

Bonneville Power Administration FY 2012 IT Asset Strategy

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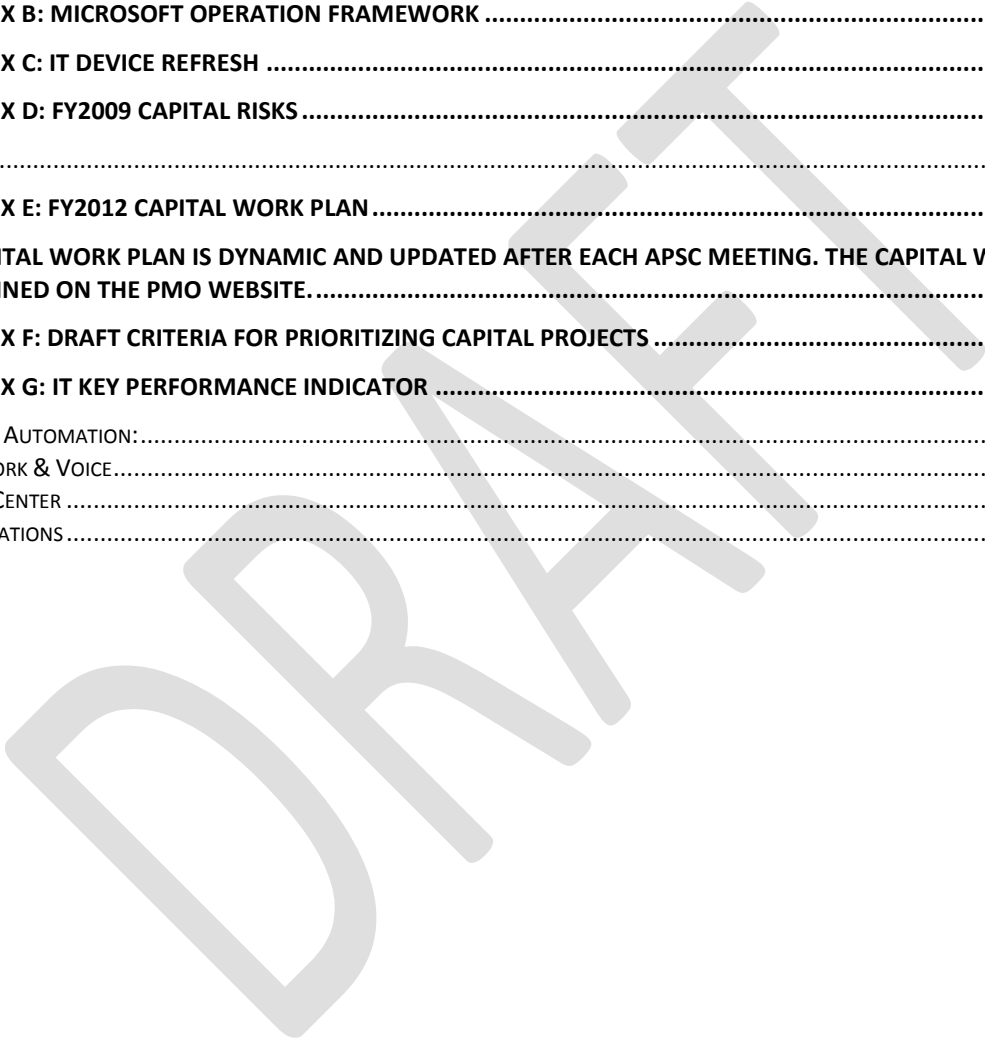
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ACCEPTANCE OF IT ASSET STRATEGY

IT Asset Manager

Date

Chief Information Officer

Date

VP, Internal Business Services

Date

DRAFT

PREFACE

The Information Technology Asset Strategy covers the technology assets hosted in the Bonneville User Domain (BUD). These assets comprise,

- 1.7% (\$112M) of the Agency’s Plant In Service total capital assets
- 5.0% (\$47M) of the Agency’s planned FY2012 capital spend
- 3.2% (\$67.5M) of the Agency’s Departments planned FY2012 expense spend

These assets include telecommunications components, circuits, servers, storage devices, desktop systems, printers, copiers, faxes, phone systems, software, and Software as a Service (SaaS). The software systems covered by this strategy include critical business systems, general business systems, web applications and task systems. Critical business systems must operate and be available around the clock (24x7). There are approximately 42 critical business systems that enable power marketing and transmission scheduling functions. General business systems enable BPA to manage its staff, finances, facilities, supply chain, transmission assets and services such as managing circuits and work planning services. Task systems are small web based applications that enable BPA staff to more efficiently perform their works. A small sampling of examples include: Absentee Tracking System, Conference Room Scheduling, Tribal Matrix website, NW Sub-basin Geographic Data browser, and New Ideas

This strategy does not cover technology assets residing on the grid network. Grid network systems monitor and manage the status of the electric grid. These management systems include systems like SCADA (supervisory control and data acquisition) and AGC (Automatic Generation Control).

Approach to Information Technology Asset Strategy

Figure P.1 shows that the IT Asset Portfolio has been divided into four major portfolios and the Project Work Plan. The Project Work Plan contains the projects which create assets (software system, networks, data center, etc.) that are placed into production under one of the four asset portfolios. Each asset portfolio has its own asset plan. These individual asset plans are reviewed and used to create an overall IT Asset Strategy. The four asset portfolios are:

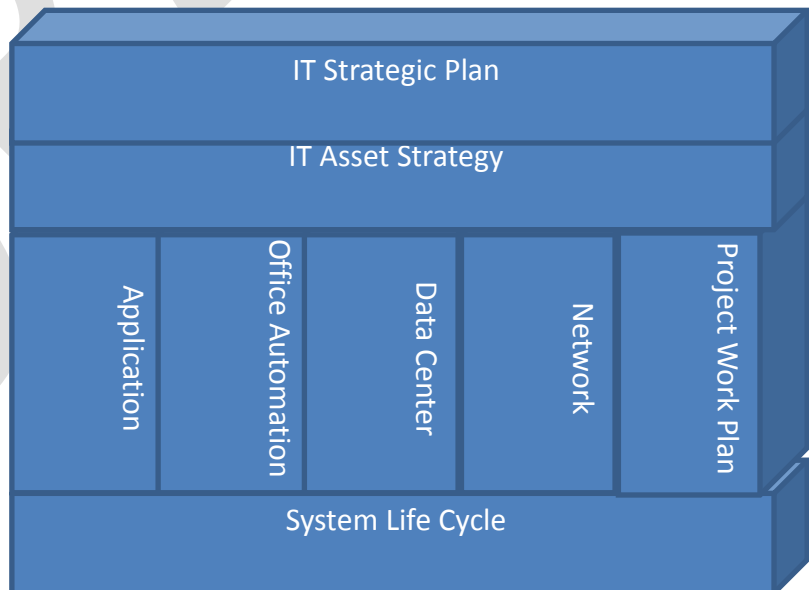


Figure P.1: Strategy and Asset Management Stack

- **Office Automation Portfolio** – Includes desktops, laptops, printers, and desktop software. The strategy for this portfolio covers:
 - Refresh of network printers and desktops/laptops
 - Upgrading workstation software
 - Adoption of new technologies
 - Bringing or maintaining systems in compliance with architectural standards
- **Data Center Portfolio** – Includes servers (infrastructure servers, application servers, database, etc.) operating systems, database management systems, and management tools. The strategy for this portfolio covers:
 - Refresh of servers and storage
 - Migrating to new server operating systems
 - Adopting new technologies (hierarchical storage management, virtualization, etc.)
 - Enhancement of data center (improving bandwidth between servers and SANS, improving backup and recovery, server consolidation, etc.)
 - Bringing or maintaining systems in compliance with architectural standards
- **Network Portfolio** – Includes data, voice, and video networks. The strategy for this portfolio covers:
 - Refresh of network infrastructure (routers, switches, hubs, firewalls, cabling, etc.)
 - Enhancement of network infrastructure (remote access, wireless access, etc.)
 - Adoption of new technologies (tele-presence, messaging convergence, IPV6, etc.)
 - Bringing or maintaining systems in compliance with architectural standards
- **Application Portfolio** – Includes the sub-portfolios for Critical Business Systems, Business Systems, General Purpose Systems, and General Tasks Systems. These sub-portfolios cover:
 - Implementing minor or major software upgrades
 - Managing systems implemented as Software as a Service (SaaS)
 - Applying system or security patches
 - Implementing planned new features to meet business needs
 - Addressing user requested changes to meet emerging business needs
 - Correcting bugs or erroneous computing conditions
 - Implementing annual changes such as tax code changes
 - Implementing expense Projects for major system changes
 - Implementing potential Capital Projects for delivering new functionality
 - Maintaining systems in to compliance with the enterprise architecture
 - Retirement and/or disposition of systems

Infrastructure

The Office Automation, Network, and Datacenter Portfolio collectively form and make up the information technology infrastructure that supports both users and systems. The term infrastructure will be used periodically in this strategy to refer collectively to these three portfolios.

1. Information Technology Asset Overview

This section will provide a collective overview of the information technology assets, providing a high level assessment of the status of these assets, the organizational goals for these assets, and the high level risks confronting these assets and asset strategy. Subsequent sections will cover each asset category in detail.

Performance Objectives

Information technology was centralized, from multiple units from across the Agency in FY2005 with the mandate to reduce and contain the cost of information technology at BPA through improved and efficient management of the Agency's information technology assets. The overarching strategy has been to drive costs out of infrastructure through a combination of:

- Reducing cost and complexity through standardization,
- Implementing new technologies,
- Adopting new refresh strategies,
- Increasing automation of information technology tasks, and
- Continuous process improvement.

Figure 1.1 shows that our approach has been successful in managing the maintenance and operations cost of information technology's infrastructure assets while continuing to meet the Agency's evolving and emerging business needs by absorbing new service contracts and new labor costs. The strategy has saved the Agency \$42M from FY2005 to FY2012 as measured from the difference between FY2005 actuals with yearly inflation plus new service contracts and each year's actuals.

The bulk of savings to date has been achieved through implementing new cost effective technologies and revamping refresh technology strategies. Our strategy is positioned to continue to achieve additional infrastructure savings through two major projects, Data Center Modernization (DCM) and Desktop Modernization Project (DMP) that will complete the first installments of our revamped refresh strategies while positioning us to continue to achieve additional cost controls through automating infrastructure tasks and delivering a highly standardized and reliable environment.

Current projections show contained growth for the Office Automation Portfolio and the Data Center Portfolio with costs growing below the rate of inflation for FY2012 through FY2017. The Network Portfolio is projected to grow at the rate of inflation during this time period.

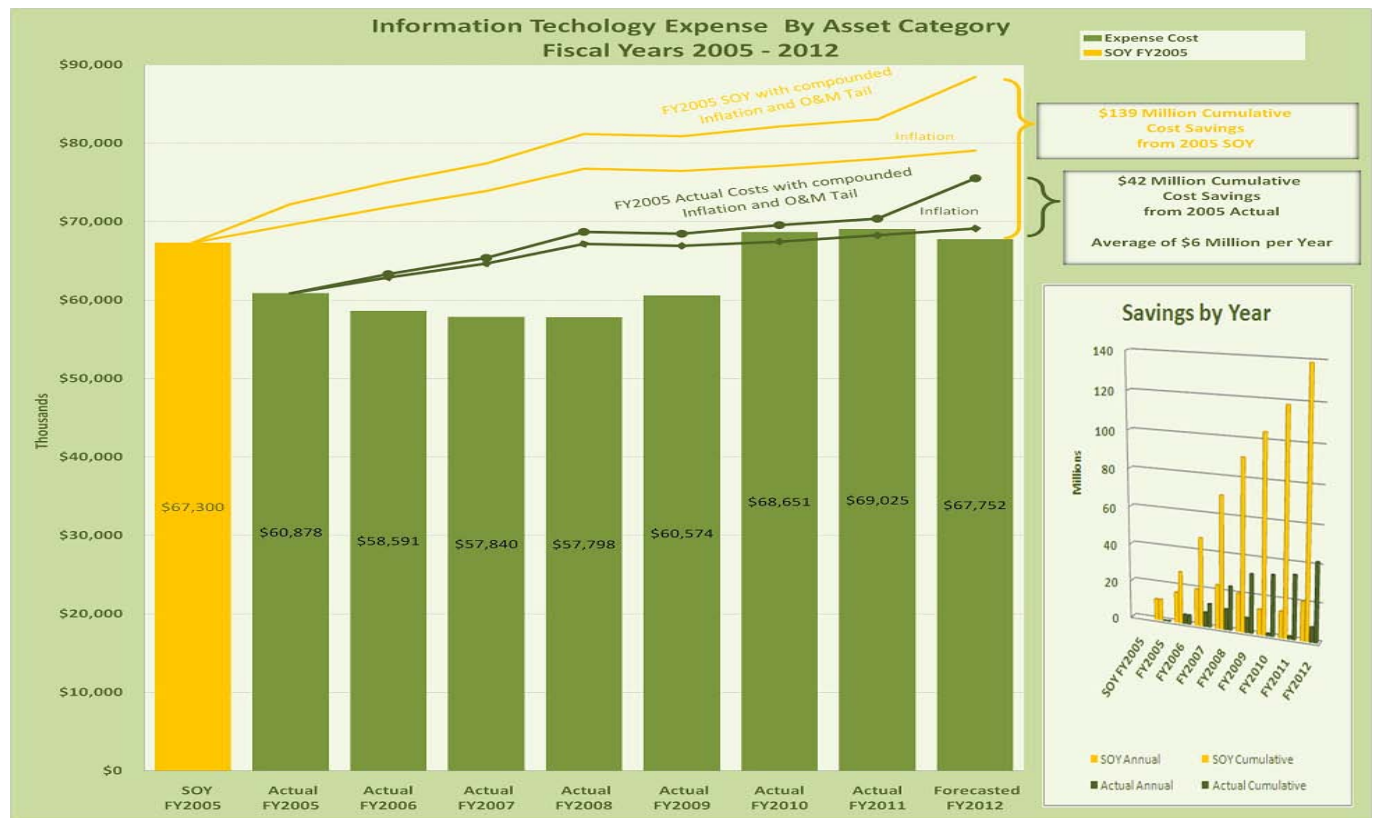


Figure 1.1: Actuals and Projected IT Expense Budget

Status of Information Technology Assets

The main drivers in the information technology expense budget come from a combination of the Application Portfolio and Projects. In order to control and rein in the growth of expense costs, growth in expense from the drivers in these two portfolios must be offset by a reduction from other activities. We will first discuss the expense cost drivers and then discuss the offsetting stratagems used to contain these expense costs to date.

Capital versus Expense

Capitalized activities include

- Software projects that deliver new capabilities
- Software procurements above \$100K
- Individual hardware items with a procurement cost above \$10K

Expense activities include

- Ongoing maintenance of assets
- Enhancements of existing systems
- Software maintenance
- Software as a Service/Cloud based services

Figure 1.2 shows the impact of increasing capital to deliver on the Agency’s Transmission Process Improvement Program (TPIP) and Regional Enterprise Value (REV) programs (systems to support new regional contracts) as well as other high value initiatives such as SLICE and RODS replacement systems. As a result of increasing capital spending, the number of application projects being delivered into production will jump to over 20 per year, beginning in FY2012, as projects are

completed and systems are moved into production. These jumps in the number of new systems will, over time, also add an additional cost of \$4M in support to the Application Portfolio expense budget.

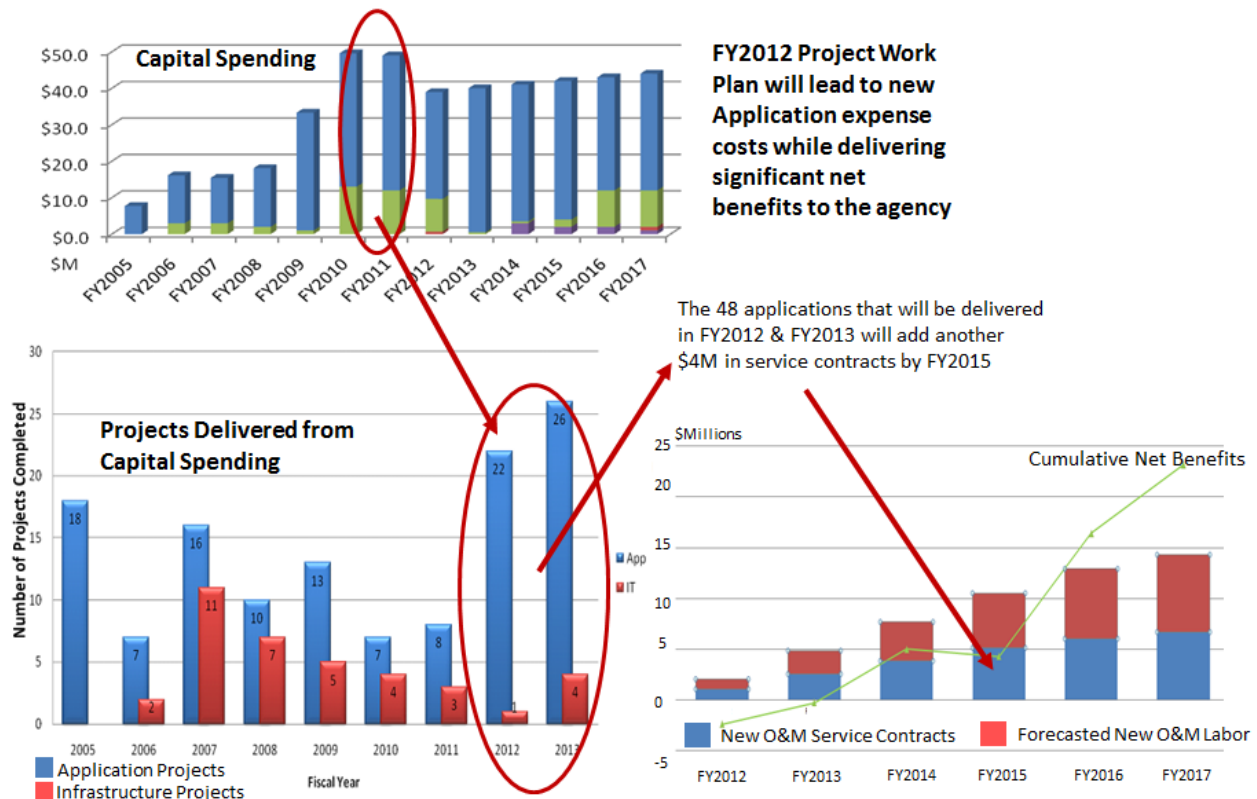


Figure 1.2: Impact of Capital Spending

These new systems will and are having a number of effects. They are delivering sufficient benefits and value to the Agency (see figure 1.2 for an example of benefits), enabling the Agency to achieve efficiencies and more effectively meet current and evolving business needs. With these new systems come new annual expense costs via new service contracts covering the maintenance of new software licenses and new labor costs to support the operations and maintenance. **These are key drivers in the escalating expense costs in the Application Portfolio.**

The stratagems to cope with these new costs and to help contain the overall information technology expenses include: (a) delaying hardware refreshes; (b) restructuring hardware refreshes; (c) creating efficiencies in the infrastructure portfolios through modernization and automation to reduce expense costs; (d) postponing or deferring system enhancements in the Application portfolio. Stratagems (a)-(c) are aimed at reducing near term expense costs in the infrastructure portfolio to offset rising expense costs in the Application Portfolio.

