimated Total Cost
DIS-OB2	543	496	47	\$ 3,092,560	55	\$ 3,600	\$ 198,000	\$ 2,172,000	\$ 16,450	\$ 24,675	\$ 41,125	\$ 347,200	\$ 5,850,885
DOC	210	177	33	\$ 1,103,595	23	\$ 3,600	\$ 82,800	\$ 840,000	\$ 11,550	\$ 17,325	\$ 28,875	\$ 123,900	\$ 2,179,170
DOR	120	119	1	\$ 741,965	13	\$ 3,600	\$ 46,800	\$ 480,000	\$ 350	\$ 525	\$ 875	\$ 83,300	\$ 1,352,940
DOT	417	315	102	\$ 1,964,025	43	\$ 3,600	\$ 154,800	\$ 1,668,000	\$ 35,700	\$ 53,550	\$ 89,250	\$ 220,500	\$ 4,096,575
LOT	14	12	2	\$ 74,820	3	\$ 3,600	\$ 10,800	\$ 56,000	\$ 700	\$ 1,050	\$ 1,750	\$ 8,400	\$ 151,770
SAO	33	33	0	\$ 205,755	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ -	\$ -	\$ -	\$ 23,100	\$ 375,255
Mainframe Svcs													
													\$ 14,006,595
ATG	48	47	1	\$ 293,045	6	\$ 3,600	\$ 21,600	\$ 192,000	\$ 350	\$ 525	\$ 875	\$ 32,900	\$ 540,420
DFI	61	44	17	\$ 274,340	7	\$ 3,600	\$ 25,200	\$ 244,000	\$ 5,950	\$ 8,925	\$ 14,875	\$ 30,800	\$ 589,215
DNR	163	142	21	\$ 885,370	17	\$ 3,600	\$ 61,200	\$ 652,000	\$ 7,350	\$ 11,025	\$ 18,375	\$ 99,400	\$ 1,716,345
DOH	175	166	9	\$ 1,035,010	19	\$ 3,600	\$ 68,400	\$ 700,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 116,200	\$ 1,927,485
DOL	169	149	20	\$ 929,015	17	\$ 3,600	\$ 61,200	\$ 676,000	\$ 7,000	\$ 10,500	\$ 17,500	\$ 104,300	\$ 1,788,015
ECY	128	118	10	\$ 735,730	13	\$ 3,600	\$ 46,800	\$ 512,000	\$ 3,500	\$ 5,250	\$ 8,750	\$ 82,600	\$ 1,385,880
ESD	191	186	5	\$ 1,159,710	20	\$ 3,600	\$ 72,000	\$ 764,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 130,200	\$ 2,130,285
HCA	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ 218,565
LNI	237	128	109	\$ 798,080	25	\$ 3,600	\$ 90,000	\$ 948,000	\$ 38,150	\$ 57,225	\$ 95,375	\$ 89,600	\$ 2,021,055
OAH	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
OSPI	51	46	5	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 204,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 32,200	\$ 548,985
													\$ 13,095,750
DFW	31	31	0	\$ 193,285	4	\$ 3,600	\$ 14,400	\$ 124,000	\$ -	\$ -	\$ -	\$ 21,700	\$ 353,385
DRS	70	70	0	\$ 436,450	8	\$ 3,600	\$ 28,800	\$ 280,000	\$ -	\$ -	\$ -	\$ 49,000	\$ 794,250
DSHS	792	748	44	\$ 4,663,780	80	\$ 3,600	\$ 288,000	\$ 3,168,000	\$ 15,400	\$ 23,100	\$ 38,500	\$ 523,600	\$ 8,681,880
OST	21	21	0	\$ 130,935	3	\$ 3,600	\$ 10,800	\$ 84,000	\$ -	\$ -	\$ -	\$ 14,700	\$ 240,435
PRT	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
SIB	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
WSGC	28	23	5	\$ 143,405	4	\$ 3,600	\$ 14,400	\$ 112,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 16,100	\$ 290,280
													\$ 10,819,230
AGR	18	18	0	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 72,000	\$ -	\$ -	\$ -	\$ 12,600	\$ 207,630
DEL	24	24	0	\$ 149,640	3	\$ 3,600	\$ 10,800	\$ 96,000	\$ -	\$ -	\$ -	\$ 16,800	\$ 273,240
DOP	44	38	6	\$ 236,930	6	\$ 3,600	\$ 21,600	\$ 176,000	\$ 2,100	\$ 3,150	\$ 5,250	\$ 26,600	\$ 466,380
GA	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
LIQ	33	28	5	\$ 174,580	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 19,600	\$ 344,955
OFM	46	46	0	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 184,000	\$ -	\$ -	\$ -	\$ 32,200	\$ 524,610
OIC	20	18	2	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ 700	\$ 1,050	\$ 1,750	\$ 12,600	\$ 217,380
PARKS	26	26	0	\$ 162,110	3	\$ 3,600	\$ 10,800	\$ 104,000	\$ -	\$ -	\$ -	\$ 18,200	\$ 295,110
PDC	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ 218,565
RCO	23	10	13	\$ 62,350	3	\$ 3,600	\$ 10,800	\$ 92,000	\$ 4,550	\$ 6,825	\$ 11,375	\$ 7,000	\$ 183,525
SOS	87	87	0	\$ 542,445	10	\$ 3,600	\$ 36,000	\$ 348,000	\$ -	\$ -	\$ -	\$ 60,900	\$ 987,345
WSP	101	92	9	\$ 573,620	11	\$ 3,600	\$ 39,600	\$ 404,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 64,400	\$ 1,089,495
													\$ 5,037,735
Totals	4,042	3,576	466	\$ 22,296,360	440		\$ 1,584,000	\$ 16,168,000	\$ 163,100	\$ 244,650	\$ 407,750	\$ 2,503,200	\$ 42,959,310

