OB2 Move Project

Implementation Plan REDACTED

State of WA DIS

June 10, 2010

Table of Contents

Revision History

Revision	Revision Date	Name	Notes
1.0	4/27/2010	Paul Thompson	Initial document
1.1	5/15/2010	Paul Thompson	Edits and additions
1.2	5/22/2010	Bernie Johansen	Edits
1.3	5/23/2010	Ian Cote	Edits
1.4	5/23/2010	Paul Thompson	Edits
1.5	5/24/2010	Ian Cote	Edits
1.6	5/24/2010	Lynda Fengler	Edits
1.7	5/24/2010	Paul Thompson	Final Edits
1.8	6/2/10	Mike Davis	Revisions
1.9	6/4/10	Paul Thompson	Final revisions incorporated
2.0	6/10/10	Mike Davis	Final DIS Revisions

1. Purpose

The purpose of this Implementation Plan is to develop a framework for the move, establish a schedule, estimate costs and identify risks. This plan is an input into the next phase of the Move Project in which DIS will develop detailed level designs and plans for the exact configuration and migration of each component that is required to build out and migrate into the new SDC.

The Implementation Plan (this document) has two other components:

- Schedule – Appendix G
- Cost Estimation Model – Appendix H

This document is designed to add context to the project schedule and estimates as well as share understanding that the team has obtained over the course of this study.

The Implementation Plan, schedule and cost estimation model are intended to be living documents to be refined as additional information becomes available.

2. Scope

Project scope is defined as the work that needs to be accomplished to deliver a product, service, or result with the specified features and functions. In order to develop this move plan the Implementation Planning Team followed the scope that was set in the OB2 Move Project Charter[1].

In Scope:

The Project Charter identifies the following as in scope:

1. *Requirements*

   Develop business and technical requirements that will properly integrate into the planning and design work for this project.

5. *Procurement of Technology & Related Purchased Services*
   - *5.1. Coordinate with procurements done by the other projects and the DIS divisions.*
6. *Procurement of Personal Services*
   - *6.1. Procurement support*
   - *6.2. Systems Integrator with Data Center design and migration expertise*
     - *6.2.1. Enterprise Project Planner*
     - *6.2.2. Vendor move support*
     - *6.2.3. Technical Training for Key Staff supporting the transition (Purchased Services)*
   - *6.3. External Quality Assurance*
   - *6.4. External IV&V*
7. *Cable Plant*

   The OB2 Move project includes the following Cable Plant:

   1. Service Suites backbone infrastructure.
   2. OB2 to SDC Outside Plant Fiber.
   3. Wheeler Office Building to SDC Inter-building Fiber backbone.
8. *Infrastructure Build Out*

   Based upon detailed design and planning documents, the SDC will be installed with the technology infrastructure required to support DIS Services and SLA's as follows:

[1] "20100408 OB2 Move Charter 2.0 Signed.pdf" located on DIS project share point site.

8.1. Software

8.2. Hardware

8.3. Network connections

8.4. Management tools

8.5. Testing and accepting the infrastructure installation and configuration

9. DIS Services Migration

DIS services migration to the SDC will be planned and executed. Testing, acceptance, cutover and closeout of OB2 based services is included.

10. Decommission DIS OB2 Services

DIS operations to support services occurring in OB2 will be terminated. DIS will maintain a DIS MON node in order to provide a CFN node and telephony PBX's will remain to support DSHS and other customers in OB2 and the Natural Resources Building. OB2 space will be returned to the Department of General Administration (GA) per the terms of the governing lease.

11. Closure

Project closure will include the following:

11.1. Conduct Knowledge Transfer activities

11.2. Receive final deliverables and invoices including QA Post Implementation Report (PIR)

11.3. Pay final invoices

11.4. Terminate contracts for Systems Integration, QA and IV&V

11.5. Final Status Report

11.6. Create PIR and submit to the ISB

11.7. Brief ISB and DIS on the PIR as required[2]

Out of Scope

In addition, the project charter identifies work which is specifically out of scope for the OB2 Move Project and is not accounted for in this plan. The items specifically excluded from this plan are:

1. Developing the DIS Business Model, rate setting and new services business models.

2. Consolidation of State Agency data centers and infrastructure outside of OB2 and related planning. This includes customer dialogues, planning, and activities related specifically

[2] The in scope items were copied directly from "20100302 OB2 Transition Charter 1.0 Signed.pdf".

to consolidating data centers that are outside of OB2. Also excluded is the development of the Implementation Plan per ESHB 1216, Section 6031, page 245 which states:

~~authorized in RCW 47.79.140.~~)) The department, in consultation with the office of financial management, shall submit an implementation plan to the fiscal committees of the legislature by December 15, 2009 identifying a schedule of consolidation of agency data centers to achieve cost savings to offset higher facility costs resulting from the construction of the new consolidated data center.

3. *Planning and Developing Central or Shared Services*

NEW SECTION. **Sec. 906. CENTRAL SERVICES.** The governor shall convene a work group consisting of representatives from the central service agencies and their clients to collaborate on methods for providing commonly needed services to state agencies, including, but not limited to: Human resource management, employee benefits, payroll, accounting, purchasing, information technology, real estate services, facility management, building and grounds maintenance, fleet management, printing services, and office mail distribution. The work

4. *Developing or modifying customer SLA's except for physical related changes such as cages, floor space and network connections.*

5. *Reengineering* A' La Carte *Customer Infrastructure*

   A' La Carte assets will be moved to the SDC as they exist at the beginning of the "OB2 Critical Changes Only" period. Reengineering À La Carte Customer Infrastructure is not part of this project.

6. *Planning, Designing and Building an Eastern Washington Data Center.*

7. *IT Service Management Project work including process development and related training for the purchase and deployment of application discovery tools, Configuration Management Databases (CMDBs), and Event Management.*

8. *Installing and accepting the Telemetry Network*

   This is in scope for the Wheeler SDC Building project.

9. *Installing and accepting the DIS Corporate Network*

   This is in scope for the Wheeler SDC Building project.

10. *Wireless Networks*

This includes office technology demonstration projects, wireless networks, voice over internet protocol (VOIP) projects and modular workstations.

11. Cable Plant

The Vertical and Horizontal Office Space Cabling that is in the Wheeler Office Building and SDC Building Project.

Campus Fiber Network Project scope is also excluded from the OB2 Move Project.[3]

Over the data gathering and analysis activities of this Implementation Plan an additional item was added to the scope. That scope change to the plan is:

The physical relocation of the PBX node will remain in OB2.

Based on the project scope, this Implementation Plan and its move schedule will complete the initial four in scope requirements and establish the plan for the execution of the remaining in scope items.

[3] The **not** in scope items were copied directly from "20100302 OB2 Transition Charter 1.0 Signed.pdf".

3. Major Alternatives

The Implementation Plan team developed information on the alternative ways to move a data center and its systems. The Major Alternatives information contains:

- Major Alternatives
- Major Alternatives Cost Analysis
- Alternative Risk Analysis
- Recommended Alternative

Data centers are populated with a variety of physical hardware including:

- Networking components.
- Storage frames and disk.
- x86 servers.
- Mid-range computers.
- Mainframes.
- Tape backup.
- Printers.
- Phone systems (PBX, VoIP).
- UPS (uninterruptable power supplies).
- PDUs (power distribution unit).
- Server cabinets.
- Miles of copper, fiber and power cables.

DIS has approximately 659 customers it services including 23 A` La Carte customers. OB2 houses approximately 600 major pieces of DIS owned and operated equipment. An additional 1,500 pieces of major equipment are owned and operated by A` La Carte customers in OB2.

Moving from one data center to another is a project that most organizations seldom perform. A data center move is complex and expensive in relation to other technology projects an organization will take on, regardless of how the move is accomplished.

The majority of the complexity involved in moving from one data center to another arises from the applications, middle ware and data that is running and stored on the different hardware components. The unique combination of hardware, software and data working to achieve a common purpose creates a system. It is the system that must be addressed in moving from one data center to another. When evaluating systems in the context of a move, it is helpful to divide them into business systems and shared systems.

Business systems are categorized as a group of diverse, but interdependent applications and their resources that interact to accomplish specific business functions. Examples of business systems include: SAP HRMS, purchasing, ACES, COMET, Orion and Famlink. Many enterprises have built their own business systems or have modified commercial off the shelf (COTS) packages.

Shared systems are categorized as the group of applications and their resources that provide common services. These common services operate as a standalone or support other systems in accomplishing specific business functions. Examples of shared systems include Email, Active Directory, DNS, FAX services, printing services, databases, and FTP. Most enterprises make minor setting changes and deploy shared systems based on published best practices.

By identifying systems in this manner, systems engineers and application developers can evaluate the boundaries and interactions of the systems. In very few cases do systems operate autonomously. This system to system interaction is what increases the complexity and risk of moving. While some systems may have high interaction with another system, that relationship may not be critical. Other systems may have a low interaction rates, but the success of the business transaction is heavily dependent on the other system's service. In many cases the system to system interactions, criticality, timing and impacts are undocumented or even unknown.

Understanding the systems' interactions is critical to unraveling the complexity, reducing the risk of unplanned outages and ensuring the systems operate correctly in the new data center.

At a macro level, DIS is investigating two major alternatives for moving systems from the Office Building 2 data center (OB2) over to the new state data center (SDC) which will account for the system to system interrelationships. Those Major Alternatives are:

1. Physical Relocation of all systems
2. Individualize System Moves based on each system's requirements and interrelationships

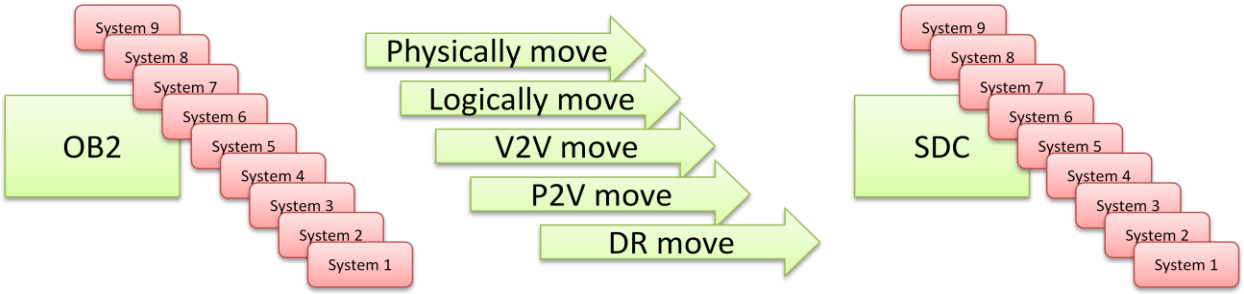
1. Physical Relocation of all systems, effectively treating the entire data center as a single, very large system. A complete physical move is often considered a brute force method. Less time is spent understanding the intricacies of each system and more time is spent on the logistical challenges.

2. Individualized System Migrations based on each system's requirements and interrelationships. Each system is decomposed into its components identifying interfaces, dependencies, job schedules, criticality, platforms and relationships. This decomposition allows the most appropriate relocation method to be employed at the individual system level. The goal is to match the cost and risk to the move method and take advantage of technologies to reduce outage risk. In the Individualized System Migration, five (5) relocation methods are available including:
    1. Physical Relocation.
    2. Logical Relocation.
    3. Virtual to Virtual Relocation (V2V).
    4. Physical to Virtual Relocation (P2V).

5. Disaster Recovery Failover (very limited applicability).

Multiple move methods may be utilized within a single system in order to meet the overall goals and system constraints.

This Individualized System Migration approach to moving a data center is more finesse oriented since it moves components of the data center in micro move events designed to minimize impacts to end users of the systems. Additionally, breaking up the migration into smaller move events allows for these events to be stacked according to system requirements, criticality, business changes and resource availability. The micro move events are not serial; typically several systems are moving in parallel throughout the structured move.



Both alternatives have advantages and disadvantages. Depending on project business drivers, constraints and DIS' risk appetite either alternative can be the appropriate choice under the right circumstances.

At a high-level the following table presents the pros, cons and assumptions of both major alternatives.

Alternative	*Pros*	*Cons*	*Assumptions*

#1 Physical Relocation of all systems	• Minimizes investment in equipment.
	• Requires less detailed planning at the system level.
	• Shorter overall project duration.
	• Less detailed system knowledge required.
	.
		• Could break existing SLAs by exceeding short outage windows.
		• Minimal pre-staging ability.
		• Ignores advantages of hardware platform redundancies and high-availability.
		• Ignores software .
		• Difficult to accommodate changes to requirements or schedule.
		• Difficult to debug issues on data center restart.
		• Limited and complex fallback.
		• Risk of equipment damage.
			• This approach would be used for all equipment.
			• The duration of the planned outage can be negotiated and agreed to by all stakeholders.
			• Logistical conflicts with access and security can be managed.
			• A single event is planned for system moves.
			• Prior to the move:
			  • Data center is tested and accepted.
			  • No equipment is staged in SDC except for networking.
			  • Structured cables in place.
			  • Cabinets are in place.
			  • Detailed information for all equipment pre and post move is complete.

#2 Individualize System Moves	• Ability to match cost, risk and outage duration to system capability and business constraints.
	• Detailed system knowledge is captured and documented for ongoing operations.
	• Greater ability to maintain SLAs.
	• Greater ability to minimize unplanned outages.
	• Takes advantage of hardware platform redundancies and high-availability.
	• Provides more flexibility to respond to changing
		• Seed equipment is required.
		• Longer project duration.
		• Higher DIS and Customer system knowledge required.
		• Greater planning details required.
			• Staff levels adequate to create detailed plans.
			• Seed equipment is available as required.
			• System migrations can be executed in phases.
			• Prior to the move:
			  • Data center is tested and accepted.
			  • New network is operational and extending OB2 into SDC.
			  • New SAN is operational and extending OB2 into SDC.
			  • Structured cable in place.

Alternative	Pros	Cons	Assumptions
	business requirements and schedules. • Greater ability to test prior to move event. • Debug effort is contained to smaller number of components. • Allows for resource management.		

3.1. Relocation Principles

Underlying both alternatives are a few basic principles that, if followed, will greatly increase the odds of success. These principles are:

1. No In-Flight Transformations. Making significant changes to services during a move creates unacceptable risks because there are too many variables to manage. Examples of significant changes include:
    - Physical to Virtual Relocations (P2V)
    - Replatforming applications to different operating systems
    - Deploying application updates

2. Avoid or minimize small changes to the greatest degree possible. Examples of small changes include:
    - Changes to configurations
    - Updates to operating systems, software, firmware and bios including version upgrades, patches or settings.

3. Only accept changes which have been thoroughly tested.

4. Develop a detailed set of tasks to be executed for each system and its underlying components.

5. Involve the stakeholders who have day to day responsibility for the use and administration of the system in the planning and execution phases of the move.

6. An accurate inventory and configuration validation must exist at the beginning of the move.

7. Tools must be used to manage the dual data center configurations and inventories through the completion of the project.

3.2. Physical Relocation of all systems

Relocating the systems (applications, data, equipment and connectivity) in a data center by physically moving the equipment is usually reserved for special circumstances. This approach is most appropriate when moving data centers that support non-critical or low priority systems that can tolerate significant outage times.

In order to accomplish a physical move of all equipment in a data center comparable to DIS, a number of physical moves with several long outages is required. Moving a mainframe takes significant time to relocate and test before it comes back on line. Network components require validation of proper patching to ensure correct communications. The larger outages for mainframes and storage will have significant impact to other systems which access these components.

A comprehensive plan and detailed sets of documentation are required to complete a physical data center move. Planning involves choreographing the move events' logistics for freighters, loading docks, elevators, vendor assignments, staff resources and management communications. The documentation sets must contain equipment maps which identify current and future location as well as the instructions for each of the components. This map includes all physical and logical connections. For example the physical portion will identify the equipment's current row, rack, rack unit number, cables and port assignments along with it corresponding information in the new location. The logical map will identify all network and storage communication routes and security contexts which pass data over physical ports in order to migrate along with the physical components.

The most significant drawback to this approach is that it tends to under estimate the complexity of the systems in the data center. It also fails to take advantage of technologies and assumes the number and duration of outages are acceptable to all stakeholders.

3.3. Individualized Systems Migration Discussion

Moving Systems from one location to another can take on several forms when applied at a system or sub-system level. To better understand the advantages of an Individualized System Migration approach the following discussion breaks down the activities and presents additional detail for the various options when individually applied at a system level.

3.3.1. Physical Relocation:

A physical relocation involves:

1. Shut equipment off.
2. Un-cabling the equipment.
3. Pulling the equipment out of the rack.
4. Packaging the equipment.
5. Transporting the equipment to the new location.
6. Un-packaging the equipment.
7. Placing the equipment into the correct new rack location.
8. Pre-test equipment for transport damage.

9. Cabling the equipment correctly. (assume all pre-cabling done).
10. Turning on the correct ports.
11. Testing the system and/or service configuration.

With careful planning and documentation, this method of moving applications or data along with all the equipment it is installed on, is relativity straightforward, and may represent a low cost option when applied at the micro-level.

Rating	Risk	Cost	Documentation level	Outage time
High (10)				**X**
Medium (5)	**X**			
Low (1)		**X**	**X**	

A physical relocation strategy is most appropriate for systems which can accept significant downtime or are highly redundant. A physical relocation strategy is also used for non-critical or redundant components of a larger system in which downtime for executing the move is acceptable.

Risk: This option carries a higher amount of risk if the installation documentation is incomplete since fall back options are limited in nature and more complex. Risks include: equipment damage, incorrect assembly into the new location, operating systems fail to reboot or port configurations have changed. Issues encountered with this relocation method require being working through one at a time serially. If a system with a large number of components is moved physically at one time, even for simple issues the resolution complexity grows exponentially.

Cost: A physical relocation can vary widely on cost. The cost is based on what equipment is expected to be in place prior to the move. Having cabinets pre-staged with power and network fixed inside the cabinet ready to accept servers and other components is more costly than tearing down racks, power strips and equipment. While the cost may be higher, the more components and services that are pre-staged in the data center before the move then the outage duration will be shorter.

Documentation level: The documentation requirement for a physical move is focused on the physical aspects of the equipment including ports, cables, interface cards, locations and installation instructions. The documentation should also contain the software, software license information and data contents of the equipment to ensure complete understanding of turning the equipment off.

Outage: In a non-redundant environment the system outage duration needs to take into account:

- How many pieces of equipment will be migrated in one Move Event?
- How many hands will be involved (technical staff and freighters).
- Time requirement to shut down applications, databases, operating systems and equipment.
- Logistics for loading docks, elevators, hallways, dollies, packaging.
- Physical time to disassemble, crate, uncrate and reassemble based on class (a mainframe requires more time than an x86 server).