Strategy (d) directly impacts the assets in the Application Portfolio. If we are to contain the growth of expense, one of the few levers we have within the Application Portfolio is to reduce or defer system enhancements. This means postponing or not performing upgrades

Controlling Infrastructure Expense

From FY2005-FY2009 we have used delaying desktop and server refreshes as a means to control expense costs. The savings in the infrastructure portfolios from this approach has been used to offset the increasing expense costs in the Application Portfolio. This approach can only be employed so long before failing hardware once again drives up expense costs.

To forestall the eventual rise in infrastructure O&M costs, two major projects were initiated in FY2009. These projects are the Data Center Modernization Projects (DCM) and Desktop Modernization Project (DPM) These projects fundamentally change the refresh philosophy and are intended to lower O&M though introducing advanced technology, improved management, and automation of core desktop and datacenter operations. Both projects are discussed in more detail in their respective portfolio sections.

to provide new capabilities (or in some cases to ensure operational reliability and security compliance) and/or not performing enhancements to meet changing business needs or obtain business efficiencies.

The need for upgrades and enhancements does not diminish as a result of postponing or deferring them, rather they create an increasing backlog of desired and needed changes. This deferral approach will see a continual degradation of the assets in the Application Portfolio overtime, resulting with systems failing to keep up with business needs and becoming more expensive to maintain. There is a limit to the savings that stratagem (a)-(c) can deliver, while stratagem (d) only defers cost to a future fiscal year at the expense of meeting business needs now.

Although stratagem (a)-(c) have been important in containing costs from FY2005 through FY2010, and will deliver additional savings with the completion of DCM and DMP, these savings will level off and will not be sufficient to meet the expense needs of the new systems being delivered under the Application Portfolio.

Figure 1.2 also shows the impact on the Application Portfolio expense budget as new systems are moved into production. On average, each year, \$1.25M from new service contracts alone will be incurred by the Application Portfolio. A similar amount in labor support will be added to the Application Portfolio. These new charges will reduce resources available for system enhancements in the Application Portfolio.

New systems are being developed, implemented, and placed into service to meet critical Agency business objectives which include supporting Regional Dialogue (REV), Transmission Process Improvement Program (TPIP), RODS Replacement, and SLICE. These systems are providing the Agency with significant benefits as shown in Figure 1.2, which shows the net benefit to the Agency from executing on the FY2012 Project Work Plan. The net benefit is calculated from the benefits identified in each capital project's business case.

The Information Technology Asset Strategy is delivering significant benefits to the Agency through its Project Work Plan. However, the rate at which service contracts from new systems continues to grow annually and is outpacing our ability to achieve offsetting cost reductions through infrastructure efficiencies. In order to ensure adequate resources for the reliable and secure operations for the assets in the Application Portfolio, ***funding of the O&M tail for new systems needs to be tied to approval of capital funding of the new system.*** These new O&M expenses, from projects delivering new systems, continues to put pressure on the Application Portfolio's expense budget, adding new expense costs faster than offsetting operational savings can be achieved. This budget pressure will continue unless approval of capital funds is linked to ensuring supporting O&M funding is available for reliable and continued support. Reducing and even eliminating enhancements would only provide short term relief on the increasing O&M tail with the consequence of failing to meet business needs.

For these reasons, it is recommended that Application Portfolio expenses be allowed to grow at the rate of inflation plus the cost of maintaining new systems being placed into production.

Although the current projections are for the Office Automation Portfolio to grow below the rate of inflation, if the Agency decides to allow a large introduction of consumer devices, such as smart phones and tablets, additional pressure will be placed on the expense budget to first provide and then maintain these devices, along with air time charges. The Application Portfolio may be impacted as the need to develop business applications will emerge once these devices are widely adopted.

Continual adoption of cloud based solutions will shift from capital to expense. An example of this is in the Data Center Portfolio in shifting from expense active SANs storage to cloud based storage solutions, which are now available through GSA and the Apps.Gov program, for archiving static data. Adopting a cloud solution for archival storage would increase the expense requirements for the Data Center Portfolio while reducing the Portfolio's requirement for capital funding. Total cost of ownership guidelines for cloud based solution will be developed in FY2012 to aid determining when a cloud based solution is the most cost effective solution for the Agency while meeting objectives.

Infrastructure

Infrastructure assets are refreshed based on a combination of industry best practices and BPA's desire to optimize value in its investment. As a rule, BPA maintains hardware one to two years beyond industry recommendations. Although this approach does increase risk of failure in the latter year of operations, in a practical sense this has not had an adverse impact on BPA's environment.

Critical systems are redundant by design, reducing the risk of operational disruptions. The increases in replacement costs from hardware failure in the year leading up to a refresh cycle are offset by lower operating costs provided by maintaining environmental stability, allowing BPA to optimize the value in its investments, keeping the overall total cost of ownership lower than adhering strictly to industry recommendations.

Infrastructure Category	Refresh Rate	Last Major Refresh Date
Servers	5 years	FY 2006 ¹
Storage (SANs and Fabric)	5 years	FY 2009 ²
Desktop	5 years	FY 2006 ³
Laptop	5 years	FY 2006
Thin Clients	7-10 years	Deploy in FY2012
Network Printers	5 years	Repair on Failure
Network	7 years	FY 2003
Cable Plant	14 years	FY2009 Headquarters FY2010 Ross Complex

Table 1.1: Hardware Refresh Schedules

Table 1.1 shows the refresh rates for BPA's major infrastructure assets. Prior to FY2009, BPA engaged in an annual refresh of its infrastructure assets. For example, our target for refreshing our fleet of workstations would be 20% each year. Due to a number of pressures, including meeting expense targets, we have failed to consistently meet our targets for infrastructure refreshes. As result, we have re-examined our approach to infrastructure refreshes.

¹ Only added needed capacity servers in 2007 and 2008

² 2009/2010 was last major refresh of SANs but have been adding new technology to meet storage growth requirements

³ Only replacing units that fail since 2007; however, number has increased due to delay in deploying Windows 7

We have adopted a planned complete refresh of an asset infrastructure category (e.g. server, desktop, network, etc.) based on the asset's refresh rate. For example, every five years we will refresh the desktop fleet of personal computers. As part of the refresh, we will implement new operating systems and upgrade the base image components (i.e. Office Suite, web, browser, etc.). This approach offers the following benefits:

- Reduces disruption to operational environment
- Maintains a highly homogenous and standardized environment which reduces operation costs
- Maximizes hardware discounts through high volume purchases
- Optimizes total cost of ownership of infrastructure assets

Drawbacks to this approach include delays in taking advantage of hardware innovations. Hardware devices do fail between refresh cycles, with the failure rate increasing toward the end of the refresh cycle. However, the benefits outweigh the drawbacks, leading to an overall lower cost environment. SAN storage is an exception to the wholesale refresh paradigm due to the scale of change in re-hosting all our data on new equipment in a short time period. We are looking at introducing a combination of hierarchical storage and cloud based storage to reduce our total cost of storage instead of wholesale refresh of our storage.

We are expected to complete our first two wholesale replacement projects in FY2013. These projects are the Data Center Modernization Project (DCM) and Desktop Modernization Project (DMP). These projects will be refreshing our infrastructure assets as well as delivering improved management and monitoring tools. The combination of a highly standardized infrastructure, with improved management and monitoring, will allow us to control the growth of expense to rise at or below the rate of inflation.

Through our adoption of our refresh strategy, we are able to minimize disruptions and reduce costs from modernization efforts, allowing capital to more effectively be targeted to meet business needs. The major infrastructure modernization efforts are listed in the IT Asset Strategy in the Information Technology Asset Overview section.

Applications/Systems

Applications are introduced to meet business needs and stay in service until the business unit(s) indicates they are no longer meeting business needs. At this point we consider the options of (a) modifying/enhancing the system to meet the business units evolving need, (b) upgrading the system to take advantage of new capabilities, (c) replacing the system, or (d) retiring the system with no replacement.

Consequences from our current business driven approach include:

- We have not developed a systematic approach to measuring the value and performance of our applications and systems
- We have not developed a long range (more than 2 years) roadmap for the evolution of systems
- We have not developed targets for system replacement or retirement

In FY2010, BPA begin the process of developing asset plans to cover our applications and systems. This process is proving to be a great aid in enabling both the business units and information support teams to work together to rectify these deficiencies. We are beginning to develop performance and value metrics for our major systems. We have also started to create a long term strategic plan for our supply chain, financial, and human resources systems.

IT Challenges & Risks

We have taken steps to control spending and the cost of information technology for the Agency through managing the costs of our infrastructure assets; however, we are facing stiff challenges from a number of key expense drivers which include:

- Increase adoption of Software as a Service, Platform as a Service and Infrastructure as a Service which all require expense instead of capital to implement and have ongoing annual expense costs
- New applications delivered through the Project Work Plan are placing upward pressure on expense budgets from new service contracts and labor for operations and maintenance (Historically, approving a capital project does not include funding the IT expense tail)
- Closer alignment of BPA’s IT capitalization rules with Federal guidelines requires more of a project’s activities to be expense instead of capital and replacement server procurement moving from capital to expense
- Doubling of the IT capital budget in FY2010 (see figure 3), has increased the need for expense funding for the planning phase of projects while the overall IT expense has not been increased to accommodate these new costs

As a result of these expense drivers

- New service contracts and O&M costs are being funded by a combination of reducing system enhancements and deferring hardware refreshes
- Key resources needed to make enhancements have been prioritized to work on projects that are delivering new automation capabilities

There are a number of emerging initiatives and trends that will impact both the information technology’s capital and expense budgets. These initiatives are not well defined; however, we can, in some cases, develop budget estimates based on the anticipated impact on our systems. These drivers do present a risk to the information technology’s capital and expense budgets. These drivers may necessitate changes in projected budgets if decisions are made to move forward on one or more of these initiatives. These drivers are discussed below.

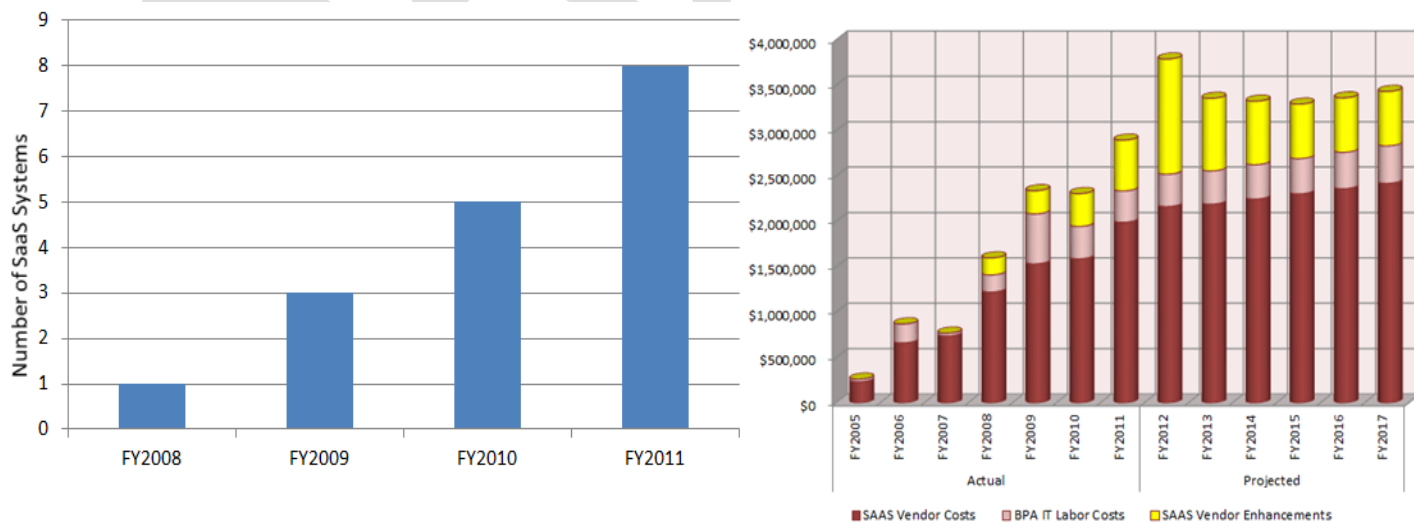


Figure 1.3: Impact of SaaS Solutions Expense Budget

Figure 1.3, shows the increasing trend toward SaaS and Cloud based solutions that would increase our need for expense dollars. Software as a Service is more difficult to estimate, as we are unable to

forecast which projects may find SaaS as the most effective solution in terms of both meeting business requirements and total cost of ownership; however, we are able to identify some potential SaaS candidates.

- Talent Acquisition (SaaS)
- Ecommerce Phase II (SaaS)
- Aircraft Services (SaaS)
- Security Operation Center (SaaS)
- GIS Applications (PaaS)
- Archiving as a Service (IaaS)
- Disaster Recovery (IaaS)
- Backup as a Service (IaaS)
- Email/collaboration (SaaS/PaaS)
- Projects/development environments (IaaS/PaaS)
- Hosted PBX/VoIP (IaaS)
- Single Sign On (SaaS)

Should these solutions prove to provide the best value to BPA then the information technology's budget will require less capital and more expense to implement these solutions; underscoring the need to start managing the expense and capital budget in unison to be able to shape and blend spending levels. Under current fixed capital and expense budgets these solutions present a potential risk to the information technology budgets.

As a result of these project related challenges, we need to adopt a new approach to shape funding for projects to blend the shifting need between capital and expense. We are recommending to maintain our current capital and expense spending levels for informational technology through FY2014; however, we are requesting to shift the levels, reducing the capital spend and increase the expense levels to adjust to the demands on the information technology expense funding.

There are a number of potential business and regulatory drivers that are emerging which if they are realized will impact the forecasted information technology capital and expense budgets. Table 1.2 summarizes the major emerging drivers and our present understanding of the potential cost impacts. Some of the drivers, such as NERC CIP version 5 regulations, may be absorbed within the current information technology budgets; however, if more of these drivers are realized than it will become harder to absorb these new costs.

	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017
NERC CIP						
• Physical Access Control (expense)	\$900K	\$1,500K	\$700K	\$700K	\$800K	\$900K
• System Changes (capital)		\$5,000K	5,000K			
Security Operation Center (on premise solution)						
• Implementation (capital)		\$1,500K				
• Operations (expense)		\$2,140K	\$2,200K	\$2,300K	\$2,400K	\$2,500K
Potential Expense Drivers (SaaS/PaaS/IaaS)	\$600K-	\$800K-	\$900K-	\$1,000K-	\$1,200K-	\$1,300K-
• Project Implementation	\$1,000K	\$1,100K	\$1,200K	\$1,400K	\$1,600K	\$1,700K

Table 1.2: Cost Exposures; Potential Emerging Business and Regulatory Budget Drivers

An additional driver that is putting pressure on the information technology budget is the strict alignment of capitalization rules with federal regulation. The outcome of this alignment is that expense funds are required for the initiation and planning phases of projects. Another impact on the expense budget is that procurement of individual servers has switched from capital to expense due to the drop in the cost of servers.

If multiple of these drivers are realized than the information technology budgets will need to be modified to meet these requirements and normal business needs.

Key Accomplishments

The Information Technology Asset Strategy has delivered sufficient new capabilities and services to meet business needs and to reduce the cost of infrastructure operations. A brief review of the accomplishments over the last two years is provided for the Application and infrastructure portfolios.

Application

Figure 1.2 shows the number of systems delivered as a result of our Project Work Plan. The increased capital spending is resulting in a large influx of new systems, particularly in the FY2012/FY2013 timeframe; however, a large number of new systems have been delivered since FY2010. These new systems are delivering new key services and capabilities to meet the agencies critical business needs. A partial listing of these delivered major systems includes:

- New systems delivered to support Regional Dialogue Contracts (REV)
 - Customer Portal
 - Customer Billing (Phase 1 & 2)
 - Customer Contracts
 - Rates Analysis Model
 - Regional Dialogue Scheduling System
 - Loads Obligation & Resource Analyzer
- Transmission Process Improvement Program (TPIP)
 - Work Planning & Analysis
 - Transmission Asset System
- New systems to enable the replacement and retirement of RODS
- Systems to support NERC ATC implementations
- Electronic Official Personnel File (SaaS)
- Pisces BiOP Accords

Infrastructure

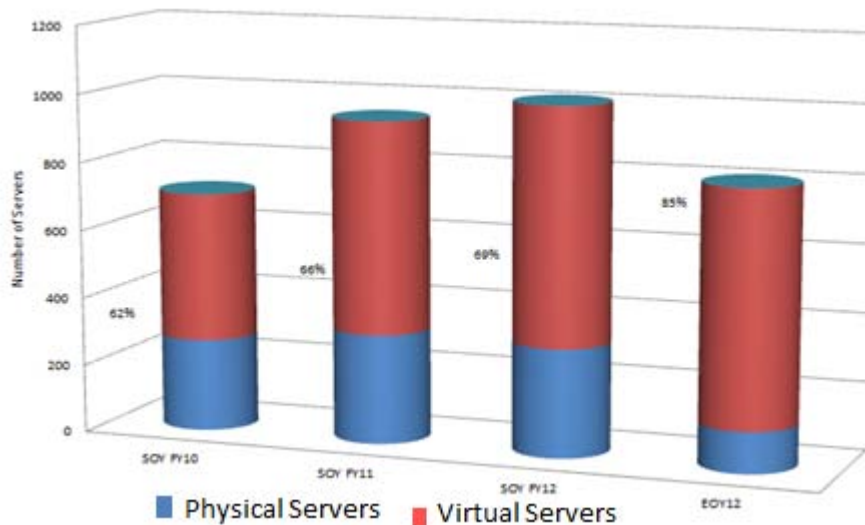
In FY2009, we began two major infrastructure projects, Data Center Modernization (DCM) and Desktop Modernization Project (DMP). DCM is vital in creating a highly standardized and reliable environment to host the new REV systems and our Critical Business Systems (CBS).