**Shared Services Financial Chart – Schedule B**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget B Estimated Agency Direct Costs	Budget B Estimated Shared Service Direct Costs
DIS-OB2	543	496	47	\$ 3,092,560	55	\$ 3,600	\$ 198,000	\$ 2,172,000	\$ 16,450	\$ 24,675	\$ 41,125	\$ 347,200	\$ 41,125	\$ 5,809,760
DOC	210	177	33	\$ 1,103,595	23	\$ 3,600	\$ 82,800	\$ 840,000	\$ 11,550	\$ 17,325	\$ 28,875	\$ 123,900	\$ 28,875	\$ 2,150,295
DOR	120	119	1	\$ 741,965	13	\$ 3,600	\$ 46,800	\$ 480,000	\$ 350	\$ 525	\$ 875	\$ 83,300	\$ 875	\$ 1,352,065
DOT	417	315	102	\$ 1,964,025	43	\$ 3,600	\$ 154,800	\$ 1,668,000	\$ 35,700	\$ 53,550	\$ 89,250	\$ 220,500	\$ 89,250	\$ 4,007,325
LOT	14	12	2	\$ 74,820	3	\$ 3,600	\$ 10,800	\$ 56,000	\$ 700	\$ 1,050	\$ 1,750	\$ 8,400	\$ 1,750	\$ 150,020
SAO	33	33	0	\$ 205,755	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ -	\$ -	\$ -	\$ 23,100	\$ -	\$ 375,255
Mainframe Svcs														
													\$ 161,875	\$ 13,844,720
ATG	48	47	1	\$ 293,045	6	\$ 3,600	\$ 21,600	\$ 192,000	\$ 350	\$ 525	\$ 875	\$ 32,900	\$ 875	\$ 539,545
DFI	61	44	17	\$ 274,340	7	\$ 3,600	\$ 25,200	\$ 244,000	\$ 5,950	\$ 8,925	\$ 14,875	\$ 30,800	\$ 14,875	\$ 574,340
DNR	163	142	21	\$ 885,370	17	\$ 3,600	\$ 61,200	\$ 652,000	\$ 7,350	\$ 11,025	\$ 18,375	\$ 99,400	\$ 18,375	\$ 1,697,970
DOH	175	166	9	\$ 1,035,010	19	\$ 3,600	\$ 68,400	\$ 700,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 116,200	\$ 7,875	\$ 1,919,610
DOL	169	149	20	\$ 929,015	17	\$ 3,600	\$ 61,200	\$ 676,000	\$ 7,000	\$ 10,500	\$ 17,500	\$ 104,300	\$ 17,500	\$ 1,770,515
ECY	128	118	10	\$ 735,730	13	\$ 3,600	\$ 46,800	\$ 512,000	\$ 3,500	\$ 5,250	\$ 8,750	\$ 82,600	\$ 8,750	\$ 1,377,130
ESD	191	186	5	\$ 1,159,710	20	\$ 3,600	\$ 72,000	\$ 764,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 130,200	\$ 4,375	\$ 2,125,910
HCA	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ -	\$ 218,565
LNI	237	128	109	\$ 798,080	25	\$ 3,600	\$ 90,000	\$ 948,000	\$ 38,150	\$ 57,225	\$ 95,375	\$ 89,600	\$ 95,375	\$ 1,925,680
OAH	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
OSPI	51	46	5	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 204,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 32,200	\$ 4,375	\$ 544,610