- Security requirements.

Outage durations estimates should be validated prior to the move event.

In the case of highly redundant systems that can support the loss of a component without stopping the work flow, outage time is theoretically zero. In this case the risk is low and the cost is minimal while the documentation level remains the same as in a non-redundant physical move. In the case of a highly redundant system the physical move is performed in stages so that the system can continue to support the work load by utilizing the remaining equipment while a manageable number of its components are physically moved.

3.3.2. Logical Relocation

A logical migration relocates the application and data without physically moving hardware. Instead new or repurposed equipment (seed gear) is set up and the system is ported over electronically. In the case of the OB2 Move program, standard DIS product refresh cycle can be timed to support Logical Relocation of systems. There are at least three distinct sub-options for relocations as listed in the table below:

#	Sub-Option	Option Description
1	Replicate	**Replicate** the current OB2 vendor product technology and functionality in the SDC.
2	Upgrade	**Upgrade** the current OB2 vendor product technology and functionality in the SDC
3	Redesign	**Redesign** the current OB2 vendor product technology and functionality in the SDC with advanced vendor product(s) as well as changes to the current service platform design and architecture.

A logical relocation involves:

1. Installing new or repurposed (seed) equipment in the new location.
2. Installing the operating system and application on the new equipment.
3. Testing the new equipment and applications for functionality.
4. Copying all relevant data and keeping it in synch with the current data source.
5. Stopping the application at source location.
6. Synchronizing the last set of data.
7. Testing the functionally.
8. Pointing production to the new location.

Planning this method of moving applications and data separate from the equipment they are installed on, is relativity straightforward and may represent a mid-cost option. The table below is most applicable to the Replicate and Upgrade Sub-Options. The Redesign Sub-Option will tend to rate higher across all of the four columns below due to the change involved.

Rating	Risk	Cost	Documentation level	Outage time
High (10)				
Medium (5)		X	X	
Low (1)	X			X

A logical relocation is appropriate for systems running on physical equipment with very little down time requirements. This approach requires equipment to be established in the new location for the system to be transferred electronically to. The equipment vacated in the move may be placed into the pool of equipment[4] which will become seed equipment for the next system.

Risk: The risk in this method is reduced by the fact that the original system can be brought back on-line if an issue arises during the cut over providing a solid fall back plan. Equipment is pre-staged and tested prior to migration. A poorly documented detail move plan and lack of understanding of how the application and data interact represents a potential for error to occur during the migration. The other area of risk is in the attempt to upgrade the new system during the move. Logical moving systems from one set of equipment to another should be between "like for like" equipment to minimize potential errors.

Cost: Pre-staged equipment is required to logically move from one component to the other. The class of equipment will dictate the cost of new or repurposed equipment. Costs for seed gear can be reduced by procuring the minimal new equipment required and cycling equipment from previous moves in as seed gear for the next iteration.

Documentation Level: Detailed documentation is required to ensure a successful cut over. The cut over typically involves a number of networking and storage changes to occur in order to direct communication appropriately to the system's new location.

Outage time: The amount of outage time can vary significantly. Data requires a final synchronization across the network to the new location before it can be put back into production. Testing time of component functionality also influences the outage duration. More complex components require longer testing times.

3.3.3. Virtual to Virtual Relocation

Relocating virtual servers and data is referred to as a Virtual to Virtual Relocation (V2V). A V2V relocation utilizes the tools available from the virtual environment software manufacturer to move virtual servers and data. The steps involved include:

1. Installing new or repurposed (seed) equipment in the new location.

[4] This is the case for service platforms that can split their hardware resources such as servers, storage and possibly mainframes with development and production machines. This is not the case for network equipment.

2. Installing a virtual environment on the new equipment.
3. Testing the new equipment and virtual environment for functionality.
4. Extending the new virtual environment into the existing one.
5. Utilizing the virtual environment's tools to move the virtual servers across to the new location.
6. After the virtual servers have been migrated to the new location, remove the physical servers in the old location from the virtual environment.

Moving applications and data using a V2V method is straightforward and may represent a low-cost option. In most cases the higher the percentage of systems migrated virtually the easier the overall move becomes. This assumes the systems are virtualized and stable in the current data center prior to executing a V2V migration.

Rating	Risk	Cost	Documentation level	Outage time
High (10)				
Medium (5)				
Low (1)	**X**	**X**	**X**	**X**

Risk: Minimal risk is involved since the virtual environment tools were designed to perform the movement of virtual servers without disruption of service. Services can be brought back on-line in the original virtual environment if an issue arises during the migration providing a solid fall back plan. Equipment for the virtual environment is pre-staged and tested prior to migration reducing the issues.

Cost: Pre-staged equipment is required to establish a virtual environment in the new location. The class of server equipment will dictate the cost of new or repurposed equipment. The relative cost per computational service is low when a large number of virtual servers are running in a virtual environment.

Documentation: Documentation is required to ensure steps are identified for using the virtual tools to complete a successful cut over and test the system in the new virtual environment. The same documented steps should be repeated for each virtual server, reducing the overall documentation need.

Outage time: A V2V migration can occur without outage time when planned correctly. Utilizing the virtual environment tools correctly for migrating systems is key to maintaining service during the system migration.

3.3.4. Physical to Virtual Relocation

Relocating servers and data stores currently running on physical servers into a virtual environment is referred to as a Physical to Virtual Relocation (P2V). A P2V relocation utilizes the tools available from the virtual environment software manufacture to migrate services into a virtual environment. The steps involved include:

1. Installing new or repurposed (seed) equipment in the new location.

2. Installing a virtual environment on the new equipment.
3. Test the new equipment and virtual environment for functionality.
4. Utilize the virtual environment's tools to draw the services running on physical servers into the virtual environment.
5. Resolve issue resulting from the virtualization of the server. This will include driver compatibility, networking interfaces and storage connections.
6. After servers have been migrated to the new virtual environment, remove the physical servers in the old location.

Moving applications and data using a P2V method presents a large amount of change which represents a very high risk option and a violation of Relocation Principles.

Rating	Risk	Cost	Documentation level	Outage time
High (10)	X		X	
Medium (5)				X
Low (1)		X		

Risk: The level of risk results from the high amount of change incurred by changing locations and virtualizing services at same time. A fall back plan involves remaining on the physical environment. However, debugging issues may require significant time based on the amount of change. A lower risk option is to perform the server virtualization prior to the move, allow for the system to stabilize and then utilize a V2V relocation method.

Cost: Pre-staged equipment is required to establish a virtual environment in the new location. The pre-staged equipment can amount to an existing virtual environment if the P2V migrations follow the V2V migrations into the new location (this assumes a current virtual environment with excess capacity for all the P2V system migrations). The class of server equipment will dictate the cost of new or repurposed equipment. The relative cost per computational service is low when a large number of virtual servers are running in a virtual environment. If an existing virtual environment exists with capacity to run the physical servers being migrated the cost can be reduced.

Documentation: Detailed documentation is required to ensure a successful virtualization. The documentation is typically at the same level that is required for a successful logical relocation.

Outage time: A P2V migration may encounter significant outage time. Driver incompatibilities can require substantial effort to resolve. Developing a process to virtualize servers prior to the move, and allowing the system to stabilize followed by a V2V relocation method will reduce the outage time requirements.

3.3.5. Disaster Recovery Failover

Relocating servers and data utilizing a disaster recovery (DR) failover involves executing the enterprise's DR plan into the new location. This option assumes a tested DR plan with complete failover and failback steps along with agreed durations, is in place today. Additionally, DR equipment to run production is re-staged in the new data center. The steps involved in relocating under this method include:

1. Establish the pre-failover requirements called out in the DR plan.
2. Stop services in the current location and fail over production activity to the DR site following the DR plan.
3. If the current DR equipment has been relocated into the SDC, the production equipment in OB2 is relocated to the DR facility following the steps in a physical move.
4. Update any DR plan elements to allow future failover to the DR site from SDC.

DIS does not have a complete failover plan and Disaster Recovery changes are out of scope for the OB2 Move. SunGard provides a limited mainframe backup service. Business Continuity/Disaster Recovery Services are provided by DIS via a contract with Liberty Lake Internet Exchange, LLC. This service could be used to facilitate some moves, for example the storage for the Electronic Records Vault (WaSERV) is synchronized with storage in Spokane.

Moving applications and data using a failover method requires a tested DR plan and presents a large amount of change and cost which translates into risk.

Rating	Risk	Cost	Documentation level	Outage time
High (10)			**X**	
Medium (5)	**X**	**X**		
Low (1)				**X**

Risk: DR plans are developed as a last resort measure for system continuation in the event of a significant incident. As a result the goal of a DR plan is typically to bring services up in a reduced capacity with limited services. Completely testing DR activities is difficult and most organizations do not fully test their failover and fail back plans.

Cost: Pre-staged equipment is required to establish a DR environment in the DR location if it does not exist today. The class of equipment will dictate the cost of new or repurposed equipment. The capacity required to execute a full scale DR failover requires replication of all system equipment in the new location prior to the DR failover.

Documentation: Detailed documentation is required to ensure a successful DR failover. The documentation is highly complex with few enterprises meeting the required levels for their systems.

Outage time: A DR failover can be instantaneous or allow for days of outage time since DR assumes it is the last resort to reestablish service. Although the time can be reduced, utilizing a DR fail over strategy for a data center relocation is seldom performed.

3.4. Alternative Risk and Cost Analysis

The nature of moving systems from one data center to another involves risk.

In order to establish a risk comparison between major alternatives, the following items were identified to represent DIS' risk at a macro-level for moving from OB2 into SDC:

1. Incorrect re-assembly of equipment failures caused by incorrect or misreading documentation.
2. Incorrect service configuration caused by incorrect or misreading documentation.
3. Outage windows exceed customers' service level agreements (SLA) and requirements.
4. Equipment damaged or lost in route.
5. Systems fail to operate correctly after installation in the new data center.
6. Operating systems fail to reboot after installation in the new data center.
7. Network or storage communication failures.
8. Cost estimates exceeded.

Most risk can be reduced through additional spending. The following chart compares the risks of the major alternatives in relation to their comparative costs. It should be noted that WAN equipment will generally be at greater risk than server and storage equipment during a physical relocation.

Risk

High (10)			
Medium (5)	Physical Relocation of all systems		
Low (1)		Individualize System Migrations	
	Low (1)	Medium (2)	High (3)

Cost

As depicted above, when applied to all systems in a data center, moving them by physically relocating all the systems (equipment, applications and data) represents a higher risk than individualizing the approach for each system.

The nature of physically moving applications and data with their equipment significantly limits the amount of pre-staging and testing that can occur raising the risk exposure during the migration process. In a move, one of the most complex components is coordinating the timing and duration of the event

with stakeholders. Using a physical move for the entire data center requires DIS and customers to accept the risk that systems will be off-line for the duration of the move. DIS has systems with SLAs that require nearly continuous uptimes. Based on the diverse class of equipment in OB2 and high-level review, it appears that Physical Relocation of all systems will unacceptably not meet customer uptime requirements.

The advantage of Physical Relocation of all systems is in its low new equipment cost. The cost of services to manage, map out and relocate equipment remains approximately the same. Activities that would be expected include: basic documentation, process definition, change freeze, event planning and physical relocation services. This assumes DIS negotiates a date and duration for the move event and all stakeholders accept the outage.

Individualizing the migration method to each system allows the risk and cost to be matched to the criticality of each system. Applications with large outage windows or highly redundant components should be moved using a physical relocation method. Critical applications with high uptime requirements should utilize a logical or virtual to virtual relocation method depending on their current platform. Storage and data can be migrated independent of the services accessing them. Networks can be setup ahead of time and extended to facilitate the process.

The risks associated with moving individual systems are typically mitigated by isolating the move to a single or small number of system components at one time known as a “Move Event”. The change which translates into risk, involved over multiple small move events can be more tightly managed compared to a single large Move Event.

The cost of individualizing the migration method to each system is higher. The higher cost is realized through:

- Required seed equipment for specific service platforms
- Higher levels of documentation
- Increased crate and freight services
- Longer project duration

For DIS the majority of the cost of seed gear is anticipated to be covered through planned equipment refresh which has been delayed to coincide with the data center move.

3.5. Assumptions

Assumptions can represent a significant risk if all stakeholders do not agree with the assumptions. In order to predict needs and outcomes of alternative move methods, assumptions have been made and documented. Assumptions provide key information upon which the Major Alternatives have been compared. If any of the assumptions are not valid, then the analysis in this document may correspondingly be invalid. The following assumptions have been used as inputs into the process:

1. The Individualized Systems Migration approach would use multiple methods for a system to take advantage of equipment redundancy.
2. A new SDC Core Network will be built out and tested prior to service platform migrations.

3. The metropolitan optical network (MON) will be complete prior to the start of system migrations.
4. IBM or IBM Business Partner services will be utilized to move the IBM mainframes.
5. For the Individualized Systems Migration approach, new seed storage will be procured.
6. For the Individualized Systems Migration approach, the network and the storage area network (SAN) will be extended from OB2 to SDC.
7. System change will be minimized during the move. No changes to configurations, operating systems, software, firmware and bios including version upgrades, patch or settings will be made during the OB2 Move migrations.
8. Systems will be tested and results documented prior to the move creating a baseline. Following the move, tests will be repeated and the results compared to the baseline validating system quality.
9. Data backups will be taken prior to the move.
10. All relocated equipment will be wrapped in static free wrap and packaged to provide appropriate protection during relocation while being moved by certified technology equipment movers.
11. A crate and freight company will unrack, package and relocate the equipment.
12. DIS will shut down, test and restart all equipment as well as connect cables.
13. Detailed move plans will identify the steps necessary to migrate systems. The plans will have enough detail in order for someone other than the author to execute the plan.
14. Outage windows for the move which are longer than standard maintenance windows will be negotiated with DIS' customers and all moves will be coordinated with customers.
15. Unplanned outage is defined as a duration in which the system is off-line that exceeds a negotiated move duration or timing.
16. The SDC will be completely tested and accepted prior to the start of system migrations.
17. Sufficient staff and resources are available for the move regardless of method.

4. Recommended Alternative

Based on our high-level understanding of OB2, the SDC and DIS' requirements, we recommend using an Individualized Systems Migration approach to address the DIS owned systems. This approach will provide the lowest overall risk and allows DIS to manage cost at a system level.

At the time the move commences, the OB2 existing environment should be moved "As Is" which is another way of stating Relocation Principle 1, "No In-flight Transformations".

The approach will be the basis of the move plan developed for DIS.

5. A' La Carte

According to the OB2 Move Project estimate dated March 2, 2010[5] there are 23 A' La Carte (ALC) customers in OB2. The ALC customers utilize OB2 as a collocation facility, placing their own equipment in rented space. Within an individual ALC customer's space they may be running their own applications, core network, storage or other technology service. Of the A' La Carte customers, the Implementation Planning Team interviewed eight. These eight represent a financial or political majority in the A' La Carte space or have significant inventory presence in OB2.

Customer[6]	Rack Count	Server Count
DSHS	95	500
DOL	20	182
KING COUNTY	10	52
ESD	22	50
DFI	2	18
OFM	3	15
DOP	1	14
CTED	1.5	13
DFW	2	10
DOC	2	10
DSHS/ISSD	5	6
DEL	0.5	5
DRS	0.5	5

[5] 20100302 TTP ROM Estimate for Charter.xlsx. Multiple sources with different counts of A' La Carte customers were provided to the Feasibility Team. The team chose to use the20100302 TTP ROM Estimate for Charter.xlsx since it had the highest count of A' La Carte customers.

[6] Interviewed A' La Carte customers identified in red text.

Customer[6]	Rack Count	Server Count
GA	0.5	5
L & I	0.5	4
OIC	1	3
DSHS/IVR	2	2
DAHP	.5 SHARED	1
IPRMT	.5 SHARED	1
DHS	0.5	0
DIS KVM	1	0

Following the interviews[7], the Implementation Planning Team gathered input from DIS staff to develop a better understanding of the ALC as well as DIS' understanding of the systems within the ALC space. Based on this information the Implementation Planning Team developed its high-level understanding of the ALC customer moves:

- ALC customers want to be responsible for moving their systems and equipment from OB2 into SDC.
- ALC customers have varying levels of complexity involved with their move. The majority of the complexities lie in planning their outages and gaining approvals for the timing of the move.
- ALC customers rely on DIS services. For example:
  - Network connectivity within OB2 to reach external offices
  - Mainframe connectivity to access mainframe data
- ALC customers would like to consider additional DIS services if the service level and costs make business sense.
- ALC customers would like to understand the SDC operational procedures as soon as possible.

Based on the understanding of the A' La Carte Customers, the Implementation Planning Team believes the OB2 Move Project can best assist DIS' A' La Carte customers with their moves by:

- Arranging for and providing crate and freight services to physically relocate ALC equipment.
- Facilitate the coordination between the ALC customers' project manager and DIS.

[7] See Appendix for A' La Carte interview notes.

- Assist with coordinating the ALC customers' defined move schedule and those of others to avoid logistic conflicts.
- Provide Planning and Execution assistance.
- Communicate DIS schedule details and progress status to ALC customers.

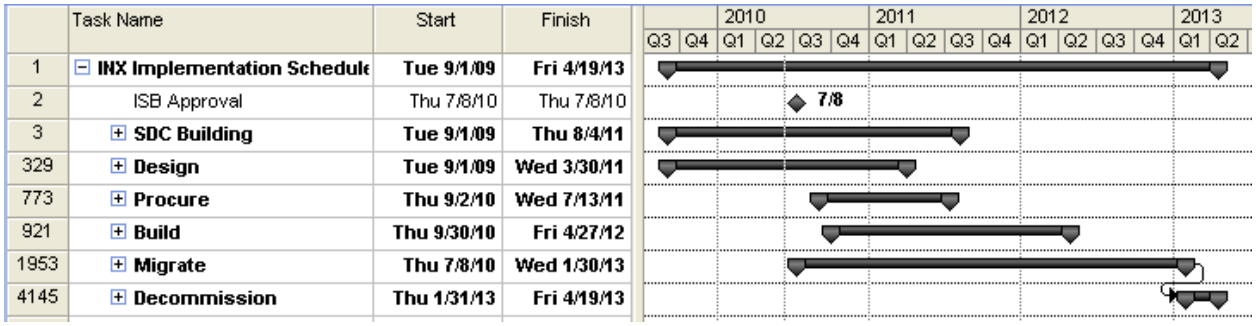
DSHS has already started their project planning for moving out of OB2. DSHS recently moved their data center into OB2 which took 12 months to plan and nine months to execute. This duration is the minimum they will require for their OB2 to SDC move.