The DCM project has provided a number of enhancements and capabilities in support of the REV systems and CBS systems. These include

- New standardized hardware
- Certified baselines, conforming to NIST guidance, using the latest server operating systems, Windows Server 2008
- Virtualization, allowing optimal usage of server resources and lower cost of operations
- Automation of server provisioning using certified baselines
- Configuration monitoring and alerting, ensuring servers are maintained in certified baselines
- Enhanced monitoring and alerting

The Critical Business Systems (CBS) are a sub-portfolio of the Application Portfolio and are being re-hosted in the new environment being created by DCM. Figure 1.4 shows the degree to which CBS systems have migrated into the new environment and have been able to leverage virtualization. DCM has been a linchpin in our strategy to lower datacenter operating costs through server reduction, automation, and standardization. To gauge how effective this strategy is progressing, we examined the average operation cost in the critical business systems environment and compared to the portion of the datacenter that has not yet migrated to the DCM environment. The average operations & maintenance cost of supporting a server outside of the DCM is approximately

\$2,337/year. Although CBS is not scheduled to fully maximize the use of virtualization until to the end of FY2012, the average operations & maintenance cost of a CBS server is \$1,122/year. This demonstrates the improvements DCM is making in controlling Data



Center operations and maintenance costs, giving us confidence that we will be able to control the growth of the data center's operation and maintenance cost at or below the rate of inflation as we complete deploying and migrating into our new environments. The Desktop Modernization Project (DMP) has not yet moved new capabilities into production. DMP has established a certified

Figure 1.4: Server Virtualization of Critical Business Systems

Windows 7 base image, with Office 2010, using the United States Government Configuration Baseline (USGCB), has proven a virtual desktop infrastructure (VDI) environment and is in the process of establishing a production VDI architecture (this architecture is in use at TVA and is being expanded to support 6,000 TVA users). BPA's VDI will support 2,500 zero and thin client users and will be used to remotely deliver applications through application streaming to all users. Users will begin to be migrated to zero client devices in June of 2012 with complete migration to the new Windows 7/Office 2010 environment in early FY2013.

Information Technology Asset Goals and Objectives



During the 1980's and 1990's, industry approached information technology management and service operations from a largely technological point of view, concentrating on large hardware platforms and maintenance of these expensive platforms. This approach then evolved into a service provider approach of procuring software systems to meet the immediate needs of individual business units. Prior to centralizing non-grid information technology assets and services under the NJ organization, the Agency's various business units information technology organizations approach was that of a purely service organization. This approach resulted in an inflexible collection of poorly interoperating and suboptimal intercommunicating software systems, with data quality problems, under-utilized hardware, and escalating information technology costs. NJ is now striving to partner with the business units to optimize the use of information technology resources and assets; enabling the Agency to meet strategic objectives while efficiently and securely performing daily operations. This shift is described in greater detail in the 2010 IT Strategic Plan. This shift encompasses optimizing resources and balancing the individual business units' needs with overarching Agency objectives, while controlling cost. Due to the long life cycle of systems at BPA, it will take more than 10 years to fully transition to an agile and flexible system environment. The overarching goals of our IT asset objectives are:

Information Technology Asset Goals:

FY 2012 BPA IT Asset Strategy

1. Enable the Agency to reliably and securely use IT resources to effectively and efficiently perform work while maximizing utilization of IT resources. (ITAG 1)
2. Optimize total cost of ownership by balancing the costs of new investments for upgrades and replacements with operations and maintenance costs. (ITAG 2)
3. Balance individual business unit’s immediate requirements with Agency strategic objectives by delivering flexible and extensible assets that meet current objectives and can be leveraged to meet future strategic business objectives, resulting in reduced future delivery times and least total cost of ownership. (ITAG 3)
4. Securely maintain and operate assets in accordance with Federal and Industry regulations and laws. (ITAG 4)
5. Institutionalize Operational Excellence through the adoption of maturity models to continuously improve processes, practices, and service delivery, maximizing the value of our IT assets and reducing the cost of operations and maintenance. (ITAG 5)
6. Become a strategic partner, advising and assisting business units and the Agency in leveraging technology to meet and achieve their objectives. (ITAG 6)

The Information Technology Asset Portfolio has been divided into four portfolios for better management of the assets. Each of these portfolios has its own unique objectives. These objectives will be discussed individually in the section covering each portfolio. Each asset portfolio section will have a table that links the sub-portfolio objectives to the Information Technology Asset Strategies (e.g. see Table 3.1 for Office Automation). In each sub portfolio’s tables, the objective relates to a single primary goal indicated by “P”; objectives may also relate to secondary goal(s), indicated by “S”. Below is table that summarizes how the individual Information Technology Asset plans collectively are meeting the IT Asset Goals. An up arrow in the status column indicates improving, down arrow declining in meeting goal, and sideways maintaining status quo.

IT Asset Goals	Status Meeting Goals	Comments
ITAG1: Enable the Agency to reliably and securely use IT resources to effectively and efficiently perform work while maximizing utilization of IT resources.		Data Center Modernization and Desktop Modernization Project are delivering virtualized environments which both will improve resource utilization and prove more secure and reliable computing environments. These projects will drastically improve the manner in which core IT services are delivered. Both projects are behind schedule in delivery; however, they are scheduled to deliver new capabilities in FY2012 and complete in FY2013.
ITAG2: Optimize total cost of ownership by balancing the costs of new investments for upgrades and replacements with operations and maintenance costs.		Converting the refresh strategy from a percentage annual refresh to a forklift ⁴ approach will optimize the investment in servers, storage, and desktops, while reducing the cost associated with refreshing equipment. Tying the refresh with operating systems upgrades will also reduce user distribution and reduce cost of performing upgrades. First forklift upgrades will begin in FY2012 and complete in FY2013. Experience with these forklifts will help simplify future forklifts. IT is currently projecting that all infrastructure categories will grow at or below the rate of inflation.

⁴ Forklift is an approach when all hardware is replaced in a relatively short time period. This approach creates a highly homogenous environment and enables cost savings resulting from discounts associated with bulk hardware buys.





<p>ITAG3: Balance individual business unit's immediate requirements with Agency strategic objectives by delivering flexible and extensible assets that meet current objectives and can be leveraged to meet future strategic business objectives, resulting in reduced future delivery times and least total cost of ownership.</p>		<p>Although the PMO has a mature process for managing business needs, the practices of Enterprise Architecture is maturing. Introducing enterprise architects to perform high level alignment across multiple projects has only achieved limited success at best. Friction between project managers, who often either don't understand or acknowledge the role of enterprise architects, and enterprise architects, has emerged. Since the project managers control project resources, to date, the enterprise architects have been unsuccessful in aligning projects to create more enterprise ready solutions. The majorities of projects being delivered are still being designed to meet individual business unit's needs and are not optimized to provide long term enterprise solutions.</p>
<p>ITAG4: Securely maintain and operate assets in accordance with Federal and Industry regulations and laws.</p>		<p>Although strides are being made to require FISMA documentation for all systems, many legacy systems still need to have robust system security plans developed. System Security Plans are required as part of the System Life Cycle. Projects have been implemented to retire long standing Plan of Action And Milestones (POAM) items like patch management. Desktop and server configuration baselines have been established for the new operation systems along with change management process.</p>
<p>ITAG5: Institutionalize Operational Excellence through the adoption of maturity models to continuously improve processes, practices, and service delivery, maximizing the value of our IT assets and reducing the cost of operations and maintenance.</p>		<p>Both the Data Center Modernization and Desktop Modernization Projects include advancing operation along a maturity model. The Software Development and Operations manager is exploring several maturity models such as the Software Engineering Institute's Capability Maturity Model.</p>
<p>ITAG6: Become a strategic partner, advising and assisting business units and the Agency in leveraging technology to meet and achieve their objectives.</p>		<p>Application Managers are beginning to use their asset plans as a tool to engage their business partners in discussing future needs for automation. IT is partnering with several key initiatives such as Wind Integration and Market Shaping to aid in aligning IT and Business objectives.</p>

Table 1.3: Status of Information Technology Assets Collectively Meeting High Level Goals

Risks to IT Assets

ID	Risks	Issue	Mitigation
R1	Failure to implement a process to enable re-alignment of capital to expense to meet	Selecting Software as a Service, or other cloud based services, as a project's solution requires access to expense funds when capital funds had been programmed in the	Work with Finance to develop budgetary flexibilities so that capital versus expense assumptions in budgets do not

	emerging business objectives.	information technology budget. Change in costs of servers has shifted from capital to expense. Issue is budgets were built assuming capital funds would be required for replacement servers instead of expense.	impede the selection of SaaS alternatives if they are operationally and economically more sound than software purchase/installation alternatives
R2	Failure to either replace contractors or to enable timely on boarding of new contractors.	There is currently a high contractor turnover of approximately 30%. Under current practices for acquiring supplemental contractor support takes approximately 2-3 months. Given this time to hire, replacing a departing contractor can leave an operational hole and impact operational reliability – this can impact the operational stability and reliability of information technology assets. Delivery of new assets can be delayed both by the time it takes to on-board a new resources or replace a departing resource.	Develop a workforce strategy to how best to staff the Agency’s IT workforce. Method for improving contractor on boarding processes needs to be implemented.
R3	Failure to fund reliable operations and maintenance for new assets delivered by capital projects.	Capital projects are delivering new assets, typically projects to Applications Portfolio each year; however, there has been no linkage between approvals of these capital projects with the associated expense burden required to reliably support these new assets.	Develop a process to either increase operation & maintenance budgets to accommodate new service contracts and support staff .
R4	Failure to adequately fund enhancements to meet evolving business requirements.	To offset increasing operation and maintenance costs from new systems, enhancement budgets have been and continued to be reduced, limiting the number and timeliness of implementing enhancements to meet business requirements.	Develop a process to either increase operation & maintenance to preserve enhancement budgets and/or establish transparency on which enhancements will be curtailed.
R5	Failure to either fully achieve benefits from Desktop Modernization and/or be delayed in achieving benefits.	The introduction of a virtual desktop infrastructure (virtual desktops and application streaming) is a key element in controlling the cost of office automation operation and maintenance cost. Delays in implementation delays benefits, adding upward pressure on the office automation expense budget.	Modernization of the desktops is a project. Timelines, scope, and budgets are being tracked per the PMO processes for projects.
R6	Failure to either fully achieve benefits from Desktop Modernization and/or be delayed in achieving benefits.	Consolidation and virtualization of servers, along with increased management tools, are key elements to controlling the operations and maintenance costs for the data center. Delays in implementation delays benefits, adding upward pressure on n expense budget.	Modernization of the data center, which includes consolidation and virtualization, is a project. Timelines, scope, and budgets are being track per the PMO processes for projects.

Table 1.4: Common IT Risks

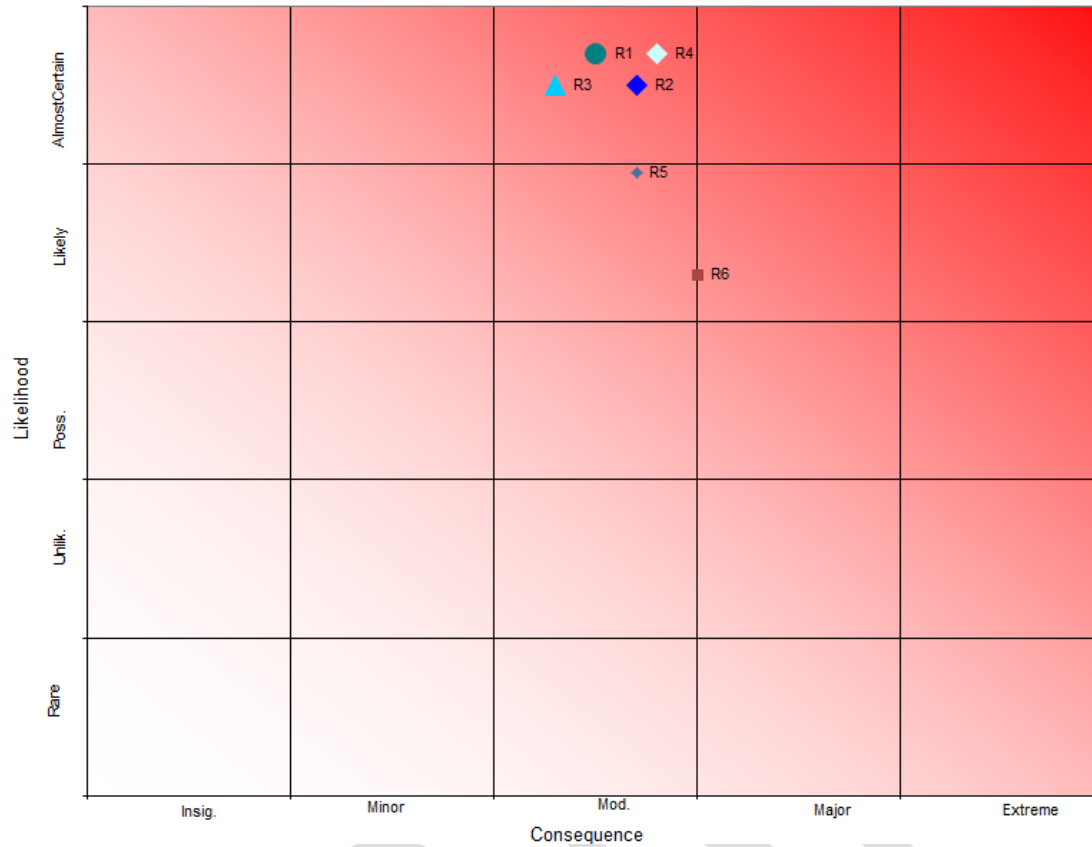


Figure 1.5 Overall IT Risk Map

Information Technology Strategies

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
<p>Drive costs out of Infrastructure through leveraging</p> <ul style="list-style-type: none"> Standardization Automation of IT tasks Process Improvement Restructuring Refresh Methodology 	<ul style="list-style-type: none"> Natural outcome of improving operations through standardization and automating IT tasks will be both increased operational reliability and lower operational costs. Restructuring refreshes will reduce overall costs of conducting refreshes 	<ul style="list-style-type: none"> Current IT staff culture does not embrace automation of IT tasks. Implementing automation has been slow, but is proceeding. Reductions in staffing to capture savings (largely avoided contractor hires) 	<ul style="list-style-type: none"> Key elements of the Data Center Modernization Project will automate provisioning of standardized images. Data Center Modernization and Desktop Modernization Projects are implementing IT's restructured, "forklift", refresh methodology.
<p>Develop and Implement Work Force Strategy</p>	<ul style="list-style-type: none"> Reduce time to on board staff resources Improve operational reliability Improve project support Increases likelihood of business continuity 	<ul style="list-style-type: none"> 40-60% of IT labor will be contractors due to limits on federal billets Need to develop consensus around which positions are a best fit for federal positions versus supplemental level Reductions in staffing to 	<ul style="list-style-type: none"> IT is working with HCM to develop federal work force alignment IT is exploring various supplement labor options

		capture savings (largely avoided contractor hires)	
Develop mechanism to accommodate shifts from capital to expense.	<ul style="list-style-type: none"> • Enable the adoption of Software as a Service solution when appropriate. • Enable rapid response as infrastructure components drop below capital threshold. 	<ul style="list-style-type: none"> • IPR process requires long term projection of capital and expense needs and does not accommodate rapid changes that occur in IT within an IPR cycle. • Currently no BPA process to accommodate shifts. • Rapid evolution of technologies and services in the market place 	<ul style="list-style-type: none"> • Without development of means to reprogram capital to expense, IT runs the risk of either exceeding its expense budget and/or rejecting Software as a Service Solution when it is operationally and economically preferable.
Develop process to ensure operational funds are in place to reliably support new assets.	<ul style="list-style-type: none"> • Ensures resources are available to reliably support all assets. • Avoids reducing resources for enhancements 	<ul style="list-style-type: none"> • Capital projects are being approved to deliver new assets while their support costs are not linked to project approval. • Savings from infrastructure improvements are being outpaced by new expense requirements • Expense budgets are not increasing fast enough to meet new operational requirements. 	<ul style="list-style-type: none"> • Need to work with Agency stakeholders to development a means to tie approval of capital projects to additional funding required to reliably support new assets; otherwise, resources available for system enhancements for all assets will need to be reduced to ensure operational reliability of all production systems.
Instill culture of continuous improvement and operational excellence.	<ul style="list-style-type: none"> • Reduction in operations cost • Reduction in development costs • Improved operational reliability • Improved customer satisfaction 	<ul style="list-style-type: none"> • IT staff does not currently have a culture of continuous improvement nor had exposure to IT based maturity models/frameworks. 	<ul style="list-style-type: none"> • Process improvement is an element of two infrastructure projects and includes the adoption of an ITIL based maturity framework • IT will be exploring the adoption a maturity framework to cover software development.

Table 1.6: Summary of IT Asset Strategies

Asset Outcome Measures

Table 1.7 contains measures for achieving the IT asset objectives. This table includes a number of Key Performance Indicators which have been developed for assessing the overall implementation of the IT Asset Strategy. The background for these indicators and details are included in Appendix G.

IT Asset Objectives	Asset Portfolio Measures
ITAG1: Enable the Agency to reliably and securely use IT resources to effectively and efficiently perform work while maximizing utilization of IT resources.	<ul style="list-style-type: none"> • Software license compliance and recovery of eligible licenses. (IT Performance Indicator – see Appendix G) • Ratio of Windows Virtual Servers to Physical Servers. (IT Performance Indicator – see Appendix G)
ITAG2: Optimize total cost of ownership by	<ul style="list-style-type: none"> • Average Cost of supporting a personal computing device at

balancing the costs of new investments for upgrades and replacements with operations and maintenance costs.	<p>BPA. (IT Performance Indicator – see Appendix G)</p> <ul style="list-style-type: none"> • Printer utilization operation and maintenance costs. (IT Performance Indicator – see Appendix G) • Length of time equipment has been in-service compared with industry recommended benchmarks for age related replacement of equipment. (IT Performance Indicator – see Appendix G) • Data center operations and maintenance costs. (IT Performance Indicator – see Appendix G) • Application Operations and Maintenance costs. (IT Performance Indicator – see Appendix G)
ITAG3: Balance individual business unit's immediate requirements with Agency strategic objectives by delivering flexible and extensible assets that meet current objectives and can be leveraged to meet future strategic business objectives, resulting in reduced future delivery times and least total cost of ownership.	<ul style="list-style-type: none"> • Utilization of network circuits and links. (IT Performance Indicator – see Appendix G) • Ratio of estimated enhance backlog costs to enhancement budget
ITAG4: Securely maintain and operate assets in accordance with Federal and Industry regulations and laws.	<ul style="list-style-type: none"> • Percentage of test and production servers adhering to a certified baseline. (IT Performance Indicator – see Appendix G)
ITAG5: Institutionalize Operational Excellence through the adoption of maturity models to continuously improve processes, practices, and service delivery, maximizing the value of our IT assets and reducing the cost of operations and maintenance.	<ul style="list-style-type: none"> • Achieve Standardized maturity level in Data Center operations by FY2013 and Rationalized maturity level by FY2015 based on Microsoft Operations Framework. • Achieve Standardized maturity level in Office Automation operations by FY2013 and Rationalized maturity level by FY2015 based on Microsoft Operations Framework.
ITAG6: Become a strategic partner, advising and assisting business units and the Agency in leveraging technology to meet and achieve their objectives.	<ul style="list-style-type: none"> • Asset plans are used to identify 70% out year capital projects starting with FY2014 capital planning cycle. • Asset plans are used to identify out year enhancements resource requirements starting with FY2014 budget cycle.