													\$ 172,375	\$ 12,923,375
DFW	31	31	0	\$ 193,285	4	\$ 3,600	\$ 14,400	\$ 124,000	\$ -	\$ -	\$ -	\$ 21,700	\$ -	\$ 353,385
DRS	70	70	0	\$ 436,450	8	\$ 3,600	\$ 28,800	\$ 280,000	\$ -	\$ -	\$ -	\$ 49,000	\$ -	\$ 794,250
DSHS	792	748	44	\$ 4,663,780	80	\$ 3,600	\$ 288,000	\$ 3,168,000	\$ 15,400	\$ 23,100	\$ 38,500	\$ 523,600	\$ 38,500	\$ 8,643,380
OST	21	21	0	\$ 130,935	3	\$ 3,600	\$ 10,800	\$ 84,000	\$ -	\$ -	\$ -	\$ 14,700	\$ -	\$ 240,435
PRT	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
SIB	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
WSGC	28	23	5	\$ 143,405	4	\$ 3,600	\$ 14,400	\$ 112,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 16,100	\$ 4,375	\$ 285,905
													\$ 42,875	\$ 10,776,355
AGR	18	18	0	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 72,000	\$ -	\$ -	\$ -	\$ 12,600	\$ -	\$ 207,630
DEL	24	24	0	\$ 149,640	3	\$ 3,600	\$ 10,800	\$ 96,000	\$ -	\$ -	\$ -	\$ 16,800	\$ -	\$ 273,240
DOP	44	38	6	\$ 236,930	6	\$ 3,600	\$ 21,600	\$ 176,000	\$ 2,100	\$ 3,150	\$ 5,250	\$ 26,600	\$ 5,250	\$ 461,130
GA	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
LIQ	33	28	5	\$ 174,580	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 19,600	\$ 4,375	\$ 340,580
OFM	46	46	0	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 184,000	\$ -	\$ -	\$ -	\$ 32,200	\$ -	\$ 524,610
OIC	20	18	2	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ 700	\$ 1,050	\$ 1,750	\$ 12,600	\$ 1,750	\$ 215,630
PARKS	26	26	0	\$ 162,110	3	\$ 3,600	\$ 10,800	\$ 104,000	\$ -	\$ -	\$ -	\$ 18,200	\$ -	\$ 295,110
PDC	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ -	\$ 218,565
RCO	23	10	13	\$ 62,350	3	\$ 3,600	\$ 10,800	\$ 92,000	\$ 4,550	\$ 6,825	\$ 11,375	\$ 7,000	\$ 11,375	\$ 172,150
SOS	87	87	0	\$ 542,445	10	\$ 3,600	\$ 36,000	\$ 348,000	\$ -	\$ -	\$ -	\$ 60,900	\$ -	\$ 987,345
WSP	101	92	9	\$ 573,620	11	\$ 3,600	\$ 39,600	\$ 404,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 64,400	\$ 7,875	\$ 1,081,620
													\$ 30,625	\$ 5,007,110
Totals	4,042	3,576	466	\$ 22,296,360	440		\$ 1,584,000	\$ 16,168,000	\$ 163,100	\$ 244,650	\$ 407,750	\$ 2,503,200	\$ 407,750	\$ 42,551,560