DSHS has a unique issue to resolve with their OB2 space. Within the DSHS space resides the network switching (IDF) for their desktop LAN (local area network). In other words all the DSHS desktops residing in OB2 are wired into their OB2 IDF via structured CAT5 cabling. As part of the DSHS move, DSHS will need to determine how they will manage their desktop IDF in the future. They may choose to negotiate for space and maintain a small presence or choose to re-locate their IDF to an alternate location.

6. High-Level Approach

Schedule Structure

Based on the DIS planning level requirements, A' La Carte interviews and industry experience the Implementation Planning Team has created a schedule for the OB2 Move Project. The project is scheduled to complete April 2013.



The schedule was built based on the concept of "Rolling Wave Planning" which acknowledges the fact that a project can more clearly see what is in close proximity than the activities and tasks further ahead. In a rolling wave approach progressive elaboration is used to add iterations of detail over time.

The migration portion of the plan assumes DIS will follow the "Individualized System Move" approach, which is recommended in the Major Alternatives. The plan for moving from OB2 (Office Building 2 Data Center) into SDC (State Data Center) has been organized into six phases. The six phases are:

- Wheeler building phase.
- Design phase.
- Procurement phase.
- Build out phase.
- Migrate phase.
- Decommission phase.

Using these phases in the plan allows DIS to organize resources around logical activities required to complete the move independent of technology or department boundaries.

Wheeler SDC Building Phase

The Wheeler SDC Building phase accounts for activities that are scoped in the physical building but are tightly coupled to and are prerequisites of the move.

The major activities tracked under the Wheeler SDC Building phase are associated with:

- Cabinets.

- Overhead fiber and cable trays.
- Power circuits to the cabinets.
- Patch panels.
- Structured cable runs.
- External carrier connectivity.
- Metropolitan Optical Network (MON) connectivity.
- OB2 / SDC fiber connectivity.

Except for the external carrier connectivity and MON connectivity, designs for these items are a DIS deliverable to the building contractor to procure the items and build out SDC suites 1 and 2. These designs and their implementation are interrelated to the move plan and should not be separated. For example, cabinet count and placement is related to the procurement and design of the server technology. By maintaining them in the move plan, project management can ensure cross functional communication of DIS staff responsible for the work efforts.

For planning purposes, the occupancy date of the Wheeler SDC building is assumed to be July 1, 2011. The occupancy date indicates the date when DIS employees can maintain a full time operational presence in the SDC Building. Prior to the occupancy date, the following tasks should be completed within the SDC:

- Overhead trays installed for all rows in suite 1 and suite 2.
    - Suite 1 is where DIS will install its service platforms and suite 2 will be where the A' La Carte assets will reside.
- All structured cabling (fiber and copper) in place and tested for suite 1 and suite 2.
- All cabinets landed to the floor per design.
- Overhead power installed and tested in suite 1 and suite 2.
- Power from the overheads to the cabinets completed per design.

Prior to the occupancy date, the schedule assumes the ability to perform staging work within the SDC. Examples of staging work include:

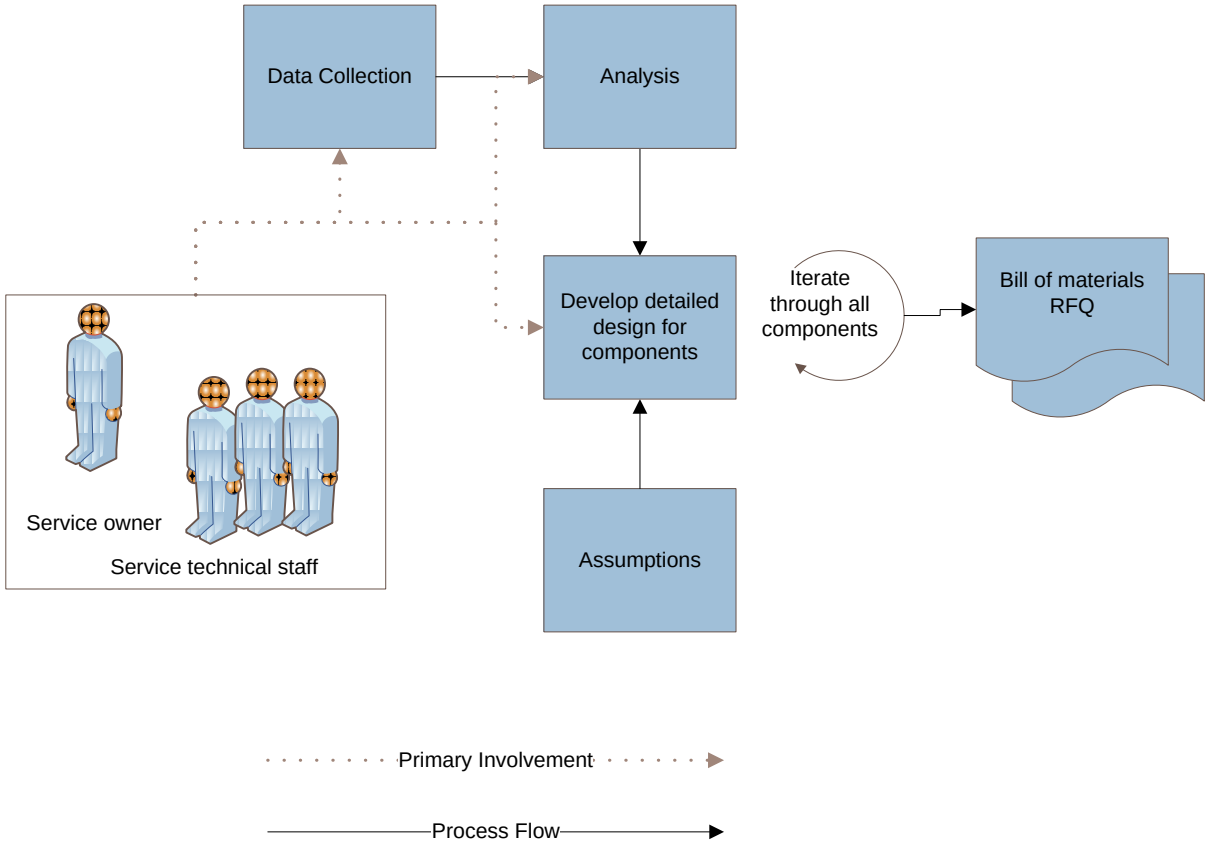
- Network carriers run their fiber and cable through conduit to the SDC.
- Vendor equipment set up in preparation for turning up external networks.
- Receipt and assembly of storage frames.
- Assembly and placement of networking equipment.
- Placement of new servers in racks.

During the staging process, the building contractor cannot ensure uninterrupted, conditioned power in the SDC. The project management team will need to work with the building contractor to negotiate access, security and acceptable liabilities for SDC equipment staged in the SDC prior to the occupancy date.

Design Phase

The design phase activities and tasks can occur in parallel with the Wheeler SDC building phase and are intended to deliver the low-level specifics of the infrastructure and technology required to support both

the move and on-going operational goals. The major output(s) of the design phase are bill of materials (BOMs) or request for quote (RFQs). The BOM/RFQ contains all the information required to purchase a complete set of components. The design phase of a data center move plan is one of the more difficult to complete and requires a significant amount of cross functional communication from the staff involved.



The design phase centers around network, storage, security, servers, print, mainframe and tape backup technologies. These technologies will be staged in the SDC and represent new equipment that will either augment the existing technologies and increase capacity or replace those in OB2.

A completely new core network infrastructure will be built out in SDC and designs must account for the new functionality represented in the network conceptual architecture[8]. A key component of the network design is the extension from OB2 to SDC; making both data centers appear as one to the systems running in the data centers.

For storage, additional capacity is required prior to the move to support existing services while other storage frames will replace existing OB2 storage. New storage frames that replace existing technology

[8] See High Level Architecture section of this document for more detail.

will need to support the functionality represented in the storage conceptual architecture. A key design consideration is the extension of the SAN (storage area network) allowing data to reside in either data center and be available to systems regardless of their location in OB2 or SDC.

Server designs are intended to support new equipment placed in SDC that will support the virtual services' conceptual architecture. Although these designs should be collaborated on by the shared services team, the scope of the OB2 Move Project is limited to the support of the virtual environments as they exist prior to the OB2 Move Project commencing. DIS is predicting they will virtualize 60% of their existing physical x86 servers over the next 12 months.

A pod concept[9] has been proposed for legacy servers as well as blade based virtual servers. The pod concept must still be validated in the design process.

A design for new high-speed printers is required to replace the current printers in OB2. The design should also include access to high-speed printers potentially located in Tumwater with the Department of Printing. The old printers will be decommissioned. The print design will encompass more than the printers themselves, it will include finishing equipment, environmentally controlled support space and secured warrant storage.

IBM mainframes represent a major computational capacity within OB2. There are three IBM mainframes: one z10 and two z9 IBM mainframes. The z9 mainframes are due for replacement. Rate setting is currently underway which is outside of the scope of the OB2 Move Project. The rate setting will determine if the two z9 IBM mainframes will be replaced one for one or consolidated onto a single larger mainframe capable of carrying the work load of both z9s. The rate setting process is also considering the additional consolidation of the z10 mainframe on to the new platform that would replace the z9 mainframes. This will have an effect on the move and must be vetted out in the detailed design of the new mainframe(s).

The mainframe design must take into account how the move will be structured based on the final disposition of the z9 mainframes. The resulting RFP/ RFQ should include any additional equipment, cables and software licenses required to move the mainframes. The RFP/ RFQ should allow the vendor to review the site drawing in order for them to understand physical delivery constraints for the SDC.

Tape backup designs are hinged on the Data De-Duplication project (#1121) and the Unisys Tape Virtualization project (#1426). Both projects are out of the OB2 Move Project's scope. These projects are designed to lower the volume of data backed up to tape.

Currently there are four silo tape backup systems in OB2 which are end of life/end of support January 1, 2011. The current SL8500 tape backup system and one additional SL8500 to be acquired are planned to replace the four silo backup systems. If either the data de-duplication or the Unisys tape virtualization project fails to reduce the amount of data to anticipated levels, a third SL8500 tape backup system will

[9] A pod is a modular design concept where a set of individual physical components make up a single logical unit, a pod. In this case the pod represents the racks, physical servers, cabling, network and storage connectivity required to create a computational module. When additional computational resource is required to support growth, a new pod is deployed rather than a single sever.

be required. The move should relocate the SL8500 tape backup systems and decommission the four silo tape backup systems.

If required, the designs for an additional tape backup system will need to account for unplanned floor space usage, power and network communications. The designs should mirror the other SL8500 tape backup systems. Additional design components to be addressed include aftermarket maintenance for the silo backup systems, physical relocation and tape rotation service for two sites.

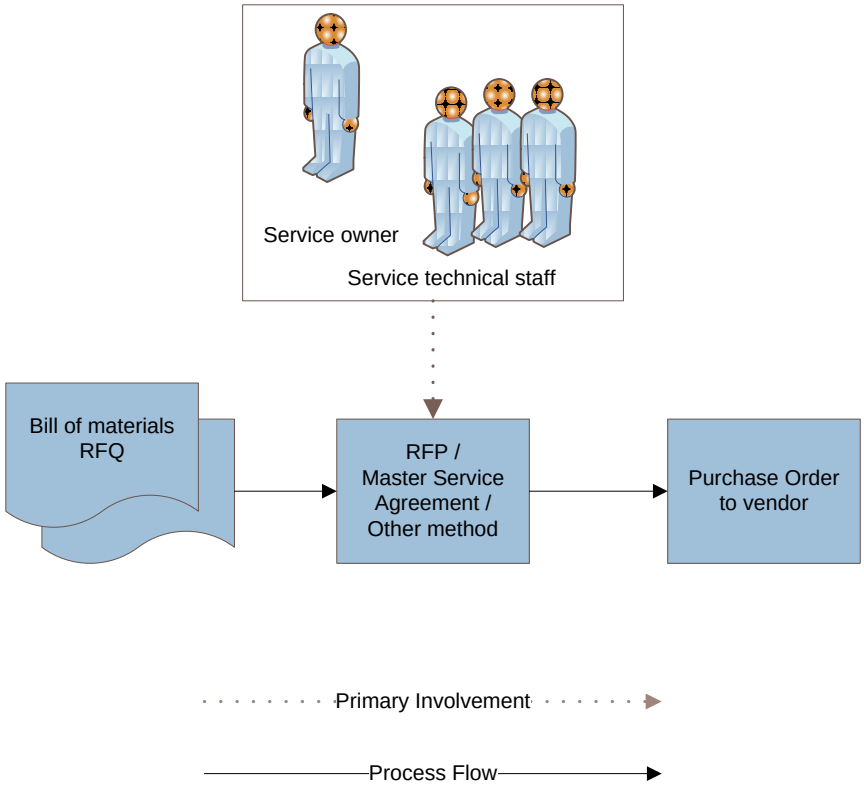
As noted earlier, the outputs from the design phase are the bill of materials (BOM) and the request for quotes (RFQ) to be procured. Supporting designs should include the configuration requirements, considerations necessary for the equipment operation in SDC, methodologies to support its functional goals and the purchased services required to move from OB2 in an effective manner.

The Implementation Planning Team developed a list of Planning Level Requirements [10]which should be a primary input into the design phase.

Procure Phase

The procure phase includes the tasks required to take the BOMs or RFQs developed from the detailed designs to a purchase order that is delivered to a vendor.

[10] See Planning Level Requirements section of this document for more detail.



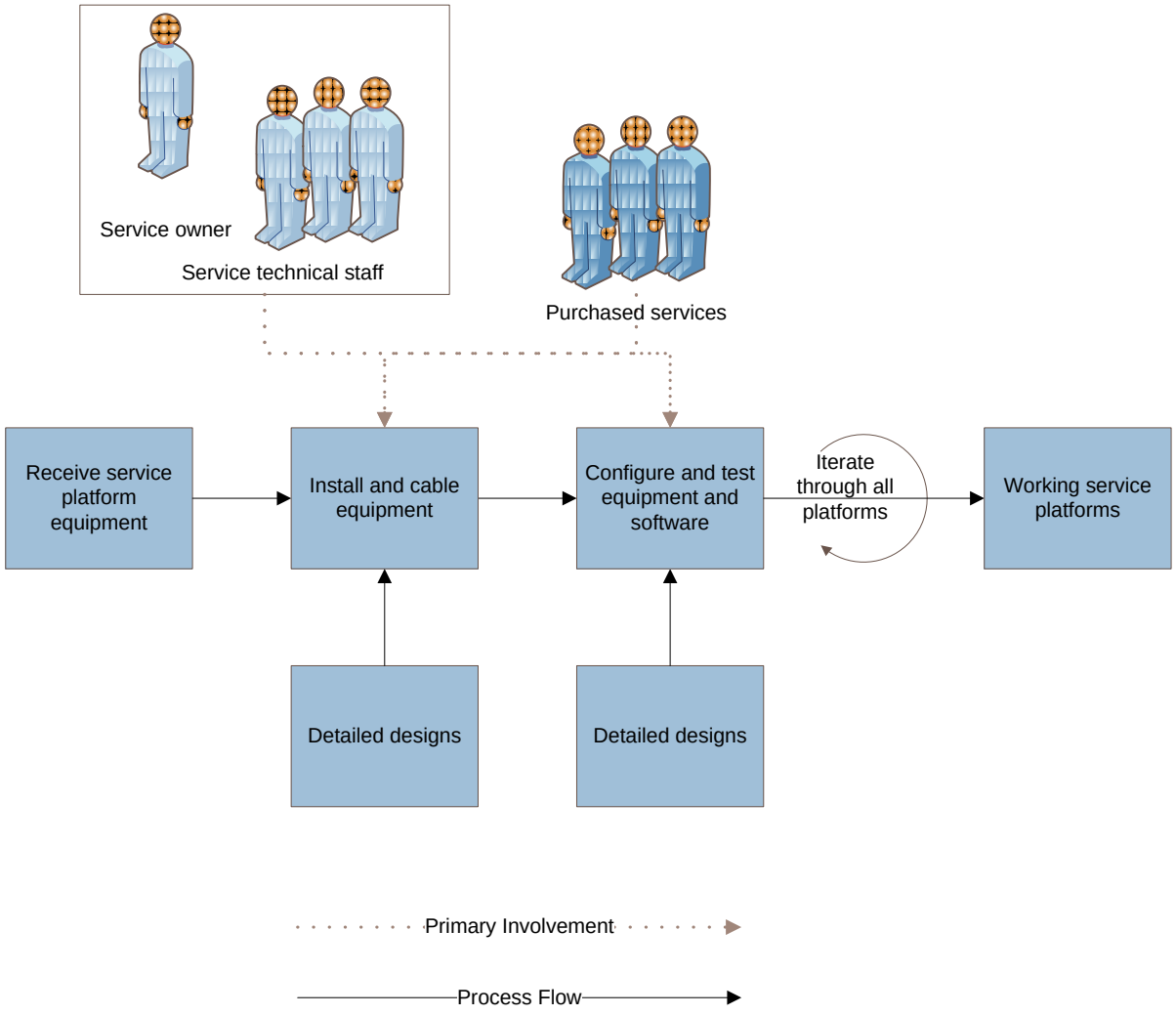
The tasks in the procure phase are well understood and defined within DIS. The primary assumption driving schedule duration is that procurement will require three months on average to complete for a given set of equipment and or services. This assumption is based on DIS staff experience and allowing for contingency to account for vendor protests.

Extensive delay in order fulfillment from the vendors presents a schedule risk. Over the last nine months, delivery times from technology vendors have extended to five months rather than previous industry standards of 30 or 60 days. Based on this trend, procurement requests should include requirements to the vendors for a delivery date based on the project schedule. This delivery date will allow vendors competing for the bid to pre-allocate manufacturing cycles or warehouse inventories in advance of receiving the purchase order and help ensure delivery within DIS' schedule. The project schedule allows for 120 days on average for equipment delivery after a signed purchase order has been delivered to the vendor.

At a minimum, DIS should request from the vendors fulfillment estimates for products being considered during the detailed designs. Those product fulfillment estimates should be reflected back into the schedule.

Build

The build phase is intended to establish the minimum base level of equipment for each service platform[11]. The base level equipment is considered the seed gear[12] which is required to be in place prior to service migration. The output of the build phase is a working data center, which is ready to receive the services from OB2.