Table 1.5: Information Technology Asset Portfolio Outcomes

Information Technology Prioritization Process

There to broad categories of information technology projects; infrastructure and applications. Infrastructure project covering changes in network, voice, office automation, and datacenter projects. On average infrastructure projects account for 25-30% of the capital spend. Application projects are driven by business need such as improving generation forecasts, dynamic and sub-hourly scheduling, or introducing innovation to achieve business efficiencies. Projects to enable or enhance continuity of operations and disaster recovery typically include both infrastructure and applications.

There are two distinct approaches to prioritizing information technologies projects, one for the infrastructure portfolios and another for the Application Portfolio. This is due to difference in infrastructure assets compared to application assets. One main difference is that hardware wears out and fails. Software does fail as well, but not due to mechanical parts wearing out. Software operational failure is often due to applying patches to the underlying operating systems. These

patches can be deferred, often with the trade-off of accepting risks from not applying security patches or delaying implementing new software capabilities.

Infrastructure Prioritization Process

Infrastructure projects are initiated to

- Prevent technological obsolescence,
- Avoid operational failure, and/or
- Gain efficiencies through innovation.

The timing of infrastructure projects is designed to balance these objectives against the assets' time in service to enable us to optimize the asset's value and performance while ensuring we maintain operational stability by avoiding failure. Appendix C contains a summary of our hardware refresh rates which blends industry best practices with our desire to optimize value based on usage and BPA's environment.

Infrastructure projects are internally prioritized through discussion between the infrastructure managers, the CTO, and the IT Asset Manager. These internally prioritized projects are then submitted through the Project Management Office (PMO) to Agency Prioritization Steering Committee (APSC) to prioritize in conjunction with business driven application projects. As the APSC prioritizes the infrastructure projects with the application projects, the infrastructure projects are added to the Capital Work plan, see section 6.

Infrastructure Strategy

Two general approaches to maintaining the infrastructure and introducing innovation have been considered. The first approach is an annual refresh of the environment. The second approach is a periodic wholesale refresh of the hardware with the period set by the hardware refresh rate (for examples, a wholesale replacement of servers would occur every five years).

Annual percentage refresh prove to be inefficient as it created a diverse number of models being supported, introduced continual disruption as systems were re-hosted on new hardware, and did not address uniform migration to new operating systems.

A complete refresh of the environment aligned with the hardware refresh rate, referred as a forklift, provide economies of scale in purchasing hardware, creates a extremely homogenous hardware environment, allows for migration to new operating systems, and minimizes disruption to the production environment.

As a result of the economic and operational benefits, BPA has adopted a forklift approach to hardware refresh for its non-grid environment.

Application Project Prioritization

Application projects are driven by emerging business needs. The majority of applications projects are delivering new capabilities. This is true even for replacement projects like the SLICE replacement which is replacing an existing with a modernized system with additional new capabilities and support requirements.

Application projects are prioritize within each business unit and then bought to the APSC to be prioritized within the Capital Work Plan. Section 6 has a description of this prioritization process.

NJ does not currently have a robust System Architecture that documents all aspects of our systems. For example, we do not have not full documentation value and performance of each application or target dates for sun setting applications. Currently the decision to sunset an application is based on the perceived value the application is providing the business units and not defined overall cost and performance metrics. NJ is in the process of developing and maturing application asset plans to include this information.

As a consequence of not having mature Application Asset Plans, a mature document System Architecture, and having the application being driven by emerging business needs, NJ is not capable of projecting application project beyond two to three years out.

Application projects are prioritize within each business unit and then bought to the APSC to be prioritized within the Capital Work Plan. Section 6 has a description of this prioritization process.

Slice – Example of Replacement Projects Delivering New Capabilities

The current Slice product is being re-designed and negotiated with customers as part of the Regional Dialogue process with the goal of offering 20 year term, to include an agreement in principle on a method for FY2012-2028 Slice contract.

The concept is to design a water routing simulator and system model that reasonably represents the energy capability, along with the peaking, ramping and storage flexibility of the federal system available after all operational constraints and system obligations faced by BPA are met.

The project will involve the development of the Slice Computing Application (SCA) comprised of a number of tightly integrated applications, including the following:

Slice Water Routing Simulator (SWRS) and Balance of Slice System (BOS) module. These applications will be integrated with key BPA systems to provide Input Parameters that relate to the FCRPS (i.e. elevations, discharge, stream flow forecasts, etc.). Additionally, the applications will allow Slice customers to model generation, elevation and discharge requests and examine the results of the simulated operation.

Expense – System Enhancement Prioritization

The reliable and secure Operations & Maintenance (O&M) of IT systems and infrastructure is non-discretionary and will be funded first. This means that the activities supporting the operations of existing assets will be fully funded prior to funding discretionary activities such as enhancements or infrastructure refreshes. The remaining expense funds available to IT are allocated to project expense costs and system enhancements. Currently, system enhancements are prioritized between the business units and the supporting IT resource managers. Enhancements are executed based on availability of resources.

Funds and resources to date have been allocated to IT resource managers based on historical spends and availability of funds. With the development of assets plans, a more holistic approach is being

developed where resources will be programmed and allocated to meet long term system needs. For example, a major upgrade of a complex system, a billing system for example, will require increased funding in the year of the planned upgrade. Through the development of asset plans, resource managers are engaging business users on their longer term needs and how those needs translate into system enhancements or upgrades along with any associated additional resources requirements. These individual system requirements are starting to be documented and collected through the asset plans. Through this developing process both the business and IT resources managers can develop justification for resources allocations. These requests can be collectively prioritized against IT's limited expense budget and then allocated to implement these enhancements. These asset plans, containing resource requirements, will be used in formulating future budget requests to help ensure expense funding is at the level to meet the Agency's evolving business needs. The intent is to mature this process to develop a 5 year projection of expense requirements for both O&M and system enhancements.

It should be noted, that under the newly released SLC, capital projects are required to deliver to the supporting resource manager an asset plan for the new system that details the new system's upgrade and enhancement schedules with associated costs. These activities and cost will be incorporated into the asset plan for the category and used in updating the overall IT Asset Strategy as well in budget formulation for out-year budgets.

Impact of Capital Reduction

IT Capital represents, on average, approximately 5% the Agency's Capital spending. IT Capital is used to maintain the reliability of IT infrastructure and to meet the Agency's business needs. IT infrastructure must be maintained to a minimum level to prevent disruption to operations, business systems, or loss of revenue.

Currently IT infrastructure is running at between 25-30% of the IT capital spend each year. IT has adopted long term strategies (see section on Network and Data Center for details) to minimize disruption and reduce costs from modernization efforts. The major modernization efforts are summarized as

- FY2012/2013 Complete first modernization of Data Center
- FY2012/2013 Complete implementation of Virtual Desktop Infrastructure
- FY2012 Archive 130TB of Static Images
- FY2012/2013 Field Upgrade (update WAN switches in preparation for IPv6 & VoIP)
- FY2012/2013 Migrate to Oracle Database Appliance
- FY2012/2013 Migrate to Exchange 2010 (on premise or off)
- FY2012/2013 Migrate Data Center core to 10Gb/s
- FY2013 Enhance Remote Access to support Telework
- FY2013 Replace Voice mail with Unified Communication solution
- FY2013/2014 Telephone and Voice System Upgrades
- FY2014 Refresh 100TB of Storage
- FY2014/2015 Network modernization and move to IPv6
- FY2016 Refresh 650TB of Storage
- FY2017/2018 Data Center modernization (includes move to new server operating systems)

- FY2018 Add 100TB of Storage
- FY2019 Refresh 100TB of Storage
- FY2021 Refresh 550TB of Storage
- FY2021/2022 Network gear modernization

A capital project has been initiated to improve IT disaster recovery for non-critical business systems. This project is currently in initiation/planning will probably move into execution during the FY2013/2015 time period.

Given the IT infrastructure requirements to maintain a reliable infrastructure, cuts to the IT capital program will result in the reduction of projects to meet evolving business needs. Since IT maintains a prioritized work plan, the net result will be moving the cut line up and reducing the number of business projects IT delivers. The net effect will be delays in delivering efficiencies in business processes and possible delays in achieving business saving or enabling additional revenue. In some cases, customer desired improvements may be delay.

Due to the role information technology plays in achieving the Agency's business objectives - achieving Agency's efficiencies, savings, and meeting customer driven improvements – the Agency has not elected to reduce the IT Capital Program below its current rate of approximately 5% of the overall Agency Capital Program,

2. Office Automation Portfolio

Assets in the Office Automation Portfolio are organized into three major categories:

- **Hardware:** the physical IT devices provided to employees to help them accomplish their missions.
 - Fixed computing devices (traditional desktop PCs and thin clients)
 - Mobile computing devices (e.g. laptops, smart phones, tablets)
 - Imaging devices (e.g. network or personal printers, copiers)
 - Multimedia/presentation devices (e.g. projectors, conference room flatscreens)
 - Specialized devices (e.g. ergo keyboards, scanners, cameras, track balls)
- **Software:** the desktop software titles provided to employees to help them accomplish their missions.
 - All personal computer software titles
- **Tools:** the management software and expertise used by the support staff to manage the Office Automation assets and service delivery.
 - Management software (e.g. MDT/MDOP, SCCM, SysTrack, AppSense, Expert)
 - Staff knowledge and skills

These assets touch almost everyone in the Agency by providing a personal desktop system, mobile devices, print capabilities, and desktop software. These are areas where IT can partner with end users and business units to jointly develop objectives and strategies. The over-arching goal is to provide cost effective and reliable desktop services to enable the Agency to perform its mission and achieve its business objectives. There are multiple strategies and combinations of strategies available to IT to achieve a balance between cost effective delivery of services and the delivery of new and/or evolving reliable desktop services. Desktop Modernization, a project delivering virtual desktops to 50% of BPA users and implementing application streaming, is the cornerstone of new technologies being delivered to reduce service time to delivery and control and reduce desktop costs. As will be seen, IT must move beyond using standards alone to continue to achieve cost savings and begin transitioning from our current basic level of operational maturity to the next level by continuously improving processes and through the introduction of greater automation into the delivery of IT services.

Goals & Objectives

The following table shows the alignment between Office Automation and IT Asset Goals

Office Automation Objectives	Aligns with IT Asset Goals	Outcomes
Leverage technology to provide superior services to end users.	ITAG 1 – P ⁵ ITAG 6 - S	<ul style="list-style-type: none"> • Features of a Virtual Desktop Infrastructure (VDI) are deployed to enable on-demand delivery of select desktop applications regardless to meet the majority of end users, without regard to the end-user device. • Self-service is enabled to allow users self-provisioning of selected software titles. • Software usage is tracked to reclaim unused titles and make them available to other end users, as well as enabling reduction of titles due to low utilization or redundant function. • Remote assistance is used to provide first call resolution. • The help desk knowledge library is maintained to reduce problem resolution time.
Services are delivered and asset components are maintained in compliance with Federal laws and regulations.	ITAG 4 –P ITAG 3 - S	<ul style="list-style-type: none"> • Desktop systems are provisioned through the use of automated management tools to ensure each deployed desktop adheres to a United States Government Configuration Baseline (USGCB) documented baseline. • Automated tools are used to track and confirm compliance between deployed software and software licenses.
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	ITAG 5 – P ITAG 2 – S ITAG 3 – S	<ul style="list-style-type: none"> • Desktop hardware and software refreshes are sufficient to meet reliability and security objectives while optimizing the total cost of ownership, using concentrated whole-replacement efforts (forklift) as opposed to annually metered replacements. • New investments are shown to remain within established budgets and contribute to reducing the total cost of operations. • The Microsoft Operations Framework (MOF) is used to provide effective operations and service delivery, targeting operation at the Rationalized level in CY2013. • Lifecycle planning and forecasting are applied to all of the asset categories.

Table 2.1: Office Automation Portfolio Objectives

⁵ Each objective relates to a single primary goal indicated by “P”; objectives may also relate to secondary goal(s), indicated by “S”.

Asset Current State

The Office Automation Portfolio maintains 5,462 desktop systems to support approximately 4,200 staff members, a ratio of 1.3 desktop systems per employee which is high compared to similarly situated organizations⁶. Through introduction of standards and refreshing heterogeneous and poorly performing systems, NJ has been able to control and reduce the overall cost of IT operations from FY2005 to the present. As will be seen under the strategy section, both NJ and Industry's thinking on managing desktops has evolved since NJ was formed in FY2005. The IT organization currently has a Desktop Modernization project in progress that includes providing desktop operating systems and applications in a virtual manner, and moving the desktop environment from Microsoft Windows XP to Microsoft Windows 7 along with specific fixed and mobile computing device upgrades where applicable. As of this writing, the virtual environment and USGCB-compliant configurations have been proven technically feasible through pilot efforts, and the roll-out planning is under way.

In FY2005 the decision was made to move to an 80% laptop and 20% workstation environment.

The rationale for this decision included:

- Reducing laptop loaner pooler inventories and associated administrative costs
- Enabling users to use laptops in meetings
- Enabling and facilitating telecommuting
- Facilitating COOP scenarios

However, in FY2010 the decision was made to reverse this trend back to a target of 20% laptops and 80% workstations in the environment. This change was driven by shrinking expense budgets, increased demand for expense services, and the higher relative cost of laptops over workstations. In addition, it was determined that the expected increase in demand to use laptops in meetings or in support of telecommuting, and requirements for supporting COOP, did not materialize. In spite of this FY2010 decision, purchases of laptops in FY2010 and FY2011 outstripped purchases of workstations largely due to like-for-like replacements of older failing systems. Laptops currently account for 65% of the desktop systems and workstations account for 35%. With the advent of new technologies such as virtual computing, these targets are changing as is detailed in the strategy section.

Figures 2.1 and 2.2 show the age distribution of the Agency's workstation systems. As can be seen from Figure 3.1, 47% of the laptops are past the industry best practice refresh cycle age and 58% of workstations are past their refresh age. The impact of the aging fleet of desktop systems is an increase in individual desktop systems failing with associated increase in maintenance costs in repairing and returning these systems to operation and a loss of staff productivity from the staff member whose system has failed. Industry reports show that keeping workstations in service from the third year to the fourth year adds an average additional cost of \$126⁷ per device in costs, while keeping the device in service an additional year (5 year refresh cycle) adds on average another \$150 per device in costs. At this point cumulative operating system errors and the increased cost of replacing failed hardware components drive the total cost of ownership up. Due to deferring refreshes, the Agency's workstation fleet exhibits an age distribution that has driven up the total cost

⁶ IT Computer Benchmark for Bonneville Power Administration, Computer Economics, March 2009.

⁷ "Using Total Cost of Ownership to Determine Optimal PC Refresh Lifecycles, Morey and Nambiar, Wipro Consulting Service Product Strategy and Architecture Practice, January 2010.

of ownership. Refreshes of the fleet are planned for FY2012 to coincide with the roll out of a new operating system and Office productivity suite, with some new technologies and strategies to reduce the total cost of ownership.

It should be noted that refreshing desktops and laptops are discretionary in the sense that refreshing desktop systems can be slowed down or pushed out. This was done from FY2007 through FY2009, to fund increasing maintenance in the Application Portfolios (see figure 1.1). Desktop refreshes were suspended in FY2008 and again in FY2009 in order to support and achieve the Agency's financial targets for IT. Approximately one third of the fleet was replaced in FY2010 and FY2011 as break/fix activities.

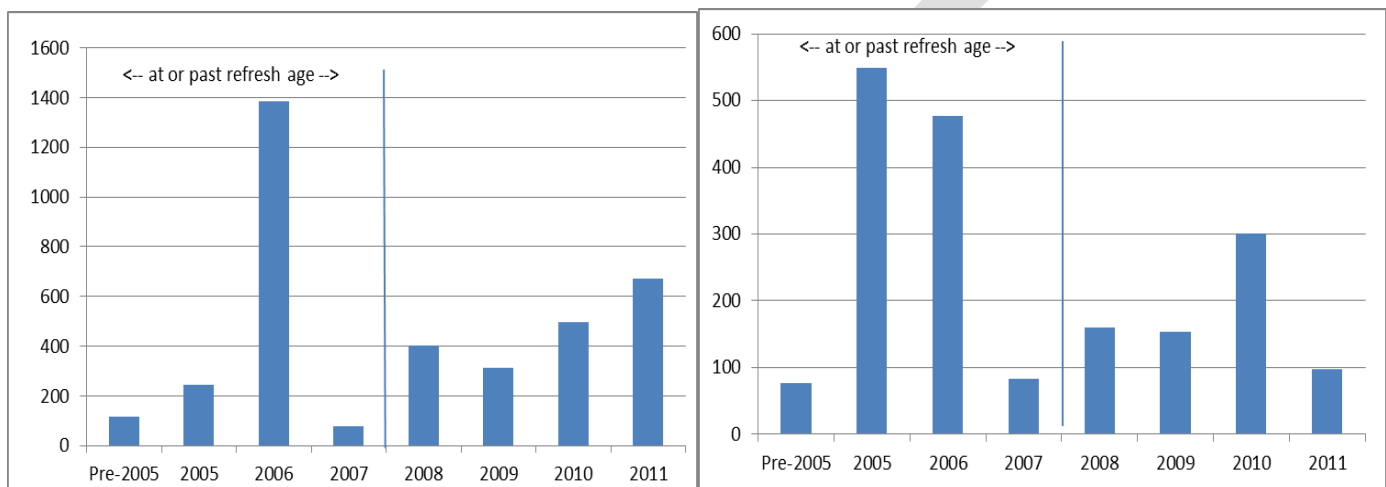


Figure 2.1: Number of Laptops by Year Procured **Figure 2.2: Number of Workstations by Year Procured**

Figure 2.3 shows a similar chart of the age distribution of the Agency's fleet of printers. One third of the total are in their eighth year or more of service, needing more frequent repair with parts that are increasingly hard to find, and using ink technologies that become more expensive to provide with age. This pushes the total cost of ownership higher. It is also noteworthy that the ratio of personnel to printers is 3.7. Specialized printing requirements and the need for confidentiality can only partly account for this low ratio. NJ needs to partner with clients more closely to lower the total cost of ownership in this area. In particular, a concerted effort to pilot the use of multifunction printers (MFP) at the Agency needs to be undertaken to better understand how this technology can be leveraged to increase efficiencies and reduce costs through:

- Energy savings
- Bulk purchase of standard consumables
- Quicker replacement/swap time (eliminate driver re-loads)
- Streamline print server management & support

FY 2012 BPA IT Asset Strategy

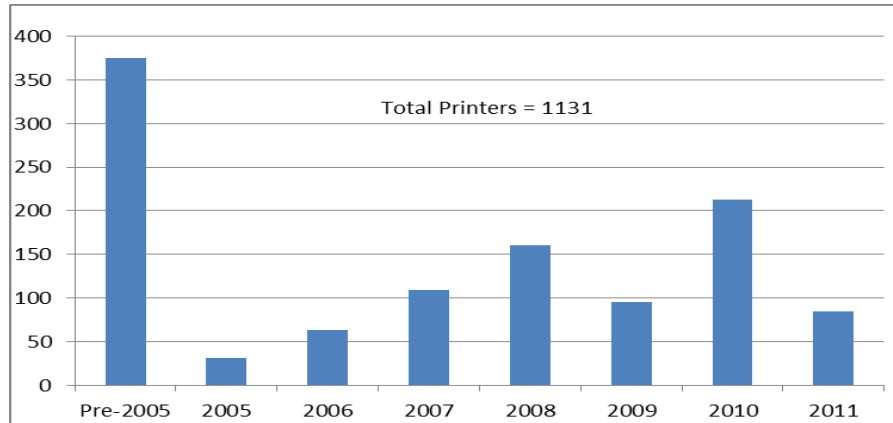


Figure 2.3: Number of Printers by Year Procured

Specialized peripheral devices such as trackballs, scanners, and cameras, as well as multimedia projection devices have are typically handled on an add-hoc basis as requested by clients. Other than asset tagging, there is no concerted effort to manage these assets as the number and procurement costs are relatively low.