**Review of Move Groups**

**Move Cost Report Plans – Move Group 1**

Under schedule A, the agencies in Move Group 1 would assume a total of \$14M, while under Schedule B; this would be reduced to \$162K. The Shared Services organization in a worst case scenario would assume a budget of \$13.8M under Schedule B.

**Schedule A – Agency Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget A Agency Estimated Total Cost
DIS-OB2	543	496	47	\$ 3,092,560	55	\$ 3,600	\$ 198,000	\$ 2,172,000	\$ 16,450	\$ 24,675	\$ 41,125	\$ 347,200	\$ 5,850,885
DOC	210	177	33	\$ 1,103,595	23	\$ 3,600	\$ 82,800	\$ 840,000	\$ 11,550	\$ 17,325	\$ 28,875	\$ 123,900	\$ 2,179,170
DOR	120	119	1	\$ 741,965	13	\$ 3,600	\$ 46,800	\$ 480,000	\$ 350	\$ 525	\$ 875	\$ 83,300	\$ 1,352,940
DOT	417	315	102	\$ 1,964,025	43	\$ 3,600	\$ 154,800	\$ 1,668,000	\$ 35,700	\$ 53,550	\$ 89,250	\$ 220,500	\$ 4,096,575
LOT	14	12	2	\$ 74,820	3	\$ 3,600	\$ 10,800	\$ 56,000	\$ 700	\$ 1,050	\$ 1,750	\$ 8,400	\$ 151,770
SAO	33	33	0	\$ 205,755	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ -	\$ -	\$ -	\$ 23,100	\$ 375,255
Mainframe Svcs													
													<b>\$ 14,006,595</b>

**Schedule B – Shared Services Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget B Estimated Agency Direct Costs	Budget B Estimated Shared Service Direct Costs
DIS-OB2	543	496	47	\$ 3,092,560	55	\$ 3,600	\$ 198,000	\$ 2,172,000	\$ 16,450	\$ 24,675	\$ 41,125	\$ 347,200	\$ 41,125	\$ 5,809,760
DOC	210	177	33	\$ 1,103,595	23	\$ 3,600	\$ 82,800	\$ 840,000	\$ 11,550	\$ 17,325	\$ 28,875	\$ 123,900	\$ 28,875	\$ 2,150,295
DOR	120	119	1	\$ 741,965	13	\$ 3,600	\$ 46,800	\$ 480,000	\$ 350	\$ 525	\$ 875	\$ 83,300	\$ 875	\$ 1,352,065
DOT	417	315	102	\$ 1,964,025	43	\$ 3,600	\$ 154,800	\$ 1,668,000	\$ 35,700	\$ 53,550	\$ 89,250	\$ 220,500	\$ 89,250	\$ 4,007,325
LOT	14	12	2	\$ 74,820	3	\$ 3,600	\$ 10,800	\$ 56,000	\$ 700	\$ 1,050	\$ 1,750	\$ 8,400	\$ 1,750	\$ 150,020
SAO	33	33	0	\$ 205,755	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ -	\$ -	\$ -	\$ 23,100	\$ -	\$ 375,255
Mainframe Svcs														
													<b>\$ 161,875</b>	<b>\$ 13,844,720</b>

**Move Cost Report Plans – Move Group 2**

Under Schedule A, the agencies in Move Group 2 would assume a total of \$13.1M, while under Schedule B, this would be reduced to \$172K. The Shared Services organization in a worst case scenario would assume a budget of \$12.9M under Schedule B.