[11] Service platforms include: networking, storage, compute, security, print and backup.
[12] Equipment which is used to receive services and data during a data center migration. Seed gear is used when the applications and data are migrated electronically over the network rather than physically moved from one location to another on the current equipment.

The build phase includes a working network connected to the Metropolitan Optical Network (MON), the Internet and OB2. The build phase activities should follow the network designs established in the design phase. It is assumed that a majority of the network build out will be performed via purchased services to install, configure and test the entire platform. DIS staff will oversee the network build activities and provide final acceptance.

Prior to allowing network traffic into SDC, security will need to implement their designs throughout the build phase. At a high-level, security in SDC is architected to protect against:

- Internet and external network attacks.
- Data center core network intrusion.
- Unprotected communication with data center services or computational equipment.

For the length of the migration period, security services will need to protect computer services running in OB2 and SDC from attack.

There are currently three classes of storage in OB2. Those classes are:

1. Mainframe storage supported by EMC's Symmetrix platform
2. Open system storage supported by EMC's CLARiiON platform
3. Content addressable storage (archive storage) supported by EMC's Centera platform.

Based on the Implementation Planning Team's understanding, the following is planned for the storage build:

- New EMC Symmetrix storage frames will be installed and configured in SDC.
- New open storage frames from an undetermined vendor will be installed and configured in SDC.
- New open storage frames from an undetermined vendor will be installed in OB2 prior to the move to support current disk space needs. The data on this storage frame(s) will need to be migrated and the frame(s) physically moved to SDC.
- New storage area network (SAN) equipment will need to be installed and configured in SDC.
- The SAN will need to be extended so that the SAN in OB2 and SDC appear as a single SAN allowing data access from any location.

The tape backup system build is dependent on the success of the de-duplication project and the Unisys tape virtualization project. Both projects are designed to reduce the amount of data backed up. If these two projects are successful the SL8500 systems will be moved and no build out of new equipment is required. If the two projects are not able to adequately reduce the number of tapes required to perform backups, a third SL8500 will be required. The build phase currently accounts for a third SL8500 to be installed and configured in SDC. There is a go/no go decision period from July 2010 to September 2010 in the design phase to determine the need for a third SL8500 backup system.

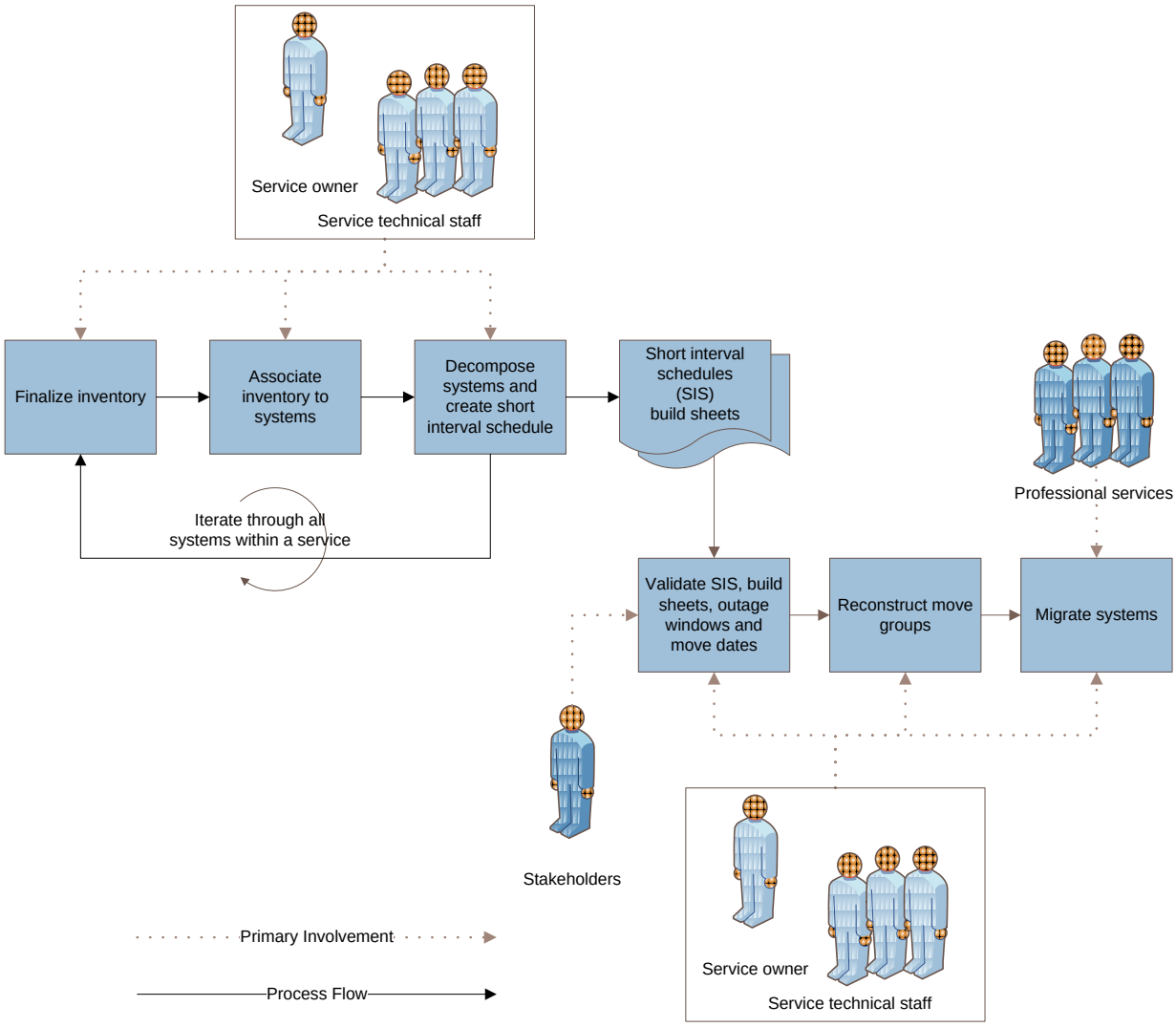
Four new high speed printers are planned to replace two DIS owned and two DSHS owned printers in OB2. Following the replacement, DIS will own all four printers. The build phase will need to install and configure the printers. The printers will reside in a space outside of the SDC. This space is currently planned to be co-located in Tumwater with the State Printers.

One of the high speed printer jobs is printing warrants. The forms for the warrants must be secured. The build phase accounts for installing a safe in the printer area of the future site to secure the forms.

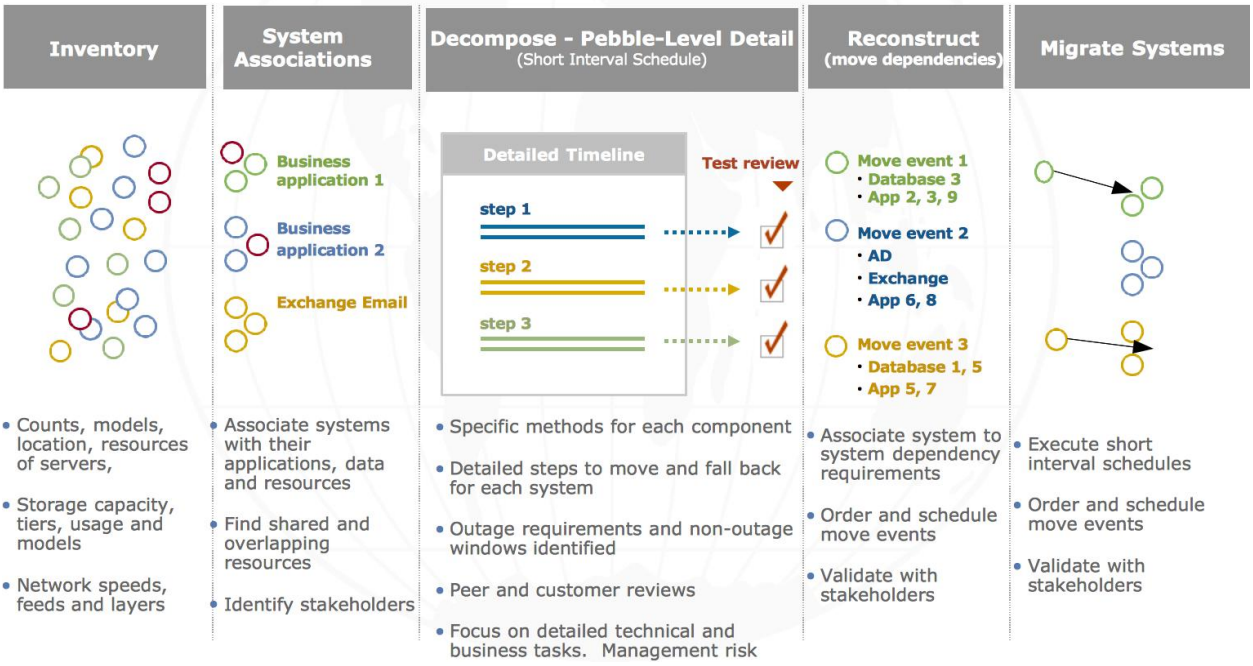
The plan assumes printing will occur in both OB2 and the future site for up to a month. In order to run both sites, extra temporary staff will be required. The build phase accounts for the on-boarding of State Printers' staff as well as training for the current staff on the new printers.

Migrate

The migration or move phase of the schedule is when the services are relocated from OB2 into SDC. The migration phase starts its planning during the design phase of the project with the actual moving occurring after the build phase is complete. Professional services can assist with removing equipment, crate and freight, installing equipment in racks and plugging in cables. The majority of the work in the migrate phase is in planning exactly how each system and its components will relocate from OB2 into SDC. The planning work is owned and performed by the service owners and their technical staff as they are the only ones who have the subject matter expertise to perform the work.



In order for the Implementation Planning Team to schedule the migrate phase, the team assumed the use of its migration process. Although the Systems Integrator who follows may have its own version of the migration process, the concepts and tasks should be equivalent.



The process used has two artifacts that are the cornerstone in migrating systems with minimal interuptions to the service. Those artifacts are:

- Short Interval schedules(SIS)[13]
- Build sheets.[14]

Most technical activities can be performed a number of different ways to ensure a successful outcome. Each path to success has steps that are common and well understood as well as a few that are unique to the individual activity being executed. Most technical complications are the result of engineers making assumptions about the common activities and not thoroughly investigating the unique steps to understand the full ramifications it may carry.

The short interval schedule (SIS) is designed to reduce costly mistakes, ensure tight outage windows are maintained and improve the success rate for non-routine activities that affect critical components in production. The SIS encourages engineers to identify and sequence all the steps they will follow to complete a high risk, complex technical activity typically associated with system moves.

Because the SIS is built prior to executing the move activity, peer and management review can vet any missed steps, maintain standards and ensure all interested stakeholders have buy off.

The engineer or SME who is responsible for the system builds the complete SIS. The engineer is expected to work with application developers, analysts, other engineers, service owners and customers

[13] See appendix for SIS example.
[14] See appendix for build sheet example.

to pull together all the information required to make any business or technical decisions. The steps to successfully develop a SIS:

Step	**Responsible Person**
Clearly identify scope of activity such as replace production firewall or migrate database to new cluster.	Service Engineer, Service Owner
Determine and document each and every step required to complete the scope of the activity. Notes should include completion criteria or return codes from scripts that ensure step success as well as identifying how control will be handed off if other individuals will execute the next step. Include pertinent pre-steps such as change control approval, VLAN assignments or server build where necessary. Include time check milestones, go/no go calls and roll back steps. Include pre-start and post completion notification, including Network Operations Center (NOC) or other monitoring group. The engineer should work with all groups who will perform tasks to ensure thorough documentation. For example: Network engineer removes server from the load balanced pool, Storage engineer reassigns Logical Unit Number (LUN).	Service Engineer
Determine order of steps, duration and who will perform the step. Since the activity the SIS is documenting will typically take only a short amount of time, steps may not require more than a few minutes to execute. These steps however, are critical to the success of the activity.	Service Engineer
Desk check the SIS with technical peers of all major groups such as systems, security, storage and networking. This should be a step by step review with all involved in order to uncover impacts or missed activities across groups. The project architect or technical lead should be included to ensure standards are met.	Service Engineer
Reviewers sign off on the SIS ensuring the technical thoroughness meets the risk associated with the activity. For example: performing a major upgrade to a business critical database in a short downtime window may require more details than moving virtual servers from one set of clustered servers to another set of clustered servers.	Service Engineer

Step	Responsible Person
Perform a walkthrough of the SIS with management and business owners. With everyone in a room have the individuals who are executing steps read out their step in turn. Be sure to identify step success criteria and hand off of control.	Service Engineers, All affected stake-holders.
At the time of move execution, ensure all parties are available and prepared prior to start. For highly critical activities, open a conference bridge and designate one person to direct each steps execution. Think NASA check list.	Service Engineers, project manager

In order to complete the SIS process, the service engineer will need to test the steps of the SIS. The tests should validate all steps including data copies and synchronizations, execution scripts, and manual activities. Timings should be validated as well as verifying the completion state of each step.

Technology systems by their very nature involve many complex parts including servers, their operating systems, storage, security and networking. When moving any part of a system without consideration for all parts, errors are often the result. The key to successfully moving a system is communication between technology service groups using their terms.

The build sheet is designed to increase communication among technology groups, reduce errors and minimize the negative impacts caused by changes to a system. Designed for engineers, the build sheet consolidates system information into one location and allows for complete communication across technology service groups.

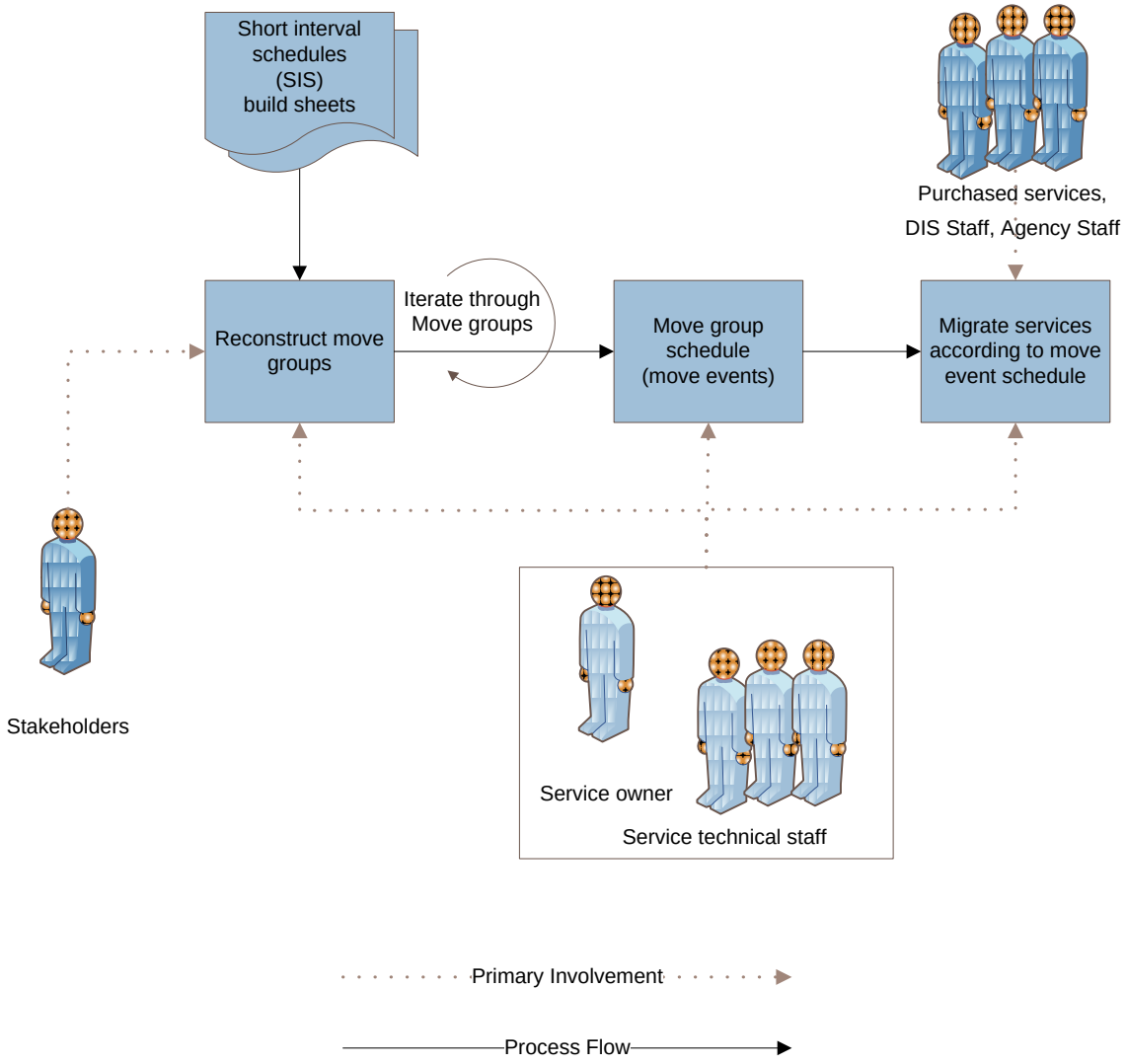
A byproduct of developing the build-sheets is improved system maintainability. By incorporating the build-sheet information into the operational runbook, long term system management costs can be reduced.

The build-sheet can be a simple Excel workbook with tabs for each major system component. Engineers complete the information requirements for the section they are responsible for such as SAN or networking. In order to complete a tab, engineers from various groups will be required to communicate with each other to ensure understanding and identify missing information.

The build sheet is owned by the same service engineer who owns the system's SIS.