The past inability to accurately track assets and software titles has had a profound effect on the Office Automation Portfolio. One impact has been the yearly true up under the Microsoft Enterprise Agreement. Under this agreement IT must report and pay for deployed desktop software titles above an established baseline. Figure 2.4 shows the annual true-up costs through FY2011. At the end of FY2011, NJ was able to successfully deploy the System Center Configuration Manager (SCCM) and SCCM Expert automated management tools and is on the verge of using the tools to drastically improve asset tracking and usage information for Office Automation assets.

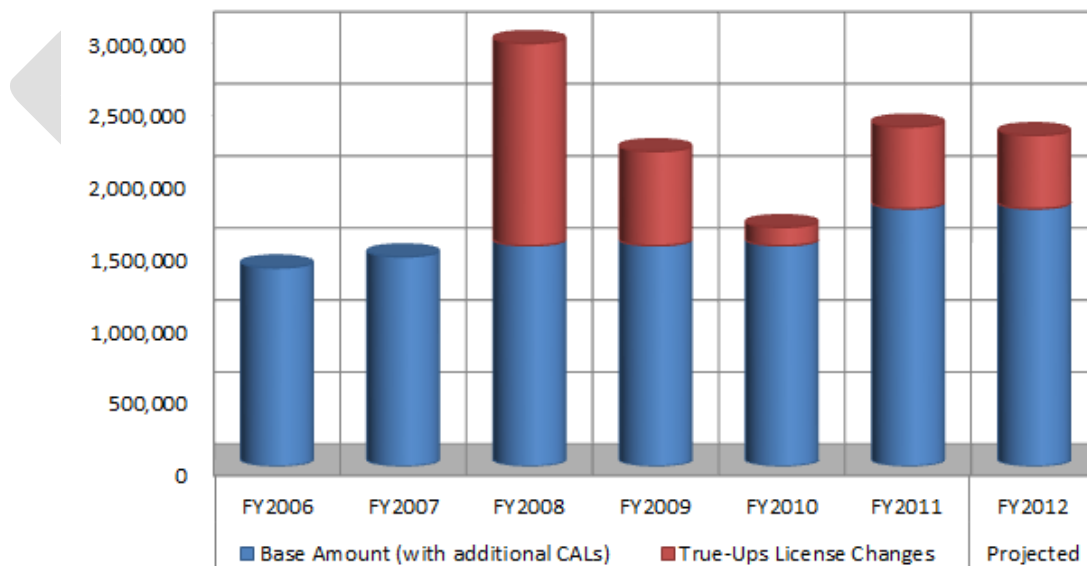


Figure 2.4: Annual Enterprise Agreement True-Up Costs

In FY2010 a concerted effort was made to identify and reduce the number of Microsoft licenses back to the last baseline. As can be seen in Figure 2.4, this effort was successful but it was a resource

intensive manual effort. As part of the Desktop Modernization project currently in progress, software management tools are being implemented to look at software installations and metering across the desktop fleet in a different manner, enabling IT personnel to provide analytical data in the effort to further rationalize not only Microsoft products, but any software title.

Although early versions of these tools were partially implemented in time to provide some additional information for negotiating the new Enterprise Agreement in the first quarter FY2011, they were not completely understood nor fully deployed. They have helped us to better understand the number of systems and titles we have deployed and are being augmented to increase our ability to effectively meter the usage of these assets. Currently, IT is using System Center Configuration Manager to track desktop software and usage, and to remotely deploy desktop titles (instead of visiting desktops to install or uninstall desktop titles as much as possible), as well as adding SCCM Expert, MDOP, and Lakeside SysTrack to add further capabilities for managing and automating the environment..

An important initiative to improve service delivery, advance Operational Excellence, and control costs was undertaken in FY2010, and began as a pilot program: the research and now roll-out of a Virtual Desktop Infrastructure (VDI). The VDI project successfully tested the viability of thin client deployment at BPA, as well as virtual deployment of applications. Thin clients move computation and storage from the desktops back into the data center while maintaining individual client environments, which improves management efficiencies (restoration of client desktop environments and software deployments can be measured in minutes rather than weeks), facilitates security, reduces power consumption (Greening of IT), and aids in meeting eDiscovery requirements. Other elements of the VDI portion of the Desktop Modernization project include instituting Application Virtualization (savings of approximately \$70 per year per desktop system⁸), and more robust remote access. These benefits are balanced by shifting what would have been expense purchases of desktop units to capital purchases of servers and storage. With the research and potential design complete, IT is currently looking to obtain funding to begin production implementation in FY2012.

Another initiative to improve Operational Excellence begun in 2010 and now producing results as it matures is implementation of the Microsoft Operations Framework (MOF). The MOF initiative began with assessments and training in fourth quarter 2010. This multi-year effort concentrates on process improvement to move Office Automation from the Basic level (bottom level) to the Rationalized level (see appendix B for details on MOF). Several employee-led process improvements based on the MOF model are now in place, with several more under way. The benefits of this initiative include improved service delivery and cost efficiencies.

The current desktop operating system, Microsoft Windows XP with service pack 3, is now beyond vendor mainstream support, with complete retirement scheduled by Microsoft in April of 2014. With the release of Office Suite 2010, June 2010, the desktop office suite is two major releases out of date. IT is striving to reduce the amount of user disruption by aligning the resumption of desktop refreshes with the rollout of Windows 7 and Office 2010. This not only reduces repeated disruptions to staff members of having their desktop systems repeatedly modified, it reduces costs from frequent visits from support staff. In addition, the shift to VDI with Windows 7 and Office 2010 for a target of 2500 clients is expected to ease the transition to the new operating system and to allow IT to re-align

⁸ "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Systems Management Server", Al Gillen, Randy Perry, Seana Dowling, & Tim Griesser, IDC, January 2007.

the deployment of desktop computers so that refresh purchases are low in FY2012. IT is ready to begin communication and training to accompany the roll out of Windows 7, Office 2010, and Internet Explorer 8. Review of our current desktop systems fleet indicates that 53% of the systems will support this major operating system and software upgrade (64-bit processors required) with some augmentation of memory. Deployment of thin clients will allow the re-use of capable end-user equipment to clients whose work does not fit the VDI environment. The migration is scheduled to start in the second quarter of FY2012.

Although the expense budget in the Office Automation portfolio is expected to grow at or below the rate of inflation, there are certain pressures to provide goods or services that could increase the rate of growth, depending on how they are addressed: adopting tablet devices, refreshing printers, and conforming software licenses.




Office Automation Objectives	Status Meeting Objectives	Comments
Leverage technology to provide superior services to end user.		<ul style="list-style-type: none"> • SCCM/MDT/MDOP effort has started to automate OS and layered product delivery, however the delay of Windows 7 roll-out has also slowed this effort. • Next generation OS and Office tools are prepared for delivery to the client base, resulting in more optimal configurations, maintainability, and support for mobile computing. • The VDI implementation is preparing for production roll-out to achieve efficiencies detailed above. • Application sequencing to provide them in virtual manner has begun. • Lightweight Portable Security is nearing production, a method of allowing use of some personally owned devices to remotely connect to BPA networks.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.		<ul style="list-style-type: none"> • USGCB compliance is built in to Windows 7 desktop images and group policies. • Asset management components of SCCM, SCCM Expert, MDOP, SysTrack and process engineering are taking place to assure compliance with software licensing.
Process and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.		<ul style="list-style-type: none"> • Effort is under way to drive MOF/ITIL practices into the IT business. • Thin client and application virtualization pilots are under way to determine the extent that maintenance costs can be driven as low as possible.

Table 2.2: Status Office Automation Portfolio in Meeting Objectives⁹

⁹ Upward arrow indicates that the status trend is improving (e.g. red upward arrow indicates that the status is trending towards yellow), horizontal indicates no change in the trend line, and a downward arrow indicates the status is trending downward (e.g. green downward arrow indicates status is heading towards yellow)

ID	Risk	Mitigation
OA1	Failure to refresh personal computing devices consistent with industry refresh schedules – resulting in desktop hardware (systems and/or components) failing at an unacceptable accelerated rate (driving expenses costs up and causing user disruptions).	<ul style="list-style-type: none"> • Monitor failure rates and maintain sufficient spares to keep systems running. • Establish Service Level Agreements with Supply Chain on procuring units and bench stock parts. • Establish bench stock levels with monitoring of levels and thresholds for replenishing levels. • Move to concerted forklift method of system refreshes to correct MTBF trends. • Shift to virtual computing environments where fit and function align.
OA2	Failure to receive sufficient time to program and to plan for support for arrival of new employees and contractors (impacts desktop system reserves and support levels).	<ul style="list-style-type: none"> • Establish Service Level Agreements with Supply Chain for projecting influx of additional contractors. • Leverage HRmis system and Service Connection to project influx of new hires. • Work with HR to develop projection of future years staffing levels. • Utilize VDI to provide compute resources, as provisioning can be very fast. • Work with Strategic Planning and business units to understand equipment and staff requirements to support major initiatives. • Work with CFO to develop funding of desktop systems, network printers, and desk side support staff to support new initiatives.
OA3	Failure to maintain accurate inventory and deployment information for hardware and software assets.	<ul style="list-style-type: none"> • Identify and implement automated management software tools to track software titles and software usage, and deployed hardware. • Review and improve current process for tracking hardware assets; investigate RFID tagging and other automated methods. • Work with IT Program Office to validate and refresh current license base. • Prepare and deliver clear and concise direction to all staff describing these roles and responsibilities. Collect signed memo of understanding from staff members. • Place accountability and consequence language into the BPAM and performance plans.
OA4	Failure to base cost justification for software based on utilization/benefit of deployed software.	<ul style="list-style-type: none"> • Review and improve current process for reclaiming software licenses. • Utilize management software tools provided by DMP to identify and meter all software titles. • Develop a methodology for renting software and role-base provisioning.
OA5	Failure of existing software to run on 64-bit Windows 7 with USGCB settings (may require upgrades or replacing with a different compliant product).	<ul style="list-style-type: none"> • Strengthen software testing to ensure USGCB compliance. • Leverage DMP effort to identify all at-risk software titles in use, and establish a mitigation plan for each (retirement, replacement, shim, update, virtualization, etc.) • Require exceptions and plan of action/retirement for legacy software.
OA6	Failure to plan and budget of increased demand for Workplace of the Future (including more remote access consumerization of IT products).	<ul style="list-style-type: none"> • Continue to research and mature remote connection technologies through DMP to enable safe use of personally owned devices for remote access. • Evaluate and update BPA policies on use of personally owned devices to leverage emerging technologies. • Evaluate and standardize on tablet devices.

Table 2.3: Office Automation Portfolio Risks

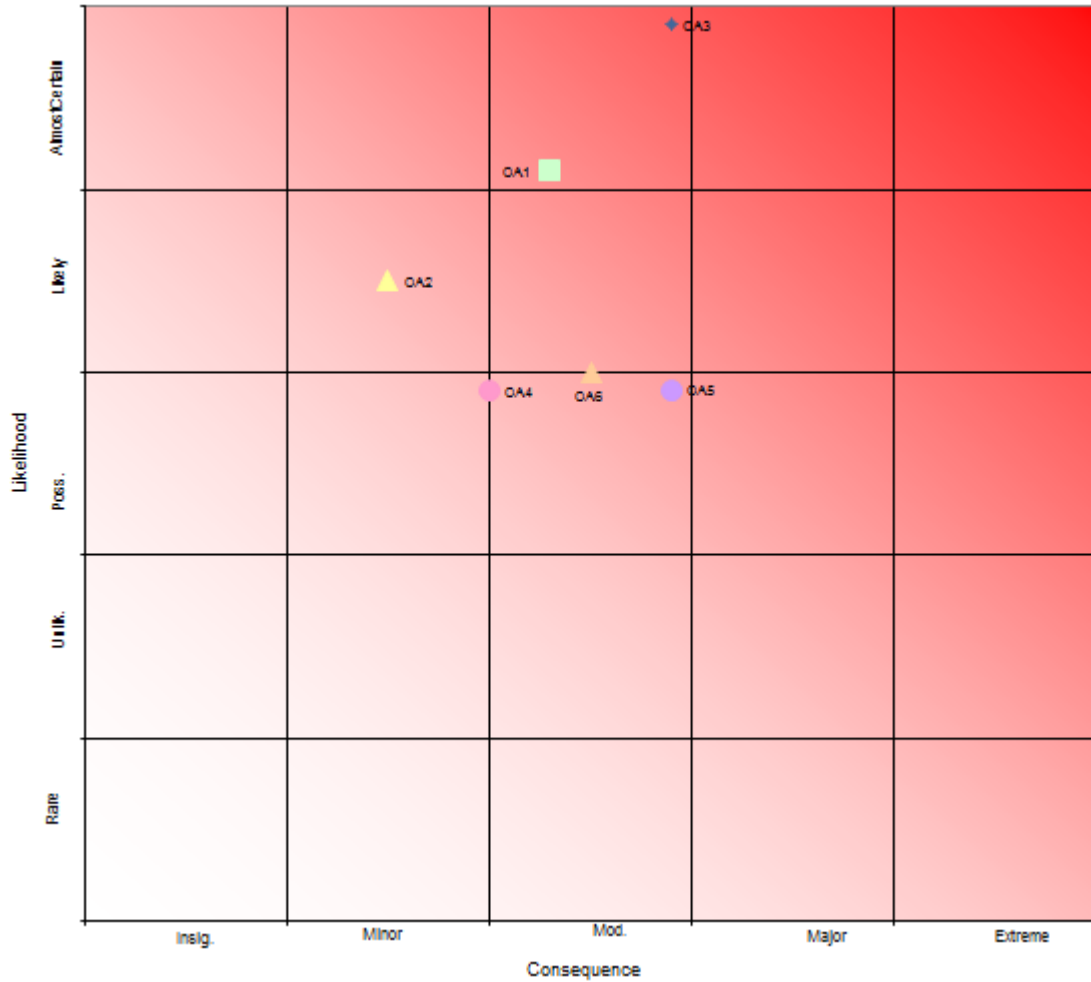


Figure 2.5: Office Automation Risk Map

Strategies

We have already discussed a number of evolving strategies IT is implementing in order to ensure reliable and secure desktop services and meet evolving and emerging requirements while striving to provide these services and maintain office automation assets at the least total cost of ownership. Here we summarize IT strategies, to include benefits, challenges and outlook. These strategies are then linked back to the portfolio’s objectives in Table 2.5.

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
<p>Device Standardization:</p> <ul style="list-style-type: none"> • Standard Laptop • Standard Desktop • LiDAR workstation • Field user – rugged laptops 	<ul style="list-style-type: none"> • Provides devices that meet business requirements. • Reduces cost of developing and maintaining Federal Desktop Core Configuration images. • Aids in controlling costs. • Improves operational reliability. 	<ul style="list-style-type: none"> • Advances in technology allows reducing the number of device standards (.e.g. today’s standard workstation is more powerful than previous advanced workstation allowing for one standard for workstations) 	<ul style="list-style-type: none"> • Continue to use strategy to control costs. • Reduce number of standards as technology advances. • Align device standards with evolving and emerging staff roles.
<p>Maintain 5 year refresh cycle on desktop systems for traditional workstations and laptops.</p>	<ul style="list-style-type: none"> • Extends investment in desktop system with minimum disruption to user. • Aligns refresh cycle with deploying new operating system and office productivity suite – minimizing disruption to end users while reducing total cost of ownership. • Avoids cost associated with current industry recommendation to re-image a system within five years due to cumulative operating system errors. 	<ul style="list-style-type: none"> • Extends refresh beyond industry best practices. Maintaining a desktop increases maintenance cost by \$126/device in the third to fourth year and \$150/device in the fourth to fifth year. 	<ul style="list-style-type: none"> • Adopt and maintain 5 year refresh to optimize total cost of ownership. • (N.B. Thin clients have a longer 7-10 year refresh cycle)
<p>Refresh Schedule: Transition from 20% annual refresh to 5 year “forklift” – completed refresh of workstation and laptop fleet within a single year.</p>	<ul style="list-style-type: none"> • Industry practices shifting to include scheduled fleet replacement versus annual percentage replacement to reduce total cost of ownership. • Achieves improved prices on commodity devices. • Provides increased uniformity in devices reducing image management issues (and costs). 	<ul style="list-style-type: none"> • Requires managing and staffing surge capability to prepare and execute on receiving, distributing, and removing equipment. • Requires budgetary discipline to program and justify repeating 5 year increase in expense budget to execute. 	<ul style="list-style-type: none"> • Transition from planned annual refreshes to “forklift” to align desktop refreshes with new operating systems and office productivity suites to minimize disruption to end users and to achieve least total cost of ownership.
<p>Virtual Desktop Infrastructure:</p> <ul style="list-style-type: none"> • Thin clients • Application streaming • Remote Access 	<ul style="list-style-type: none"> • Moves computational power of workstations into datacenter allowing for improved management and security with reduced labor costs. • Enables application streaming (potential \$155/seat savings) • Desktop units have 7-10 year lifecycle. • Lower desktop unit refresh costs with minimum disruption to end user. • Supports sustainability, Workplace of the Future, and eDiscovery initiatives. 	<ul style="list-style-type: none"> • Thin client devices must be aligned with users’ functional needs (e.g. field user requiring a rugged device would not be a candidate for thin client while most knowledge workers would be candidates). • Unclear if performance will be adequate for field office users and will need to be tested. 	<ul style="list-style-type: none"> • Adopt thin clients with initial target of 2000 users in Headquarters/Ross • Based on success of initial result, determine if number of thin clients should be expanded at Headquarters/Ross.