**Schedule A – Agency Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget A Agency Estimated Total Cost
ATG	48	47	1	\$ 293,045	6	\$ 3,600	\$ 21,600	\$ 192,000	\$ 350	\$ 525	\$ 875	\$ 32,900	\$ 540,420
DFI	61	44	17	\$ 274,340	7	\$ 3,600	\$ 25,200	\$ 244,000	\$ 5,950	\$ 8,925	\$ 14,875	\$ 30,800	\$ 589,215
DNR	163	142	21	\$ 885,370	17	\$ 3,600	\$ 61,200	\$ 652,000	\$ 7,350	\$ 11,025	\$ 18,375	\$ 99,400	\$ 1,716,345
DOH	175	166	9	\$ 1,035,010	19	\$ 3,600	\$ 68,400	\$ 700,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 116,200	\$ 1,927,485
DOL	169	149	20	\$ 929,015	17	\$ 3,600	\$ 61,200	\$ 676,000	\$ 7,000	\$ 10,500	\$ 17,500	\$ 104,300	\$ 1,788,015
ECY	128	118	10	\$ 735,730	13	\$ 3,600	\$ 46,800	\$ 512,000	\$ 3,500	\$ 5,250	\$ 8,750	\$ 82,600	\$ 1,385,880
ESD	191	186	5	\$ 1,159,710	20	\$ 3,600	\$ 72,000	\$ 764,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 130,200	\$ 2,130,285
HCA	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ 218,565
LNI	237	128	109	\$ 798,080	25	\$ 3,600	\$ 90,000	\$ 948,000	\$ 38,150	\$ 57,225	\$ 95,375	\$ 89,600	\$ 2,021,055
OAH	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
OSPI	51	46	5	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 204,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 32,200	\$ 548,985
													<b>\$ 13,095,750</b>

**Schedule B – Shared Services Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget B Estimated Agency Direct Costs	Budget B Estimated Shared Service Direct Costs
ATG	48	47	1	\$ 293,045	6	\$ 3,600	\$ 21,600	\$ 192,000	\$ 350	\$ 525	\$ 875	\$ 32,900	\$ 875	\$ 539,545
DFI	61	44	17	\$ 274,340	7	\$ 3,600	\$ 25,200	\$ 244,000	\$ 5,950	\$ 8,925	\$ 14,875	\$ 30,800	\$ 14,875	\$ 574,340
DNR	163	142	21	\$ 885,370	17	\$ 3,600	\$ 61,200	\$ 652,000	\$ 7,350	\$ 11,025	\$ 18,375	\$ 99,400	\$ 18,375	\$ 1,697,970
DOH	175	166	9	\$ 1,035,010	19	\$ 3,600	\$ 68,400	\$ 700,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 116,200	\$ 7,875	\$ 1,919,610
DOL	169	149	20	\$ 929,015	17	\$ 3,600	\$ 61,200	\$ 676,000	\$ 7,000	\$ 10,500	\$ 17,500	\$ 104,300	\$ 17,500	\$ 1,770,515
ECY	128	118	10	\$ 735,730	13	\$ 3,600	\$ 46,800	\$ 512,000	\$ 3,500	\$ 5,250	\$ 8,750	\$ 82,600	\$ 8,750	\$ 1,377,130
ESD	191	186	5	\$ 1,159,710	20	\$ 3,600	\$ 72,000	\$ 764,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 130,200	\$ 4,375	\$ 2,125,910
HCA	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ -	\$ 218,565
LNI	237	128	109	\$ 798,080	25	\$ 3,600	\$ 90,000	\$ 948,000	\$ 38,150	\$ 57,225	\$ 95,375	\$ 89,600	\$ 95,375	\$ 1,925,680
OAH	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
OSPI	51	46	5	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 204,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 32,200	\$ 4,375	\$ 544,610
													<b>\$ 172,375</b>	<b>\$ 12,923,375</b>

**Move Cost Report Plans – Move Group 3**

Under Schedule A, the agencies in Move Group 3 would assume a total of \$10.82M, while under Schedule B, this would be reduced to \$43K. The Shared Services organization in a worst case scenario would assume a budget of \$10.77M under Schedule B.