Step	Responsible Person
Clearly identify the SIS associated with the build sheet.	Service Engineer
Establish the system information identifying which components will be built new and which will be moved.	Service Engineer
Complete the build information for the computational components. The information may need adjustment in the case of mainframes.	Service Engineer

Step	Responsible Person
The service engineer will need to copy and paste component information into the network tab rows in order for the network engineer to understand what components require information.	Service Engineer
The service engineer will need to copy and paste component information into the SAN tab rows in order for the storage engineer to understand what components require information.	Service Engineer
Draft the Network information for the system components. Initially not all information will be known. Completing the build sheet is iterative and establishes the gaps of information remaining to be completed before the move date. The service engineer should work with the network engineer and facility engineer to complete their portions of the build sheet.	Service Engineer
Draft the SAN information for the system components. Initially not all information will be known. Completing the build sheet is iterative and establishes the gaps of information remaining to be completed before the move date. The service engineer should work with the storage engineer to complete their portions of the build sheet.	Service Engineer
Draft the Test Plan for validating the system components. Initially not all information will be known. Completing the build sheet is iterative. Each iteration establishes the gaps of information remaining to be completed before the move date.	Service Engineer
Complete all tabs and verify against the SIS prior to the SIS peer review. The service engineer should work with the network, storage and facility engineers to finalize all build sheet information.	Service Engineer



Once the systems have been decomposed into SIS and build sheet packages, the service owner facilitates the activities to reconstruct the SIS and build sheet packages into move groups. Move groups identify order and set execution schedules. In most complex data center migration projects, several systems are required to move in concert because of their dependencies and relationships. The service owner, service engineers and stakeholders will establish move groups by consolidating multiple SIS/ build sheet packages into a group creating a move event. Creating move groups is a balance between the risk of completing the move event within the outage window against the available resources. Smaller move events are more easily executed but difficult to keep scheduled. The tendency is to create move groups which are too large and several passes may be required when creating move groups to strike the correct balance. The network and SAN will be extended across both data centers which will allow for system components moved into SDC to communicate with system components remaining in

OB2. This ability to communicate across data centers will facilitate multiple smaller move events over a single large event.

The move plan assumes the A' La Carte[15] customers will manage their own migrations from OB2 into SDC. This assumption is based on interviews with eight of the larger A' La Carte customers which were representative of the remaining A' La Carte customers. DIS will support the A' La Carte customers in moving their systems by providing:

- Project coordination between the A' La Carte customer's project manager and DIS.
- Crate and freight services for physically relocating equipment.

SDC's suite 2 is currently planned to receive A' La Carte customers. The operational processes under which DIS will manage suite 2 are anticipated to be similar to OB2. The specific operational processes governing day to day management practices as well as on-boarding remain to be finalized. The schedule calls out:

- Development of sub-committees.
- Gather requirements for each A' La Carte customer
- Negotiate facility and operational processes to meet customers' needs.

Decommission

The decommission phase represents the activities associated with decommissioning equipment in OB2. The final state of the space remains to be negotiated with the Office of General Administration. If space retrofit is required then it will be handled as a separate "Retrofit Phase".

DIS will maintain a DIS MON node in order to provide a CFN node and telephony PBX's will remain to support DSHS and other customers in OB2 and the Natural Resources Building. OB2 space will be returned to the Department of General Administration (GA) per the terms of the governing lease.

The DSHS corporate core network switching resides in the A' La Carte A' La Carte 2 suite on the OB2 service level, supporting all LAN connectivity through vertical CAT5 building cabling to upper floor IDFs. In other words all the DSHS desktops residing in OB2 are wired into their OB2 A' La Carte A' La Carte 2 suite via structured CAT5 cabling. As part of the DSHS move, DSHS will need to determine how they will manage their desktop IDF in the future. They may choose to negotiate with GA for space and maintain a small presence or choose to re-locate their IDF to an alternate location.

System Containers

REDACTED p.43-50

[15] See A` La Cart interview notes.

REDACTED p.43-50

REDACTED p.43-50

REDACTED p.43-50

REDACTED p.43-50

REDACTED p.43-50

REDACTED p.43-50

REDACTED p.43-50

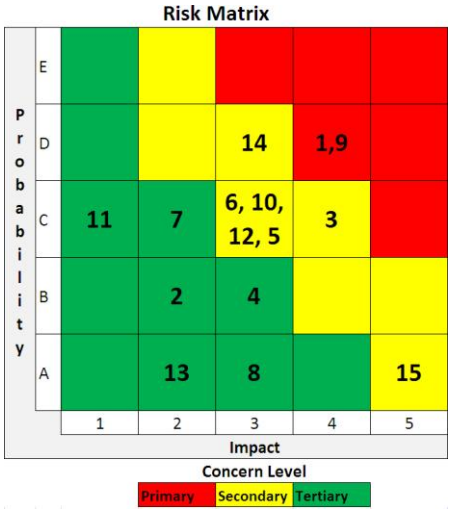
7. Risks

"Project risk is an uncertain event or condition that, if it occurs, has a positive or a negative effect on at least one project objective. A risk may have one or more causes and, if it occurs, one or more impacts."[16]

Risk management is the process of planning for, identifying, analyzing, responding to, and monitoring project risks within the context of cost, time, scope and quality. Project risk management is most effective when performed early in the life of the project and is continued throughout the project's life cycle.

A key success factor of risk management is that it:

- Supports the honest, realistic and open recognition of project risks even if they indicate problems with the project.
- Encourages talking about risks realistically with no penalty for people who do so openly within the risk management process.



In order to establish the initial risk assessment, the Implementation Planning Team interviewed OB2 Move Project staff, Facility staff, A' La Carte customers and other DIS staff to understand various perspectives of the project. Based on these discussions and the team's data center project experience, risks were identified and analyzed for impact and probably.

Risk = probability of event x impact of event

By evaluating the likelihood and impact of the risk, the team created a risk matrix to prioritize those risks which should be mitigated and those which should be monitored and accepted. Mitigation strategy recommendations were developed for risks with a primary or secondary concern level.

Probability or likelihood of risk event occurring	
E	Nearly certain, 90%
D	Highly certain, 70%

	Impact if risk is realized		
	Technical Performance	**Schedule**	**Cost**
5	Severe degradation in performance. Will jeopardize the programs quality.	Cannot meet major milestones.	Exceeds budget threshold, greater than 10% of budget.
4	Significant degradation in performance. May jeopardize the programs quality.	Critical path affected.	Cost increases less than 10% of budget.

[16] A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Third Edition, Chapter 11.

Probability or likelihood of risk event occurring	
C	Likely certain, 50%
B	Low likelihood, 30%
A	Not likely, 10%

	Impact if risk is realized		
	Technical Performance	**Schedule**	**Cost**
3	Moderate reduction in performance. May limit program objectives.	Minor schedule slip. Should still hit milestones with resource changes.	Cost increases less than 5% of budget.
2	Minor reduction in performance. Minimal impact to program objectives.	Able to meet key dates.	Cost increases less than 1% of budget.
1	Minimal or no impact to program performance.	Minor or no impact.	Minimal or no impact.

The following table lists the major risks identified by the Implementation Planning Team.

OB2 Move Project Risks	
ID	**Description**
1	DIS and service owner's staff involvement does not meet project need, impacts schedule and quality
2	Negotiated outage windows exceeded, impacts quality
3	Budget cuts to the project will occur, impacts schedule and quality
4	Operational processes are incomplete, impacts schedule and quality
5	Vendor manufacturing cycles push technology equipment delivery dates, impacts schedule
6	Incomplete system documentation and designs, impacts schedule and quality
7	Tape De-duplication is not adequate, impacting cost
8	MON and Dark Fiber projects between SDC and OB2 are not complete impacting schedule
9	External projects inject new requirements, impacting schedule and cost
10	Unplanned / uncontrolled changes over the next 24 months impact quality, schedule and cost
11	Egress / ingress to the SDC impacts schedule and cost
12	Anticipated Virtualization is not complete impacting schedule and cost
13	Equipment damaged during the move impacting quality, cost and schedule for replacement

OB2 Move Project Risks	
ID	**Description**
14	Systems fail when brought up in SDC impacting quality
15	Data loss / corruption occurs during the move impacting quality

A number of major risks were identified above for the OB2 Move Project. DIS is encouraged to continue to identify risks over the life of the project and determine their concern level. Mitigation should be considered for those risks which fall into the primary concern or secondary concern categories. Below is an explanation and mitigation strategy for those major risks identified above as primary or secondary concerns.

#1 - DIS and service owner's staff involvement does not meet project need, impacts schedule and quality.

Description

Data center moves by their very nature involve many complex parts including computers, their operating systems, storage, security and networking as well as applications and data. When moving any part of a system without consideration for all parts, errors are often the result.

While vendors can support the move; providing project management, crate and freight services and assisting with designs, the knowledge required to successfully move a system (or service) is contained within the individuals and teams responsible for the services on a daily basis. This system's engineer or SME will work collaboratively with the Project Manager assigned to service platforms to build short interval schedules (SIS)[17], identify move groups, establish fall back plans, identify move times and negotiate outage windows with customers.

A significant amount of time is required to:

- Create the SIS.
- Write scripts to execute the SIS.
- Negotiate outage windows for the move.
- Align multiple SIS to create move events.

The impact of not planning for and dedicating enough subject matter expert's time is:

- Moves fail or they exceed planned outages.
- Errors are introduced into the systems.

[17] See the migrate section of the schedule approach for a detailed description of the short interval schedule methodology

- Additional costs are required to uncover and document details known to subject matter experts.
- Additional costs for overtime work.
- Subject matter experts leave DIS.

Based on experience with other move projects as well as interactions with DIS and other agencies, the likelihood of this risk being realized is high. The likelihood is also based on the assessment that there appears to be a limited number of SMEs and they are already engaged in day to day actives as well as other projects.

Mitigation

Mitigation of this risk is difficult and costly. The Implementation Planning Team recommends the following mitigation steps be taken:

- Identify key technical SMEs for a system or service. Hire temporary staff to back fill the day to day work of SMEs. There is a knowledge transfer time requirement so the hiring step needs to include that time.
- Limit the number of systems a technical SME is assigned to build a SIS for. Based on experience, SMEs can work on two to three systems in parallel assuming the SME completely understands the service work flow and technology components. Creating a SIS, performing walkthroughs, testing it and gaining approvals can require up to 180 days depending on system's complexity and criticality.
- Minimize the time required to make service decisions by quickly escalating questions to final decision makers. Developing a detailed plan involves walking down a decision tree. Each decision choice will lead the SME to a number of other choices. Decisions requiring management or customer input often delay the process when decisions impact critical services or high dollar amounts. Service owners should plan on participating in the SIS development and review process.
- De-prioritize non-move work and assign it to staff not working on the OB2 Move Project.
- For each service plan for the following service team involvement:
    - Architect (70% involvement) – individual who understands the complete architecture of the service and its interfaces to other systems and services.
    - System engineer or SME (100% involvement) – one to two individuals who know the components of the system and its interactions. Typically they are responsible for the day to day administration and maintenance of the system or service.
    - Project manager (50% involvement) – An individual who can manage internal service resources, facilitate service customer discussions, negotiate outage windows and work with OB2 Move Project's project manger
    - Service owner (20% involvement) – provide timely decisions and reconcile service and customer conflicts with the move plan.
- Set aside a contingency amount equal to 20% of the service revenue or service cost (whichever is higher) over the 24 month planning and move effort. This contingency is for additional equipment and professional services to compensate for a lack of service staff involvement.

#2 - Negotiated outage windows exceeded, impacts quality

Description

The duration of time a system migration will require is negotiated between DIS, the service owner and the customers relying on the system. If the negotiated window is too short or the migration fails to execute within the committed time frame unplanned outage will occur. The short interval schedule process is designed to prevent unplanned outages.

Mitigation

Based on probability of occurrence and the impact to the project if the risk is realized, this risk should be accepted. The risk should be monitored and re-evaluated throughout the project.

#3 - Budget cuts to the project will occur, impacts schedule and quality

Description

This move plan, the schedule and the project estimate have all been developed together. The project estimate identified a number of items which are not specific to the move, such as the purchase of refresh storage or mainframe equipment to replace existing equipment which is at the end of its life cycle. Although not specific to the move, the move plan has incorporated the refresh equipment into the schedule as seed gear and developed tasks based on that equipment's availability.

If items identified in the estimate are removed due to budget cuts or changes, the project will need to re-evaluate the schedule and approach of all components previously dependent on those items. The cost of re-planning and rescheduling based on a budget change increases as the project progresses.

Mitigation

Any item cut from or changed in the estimate during the design phase should return a 20% premium to address its impacts. In other words if a $1,000,000 item is removed or changed, a contingency cost of $200,000 should be accepted for re-planning, rescheduling and reworking all the activities related to the removed or changed item.

Any item cut from or changed in the estimate after the design phase should return a 40% premium to address its impacts.

Any item cut from or changed in the estimate which has an established move event should return a 50% premium to address its impacts.

#4 - Operational processes are incomplete, impacts schedule and quality

Description

Operational processes dictate who, what and how various activities will occur within the physical data center. The operational procedures for moving out of OB2 and into SDC need to be finalized. DIS and A' La Carte customers require the operational processes to complete the planning their move. The first draft of these processes can be found in this document under Infrastructure Services.

Mitigation

Based on probability of occurrence and the impact to the project if the risk is realized, this risk should be accepted. The risk should be monitored and re-evaluated throughout the project.

#5 - Vendor manufacturing cycles push technology equipment delivery dates, impact schedule

Description

The length of order fulfillment from the vendors presents a schedule risk that is not accounted for in the procurement process. Over the last nine months, the Implementation Planning Team has seen delivery times from technology vendors extend five months rather than previous industry standards of 30 or 60 days.

Mitigation

Based on this trend, quote requests should include a requirement to the vendors for a delivery date based on the project schedule. This delivery date will allow vendors competing for the bid to tag manufacturing cycles or warehouse inventories in advance of receiving the purchase order and help ensure delivery within DIS' schedule. The project schedule allows for 120 days on average for equipment delivery after a signed purchase order has been delivered to the vendor.

At a minimum, during the detailed designs DIS should request from the vendors fulfillment estimates for products being considered. Those estimated product fulfillment estimates should be reflected back into the schedule.

#6 - Incomplete system documentation and designs, impacts schedule and quality

Description

The design phase tasks produce the design documents and a bill of materials for the system components installed in the build phase. These design documents dictate how the equipment will be configured to meet the requirements. If the designs are incomplete, additional work will be required in the build phase to redo the designs in order to build install and configure the components correctly.

Revising the design after the equipment is received will add duration to the schedule and may require additional expense for new or different components.

Mitigation

DIS should partner with vendors with technical expertise to develop complete design documents. DIS service resources should be assigned to the design tasks full time in order to maintain focus on achieving the level of detail required for complete design documents.

The OB2 Move Project should require the Systems Integrator to staff a senior architect who will oversee the technical aspects of the project. The senior architect should be skilled in designs for networks, storage, virtual environments, mainframes and data center infrastructure. The senior architect needs to

ensure all designs are developed correctly and to the right level of detail to support the build phase. They will also need to ensure the build phase tasks follow the designs.

DIS will need to ensure technical and business decisions are made in a timely manner to avoid the use of assumptions in the designs. Service owners should meet with the design teams twice a week to monitor progress, resolve issues and make required decisions for the team to produce their deliverables according to the schedule.

Five percent (5%) of each BOM should be set aside as a contingency for rework during the build phase. The contingency can be released after the build phase is complete.

#7 - Tape De-duplication is not adequate, impacting cost

Description

The De-duplication project is intended to reduce the amount of data backed up to tape. The schedule for moving the tape backup systems is based on the successful completion of the De-duplication project[18].

Mitigation

Based on probability of occurrence and the impact to the project if the risk is realized, this risk should be accepted. The risk should be monitored and re-evaluated throughout the project.

#8 - MON and Dark Fiber projects between SDC and OB2 are not complete, impacting schedule

Description

High capacity network connectivity is a primary requirement to support the OB2 Move Project (OB2M) and to support a fully functioning SDC. Two critical network projects identified in the schedule are:

"SDC-WAN OB2 Core Outside Plant" – provide optical connectivity between the SDC and OB2 by extending the currently OB2 core into the SDC, allowing the two data center to appear as a single network attached equipment and systems. The extention of the OB2 core network and SAN is a key requirement to support the OB2M Project execution and has a direct impact to the OB2M schedule.

"Metropolitan Optical Network(MON)" – the primary deliverable of the Campus Fiber Network Expansion Project (CFNXP). The design includes the SDC as a node on the MON to support Gigibit connectivity between Olympia, Tumwater and Lacey Agency locations and the SDC. This project has an impact on the SDC to reach fully functionaliy, but this project does not impact the OB2M project schedule in anyway.

[18] See High-Level Approach for an explanation of the Tape Backup System move.

Mitigation

Both projects should have weekly status updates to the OB2 Move Project's project manager and architect. Any deviations in schedule or designs on either project should be evaluated and tracked closely.

Both projects should be prioritized above the network team's telecommunication projects in the OB2 Move Project's schedule. The telecommunication projects are not critical predecessors of other OB2 Move Project activities.

It is assumed professional services will be employed to execute both of these projects. DIS should consider implementing schedule and quality incentives and penalties in the contract.

Depending on the reasons the projects are falling behind, changes to designs or equipment options may allow the project to return to schedule. A contingency of 20% of the two project's estimated cost should be set aside to resolve scheduling issues. The contingency would need to cover service changes or additions, expedites to account for design rework as well as equipment and professional services changes or upgrades.

#9 - External projects inject new requirements impacting schedule and cost

Description

The OB2 Move Project is dependent on a number of other projects outside of its control. Some of these projects include: the Wheeler SDC Building, Data De-duplication, Mainframe Service Rating and Shared Services. All of these projects have influence over what, how and when systems and equipment are planned to relocate from OB2 into SDC. The schedule and cost impact of new requirements varies widely depending on the change and the source of the change. However with the number of outside projects and the duration of the OB2 Move Project, it is certain changes will occur.

Mitigation

Re-use existing Change Control Board and PMO PCR processes or implement a formal Project Change Control Board (PCCB)[19] to govern both internal and external changes affecting baselined project artifacts. The PCCB provides a quality gate that ensures the effects of a change on requirements, schedule or budget item are understood and agreed to before they are accepted by the project.

In order for the PCCB to understand the effects of a change, the following list provides a checklist for evaluating a change.

- Impacted Stakeholders
  - Have the impacted stakeholders been identified?
  - Have the impacted stakeholders provided input to the impact analysis?
  - Have the impacted stakeholders signed off on the final impact analysis?
- Impacted Work Products

[19] See appendix for Project Change Control Management Example Plan

    - Have the work products impacted by the change request been updated? (Impacted work products may include, but are not limited to, Architectural Design, System Design Document, Requirements Document)
- Analyze Risks
    - Have the risks for the proposed change been analyzed?
    - Have the existing requirements in baseline been reviewed to determine if any are in conflict with the proposed change?
    - Has the consequence of not implementing change been analyzed?
    - Have the possible adverse effects or other risks of making the change been identified and analyzed?
    - Does the proposed change adversely affect outage window requirements or other quality attributes?
    - Has it been verified that the proposed change is feasible within known technical constraints and current staff skills?
- Impact on Resources
    - Have the needed resources required to implement change been identified and secured?
    - Have the environment needs been verified and confirmed for availability?
    - Are additional tools needed to implement and test the change identified and secured?
- Impact on Schedule
    - Have the cost and schedule impact for requested change been prepared, reviewed and approved?
    - Has the impact of proposed changes effect on the sequence, dependencies, effort and/or scheduled duration of tasks currently in project plan been investigated?
    - Is prototyping or other user input required to verify the proposed change?
- Impact on Cost
    - Has an estimate of effort been reviewed for what has already been invested in the project and will be lost if the proposed change is accepted?
    - Has an estimate of increase in product unit cost (for example, increasing third party product licensing fees) been investigated?
    - Has it been verified whether the change will affect marketing, sales, training, support plans or other groups?