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
Improve Remote Access: Examine access from non BPA equipment.	<ul style="list-style-type: none"> Reduces requirements for laptops. Supports potential COOP scenarios. Supports Workplace of the Future. 	<ul style="list-style-type: none"> Identifying and ratifying access methodology that allows access within acceptable risks. Identifying network resources that are accessible via remote access. 	<ul style="list-style-type: none"> Investigate and adopt risk informed remote access to network resources.
Device Ratio: Transition from 80% laptop strategy to 20% laptop, 50% thin client, 30% workstation. (Assumes VDI is successful, enabling 50% of fleet to be transitioned from standard workstation/laptop to thin clients.)	<ul style="list-style-type: none"> Controls and contains cost of providing desktop devices. Reduces maintenance costs – laptops fail at a higher rate than workstations Thin clients are low cost commodity items that are replaced on failure minimizing end client's disruption of services. 	<ul style="list-style-type: none"> Culture shift in adopting thin clients: Workstations and laptops are often considered as "personal" work items. Changing from one device to another type may be met with end user resistance and dissatisfaction. May impact COOP and Workplace of the Future plans. 	<ul style="list-style-type: none"> Adopt new device ratio. Develop Agency-level communication plan on the need to adopt devices and explain how this helps the Agency meet its objectives.
Automation: Leverage tools for provisioning new equipment, improving patch management, delivering applications, and monitoring & repairing system/application errors.	<ul style="list-style-type: none"> Improves operational reliability through providing consistency of actions and outcomes. Reduces time to provision and deliver operational devices. Ensures devices are delivered and maintained at known secured baselines. Ensures speedy response to system and device failures, reducing time for return to operation. 	<ul style="list-style-type: none"> Requires labor investment in setting up and configuring tools. Monitoring tools need to be tuned to reduce the number of false positive alerts. 	<ul style="list-style-type: none"> Use management and monitoring tools to ensure operational reliability and to reduce operations costs.
License Tracking/Usage Monitoring	<ul style="list-style-type: none"> Enables identification and removal of unlicensed software. Allows BPA to repurpose underutilized licenses to reduce and control software license costs. Facilitates budget formulation for software licenses. 	<ul style="list-style-type: none"> Initial deployment may identify software licenses that either need to be removed or procured – may be substantial costs to true up licenses. Constrained IT staff time will be needed to implement, tune, and manage monitoring tools and to create reports. 	<ul style="list-style-type: none"> Use tracking and monitoring tools to manage licenses to reduce and control software license costs.
Self Service: Ties automation and license tracking to enable users to download select titles on demand.	<ul style="list-style-type: none"> Enables clients to request and download commonly used software titles through a web interface. 	<ul style="list-style-type: none"> Requires license tracking and monitoring tools to be in place prior to implementing. Requires procuring a tool that will enable requesting and downloading software. 	<ul style="list-style-type: none"> Explore implementing self service in late FY2011 to FY2012.

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
Storage: Develop guidelines and practices for user storage (home drive, shared drives, work groups, Sharepoint, etc).	<ul style="list-style-type: none"> • Supports eDiscovery and electronic records management. • Supports tiered storage, reducing total cost of ownership. • Supports ability to restore valuable files that owner may have accidentally deleted. 	<ul style="list-style-type: none"> • Storage growth has jumped from 5TB/month to 18TB/month; it is unclear if this rate of growth will settle down to a lower value, making planning difficult. • Guidelines have not been developed to provide to users on their file storage options and preferred file management. 	<ul style="list-style-type: none"> • Data Center Modernization project is implementing storage management tools to improve storage projections. • File management guidelines will be integrated into new-hire training, and roll-out of Windows 7/Office 2010.
Process Maturity: Transition from Basic maturity level to Standard and then to Rationalized level.	<ul style="list-style-type: none"> • Improves quality of service to end users, reducing time to repair systems or deliver new software. • Supports Operational Excellence through implementing efficiencies and creating culture of continuous improvement. 	<ul style="list-style-type: none"> • IT staff currently heavily engaged in key programs (e.g. TPIP, REV) and projects (e.g. Windows 7 upgrade) and feel stressed to find time for process improvements. • Some IT staff concerned that finding efficiencies may translate into lower staffing levels. 	<ul style="list-style-type: none"> • Project has been initiated to ensure IT learns how to institutionalize continuous process improvement. • Have set goal of maturing four key processes in CY2012 (basic to standard) and again in CY2013 (standard to rationalized). Processes include: <ul style="list-style-type: none"> ○ Configuration/Change Management ○ Incident Management ○ Problem Management ○ Operations Management
Network Printers Refresh <ul style="list-style-type: none"> • Adopt 5 year refresh cycle. • Transition to managed printer services through centralized monitoring and management tools. • Pilot and transition for multifunction printers (MFP) wherever possible. 	<ul style="list-style-type: none"> • Optimizes total cost of ownership: As printer models age, the cost of toner increases. For printers that are 5 years old, the cost per unit of toner can be twice the first year's cost (cost per unit may continue to rise to 4 times first years cost over life of printer). • Reduces time to repair printer issues. • Provides insight to cost of printing operations. • MFP consolidates devices to reduce energy consumption, reduce consumable costs, speed replacements, and streamline support. 	<ul style="list-style-type: none"> • The temptation and current practice is to continue to use printers past their refresh date. This increases toner cost and can cause print driver issues when upgrading to new operating systems. • Staff often considers shared printers as "theirs", and attempts to remove or consolidate printers to achieve efficiencies are often met with end user resistance and complaints. 	<ul style="list-style-type: none"> • Printers are becoming more efficient and evolving to allow multi function capabilities (scanning, copying, etc). Security issues with multifunction devices are becoming better understood and manageable. Outlook is good to consolidate and leverage these devices (along with employing network monitoring tools) to achieve efficiencies while improving overall agency network printing capabilities.
Cloud-based Services <ul style="list-style-type: none"> • Investigate services for form, fit, function, and security. 	<ul style="list-style-type: none"> • May support least total cost of ownership for specific services (e.g. email, general files storage, collaboration) 	<ul style="list-style-type: none"> • Concept may be viewed as threatening to support staff. • Client re-training will be required. 	<ul style="list-style-type: none"> • Explore cloud maturity and associated organizational change management issues in FY2012 – FY2013.

Table 2.4: Summary of Office Automation Strategies

Asset Portfolio Outcomes

The current status of the Office Automation Portfolio objectives is discussed in detail below.

Office Automation Objectives	Supporting Portfolio Strategy	Asset Portfolio Measures
Leverage technology to provide superior services to end user.	<ul style="list-style-type: none"> • Device Standardization • Virtual Desktop Infrastructure. • Improved Remote Access. • Self Service. • Storage Guidelines. • Network Printers. • Cell Phones. • Cloud Services 	<ul style="list-style-type: none"> • Provision a minimum of 20% client systems with thin clients by 4th quarter FY2012.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	<ul style="list-style-type: none"> • Virtual Desktop Infrastructure. • Improved Remote Access. • Automation. • License Tracking. • Storage. 	<ul style="list-style-type: none"> • USGCB image is certified for Windows 7 with all new client systems deployed with the certified image by 2nd quarter FY2012. • 60% of all client systems are running USGCB certified system by 2nd quarter FY2013. • 100% of all client systems are running USGCB certified system by 4th quarter FY2013.
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	<ul style="list-style-type: none"> • 5 Year refresh cycle. • Forklift Refresh. • Device Ratio. • Automation. • License Tracking. • Process Maturity. 	<ul style="list-style-type: none"> • Transition key processes (Change & Configuration Management, Incident Management, Problem Management, and System Monitoring) from Basic to Standard level of the MOF maturity framework by EOY2012. • Transition key processes (Change & Configuration Management, Incident Management, Problem Management, and System Monitoring) from Standard to Rationalized level of the MOF maturity framework by EOY2013. • Achieve Standard level for all operational process by EOY2013 (See Appendix B) • Achieve Rationalized level for all operational processes by EOY2014. • Control expense budget to below EOY2010 plus inflation through FY2017.

Table 2.5: Office Automation Portfolio Outcomes

3. Data Center Portfolio

The Data Center Portfolio provides the computational resources (servers), Fiber Channel switches, data storage, and other infrastructure components necessary to operate the Agency's Critical Business Systems and Enterprise Systems (see chapter 5 for a discussion of these assets). The Data Center Portfolio contains assets that the typical end users seldom think about. However, this portfolio does contain services that are of interest to the most users, including email (includes controlling spam email) and file services.

Goals & Objectives

Data Center Objectives	Aligns with IT Asset Goals	Outcomes
Align resource utilization with industry practices while providing capacity to meet systems' current and projected average and peak resource requirements.	ITAG 2 – P ¹⁰ ITAG 3 - S	Capacity monitoring is used to achieve optimal resource balancing of key server and storage resources. Capacity planning is use to project future needs, acquiring and deploying additional resources prior to over subscribing existing resources. Introduce multi-tiered to storage (high cost Tier 1 to low cost Tier 4) based on performance requirements to control costs.
Proactively monitor data center resources and services.	ITAG 1 – P ITAG 2 - S	Monitoring tools deployed, tuned, and scripted to automatically respond to threshold events, preventing disruption of production services. Information from monitoring tools is merged to enable event correlation, reducing time to restore services. Establish proactive monitoring tools' thresholds to enable staff to respond to negative trends prior to an event occurring.
Deliver secure, reliable, efficient, and predictable services through the effective use management tools.	ITAG 1 – P ITAG 4 –S ITAG 5 - S	Recurring tasks automated through the use of management tools, ensuring repeatable and consistent outcomes. Provisioning servers adhere to documented baselines. Increased server to server administrator ratios as staff time is freed from performing routine tasks though automation. Standardize and automate backups and storage provisioning resulting in faster turnaround for requested services, reduced costs, and reliable services.
Leverage technology to achieve efficiencies.	ITAG 2 - P	The number of physical servers is reduced from the <i>FY2010 baseline, 1450 physical test and production servers</i> , though consolidation and virtualization, utilizing the increased capabilities of new hardware. Target is a 25-50% reduction from the baseline. ¹¹ The growth of new physical servers (and costs) is controlled through increased standardization, server virtualization, and establishing server farms. Data center energy consumption is reduced as a direct result of reducing the

¹⁰ Each objective relates to a single primary goal indicated by "P"; objectives may also relate to secondary goal, indicated by "S".

¹¹ The baseline is the number of servers needed to support the deployed systems as of FY2010. Projects delivering new system may require new servers and servers supporting disaster recovery will could impact reduction from the baseline.

		<p>number of physical servers from the FY2010 levels.</p> <p>Optimize storage performance while reducing total cost of ownership through implementing tiered storage.</p> <p>Modernize backup technology to reduce backup windows and to improve recoverability capabilities to include introducing de-duplication and snapshots.</p> <p>Implement capacity planning and thin provision to improved storage utilization and reduce storage costs.</p>
Data Center Objectives	Aligns with IT Asset Goals	Outcomes
Achieve reliable and available services to support and meet Agency's Continuity of Operations Requirements (COOP).	ITAG 1 – P ITAG 6 – S ITAG 3 – S ITAG 4 - S	<p>Resources sufficiently redundant to meet Critical Business Systems failover requirements.</p> <p>Resources configured and maintained to meet systems Return to Operations requirements.</p> <p>Resources engineered and maintained to meet Critical Business Systems 99.9% availability of services.</p> <p>Resources configured and maintained to meet Commercial and Enterprise 99.8% availability of services.</p> <p>Leverage replication capabilities in storage solutions and databases to protect structured and unstructured data to ensure Return To Operations (RTO) and Recovery Point Objectives (RPO) can be met.</p>
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	ITAG 4 –P ITAG 3 - S	<p>Continuous monitoring tracks compliance with baselines and detects unauthorized changes from the baseline.</p> <p>Servers provisioned through the use of automated management tools to ensure each deployed server adheres to a documented baseline.</p> <p>All changes to server configurations are performed following the documented change management process.</p> <p>Configuration tools are used to create audit trails on configuration changes.</p> <p>Design and implement all data/file transfers, monitoring and backup solutions operate in a High to Low Security domain to reduce risks and meet security objectives.</p>
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	ITAG 5 – P ITAG 2 – S ITAG 3 – S	<p>Data Center hardware and software refreshes are sufficient to meet reliability and security objectives while optimizing the total cost of ownership.</p> <p>Costs of new investments balanced with operations and maintenance costs to achieve an optimized total cost of operations.</p> <p>Effective operations and service delivery in place as a result of adopting a Microsoft Operation Framework (MOF) for configuration management, change management, incident management, problem management, and operations management:</p> <p>Move from Basic to Standard level in CY2012</p> <p>Move from Standard to Rationalized level in CY2014</p> <p>Deliver a strategy for the of appliances based on combination of performance, operational reliability and total cost of ownership.</p>

Table 3.1: Data Center Portfolio Objectives

Asset Current State

The major aspects of the Data Center Portfolio, describe in greater detail below, can be summarized as:

- Identifying and documenting asset business objectives, and risks

- Server refresh transitioning to five year forklift approach to reduce costs, assist in meeting business objectives, and to align efforts with migrating to new operating system.
- Executing on the Data Center Modernization (DCM) project to achieve improved service delivery, adoption of best practices, improved resource utilization, and control future operating costs. The DCM will transition the data center and is pivotal for achieving major outcomes, associated with the data center objectives, to include server consolidation, virtualization, and hierarchical storage.
- Adopting Microsoft Operations Framework (MOF), an ITIL¹² based operations maturity model, to improve service delivery and reduce future operating costs by aligning people, processes, and technology with service delivery and operations to improve effectiveness and efficiencies.
- Developing metric program to measure performance and value as well to ensure optimal utilization of data center resources.

The current status of the data center is discussed in detail below.

The Data Center Portfolio includes 1,450 servers to support development/testing, production and failover (Alternate Data Center) environments as of the beginning of FY2012. These servers are primarily located in Headquarters and at the Ross Complex. Servers are located at the Alternate Data Center to provide COOP capabilities for the Critical Business Systems. Servers are also located several of the field sites. Standards have been established for Refreshing of servers has adhered to these standards and as a result the data center is highly homogenous which has led to efficiencies and cost reductions.

Industry standards for server and storage device lifecycles typically range from three to five years. The variance in the refresh rate depends on the business objectives. A business which has high concurrent users, high transaction rates and high availability requirements (these include retailers such as Amazon, banks like Wells Fargo, and stock exchanges) typically adopt aggressive three year refresh cycles. BPA is a low concurrent user and transaction environment with high availability requirements. From an operational, reliability, and cost perspective, a five year server lifecycle optimizes total cost of ownership against operational reliability for BPA's business and IT environment.

Prior to the initialization of Data Center Modernization Project in FY2009, servers were replaced as they failed or reached end of life with no attempt to consolidate and optimize resource utilization. This past practice has resulted in a steady increase in the number of physical servers. DCM will introduce consolidated servers hosting between 8 – 20 virtual servers (currently these are physical servers in the data center). Although not all servers are candidates for virtualization and projects are delivering new requirements for servers, DCM is projected to reduce the number of physical servers by 25-50% servers. These servers will adhere to rigorous hardware standards and software baselines.

In addition, storage has been procured on an as needed basis. Management tools have not been implemented to perform resource capacity planning to achieve higher efficiencies, optimized resource utilization, power reduction, automatic provisioning, or configuration management.

¹² ITIL, Information Technology Infrastructure Library, is a set of concepts and practices for [Information Technology Services Management \(ITSM\)](#), Information Technology (IT) development and IT operations.

On average Microsoft releases a major version upgrade to its server operating system approximately every three to five years. The last release was late calendar year 2008. Typically it takes time to understand the operational impact of a new operating system and then develop documented baselines for deploying the new operating system. Typically we adopt a new operating system approximately 24-36 months after release; however, historically due to the lack of a cohesive program to migrate to the new operating system and the time and costs involved across multiple organization to test systems on the new operating system, we straddle multiple versions of an operating system for several years. This increases costs and reduces overall security as we must manage security patches and issues across multiple versions of an operating system. We have a similar situation with databases. At this point in time, we have major release of the server operating systems (Windows Server 2008), and the databases (Microsoft SQL 2008 and Oracle 11g) that we will need to deploy. The Data Center Modernization project has established configuration baselines for all Window 2008 Servers, using automated provisioning, to migrate all systems to these new server baselines by the end of FY2013.

The storage is in a state of flux as storage has been added to facilitate the retirement of aging HP EVA SANS devices (providing 200TB of storage) and to provide storage to provide capacity to use with consolidated serve. In addition, DCM will be introducing hierarchical storage to transition storage from the current practice of using only one type of expensive storage to introducing lower cost storage. For example, 130 TB of static infrequently accessed imagery files have identified that represent a strong candidate for low cost archival storage, or even cloud storage. This represents approximately 20% of current used SANS capacity. In addition, plans are being developed to implement an Oracle database appliance (Oracle Exadata) which will move 70TB off our current storage. Several of the SANs devices are past the manufacture's end of life and have created service disruptions resulting in loss of productivity. DCM will be developing a comprehensive architecture for our storage to address our evolving storage needs with the intent to transition our from current mono tire of expensive SANS devices, many past their operational reliability age, that are over-subscribed from an input/output basis, and are in some cases providing suboptimal performance to the systems using them.






The DCM project will also address upgrading backup capabilities and services. New backup tape drives will be installed to reduce backup windows. In order to achieve full benefits, backup processes will need to be re-engineered to include establishing data retention policies.

As a result of the issues described above, the Data Center represents a rich target for achieving greater efficiencies while improving service delivery and reducing out-year costs. The DCM project was initiated in FY2009 to take advantage and realize these efficiency opportunities as well as to align the efforts of migrating to new server operation systems and databases. Current expectation is the DCM will be completed in FY2013. Some savings from introducing efficiencies will be achieved in FY2012 and FY2013; however, full savings will not be realized until FY2014.

Although on surface the DCM project may look to be a hardware refresh effort, this is less than half of the project's objectives. The Data Center Modernization Project was initiated to ensure we align people, processes and technology with service delivery and operations. This means ensuring we have processes in place to take advantage of the new capabilities being delivered through the project,

both enhanced hardware capabilities and software management tools. The DCM project will also develop the policies and practices needed to achieve efficiencies and ensure operational reliabilities. We also need to ensure our people understand how to take advantage of these capabilities and are following processes based on industry best practices to maximize the benefits from these new capabilities. The main thrust of aligning people, processes and technology will be through the adoption of the Information Technology Infrastructure Library (ITIL) based maturity model Microsoft Operation Framework (MOF). This approach is discussed in more detail in **Appendix B**.

A summary of the how the data center is currently meeting its objectives is presented in Table 3.2. The arrows follow the same convention as outlined for Table 2.2.