**Schedule A – Agency Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget A Agency Estimated Total Cost
DFW	31	31	0	\$ 193,285	4	\$ 3,600	\$ 14,400	\$ 124,000	\$ -	\$ -	\$ -	\$ 21,700	\$ 353,385
DRS	70	70	0	\$ 436,450	8	\$ 3,600	\$ 28,800	\$ 280,000	\$ -	\$ -	\$ -	\$ 49,000	\$ 794,250
DSHS	792	748	44	\$ 4,663,780	80	\$ 3,600	\$ 288,000	\$ 3,168,000	\$ 15,400	\$ 23,100	\$ 38,500	\$ 523,600	\$ 8,681,880
OST	21	21	0	\$ 130,935	3	\$ 3,600	\$ 10,800	\$ 84,000	\$ -	\$ -	\$ -	\$ 14,700	\$ 240,435
PRT	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
SIB	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
WSGC	28	23	5	\$ 143,405	4	\$ 3,600	\$ 14,400	\$ 112,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 16,100	\$ 290,280
													<b>\$ 10,819,230</b>

**Schedule B – Shared Services Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget B Estimated Agency Direct Costs	Budget B Estimated Shared Service Direct Costs
DFW	31	31	0	\$ 193,285	4	\$ 3,600	\$ 14,400	\$ 124,000	\$ -	\$ -	\$ -	\$ 21,700	\$ -	\$ 353,385
DRS	70	70	0	\$ 436,450	8	\$ 3,600	\$ 28,800	\$ 280,000	\$ -	\$ -	\$ -	\$ 49,000	\$ -	\$ 794,250
DSHS	792	748	44	\$ 4,663,780	80	\$ 3,600	\$ 288,000	\$ 3,168,000	\$ 15,400	\$ 23,100	\$ 38,500	\$ 523,600	\$ 38,500	\$ 8,643,380
OST	21	21	0	\$ 130,935	3	\$ 3,600	\$ 10,800	\$ 84,000	\$ -	\$ -	\$ -	\$ 14,700	\$ -	\$ 240,435
PRT	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
SIB	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
WSGC	28	23	5	\$ 143,405	4	\$ 3,600	\$ 14,400	\$ 112,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 16,100	\$ 4,375	\$ 285,905
													<b>\$ 42,875</b>	<b>\$ 10,776,355</b>

**Move Cost Report Plans – Move Group 4**

Under Schedule A, the agencies in Move Group 4 would assume a total of \$5.03M, while under Schedule B, this would be reduced to \$31K. The Shared Services organization in a worst case scenario would assume a budget of \$5M under Schedule B.

**Schedule A – Agency Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (2 hours per Server @ \$175 an hour)	Estimated Server Moves (3 hours per Server @ \$175 an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget A Agency Estimated Total Cost
AGR	18	18	0	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 72,000	\$ -	\$ -	\$ -	\$ 12,600	\$ 207,630
DEL	24	24	0	\$ 149,640	3	\$ 3,600	\$ 10,800	\$ 96,000	\$ -	\$ -	\$ -	\$ 16,800	\$ 273,240
DOP	44	38	6	\$ 236,930	6	\$ 3,600	\$ 21,600	\$ 176,000	\$ 2,100	\$ 3,150	\$ 5,250	\$ 26,600	\$ 466,380
GA	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ 229,500
LIQ	33	28	5	\$ 174,580	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 19,600	\$ 344,955
OFM	46	46	0	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 184,000	\$ -	\$ -	\$ -	\$ 32,200	\$ 524,610
OIC	20	18	2	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ 700	\$ 1,050	\$ 1,750	\$ 12,600	\$ 217,380
PARKS	26	26	0	\$ 162,110	3	\$ 3,600	\$ 10,800	\$ 104,000	\$ -	\$ -	\$ -	\$ 18,200	\$ 295,110
PDC	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ 218,565
RCO	23	10	13	\$ 62,350	3	\$ 3,600	\$ 10,800	\$ 92,000	\$ 4,550	\$ 6,825	\$ 11,375	\$ 7,000	\$ 183,525
SOS	87	87	0	\$ 542,445	10	\$ 3,600	\$ 36,000	\$ 348,000	\$ -	\$ -	\$ -	\$ 60,900	\$ 987,345
WSP	101	92	9	\$ 573,620	11	\$ 3,600	\$ 39,600	\$ 404,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 64,400	\$ 1,089,495
													\$ 5,037,735