It is assumed change requests presented to the PCCB will include the cost estimate of the change along with budget to support the change. However, as a contingency, the Implementation Planning Team recommends that an additional five percent (5%) of the project budget be set aside to cover project changes which are unfunded or inaccurately estimated and accepted. Five percent is based on industry practice, the complexity of the OB2 Move Project and the number of projects which have significant influence over the outcome of the OB2 Move project.

#10 – Unplanned / uncontrolled changes over the next 24 months impact quality, schedule and cost

Description

This risk is the internal version of risk "#9 - External projects inject new requirements impacting schedule and cost". The OB2 Move Project will require approximately three years to complete. Over that time a number of changes can be expected including technology releases, staffing, budget cycles and requirement alterations. The project will be expected to adapt and make adjustments. Depending on the timing of the change, the effects will vary. Changes which occur during the design phase will have less impact than those which occur during the build phase of the project.

The risk lies in the lack of control and formal acceptance of the change, its impacts and associated risks.

Mitigation

This mitigation of this risk is the same as the mitigation for risk "#9 - External projects inject new requirements impacting schedule and cost".

#11 - Egress / ingress to the SDC impacts schedule and cost

Description

Physical access to SDC is limited. There is a single elevator and a single door way. The loading dock has limited space. If too many activities requiring physical access are planned at the same time, congestion will slow down their progress. Some equipment may need to be disassembled to fit into the elevator or through the door way. The schedule calls out vendor walkthroughs of the SDC facilities in order for them to verify access prior to building out or moving their equipment.

Mitigation

Based on probability of occurrence and the impact to the project if the risk is realized, this risk should be accepted. The risk should be monitored and re-evaluated throughout the project.

#12 - Anticipated Virtualization is not complete, impacting schedule and cost

Description

DIS currently runs services on physical and virtual servers. Approximately 20% of their x86 class servers are virtual. The plan is for 60% of their servers to be virtualized by the time the migration phase begins. This virtualization estimate is aimed at reducing the number of physical servers rather than increasing the total count of servers. Migrating servers using a V2V[20] method is similar and requires less resources than physically or logically relocating physical servers. If the anticipated virtualization does not occur,

[20] V2V is a "Virtual to Virtual" migration performed using tools and methods included with the virtualization technology platform. These methods are typically well tested and have robust features simplifying the migration process.

additional time and resources will need to be added to the project to develop new short interval schedules and build sheets as well as crate and freight services and possible seed gear.

Mitigation

In order to mitigate the risk of not achieving the anticipated 60% virtualization, DIS should add the resources necessary to ensure the physical to virtual server conversion (P2V) occurs on time prior to the migrate phase.

These resources should have expertise in the virtual environment software which is assumed to be VMware. While DIS may consider employing P2V tools such as Platespin, they should not rely on them to mitigate this risk since tools new to an environment bring their own set of risks.

As a contingency, DIS should set aside $120,000 for this risk. The $120,000 contingency fund calculated as follows:

400 total physical servers

400 x 60% = 240 (virtual server goal)

240 x 50% = 120 (only half the number of servers are virtualized on time)

120 x $10,000 = $1,200,000 (for resources to build new SIS/ build sheets, crate and freight, additional cables, power, cooling, network services, storage services, project rework)

#13 - Equipment damaged during the move impacting quality, cost and schedule for replacement

Description

Physical damage to the equipment may occur during the move causing the equipment to fail. It is assumed:

- The crate and freight company who physically relocates equipment will wrap equipment in static free bubble wrap. Clean pads will be used to protect equipment. Air ride trucks will be used to transport equipment and the equipment will be tied down securely.
- Equipment manufacturers will be utilized to move large, expensive components such as storage frames, high-speed printers or mainframe computers.

Mitigation

Based on probability of occurrence and the impact to the project if the risk is realized, this risk should be accepted. The risk should be monitored and re-evaluated throughout the project.

#14 - Systems fail when brought up in SDC, impacting quality

Description

If a system fails to operate as it did previously in OB2 following its move, the relocation of that system is considered in error. Because of the amount of change that occurs with a system move, analysis and

resolution can become a large effort and require a significant amount of time. The impact of a system which fails to come up correctly is usually not isolated to that system. Many of the DIS systems are interdependent, meaning an error may be realized in a system which did not move, impacting customers in unanticipated ways.

Mitigation

Mitigation of this risk occurs in the analysis and planning for the system being moved. In order to mitigate the risk of systems failing to come up correctly the Implementation Planning Team recommends:

- Create SIS and build sheets for all systems. All SIS and build sheets should have a peer and customer review.
- Test the SIS prior to executing the move. Testing may involve using development systems and/or staged equipment. Verify results, timing, and workflow to ensure no steps have been omitted from the SIS and all identified information in the build sheet is correct. Identify the individual who can sign off on the baseline results as well as the testing after the move.
- Create a freeze period for the system being moved. The freeze should be a short period prior to the move which allows:
    - All final updates to be incorporated into the SIS and build sheets.
    - System stabilization prior to the move.
    - Documentation of base line test results.

  The freeze period is intended to prevent changes from occurring right up to the move. Changes should not occur during the move.

- Create a set of test cases to validate the system functionality in OB2 creating a results baseline. The base line test should be run prior to the move and after the freeze period has started. Execute the test cases and document the results before the move. Following the move, execute the same test case and compare results. This will streamline the testing and prevent current system behavior from being interpreted as an error following the move. For example: baseline test case X shows the system displays an error message anytime button A is pushed on the website homepage.
- Utilize current production change control process and Change Advisory Board (CAB) for moves in or out of either data center.
- Create a resource contact list for all system move events. These resources should be notified in advance that they are required for the move event. Some resources may be on call. Other resources should be on-site. The resource list should include:
    - System Architect for the service
    - System Engineer or SME involved in the move
    - Network service engineer
    - Storage service engineer
    - Customer representative
    - Testers
    - Vendors for equipment or software that is involved

    - Project manager responsible for the system move
- During the move, treat the SIS as a check list and record the execution of each step in the SIS during the move. Recording should be done by someone who is not involved in executing the SIS or any of its steps. Note any timing differences and validate go/no go and rollback decision points.

#15 - Data loss / corruption occurs during the move, impacting quality

Description

Whenever equipment is moved there is a risk of damage. During the build and migrate phase a significant amount of equipment will be brought in new or moved from OB2 to SDC.

Data loss or corruption can occur at any time but is especially vulnerable when the equipment it is housed on is moved or it is transferred electronically from one component to another. Data loss or corruption can be difficult to immediately identify or diagnose and incorrect business data can cause significant customer and legal issues.

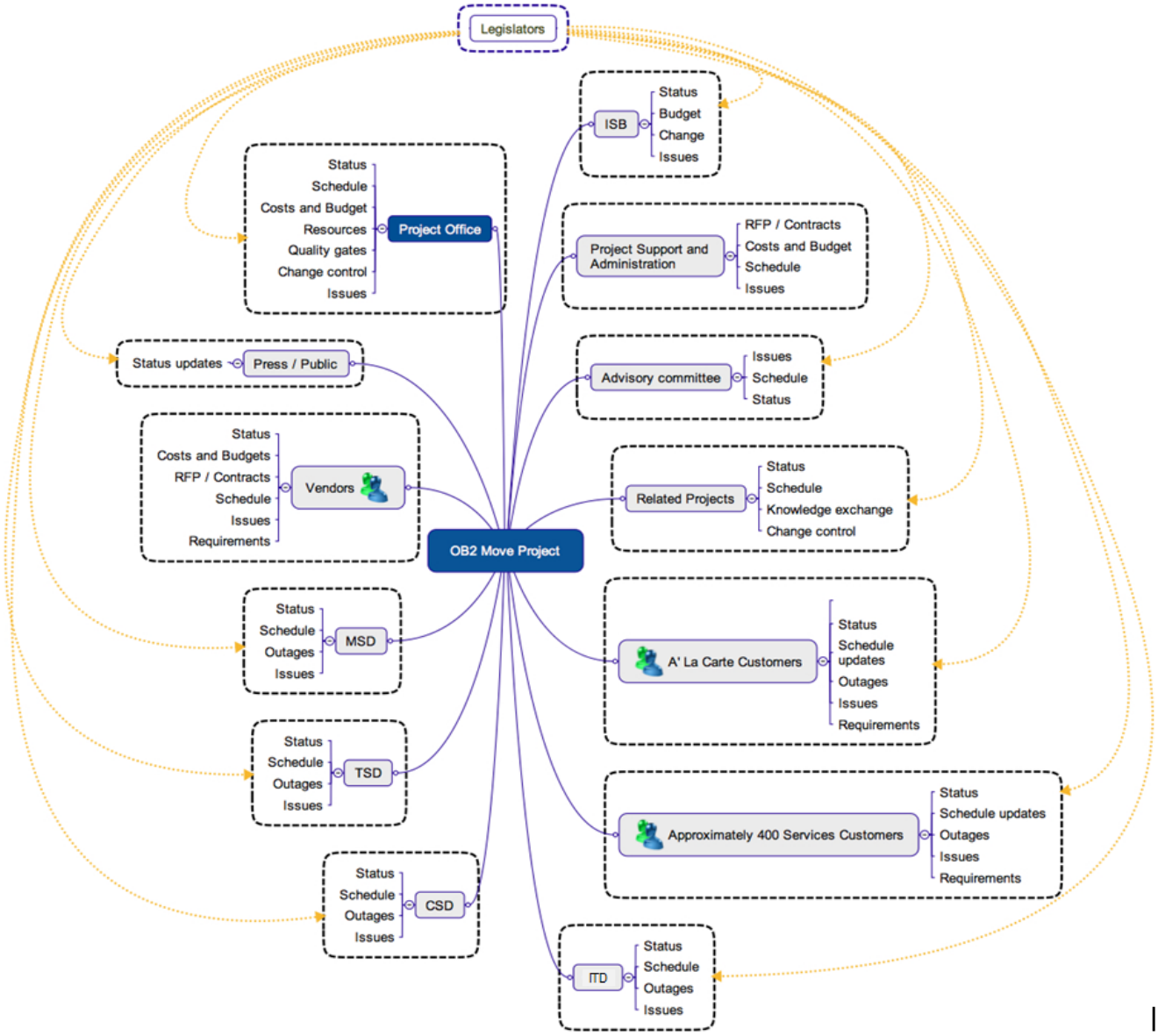
Mitigation

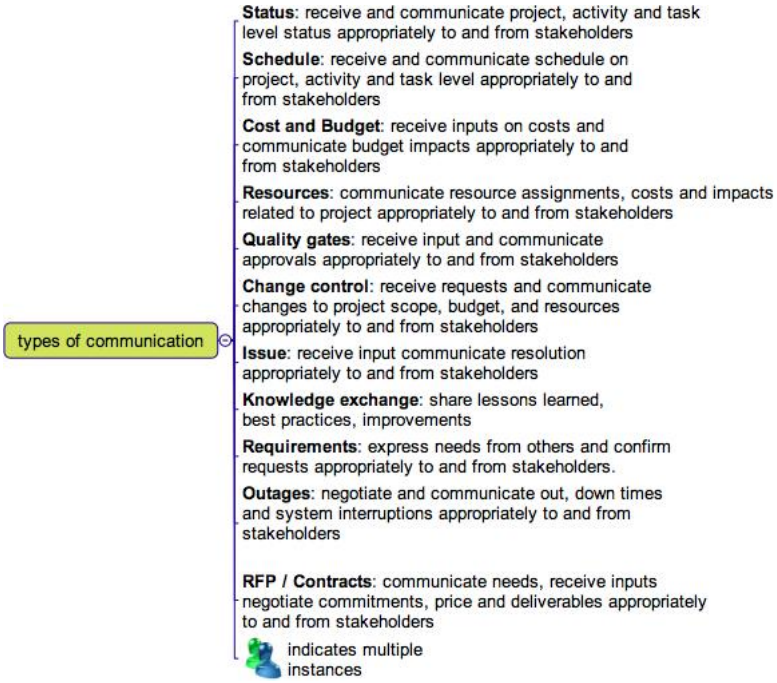
The following steps should be taken to minimize the possibility of lost or corrupted data and mitigate the resulting issues.

- Prior to moving equipment which houses business or configuration data, a verified backup should be taken. Depending on the data and its criticality, the backup can be a simple copy to another location on different equipment or a fully restorable tape backup.
- Electronic data transfers from one location to another should include at a minimum a cyclic redundancy check (CRC)[21].
- A MD5 (Message-Digest algorithm 5)[22] check should be included in the electronic data transfer process depending on data criticality. Due to security vulnerabilities found in MD5, it should be employed as a file integrity check and not a security measure.
- All SIS should call out backups and how data verification is performed.

[21] See definitions in the appendix for an explanation of cyclic redundancy check
[22] See definitions in the appendix for an explanation of Message-Digest algorithm 5

8. Project Communication





The communication map above visually depicts the complexity involved in the OB2 Move Project. 400 customers, 23 A' La Carte, multiple vendors, the press, various DIS groups, supporting agencies and the Legislators all have a stake in the success of the OB2 Move Project. These stakeholders also have to communicate information into the project as well as receive information from the project. In order to maintain the appropriate levels of communication with all stakeholders the following is recommended:

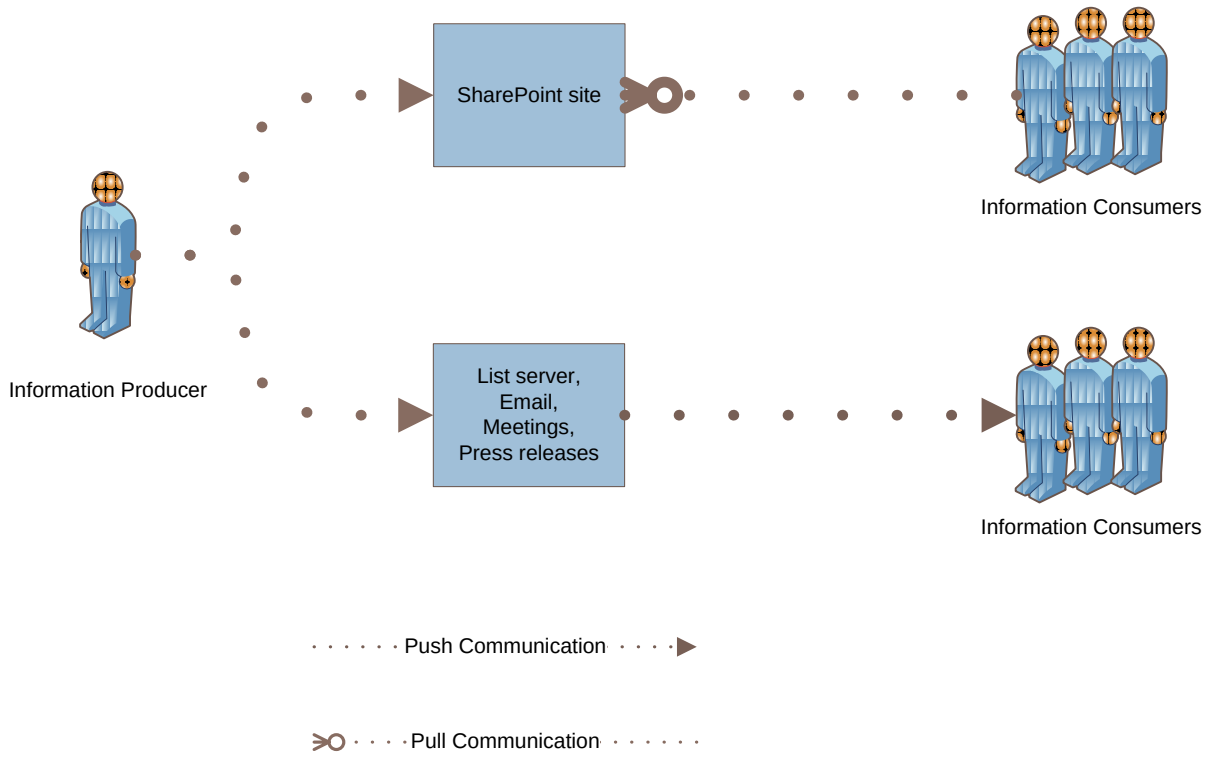
- The project should maintain a dedicated Project Communication Coordinator.
- Establish an email list server and continue the project SharePoint site.
- Establish a communication plan and standardize the process of communication.

The project should maintain a dedicated Project Communication Coordinator. This role focuses on ensuring communication to and from stakeholders meets the project's needs. Achieving appropriate project communication is accomplished through:

- Producing and distributing
  - Meeting minutes
  - Project status reports
  - Project updates and press releases
  - Informational articles
- Maintaining and administering the project SharePoint site.
- Collecting and publishing technical designs and plans.
- Coordinating schedules and meetings across the project and various stakeholders.
- Coordinating and facilitating "Lunch and Learn" sessions.
- Editing and proofing all project communications and documentation.

The Project Communication Coordinator should work with project management and subject matter experts to develop the content in order to produce communications which deliver the appropriate information to the correct audience.

Communication of project information should be provided in two methods known as information push and information pull. Information pull is where a project stakeholder takes (or is given) the initiative to consume the information they want. Information push is where a project takes (or is given) the initiative to deliver the information to the consumers.



Both the project and the stakeholders will be information producers and consumers at various times. In order to communicate effectively to all stakeholders, the OB2 Move Project should employ both methods of communication. All published documents and communications should be placed on the SharePoint site making information available for consumers to pull from. The Project Communication Coordinator should continually work to train consumers how and where to pull information in order to empower them to fulfill their information needs.

Information which has immediacy should be deployed to its consumers via one or more of the push methods. The Implementation Planning Team recommends using a list server to push information. A list server allows consumers to subscribe to information topics such as network design or project architects. Individuals can then email a topic and reach everyone who is involved with a topic. A list server is preferred over Exchange groups since a list server overcomes the issue of having stakeholders on different email systems. The Project Communication Coordinator should administer and maintain the list server.