Data Center Objectives	Status Meeting Objectives	Comments
Maximize resource utilization while providing capacity to meet systems' current and projected average and peak resource requirements.		<ul style="list-style-type: none"> • Collection of capacity data is inconsistent, and analysis of available data is often overcome by operational events. In FY2012 a capacity planner was added to the organization to help improve resource utilization. • Prior to the DCM project, IT has been unable to effectively continue to consolidate processing to increase component utilization to an optimal level. The DCM project has begun introducing virtualization which is increasing server utilization. • DCM project will recommend and implement additional automation for data collection, and methods to consolidate further. • DCM has worked to develop storage needs and purchased the switching and storage devices to meet requirements.
Proactively monitor data center resources and services.		<ul style="list-style-type: none"> • Hardware resource monitoring is well established. • Service monitoring is improving through leveraging existing technology and researching advanced tools and methods. • DCM is working to develop monitoring requirements and select appropriate management tools to effectively manage and monitor our storage.
Deliver secure, reliable, efficient, and predictable services through the effective use management tools.		<ul style="list-style-type: none"> • Windows Sever 2008 baselines have been established. • Simple use of imaging is currently employed, and more advanced automation for delivery of base images and layered applications has been started. <ul style="list-style-type: none"> ○ Automated deployment of the Operating System has been implemented in development using System Center Configuration Manager.
Leverage technology to achieve efficiencies.		<ul style="list-style-type: none"> • Use of Systems Center modules to manage the environment is growing, and gaps are being filled by other products. • The BITA has established standards placing a priority on virtualization and establishing virtual farms and limiting physical servers.
Achieve reliable and available services to support and meet Agency's Continuity of Operations Requirements (COOP).		<ul style="list-style-type: none"> • Alternate Data Center is on-line for Critical Business Systems. • Some redundancy has been achieved between HQ and Ross. • Business Continuity efforts are under way to identify the next level of business functions needing continuity support for their automation.



<p>Services are delivered and asset components maintained in compliance with Federal laws and regulations.</p>		<ul style="list-style-type: none"> • NIST-based server baselines are being used for new builds, and FDCC compliance is built in to desktop images. • Automated tools for monitoring and validating configuration baselines are being implemented under the DCM project. • Automated patch management tools and processes are being implemented to improve operational reliability and improving system security. • Additional projects are scheduled to resolve long standing POAM items.
<p>Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.</p>		<ul style="list-style-type: none"> • The DCM project is using Microsoft services and consulting to examine these areas and provide analysis and recommendations to align with industry practices.

Table 3.2: Status of Data Center Portfolio in Meeting Objectives

The Desktop Modernization Project (DMP) will be deploying a virtual desktop infrastructure in FY2012 which will require additional servers to host approximately 2,500 virtual desktop. Additional enterprise storage will be required to support these desktops. Although DMP will be responsible for acquisition of these servers, the support and maintenance for these servers will likely fall within the Data Center Portfolio and will place upward pressure on the number of physical servers. Similarly, the federal telework initiative may also require additional servers to support increased remote access from teleworkers.

A challenge facing the data center portfolio is the shift in the cost of servers. In prior years the individual cost of servers exceeded the threshold for capital expenditures. With advances in technology, the data center standard server now falls below the capital threshold and is now an expense costs. The IPR budgets were built with the assumption that capital funds would be used to replace servers that failed between refresh cycles. This means that funding for replacing failed servers needs to shift from capital to expense.

NJ is tracking and formulating a strategy for adopting appliances. Appliances are combinations of servers and storage optimized to perform functions. The promise of appliances is lower total cost of ownership through a combination of optimized hardware and optimized management practices.

Several areas that are candidates for appliances include:

- Email
- SQL Servers
- Oracle Servers

NJ is also looking at options for implementing archival storage to reduce storage costs. Options being investigated include implementing on site archiving solutions such as DVD and adopting cloud based archiving solutions. Total cost of ownership, network considerations, reliability and performance will lead to selection of the optimal solution for archiving.

Risks

ID	Risk	Mitigation
DC1	Failure to deploy servers in documented security baselines to meet operations objectives.	Deploy management and monitoring tools – part of the Data Center Modernization Projects. Note: Baselines have been established for Windows servers; however, baselines still need to be established for Linux and Solaris servers.
DC2 (Note: DC1 & DC2 should be combined)	Failure to maintain server in documented security baselines to meet compliance requirements.	Deploy management and monitoring tools – part of the Data Center Modernization Projects. <ul style="list-style-type: none"> • Tripwire and has been deployed to monitor compliance with baselines • SSCM is being deployed to aid in monitoring compliance • SCAP compliance monitoring is being configured
DC3	Failure of Joint Telecommunication Service (JTS) Rooms to have adequate condition power and cooling to meet availability requirements. <i>(mitigated to acceptable levels and will be drop from future reports)</i>	Consolidate to JTS rooms being prepared by facilities to meet power and cooling requirements for high availability – part of Data Center Modernization Project.
DC4	Failure to implement capacity leading to either over-subscribing (degrade performance) or under-subscribing (idle servers).	Provide capacity training and use management and capacity tools being deployed by the Data Center Modernization Project; VM Capacity planner has already been deployed and is collecting information for capacity planning.
DC5	Failure to implement proactive monitoring to prevent service disruption.	Data Center Modernization Project will implement monitoring tools and process to move IT from reactive to proactive monitoring.
DC6	Failure to adequately staff, with sufficiently trained personnel, to leverage monitoring and automated solutions.	Data Center Modernization Project will provide training and identify skill and staffing levels required to maintain capability but will not provide on-going staffing levels.

Table 3.3: Data Center Portfolio Risks

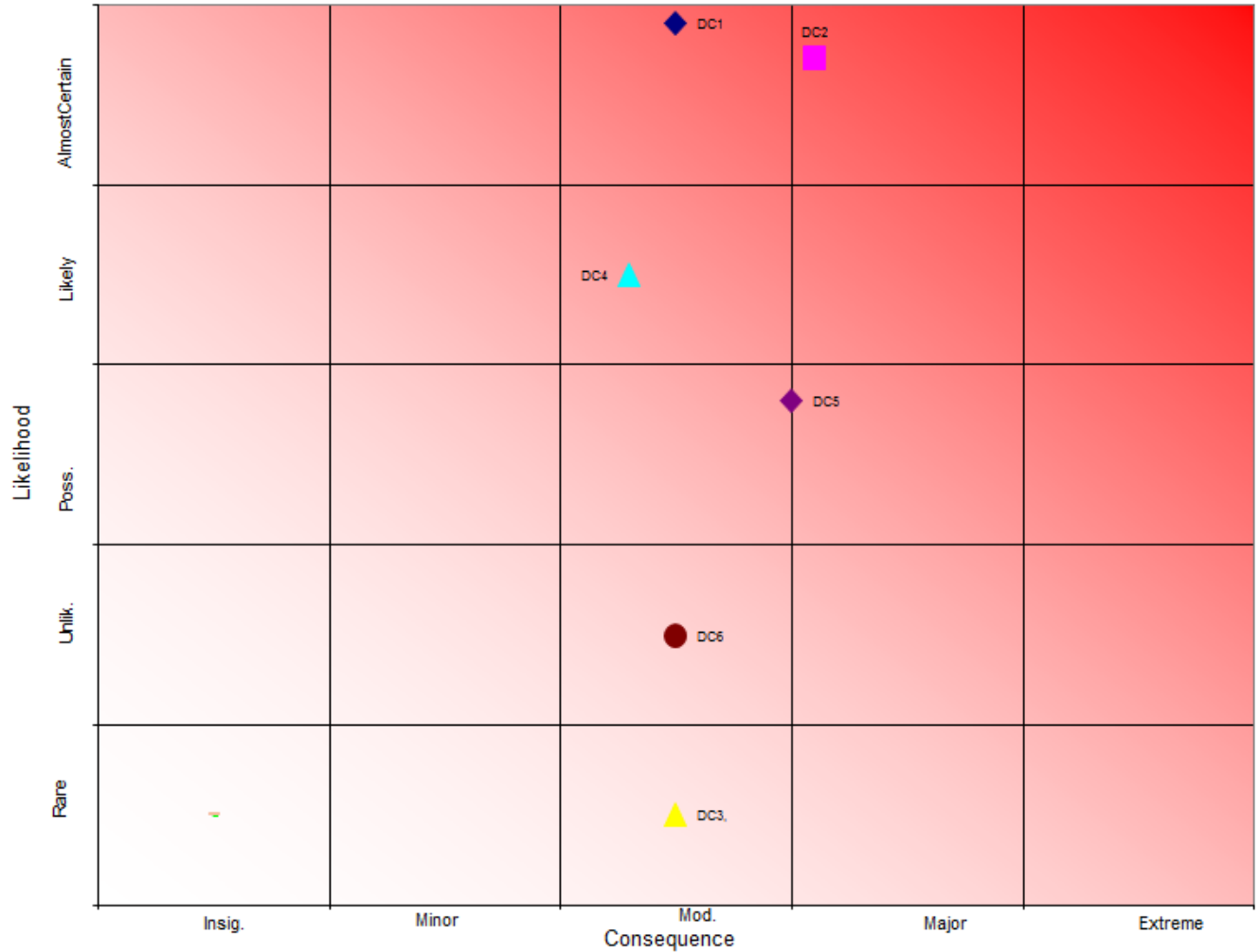


Figure 3.1: Data Center Risks

Strategies

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
Implement management tools to monitor and maintain data center assets.	<ul style="list-style-type: none"> • Monitor health and status of hardware and service with alerting. • Enable capacity planning to optimize resource utilization. • Monitor configuration baselines to maintain operational reliability and security posture. • Long term, reduce cost of operations by transitioning from reactive to proactive maintenance. 	<ul style="list-style-type: none"> • Tuning alerts to reduce false positives/chatter. • Developing corrective scripts to take proactive actions. • Instilling discipline and creating culture to embrace monitoring and proactive maintenance. • Establishing a monitoring team to leverage and manage capabilities. 	Key element of the Data Center Modernization Project is to extend monitoring of <ul style="list-style-type: none"> • Servers health • Configuration monitoring • Service performance

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
Implement automated services to provision new equipment with certified baselines, enable proactive event scripting; and roll backs of unauthorized changes.	<ul style="list-style-type: none"> • Enables deployment of devices provisioned with certified baselines increasing operational reliability while reducing costs. • Enables execution of predetermined automated actions (scripts) based on monitoring thresholds. 	<ul style="list-style-type: none"> • Selection and implementation of software that links workflow with license tracking software/database. • Need to identify titles for self-service. • Need to enable automatic delivery of titles to users 	<ul style="list-style-type: none"> • Industry best practices currently embrace adopting and expanding IT automation as a key component of increasing operational reliability and reduction of ongoing operating costs.
Consolidate and virtualize servers. (Note: ITDR and new projects may require addition of new servers; however, virtualization will minimize the impact from new requirements).	<ul style="list-style-type: none"> • Reduces number of physical servers leading to lower hardware costs, licenses costs, lower staffing levels/costs, and lower power consumption. 	<ul style="list-style-type: none"> • Requires use of management and monitoring tools to achieve and manage consolidated and virtualized servers. 	<ul style="list-style-type: none"> • Industry best practices embrace adopting and expanding server consolidation and virtualization to reduce ongoing operating costs (licensing costs, hardware costs, and labor costs) as well as reducing carbon foot print with associated reduced power and cooling costs.
Implement maturity model:	<ul style="list-style-type: none"> • Transiting up the maturity levels improves operational reliability while reducing maintenance labor costs. NJ can expect to see a reduction in operations labor costs of 10%¹³ by moving up a level in the maturity model. 	<ul style="list-style-type: none"> • NJ culture has not lent itself to change and/or documenting processes and their supporting role. This will require change management to be effective. 	<ul style="list-style-type: none"> • Industry has embraced ITIL to improve operational reliability, improve quality of service, and to reduce cost of operations. • NJ is implementing a maturity project to move NJ operations from basic to standard level for four key processes.
Implement tiered storage.	<ul style="list-style-type: none"> • Reduces total cost of storage while reducing overhead associated with data backups and recovery. 	<ul style="list-style-type: none"> • Data retention needs to be more widely defined and enforced • Data archiving needs to be defined and addressed 	<ul style="list-style-type: none"> • Implementing tiered storage is a key component of industry best practices to control the growth, costs, and power consumption associated with storage.

¹³ Ross & Weil, Harvard Business Review, Nov. 2002.

Portfolio Strategy	Benefits	Challenges/Issues	Asset Portfolio Outlook
Adopt 5 year refresh cycle:	<ul style="list-style-type: none"> •Optimizes total cost of ownership with operational reliability and stability. •Reduces cost and potential disruptions associated with migrating systems to new hardware. 	<ul style="list-style-type: none"> • Longer lead time in adopting and implementing new technology and capabilities. • Higher maintenance costs over 3 year refresh cycle. 	<ul style="list-style-type: none"> •Majority of industry has adopted a 3 to 4 year server refresh cycle with 3 years being the norm for high transactional, high concurrent user organizations •BPA's systems are a low transactional, low concurrent user which emphasis system stability. A 5 year cycle optimizes total cost of ownership and system stability for BPA.
Align operating and database upgrades with hardware refreshes.	<ul style="list-style-type: none"> •Minimizes cost and disruption of migrating to new operating systems and databases by coordinating testing and deployment with rollout of replacement hardware. 	<ul style="list-style-type: none"> • Longer lead time adoption of operating and database new features/capabilities. 	<ul style="list-style-type: none"> •NJ intends to minimize labor and testing costs by aligning move to major releases of operating system and databases with the five year server refresh cycle.
Develop approach for cloud services. Candidates for the cloud include <ul style="list-style-type: none"> • Email • Live Meeting • SharePoint • File Services 	<ul style="list-style-type: none"> •Leverages reliability and economy of scale of large data centers leveraging cloud's inherit capabilities <ul style="list-style-type: none"> ○ High reliability ○ Site failover ○ Backup/recovery ○ Archiving ○ eDiscovery ○ Patching ○ Hardware refresh ○ Monitoring ○ Security device • Moves servers out of BPA data center into highly optimized data centers with lower cost of operations and lower carbon footprint 	<ul style="list-style-type: none"> • Additional or increased bandwidths for circuits to cloud based services may offset savings • Performance of cloud base services needs to be investigated. • Security risks need to be evaluated and assessed. • Interoperability issues need to be evaluated. 	<ul style="list-style-type: none"> •Federal government is moving to cloud based services with agencies like USDA and GSA leading the way moving to email cloud services. •NJ is conducting a small scale pilot to investigate benefits and drawbacks to adopting cloud based services. •Strategy is expected to be developed no later than second quarter FY2011.

Table 3.4: Data Center Portfolio Strategies

Asset Portfolio Outcomes

Data Center Objectives	Portfolio Strategy	Asset Portfolio Measures
Maximize resource utilization while providing capacity to meet systems' current and projected average and peak resource requirements.	<ul style="list-style-type: none"> • Implement management tools. • Consolidate and virtualize servers. • Implement tiered storage. 	<ul style="list-style-type: none"> • Reduce current fleet of 1,450 physical servers by 25% by 4th quarter FY2012. • Non -infrastructure production server resource utilization average is greater than 45% during core business hours by end of 4th quarter FY2011.
Proactively monitor data center resources and services.	<ul style="list-style-type: none"> • Implement management tools. • Implement automated services. • Implement maturity model. 	<ul style="list-style-type: none"> • Enable monitoring on all DCM production servers key resources (e.g. CPU, etc.) as servers are placed into production with monthly usage reports and real-time snapshots beginning 4th quarter FY2011. • Enable monitoring of all SANS disk space by 3rd quarter FY2011 with monthly usage reports and real-time snapshots beginning in 4th quarter FY2011.
Deliver secure, reliable, efficient, and predictable services through the effective use of management tools.	<ul style="list-style-type: none"> • Implement management tools. • Implement automated services. • Implement maturity model. 	<ul style="list-style-type: none"> • Enable capacity planning for all production servers and SANS devices, providing monthly reports beginning 4th quarter FY2011.
Leverage technology to achieve efficiencies.	<ul style="list-style-type: none"> • Implement management tools. • Implement automated services • Consolidate and virtualize servers. • Implement tiered storage • Develop approach for cloud services. • Adopt 5 year refresh cycle • Align operating and database upgrades with hardware refreshes. 	<ul style="list-style-type: none"> • Reduce FY2010 energy consumption for production by 20% by EOY2013 (coincides with migration to new environment delivered by DCM). • Through EOY2016 absorb inflation and maintain operations and maintenance costs of data center at or below EOY2010 levels.
Achieve reliable and available services to support and meet Agency's Continuity of Operations Requirements (COOP).	<ul style="list-style-type: none"> • Implement management tools. • Implement automated services. • Implement maturity model. 	<ul style="list-style-type: none"> • Exercise COOP plans for Critical Business Systems twice a year. • Extend telework capacity to 75% of Agency personnel by EOY2013.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	<ul style="list-style-type: none"> • Implement management tools. • Implement automated services. • Implement maturity model. • Implement tiered storage. • 	<ul style="list-style-type: none"> • Implement configuration monitoring for all production servers with monthly compliance reports by 4th quarter FY2011.
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	<ul style="list-style-type: none"> • Implement management tools. • Implement automated services. • Consolidate and virtualize servers. • Implement maturity model. • Implement tiered storage. 	<ul style="list-style-type: none"> • Transition key processes(Change & Configuration Management, Incident Management, Problem Management, and System Monitoring) from Basic to Standard level of the MOF maturity framework by EOY2011. • Transition key processes(Change & Configuration Management, Incident Management, Problem Management, and System Monitoring) from Standard to Rationalized level of the MOF maturity framework by EOY2013. • Achieve Standard level for all operational processes by EOY2012 • Achieve Rationalized level for all other operational processes by EOY2014.

Table 3.5: Data Center Portfolio Outcomes

4. Network Portfolio

The services delivered through the Network Portfolio can be best described as a utility services in the sense that end users expect the services to be available without thinking about them, just like the electric power in their offices. As a result, these asset objectives tend to have an internal IT aspect to them; although, video conferencing, tele-presence, and mobile connectivity are areas where business units and IT can partner to develop network service objectives and strategies to maintain, enhance existing services, and to implement new services, such as wireless access points, where requirements dictate.