**Schedule B – Shared Services Model**

Agency	Current Servers	New Servers	Servers to Be Moved	Estimated Total New Server Cost	Estimated Total Number of Racks	Estimated Cost Per Storage Rack	Estimated Total Rack Cost	Storage (Current Estimate is 1 TB per Server @ \$4K per TB in 2012)	Estimated Move Planning (hours per Server @ \$ an hour)	Estimated Server Moves (hours per Server @ \$ an hour)	Estimated Total Move Labor	New Server Deployment (4 hours per server @ \$175 an hour)	Budget B Agency Direct Cost	Budget B Estimated Shared Services Direct Cost
AGR	18	18	0	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 72,000	\$ -	\$ -	\$ -	\$ 12,600	\$ -	\$ 207,630
DEL	24	24	0	\$ 149,640	3	\$ 3,600	\$ 10,800	\$ 96,000	\$ -	\$ -	\$ -	\$ 16,800	\$ -	\$ 273,240
DOP	44	38	6	\$ 236,930	6	\$ 3,600	\$ 21,600	\$ 176,000	\$ 2,100	\$ 3,150	\$ 5,250	\$ 26,600	\$ 5,250	\$ 461,130
GA	20	20	0	\$ 124,700	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ -	\$ -	\$ -	\$ 14,000	\$ -	\$ 229,500
LIQ	33	28	5	\$ 174,580	4	\$ 3,600	\$ 14,400	\$ 132,000	\$ 1,750	\$ 2,625	\$ 4,375	\$ 19,600	\$ 4,375	\$ 340,580
OFM	46	46	0	\$ 286,810	6	\$ 3,600	\$ 21,600	\$ 184,000	\$ -	\$ -	\$ -	\$ 32,200	\$ -	\$ 524,610
OIC	20	18	2	\$ 112,230	3	\$ 3,600	\$ 10,800	\$ 80,000	\$ 700	\$ 1,050	\$ 1,750	\$ 12,600	\$ 1,750	\$ 215,630
PARKS	26	26	0	\$ 162,110	3	\$ 3,600	\$ 10,800	\$ 104,000	\$ -	\$ -	\$ -	\$ 18,200	\$ -	\$ 295,110
PDC	19	19	0	\$ 118,465	3	\$ 3,600	\$ 10,800	\$ 76,000	\$ -	\$ -	\$ -	\$ 13,300	\$ -	\$ 218,565
RCO	23	10	13	\$ 62,350	3	\$ 3,600	\$ 10,800	\$ 92,000	\$ 4,550	\$ 6,825	\$ 11,375	\$ 7,000	\$ 11,375	\$ 172,150
SOS	87	87	0	\$ 542,445	10	\$ 3,600	\$ 36,000	\$ 348,000	\$ -	\$ -	\$ -	\$ 60,900	\$ -	\$ 987,345
WSP	101	92	9	\$ 573,620	11	\$ 3,600	\$ 39,600	\$ 404,000	\$ 3,150	\$ 4,725	\$ 7,875	\$ 64,400	\$ 7,875	\$ 1,081,620
													\$ 30,625	\$ 5,007,110

**Estimated Operating Cost Summaries****Estimated Resource Schedule**

<b>Technical Resource</b>	<b># of FTEs</b>	<b>Estimated Avg Cost per FTE</b>	<b>FTE Estimated Cost</b>
Windows Server Admins	70	\$ 100,000	\$ 7,000,000
Storage Admins	81	\$ 120,000	\$ 9,720,000
UNIX Server Admins	16	\$ 110,000	\$ 1,760,000
Data Center Facilities	15	\$ 90,000	\$ 1,350,000
Data Center Manager	1	\$ 140,000	\$ 140,000
Asset Data Center Manager	1	\$ 100,000	\$ 100,000
<b>Total Estimated Migration Costs</b>	<b>184</b>	<b>\$ 660,000</b>	<b>\$ 20,070,000</b>