The OB2 Move Project should establish a communication plan and standardize the process of communication. The table below sets the recommended minimum project communications required.

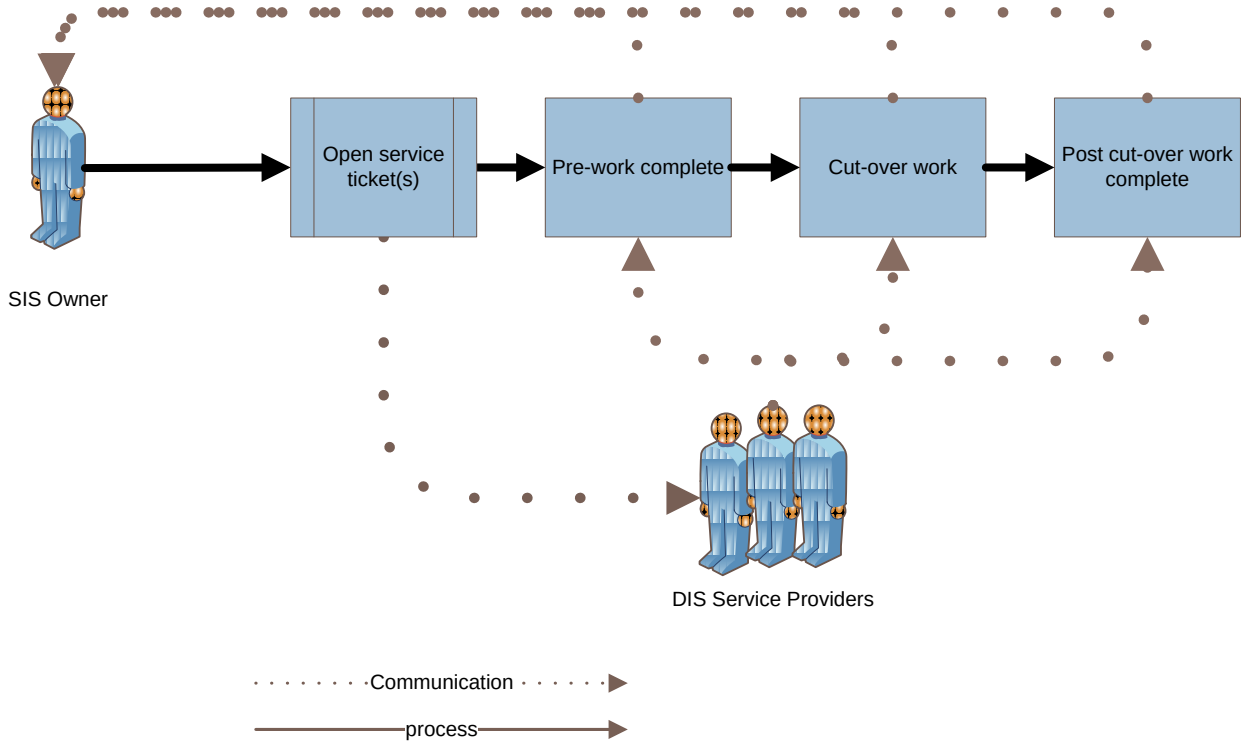
What	Who/Target	Purpose	When/Frequency	Type/Method(s)
Distribute Project Plan	All stakeholders.	Distribute Plan to alert stakeholders of project scope and to gain buy in.	Following ISB approval.	Document distributed via hardcopy or electronically. May be posted on project SharePoint.
Status Reports	All stakeholders and Project Office.	Update stakeholders on progress of the project.	Regularly Scheduled. Monthly is recommended.	Distribute electronically and post via project SharePoint.
Team Meetings	Entire Project Team. Individual meetings for sub-teams, technical team, and functional teams as appropriate.	To review detailed plans (tasks, assignments, and action items).	Regularly Scheduled. Weekly is recommended for entire team. Weekly or bi-weekly for sub-teams as appropriate.	Meeting.
Project Advisory Committee Meetings	Project Advisory Committee and Project Manager.	Update Project Advisory Committee on status and discuss critical issues. Work through issues and change requests here before escalating to the Sponsor(s).	Regularly Scheduled. Monthly is recommended.	Meeting.
Project Change Control Meeting[23]	Project Change Control Board.	Evaluate proposed project changes to baseline artifacts.	Monthly or as needed.	Meeting.

[23] See appendix for project change control process

What	Who/Target	Purpose	When/Frequency	Type/Method(s)
Sponsor Meetings	Sponsor(s) and Project Manager.	Update Sponsor(s) on status and discuss critical issues. Seek approval for changes to Project Plan.	Regularly scheduled Recommended biweekly or monthly and also as needed when issues cannot be resolved or changes need to be made to Project Plan.	Meeting.
Executive Sponsor Meetings	Executive Sponsor(s) and Project Manager.	Update Sponsor(s) on status and discuss critical issues. Seek approval for changes to Project Plan.	Regularly scheduled. As needed when issues cannot be resolved or changes need to be made to Project Plan.	Meeting.
Audit/Review	Project Office, Project Manager, select stakeholders, and possibly Sponsor(s) if necessary.	Review status reports, issues, and risks. To identify and communicate potential risks and issues that may affect the schedule, budget, or deliverables.	Monthly. Scheduled by the Project Office.	Meeting/Report. Project Office will produce report using their template.
Post Project Review	Project Office, Project Manager, key stakeholders, and sponsor(s).	Identify improvement plans, lessons learned, what worked and what could have gone better. Review accomplishments.	End of Project or end of major phase.	Meeting/Report. Project Office will produce report.
Quarterly Project Review	Project Office, Project Manager, and key stakeholders.	Review overall health of the project and highlight areas that need action.	Quarterly. Scheduled by the Project Office.	Meeting/Report. Project Office will produce report using their template.

What	Who/Target	Purpose	When/Frequency	Type/Method(s)
Presentations to Special Interest Groups	Examples: A' La Carte customers, Service owners, Service customers.	To update external groups to promote communication, create awareness of project interdependencies.	At project milestones so as to communicate with other interested parties of changes that will be introduced outside of the Project Team.	Presentation.
Quarterly news letter	State of Washington staff.	Publish progress and generate excitement around the project.	Quarterly.	Incorporate short article into existing staff publication.
Other…	To be determined by the Project Team.	General communications.	As needed.	Lunch n Learns, email lists, SharePoint site, announcements, etc.

In addition to the project communication above, the OB2 Move Project will need to standardize a technical communications process. For example moving SAP will involve assigning rack space, network changes and storage changes which need to be communicated to/from the facility, network and storage teams.



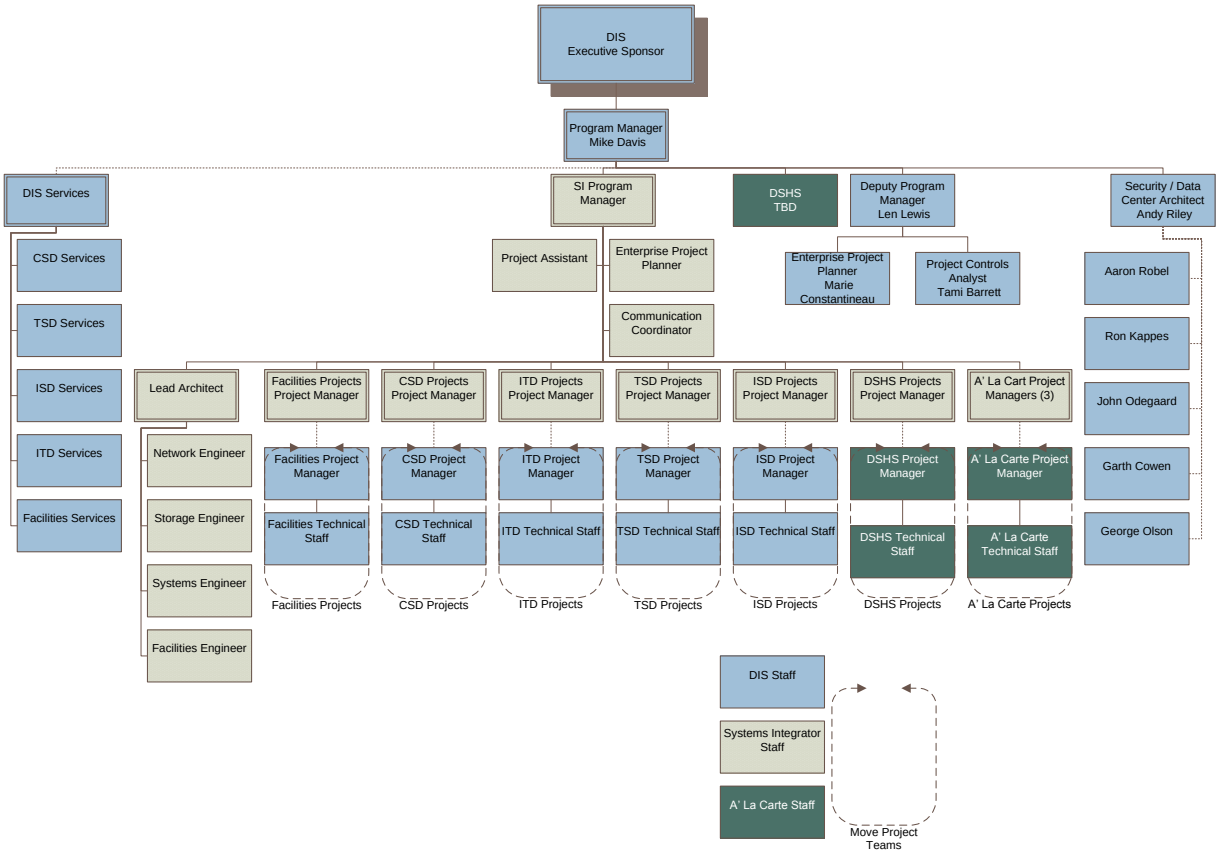
The recommended approach is to utilize the current service ticketing system which has an understood workflow. However, changes will need to be incorporated to align the supporting workflow with the move project. This alignment effort will need to be documented and published to all technical stakeholders[24]. The process will need to take into account tying together the different ticketing systems currently used by various service organizations.

The intent of project communication for the OB2 Move Project is not to prevent direct communication between subject matter experts, but rather to facilitate, track and maintain visibility of the communication. The goal is to prevent the same conversation from occurring multiple times and ensuring everyone operates from the same set of information in order to significantly improve the project work flow.

[24] Technical stakeholders includes: SIS owners who call out service changes in their SIS and service technicians who execute on service tickets.

9. Project Governance

In order for the OB2 Move Project to manage the activities and the resources associated with project tasks the Implementation Planning Team recommends the following program governance structure.



The move from OB2 into SDC will involve a number of resources from various groups including:

- OB2 Move Project Team
- Systems Integrator
- DIS Services
- A' La Carte Customers
- DIS Facilities

The DIS Program Manager is ultimately responsible for the OB2 Move Project. To manage and complete the project on time, within budget and meet the requirements, the DIS Program Manager will require project management and technical support from a Systems Integrator (SI).

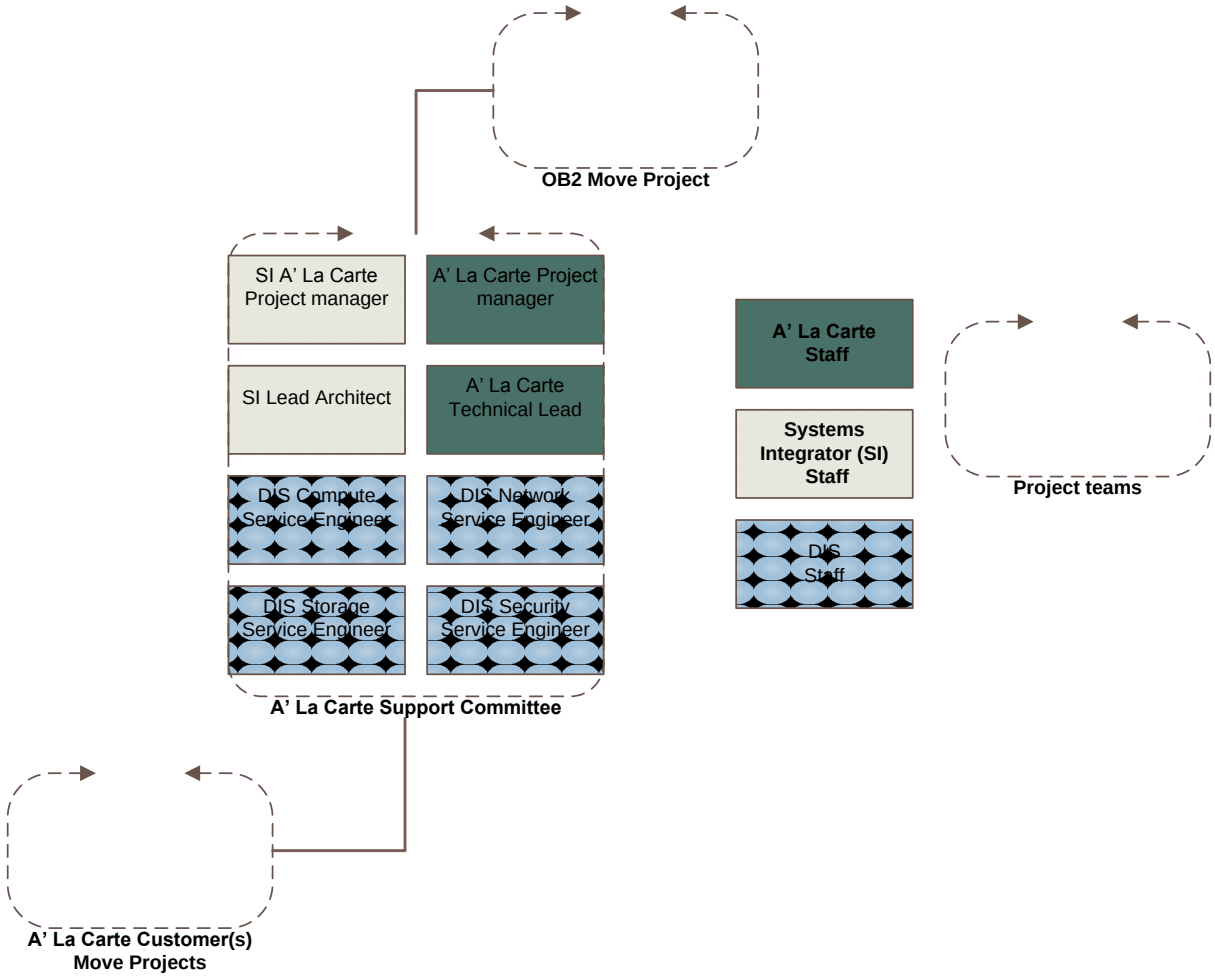
The SI resources include:

- Program Manager to control and oversee all SI staff, move and sub-projects.

- Enterprise project planner to maintain the SI's project schedule, work with DIS enterprise project planner and report on schedule progress, delays or over runs.
- Project Communication Coordinator to facilitate all project communications within the project and externally to stakeholders.
- Project Administrator supports all the projects administration needs.
- Lead Architect to maintain technical consistency across the program and provide quality gates across all sub-projects.
- Network Engineer to provide sub-projects with network support.
- Storage Engineer to provide sub-projects with storage support.
- Systems Engineer to provide sub-projects with systems support.
- Facilities Engineer to provide sub-projects with facilities support.
- Facility Project Manager to manage facility sub-projects and maintain continuity with the program.
- TSD Project Manager to manage TSD sub-projects and maintain continuity with the program.
- CSD Project Manager to manage CSD sub-projects and maintain continuity with the program.
- ITD Project Manager to manage ITD sub-projects and maintain continuity with the program.
- DSHS Project Manager to manage DSHS sub-projects and maintain continuity with the program.
- A' La Carte Project Manager to manage A' La Carte sub-projects and maintain continuity with the program office. One SI project manager should be able to manage six A' La Carte customer's sub-projects at one time. Since the size and complexity of the A' La Carte customers varies, the work load should be balanced across the SI project managers.

Service Owners, project managers and technical staff from CSD, TSD, ITD, and ISD are integral to the planning and execution of the OB2 Move. The Services' technical staff may be augmented by contractors or other professional services to assist with the work load, the Services' technical staff will still be accountable to:

- Develop designs.
- Select products and vendors.
- Procure hardware and software.
- Deploy equipment in SDC.
- Migrate systems.
- Provide the services necessary for the customer and A' La Carte on-boarding process.



A' La Carte customers will manage their own move from OB2 to SDC suite 2. They will plan and execute their relocation, maintaining control over how and when they execute within the project schedule's move windows. Each A' La Carte customer will utilize their staff for technical activities as well as internal management of those tasks. The OB2 Move project should provide support which will be implemented through the A' La Carte Support Team.

The A' La Carte Support Team is intended to ensure the OB2 Move Project is providing support to the A' La Carte customer, maintaining the flow of communication, coordinating DIS services with the A' La Carte customer, removing road blocks, working through the logistics of the move and staying on schedule.

The A' La Carte Support team brings together the technical and project management staff involved in the day to day planning and execution of the move. By acting as an information funnel between the A' La Carte and the OB2 Move Project, the team will ensure common understanding, maintain schedule synchronization and alignment of services.

An A' La Carte Support Team should be formed for each A' La Carte customer. The SI project manager and A' La Carte project manager should meet weekly to review schedules, issues, risks and budgets. Other team resources should be brought in as needed. In the early planning meetings, the SI architect and A' La Carte technical lead should meet to align technical considerations of the move. As the sub-projects approach the execution portion of the move, the DIS service engineers should collaborate service turn up and migration. Throughout the A' La Carte sub-project additional discussions may be required off-line between team members to resolve technical, scheduling or logistic issues. The team's life is from the beginning of planning through execution of the A' La Carte customer move.

Based on the size, complexity and experience of DSHS, it has a unique role within the project structure. In addition to DSHS' A' La Carte Support Team, DSHS has a team member role directly on the OB2 Move Project team to ensure it can provide direct input to the project. This direct input should positively shape the overall project and represent the A' La Carte customers within the OB2 Move project.

10. Infrastructure Services

Overview

The SDC facility management and operational procedures are planned to be governed by a Shared Services Workgroup. In lieu of having this definition available today, this section is intended to establish a baseline for discussion between DIS service staff, facility management, A' La Carte customers and other SDC stakeholders.

This baseline was assembled through workshops with facilities staff and DIS services representatives.

Equipment Delivery

Equipment will typically arrive at the SDC either by customer transport or third party conveyors. In either case, an Infra ticket will need to be generated to track the equipment through the installation process. For equipment: delivered directly by the customer, the ticket will be used by the facility to take receipt of the equipment and schedule installation. For equipment shipped by a third party, the ticket will be used by the facility to take receipt on the expected delivery date and prepped for next steps in the installation process.

Loading Dock

Typical loading dock procedures include:

- Scheduling the dock for shipments.
- Taking receipt of goods and notifying contact of their arrival.
- Refusing unknown shipments.
- Storing goods for pick up/shipment.
- Defining requirements for delivering goods to the dock. For example:
    - Lift gate required.
    - Inside delivery required.
    - Ticket opened with tracking information to identify the goods.

Comments:

The loading dock is managed by the DIS Facilities Office; presently this is Reuben Amamilo. He will manage the scheduling of the dock. The SDC Facilities Manager, presently Greg Couch, will provide a set of delivery procedures and requirements for the SDC.

Equipment Staging

Secure Storage

Often equipment received at a loading dock will need to be temporarily stored in a secured area to clear the dock for new shipments until the owner of the goods is able to take delivery. There will be a process in place around this transaction of goods and an identified location.

Comments:

A need for storage had not been previously identified. DIS needs to identify how it will be managed. A staging area is envisioned and the actual location needs to be determined. Procedures for equipment receipt and internal delivery need to be flushed out. Need some resources identified to handle the trucks coming in and the moving of equipment into storage or staging.

Customer Build Room

Space will be identified and made available to customers for onsite hands-on work with their equipment. The build room will have network, phone and power resources made available for customer use. Customers will be responsible for their own tools.

Equipment Installation

Allocating cabinet space

Cabinet space will be allocated in two contracted formats – dedicated cabinets and shared cabinet space. Dedicated cabinets are allocated entirely to the customer for use at their discretion. Shared cabinet space is allocated on a demand/next available basis.

Dedicated Cabinets

Full cabinets will be allocated based on contract documents. Options for in-use and RoFR (right of first refusal[25]) will be declared in contract. Customers will have the option to upgrade the locking mechanism on dedicated cabinets to meet heightened security standards.

Shared Cabinets

Generate an infra ticket to have rack space allocated. Rack space in shared cabinets will be allocated on a next available basis. Power delivery and cabinet locking mechanisms are to facility standards.

Cabling

Power

Standard power is delivered via redundant 30A/208V metered power strips with C13 outlets. Non-standard power will be made available for special circumstances and equipment. A list of optional Cabinet power Distribution Unit (CDU) configurations will be made available.

[25] A provision in an agreement stating that a specified party will be given first opportunity to either accept or reject an offer. In the case of a data center it may be the option to rent the adjacent space or cabinet in question or release the right.

Fiber

Allocated on a per-cabinet basis at the top of cabinet. A “to be determined” number (6 – 12) 100G rated LC 50u duplex ports located in a 1U fiber panel running back to the End Of Row cabinet will allow for inter-cabinet and inter-row connectivity. Cross connects are provisioned via an Infra ticket.

Ethernet

Allocated on a per-cabinet basis at the top of cabinet. A “to be determined” number (6-24) cat 6 ports, with option to upgrade the counts running back to End Of Row for patching. Any structured inter-cabinet cabling will be handled by facilities on a cost basis. Any End Of Row cross connections will be provisioned via an Infra ticket.

Telco

In Suite 1 TDM will be handled by row on the SDC floor via SONET equipment in the End Of Row cabinet. In Suite 2 TDM will be handled on a case by case basis. All circuits will be provisioned and connected via Infra tickets.

Ongoing Maintenance

Remote Hands

Remote hands services will be provided to A’ La Carte and work will be scheduled via the Infra ticketing system.

Services

Services provided:

- Equipment ingress (shipping receipt, stripping, prep/staging, physical install into final location, cable connections, etc).
- Equipment removal/decommissioning.
- Troubleshooting network cable/connectivity issues.
- KVM troubleshooting.
- Crash cart/console services – hands on the console, user on the phone.
- Eyes onsite.
- Tape rotation/offsite services for A’ La Carte.
- Reboot/power on of servers.
- Inventory audits.
- Third party/vendor escort.
- Power and environmental reporting.

Anything changing inside the computer (card add/changes, memory or processor upgrades, etc) will have the equipment pulled and delivered to staging for customer work. This may be revisited with proper staffing and customer demand.

Remote Hands SLAs

In order to better schedule facility resources, remote hand tickets can be opened with different levels of service or response. Different SLAs may apply based on time of day, day of week or support contract in place. Classes of SLA for remote hands:

Class 1 – Immediate response required.

Class 2 – Action within 4 hours.

Class 3 – Action within 24 hours.

Class 4 – Scheduled work event.

Security

Customer Physical Access

Customer access requests will be made via an infra ticket and approved by the SDC manager or an approved designate.

Authorized vendors – follows the customer access request, initiated by customer approved by SDC Facilities Manager.

Physical Security

DIS will provide locking cabinets as a standard with the option for card key or biometric locks as required to meet security requirements. Physical cages will only be provisioned in the A' La Carte area if security requirements cannot be met otherwise.

Equipment Decommissioning and Removal

Customer equipment removal will be handled by opening an Infra ticket to schedule remote hand support. Facility personnel will remove the asset, clean up any unused cabling and labeling, update asset databases and procedures surrounding the equipment. Facility databases will be updated to reflect the newly available resources.

11. Assumptions

Assumptions can represent a significant risk if stakeholders do not agree with the assumptions. In order to develop the schedule and estimate costs, assumptions must be made. In developing this move plan the following assumptions have been used as inputs into the process:

1. Project will utilize an Individualized System Move approach.
2. Sales tax applies to hardware, software and services.
3. SDC occupancy date is July 1, 2011. DIS can start the SDC build phase May 1, 2011.
4. A process similar to the Short Interval Schedule / Build Sheet process will be used to migrate systems.
5. A' La Carte customers will be responsible for their own moves. DIS will provide project support, crate and freight services and facilities in SDC suite 2.
6. Virtualization will continue. Prior to the move 60% (or 240) of the x86 servers will be virtual.
7. OB2 and SDC will appear as the same logical space from a networking and SAN perspective (142 strands of dark fiber, with a 40gig service)
8. The DIS procurement process requires 120 days.
9. IBM move services will be used to build and migrate the IBM mainframes.
10. The current CAB process will be used to manage changes occurring within the SDC.
11. A project change control process will be established to manage changes to the project.
12. Design documents will provide the details necessary to develop a complete bill of materials (BOM) and configure the equipment purchased.
13. New business plans do not exist for A' La Carte customers or shared / managed services. The current business plans will be carried forward and used in SDC.
14. The new Shared Services Virtual Environment project will not impact the OB2 Move Project.
15. New cabinets will be installed in suite 1 and 2 of the SDC. DIS and A' La Carte customers will move into the new cabinets.
16. Physical security in the A' La Carte area of suite 2 will not require cages.
17. Cost assumptions are captured and documented in the project estimate.
18. Schedule assumptions are captured in the Microsoft Project schedule.

12. Cost Summary

The cost estimate represents all the costs affecting the move. While the costs may be allocated to budgets other than the OB2 Move Project, the schedule and move plan is based on these estimated costs. If any of the estimated items is removed or changed, the schedule will need to be evaluated for impacts. Items added to the estimate will need to be evaluated to determine schedule impacts.

Cost Component	OB2 Move	Standard Refresh	Wheeler Building Project	Totals	Description
SDC Facilities	$0	$0	$9,328,400	$9,328,400	Power Distribution, Cabinets, Fuel Oil, Cable Infrastructure, Power Mgmt/Monitoring System, Video Monitoring, Tool kit, Crash Carts, & Wheeler Fiber Cabling
Dual Data Centers	$4,588,100	$0	$0	$4,588,100	Resources for A la Carte physical moves , OB2 Operating Costs, Dual Network Costs, OB2 Security Staff, OB2 Facilities Staff
CSD Technology & Services	$3,937,200	$6,628,900	$0	$10,566,000	Refresh + OB2 Move Costs
ITD Technology & Services	$418,500	$12,407,700	$0	$12,826,200	Refresh + OB2 Move Costs
TSD Technology & Services	$2,193,300	$12,856,000	$0	$15,049,200	Refresh + OB2 Move Costs
OB2 Decommission	$3,700,700	$0	$0	$3,700,700	Decommission and restoration costs
Systems Integrator Services	$15,045,400	$0	$0	$15,045,400	Contractor leadership and planning of OB2 Move
QA & IV&V Services	$391,400	$0	$0	$391,400	Contractor Staff for Mandatory External QA and IV&V
Security/Data Ctr Architect Services	$751,400	$0	$0	$751,400	Contractor Staff
Allowances	$2,029,200	$0	$0	$2,029,200	Allowances for specific hardware expenditures requiring more detail
Contingency	$7,214,500	$0	$0	$7,214,500	10% Contingency allocated by month
Totals	$40,269,700	$31,892,600	$9,328,400	$81,490,500	
DIS Project Staffing	$1,040,600			$1,040,600	Pgm Mgr, Enterprise Planner, Project Controls, Admin Assist
DIS Staff	$8,229,900			$8,229,900	Deputy Prog Mgr, Estimated DIS staff cost based on scheduled
GRAND TOTALS	**$49,540,200**	**$31,892,600**	**$9,328,400**	**$90,761,000**	
Decision Package Total (less DIS staff)	$41,310,300				

Notes
Customer soft staff costs for migration of Ala Carte services, assets or customers will be determined within the SIS development and are not included above.
Planning, design, or implementation of an alternate Data Center is not included.
All estimates are in today's dollars (05/10).
DIS final discounts will affect final purchase price.
DIS staff costs based on IT6 level.

The complete cost estimate is in Appendix H to this document as a separate file.

13. Appendices

A. Short Interval Schedule (SIS) Example

Example inserted as following pages

B. Build Sheet Example

Example inserted as following pages

C. Documentation Location

Documents referenced in the plan and supporting materials used to develop the plan can be found on the DIS OB2 Move Project SharePoint web site: https://sharepointext.dis.wa.gov/ob2move/default.aspx

D. A' La Carte Interview Notes

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

REDACTED p.81-91

E. Definitions

A' La Carte	Customers who rent space in the OB2 Data Center. These customers provide and manage their own equipment (network, servers, storage, cabinets, cables). Some Customers have caged space, some do not.
Bill of Materials (BOM)	A list of the individual items that make up a finished good or subassembly. For example a bill of materials for a server may include the specific configuration of a model, power supplies, processors, memory, hard drives, controllers, bus adapters, network adapters, riser cards, out of band management, BIOS settings, rails, cables, operating system and management software.
Build Sheet	A documented set of systems, facilities, network and storage information required to build a computer system. The build sheet allows one engineer to document how the system should be built and another engineer to build the system.
Business Systems	Business systems are categorized as a group of diverse but interdependent applications and their resources that interact to accomplish specific business functions.
Cyclic redundancy check (CRC)	A non-secure hash function designed to detect accidental changes to raw computer data, and is commonly used in digital networks and storage devices such as hard disk drives. A CRC-enabled device calculates a short, fixed-length binary sequence, known as the CRC code or just CRC, for each block of data and sends or stores them both together. When a block is read or received the device repeats the calculation; if the new CRC does not match the one calculated earlier, then the block contains a data error.
Key Stakeholder	A key stakeholder is defined as a person whose support is critical to the project – if the support of a key stakeholder were to be withdrawn, the project would fail.
Landed	Verb typically used when referring to the process of assembling cabinets and affixing them to the floor.
LUN	In computer storage, a logical unit number or LUN is the identifier of a SCSI logical unit. A logical unit typically corresponds to a storage volume and is represented within a computer operating system as a device such as a hard drive.

Move Event	The start and end day and time when one or more systems (or system components) are being relocated from one data center to another. The relocation may be physical or logical or a combination of both depending on the components and their SIS.
On-boarding	The process of moving into a data center. Similar to moving into an apartment where the landlord provides keys and explains the location of mail boxes, use of the gym and laundry facilities as well other amenities. The SDC on-boarding process explains what services are available and how to engage them as well which services are not available and the rules governing how customers operate within the SDC.
SDC	State Data Center. The data center is will be in the Wheeler Building Complex and is composed of two floors. Each floor houses two data halls or suites.
Shared Services	Shared services are categorized as the group of applications and their resources that provide common services as standalone and by other systems that are independent of specific business functions.
Short Interval Schedule (SIS)	A detailed minute by minute schedule for completing a complex set of tasks. Used to call out specific actions and resources required to be executed in order. Short interval schedule's typical duration is less than one day although pre work and post work activity is called out as milestones.
SLA	Service Level Agreement. The SLA records a common understanding about services, priorities, responsibilities, guarantees, and warranties. The SLA may specify the levels of availability, serviceability, performance, operation, or other attributes of the service, such as billing.
Stakeholders	Any person or group who has a vested interest in the success of the project, i.e. either provides services to the project, or receives services from the project.
Subject Matter Expert (SME)	Professionals with expertise in a particular system or component and its day to day function and maintenance as it relates to DIS and its customers.
Systems	Generic use of business and shared systems to represent a group of applications and their resources that interact to accomplish a specific function or service.
Systems Integrator (SI)	A company that specializes in bringing together component subsystems into a whole and ensuring that those subsystems function together, a practice known as System Integration.

Shared System	Shared systems are categorized as the group of applications and their resources that provide common services as standalone and by other systems that are independent of specific business functions.

F. Project Change Control Management Example Plan:

It is assumed the Systems Integrator contracted to perform the OB2 Move Project will either re-use the existing DIS Change Control Board and PMO PCR processes or implement their standard version of Project Change Control Management. The following is an example change control management plan with elements that should be reflected in the Systems Integrators project change control management plan.

Overview:

This process manages change to baseline[26] work products[27] throughout the project's life cycle. The Change Control Management Plan is intended to track project change requests and corresponding activities. All project change requests are logged. Information is retained on how the impacted items were changed, by whom, when and what remains to be completed. Anyone who is interested should be able to identify open project change requests, changes to a particular work product and the oldest outstanding change.

Project Change Control Board (PCCB):

A function of the Project Change Control Board is to ensure that every change to a work product under baseline control is properly considered, coordinated, scheduled and cost estimated. It evaluates each change request to a baseline work product and approves, rejects or defers it for more information for a later date. The PCCB also ensures involvement from all affected groups. Every authorized change, once complete, is reviewed by the PCCB before including it in the baseline library.

The following is recommended as the minimum OB2 Move Project Change Control Board participants:

- DIS Project Sponsor
- SDC Facilities Manager
- Service Owner Representative
- Systems Integrator Project Manager
- OB2 Move Project Manager
- DSHS Project Manager

[26] In order to evaluate and compare a change, an approved version must be kept. When you baseline a work product you agree to and preserve its information, format and assumptions at that point in time. Any changes to a baseline work product must follow the Configuration Management Plan.
[27] Any deliverable, documented process, written commitment, or code module required to fulfill the project mission. Examples include the Short Interval Schedule, Project Schedule, Project Budget, Mainframe BOM, Storage design document or other required items.

- Project Communication Coordinator

Change Control Management Process:

1. Anyone wishing to initiate a change to a baseline work product will fill out a Change Request Form (CRForm) and submit it to the OB2 Move Project Communication Coordinator via email as an attachment. Information in the CRForm should include initial estimates for completing the requested change. The request will be addressed to the OB2 Move Project Office.
2. The OB2 Move Project Communication Coordinator is responsible for collecting, logging and distributing all change requests. The initiator of the change will be notified of the CRForm's receipt and status.
3. Submitted CRForms will be stored in the project repository, where all PCCB members and interested individuals will have read access.
4. The OB2 Move Project Communication Coordinator will document the change request on the Change Request Log (CRLog). Each CRLog entry will contain the following information:
   - Change Control Number
   - Requester
   - Date Submitted
   - Description of Change
   - Affected Work Products
   - Current Status (new, deferred, in progress, complete)
   - Date of last Status Change
5. The OB2 Move Project Communication Coordinator will schedule PCCB meetings as needed to perform the following functions:
   - Review all new, deferred and in progress change requests
   - Approve, reject, or defer change requests
   - Prioritize all outstanding approved change requests
   - Communicate with all affected parties of each change request
   - Follow up with completed changes to ensure CRForms were closed, reports were kept up to date and all affected parties were notified
   - Approve new work products promotion to baseline
6. The OB2 Move Project Communication Coordinator will assign "Approved" change request to the managers affected for rescheduling and assigning it to an individual team member(s) for resolution. "Deferred" change requests will be held over for the next PCCB meeting. "Rejected" change requests are closed and the reasons documented in the CRForm's "Notes & Comments" section.
7. The project team member assigned to work on the CRForm will resolve the change request, update all affected work products, ensure the solution has been tested and that all approvals have been obtained.
8. The PCCB will verify that all parties have agreed to the revised commitments and that all affected work products have also been reviewed and kept in sync with the changes. They will then authorize the implementation of the new or modified work products.

9. With the PCCB authorization, the project team members assigned to the change request will implement the change and close the change request. The OB2 Move Project Communication Coordinator will notify the requesting party that the change request has been closed and the solution implemented.
10. The OB2 Move Project Communication Coordinator will perform maintenance support of the baselined work products:
    - Checking out work products to project team members after verifying that a change request has been approved.
    - Checking in work products into the baseline library after verifying that the change has been signed off by all affected parties.
11. Monthly or based on the needs of the project, the CRLog will be distributed to affected groups by the OB2 Move Project Communication Coordinator.
12. Standard office automation tools will be used for change request maintenance.
    - MS Word to create/maintain change request forms.
    - MS Excel to maintain the CRLog.
    - Email to submit change requests.
    - MS SharePoint for publishing and library archival.

Required Support:

1. QA audits and reviews will be conducted periodically to validate process conformation, coaching, and mentoring on the change control management process.
2. Help Desk support for tools, LAN, and security issues.

Maintenance:

As with all work products this plan will be baselined and move through the defined Change Control Management Process as procedures require modifications. This document is a living document which will mature over the course of the project's life.

G. Schedule

The Microsoft Project Schedule is not included because it contains over 4,100 rows. The Schedule is available in soft copy.

Schedule Task Notes and Assumptions

The project schedule was built using Microsoft Project. Notes and assumptions where called out to assist the users of the schedule in understanding the Implementation Planning Team's intent for that task. The table of notes and assumptions was pulled from the schedule and provided here for interested individuals who may not have MS Project.

REDACTED p.97-119

H. Cost Estimation Model

Provided as a separate file.

I. High Level Architecture

Provided as a separate file.

J. Planning Level Requirements

Provided as a separate file.