Goals & Objectives

The following table shows the alignment between the Networking Enterprise and Voice & Video services to the IT Asset Goals:

Network Objectives	Aligns with IT Asset Goals	Outcomes
Provide secure and reliable voice and data network services to enable the Agency to perform their functions and to coordinate and communicate internally and externally.	ITAG 1 –P ¹⁴ ITAG 3 –S ITAG 4 - S	<ul style="list-style-type: none"> • Detection and prevention of unauthorized access. • Capacity and redundancy to meet availability and return to operations objectives. • Sufficient network capacity to ensure quality of service (low latency) to enable users to effectively and efficiently access IT resources to perform their jobs. • Sufficient network redundancy to meet identified Continuity of Operations (COOP) objectives. • Reliable phone services to enable the Agency to coordinate and communicate internally and externally. • Secure remote access to Agency IT resources.
Leverage technology to meet Agency business objectives.	ITAG 6 – P ITAG 3 – S ITAG 4 - S	<ul style="list-style-type: none"> • Reliable video conferencing and tele-presence capabilities. • Secure and reliable wireless access. • Secure and reliable services for mobile users. • Unified messaging/communication capabilities are provided. • Access, security (firewall), and adequate bandwidth to the public internet are sufficient to meet emerging cloud computing requirements.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	ITAG 4 –P ITAG 3 - S	<ul style="list-style-type: none"> • Continuous monitoring program tracks compliance with baselines and detects unauthorized changes from the baseline. • Risks mitigated to acceptable levels to enable the Agency to perform its functions. • Networks migrated to IPv6 (FY2014/2015) • Smart Cards used in two form authentication for network access (CY2012 - acceleration in delivery from the FY2010 Asset Strategy) • Critical Business systems segregated in a secure network enclave (CY2011/2012). • Expand remote access to align and enable Federal Telework directives
Process and practices aligned with industry practices to deliver secure, reliable services with the least total cost of	ITAG 5 – P ITAG 2 – S ITAG 3 - S	<ul style="list-style-type: none"> • Network hardware and software refreshes sufficient to meet reliability and security objectives while optimizing the total cost of ownership. • Costs of new investments balanced with operations and maintenance costs to achieve an optimized total cost of operations. • Effective operations and service delivery in place from adopting

¹⁴ Each objective relates to a single primary goal indicated by “P”; objectives may also relate to secondary goal, indicated by “S”.

ownership.		Microsoft Operation Framework (MOF) ¹⁵ <ul style="list-style-type: none"> ○ Move from Basic to Standard level in CY2012 ○ Move from Standard to Rationalized level in CY2013
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Table 4.1: Network Portfolio Objectives

Asset Current State

The major aspects of the Network Portfolio can be summarized as:

- Identifying and documenting asset business objectives, risks, and associated metrics
- Adopting Microsoft Operations Framework (MOF), an ITIL based operations maturity model, to improve service delivery and reduce future operating costs by aligning people, processes, and technology with service delivery and operations to improve effectiveness and efficiencies
- Implement network segmentation architecture
- Expand monitoring and reporting capabilities to improve security, meantime-to-repair, and network reliability and availability.
- Expand outside-of-network-monitoring data integration to improve IT monitoring capabilities, security, and accessibility.
- Expand firewall administration and advanced packet analysis staff capabilities to improve security, service delivery, and achieve additional efficiencies

The current status of the network assets are discussed in detail below.

The current Network Portfolio includes 700+ network devices, 7 PBX systems, and over 300 security cameras spread across a four state region. The average lifecycle varies for network, voice, and video equipment with network equipment averaging seven to nine years, voice averaging twelve to fifteen years, and video averaging eight to ten years. The cabling in headquarters was recently upgraded to CAT 6 to provide 100 mb/s to the desktop and the Ross Complex is scheduled to have its cabling infrastructure upgraded to CAT 6 in FY2012/FY2013.

The network has been providing solid performance over the last five years with no service disruption of core services in Headquarters or the Ross Complex. Branch offices have seen minor disruptions due to issues with external Internet Service Providers (ISP) resulting from fiber being cut or other issues that are generally quickly resolved. Managing this diverse and disparate collection of assets across a large geographic area offers distinct and daunting challenges, requiring a phased and iterative process that can span multiple fiscal and calendar years and include the coordination and cooperation of IT, Transmission Services, Power Services, and a variety of governmental and private sector service providers.

Several OMB mandates and other upgrade/modernization projects will require the network portfolio to modernize equipment in the coming years. Specific technologies on the near horizon include IPv6 compliance, implementation and expansion of wireless services, LAN/WAN bandwidth upgrades, ubiquitous computing (tablet computing), and broadcast streaming media services. It is expected that the business will make selective moves to cloud services over the coming years, which will require the Network portfolio to ensure access (circuits – generally public internet) and security (firewall) and bandwidth to meet business demands.

¹⁵ See Appendix F for discussion of MOF and its relationship to Operational Excellence.

Due to relatively long lifecycles, the replacement of the aging Network Portfolio equipment requires acquiring new network, voice, and video hardware compliant with our standards for Internet Protocol version 6 (IPV6), Simple Network Management Protocol version 3 (SMNP V3), Syslog, Quality of Service (QOS), Unified Communications (UC), and Voice Over Internet Protocol (VOIP). It is necessary to acquire compliant components now in order to migrate to new capabilities in the future, for example to migrate to IPV6 (an OMB mandate) in 2015 and VOIP (enhanced business service). The Network End of Life Schedule can be seen below:

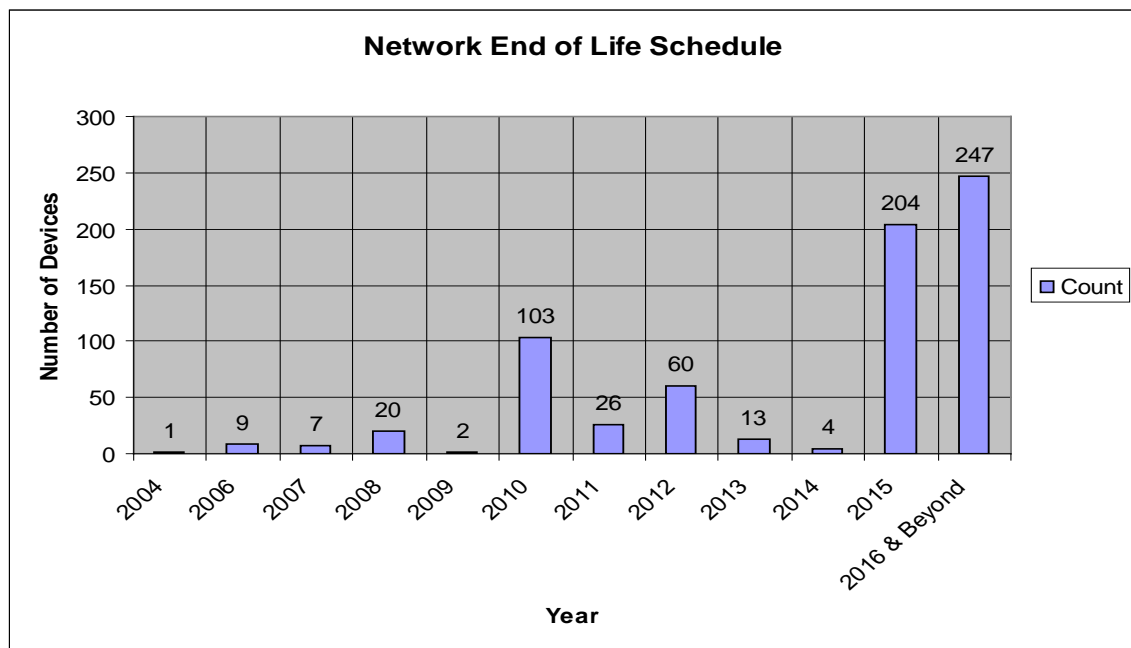


Figure 4.1:
Network

Components End of Life Schedule

This portfolio is experiencing both positive and negative pressures in achieving an expense growth at or below the rate of inflation. On the positive side, re-negotiation of network maintenance contracts has resulted in a new annual savings of \$250k per year. On the negative side are two large drivers. The first driver is our current collection of leased network circuits. We are reviewing our circuits to ensure we are providing reliable circuits with adequate bandwidth to field sites (which may mean redundant circuits or moving to more expensive MPLS circuits). The net result we are expecting to our service contracts for leased circuits is the costs for these circuits to grow faster than the rate of inflation in FY2012 and possibly FY2013 are we right size these circuits.

The second driver is the desire to enhance our network to allow wireless access in Headquarters, the Ross Complex, and Park Place. Adding wireless access points will be a discretionally expense enhancement to the network. Current estimates place the expected costs for adding access points, in a phased deployment, of approximately \$100k from FY2013 through FY2015. The deployment of these access points will also lead to approximately \$100K increase in the annual expenses costs – initially for deploying the access points and then operations and annual replacements (assuming 4-5 year refresh rate for access points).

The voice messaging system is beyond end of life and our as external web conferencing service is being terminated by the provider. Two small capital projects are being proposed, one to replace the voice messaging while leveraging investments in our current email (Microsoft Exchange) and the other to enable both internal and external web conferencing by leveraging Microsoft Office Communicator Services (now rebranded as Lync). The voice messaging project would avoid the necessity of buying dedicated messaging hardware while integrating voice and email (e.g. sending a copy of voice messages to the recipients' email account). There is a dependency on upgrading to Exchange 2010. These projects are being proposed for FY2012/FY2013.

A recap of the planned capital projects for this portfolio and preliminary costs are

- FY2012/2013 Field Upgrade (update WAN switches in preparation for IPv6 & VoIP)
 - \$905K in FY2012
 - \$1,200K in FY2013
- FY2013 Enhance Remote Access to support Telework
 - \$600K in FY2013
- FY2013 Replace Voice mail and implement Unified Communication solution
 - \$1,400K in FY2013
- FY2013/2014 Telephone and Voice System Upgrades (transition to VoIP)
 - \$500K in FY2013 for Walla Walla and Van Mall
 - \$1,200K in FY2014
 - \$2,300K in FY2015
- FY2014/2015 Network modernization and move to IPv6
 - \$2,000K in FY2014
 - \$3,000K in FY2015
- FY2021/2022 Network gear modernization
 - \$2,000K in FY2021
 - \$3,000K in FY2022

These individual Network project capital requests are summed by year to be:

- FY2012 \$ 905K
- FY2013 \$3,900K
- FY2014 \$3,200K
- FY2015 \$5,300K
- FY2021 \$2,000K
- FY2022 \$3,000K





Network Objectives	Status Meeting Objectives	Comments
Provide secure and reliable voice and data network services to enable the Agency to perform its functions and to coordinate and communicate internally and externally.		<ul style="list-style-type: none"> • BPA's telecommunications backbone has a longstanding reputation for delivering secure, reliable, and highly available voice and data services throughout the agency. • Power fluxes at some substations are producing momentary loss of network services. Services are typically quickly restored. Business impact has been minimal. • Parts availability becomes an increasing challenge as systems approach end of life, risking continued reliability.
Leverage technology to meet Agency business objectives.		<ul style="list-style-type: none"> • Through the use of proven, scalable, technologies and adaptive, low-latency, high-availability architectures, BPA's voice and data needs and objectives have been, and will continue to be, met and/or exceeded. • BPA must evolve WAN circuits to provide sufficient bandwidth to support emerging business requirements such as streaming video/video broadcast, VOIP, and video teleconferencing. • Continue to replace existing CAT 5e cable plant with CAT6 LAN cabling to support increased LAN bandwidth requirements. • Telecommuting and expanded business outreach is generating increased usage of the BPA audio conference system and circuits.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.		<ul style="list-style-type: none"> • In the past, Federal law and regulation compliance for voice and data components and services has not been a high priority. However, with the cooperation of Cyber Security and continued adoption of FISMA, DOD, and NERC/CIP standards, we are steadily moving in the direction of full compliance. • Evolving threats to government networks and system, particularly CIP, will require continued enhancement to the network infrastructure security (firewall security). In cooperation with other IT initiatives (e.g., Windows 7 upgrades), network infrastructure will evolve to insert new security technologies to maintain compliance and enhance the BPA IT security perimeter.
Process and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.		<ul style="list-style-type: none"> • The network and voice processes and practices have been negatively impacted by past organizational and management challenges.

Table 4.2: Network Portfolio Objectives

Risks

ID	Risk	Mitigation
NP1	Failure to procure network components and application software to support network standards to enable the evolution of the network to support IPv6, SNMPv3, Power over Ethernet (POE), multicast, fault tolerance, and Quality of Services (QOS).	<ul style="list-style-type: none"> • Purchasing guidelines require IP V6 compliance for all new network hardware purchases. • Purchasing guidelines require IP V6 compliance for all new software purchases. • Implement purchasing guidelines requiring SNMP V3 compliance for all new network hardware. • Implement purchasing guidelines requiring POE capability for all new client access network hardware. • Implement purchasing guidelines requiring QOS compliance for all new layer 3 devices. • Implement purchasing guidelines requiring multicast compliance for all new layer 3 network hardware. • Implement purchasing guidelines requiring fault monitoring (Syslog) compliance on all new network hardware.
NP2	Failure to adequately train staff will to ensure staff can support evolution of network to support new technologies and management techniques.	Implement regular and on going annual training for Network team members.
NP3	Failure to implement and leverage the necessary management and monitoring tools to enable expansion, maintenance, troubleshooting, and reporting-on existing and future networks.	Implement purchasing guidelines requiring the inclusion of management and monitoring tools, plans, and methodologies to be implemented with each new purchase.
NP4	Failure to position and prepare BPA's systems and services to meet emerging security threats.	Work closely with Cyber Security to maintain existing security infrastructure (IDS, firewalls, etc.) while harnessing emerging technologies and methodologies to further enhance our security coverage.
NP5	Failure to replace systems at or near End-of-Life, particularly the BPA voice messaging system	Replace the BPA voice messaging system (last upgraded in 1999, and no longer supported by vendor).

Table 4.3: Network Portfolio Risks

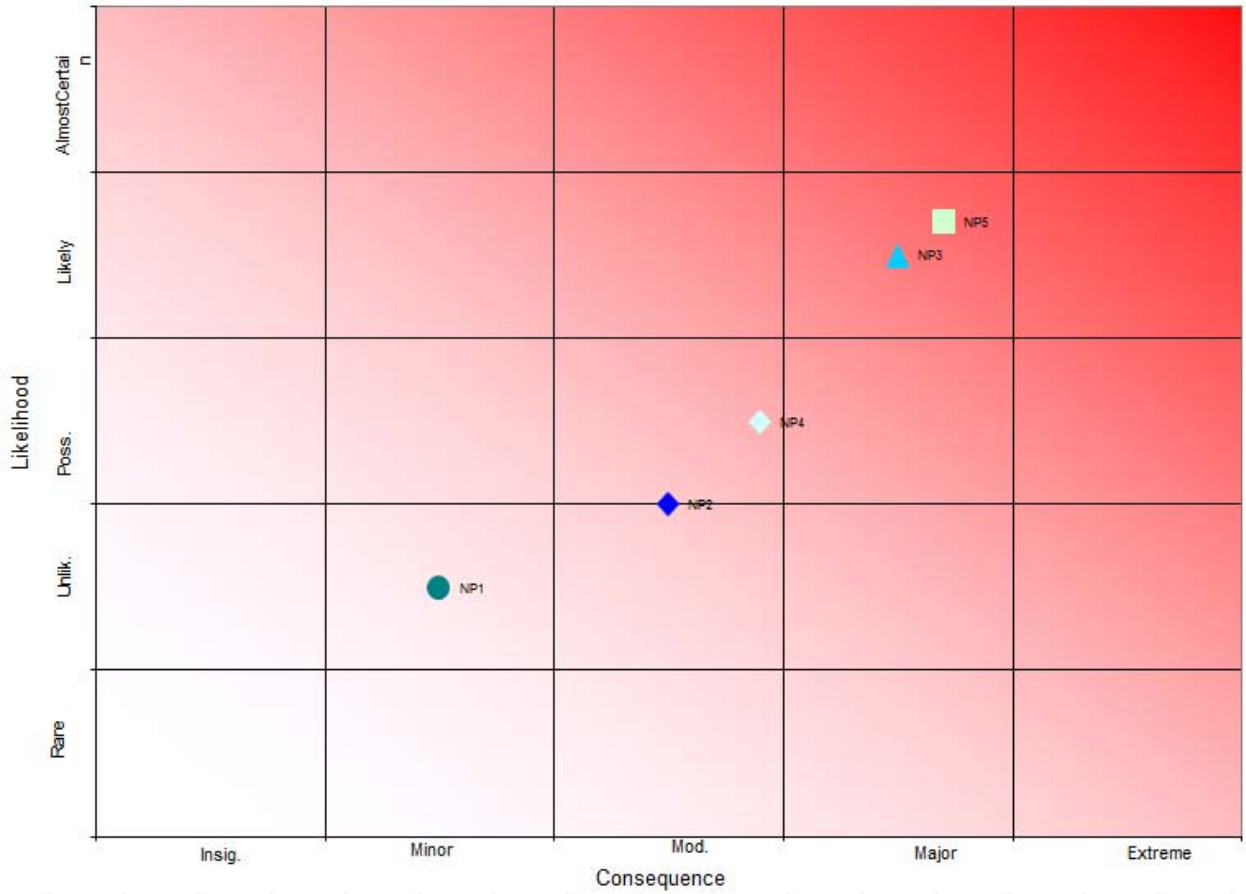


Figure 4.2: Network Risks

DRAFT

Strategies

Portfolio Strategy	Benefits	Challenges/Issues	Outlook
<p>Execute on established refresh cycles to optimize total cost of ownership.</p>	<ul style="list-style-type: none"> • Provides for orderly, non-disruptive, and cost effective insertion of new technology. 	<ul style="list-style-type: none"> • Long lifecycles for network and phone devices results in delays in implementing new technology and deploying new capabilities. • Next network refresh cycle will need to plan for: <ul style="list-style-type: none"> ○ Implementation of IPv6 ○ Voice over IP ○ Increased adoption of telecommuting places greater demand on conference bridge systems and circuits. ○ Wireless access points with integration into network ○ Possible deployment of soft phones • Voice mail system is past refresh cycle, continue defer of refresh will increase risk of failure. 	<ul style="list-style-type: none"> • Phone and network systems must achieve 99.99% availability or better. While past experience has demonstrated excellent reliability and stability, these systems are pervasive, and upgrade implementations are complex and long in duration. <ul style="list-style-type: none"> ○ Network refresh scheduled for FY2014/FY2015 timeframe ○ Phone refresh schedules include evaluation of PBXs in FY2012 with determination to procure new modules in FY2011-2014 or wait for refresh in FY2014/2015 ○ Voice messaging system replacement in FY2013
<p>Institutionalize Operational Excellence to improve service delivery, increase work throughput, and achieve efficiencies.</p>	<ul style="list-style-type: none"> • Implementing and incorporating a maturity model into daily operations will improve operational reliability while reducing maintenance labor costs. NJ can expect to see a reduction in operations labor costs of 10%¹⁶ by moving a level in the maturity model. 	<ul style="list-style-type: none"> • NJ culture has not lent itself to change and/or documenting process and their supporting roles. This will require change management to be completely successful. 	<ul style="list-style-type: none"> • Industry has embraced ITIL to improve operational reliability, improve quality of service, and to reduce cost of operations. • NJ is implementing a maturity project to move NJ operations from basic to standard level for four key process

Table 4.4: Network Portfolio Strategies

¹⁶ Ross & Weill, Harvard Business Review, Nov 2002.

Asset Portfolio Outcomes

Network Objectives	Strategy	Asset Portfolio Measures
Provide secure and reliable voice and data network services to enable the Agency to perform their functions and to coordinate and communicate internally and externally.	<ul style="list-style-type: none"> • Refresh Cycles • Operational Excellence 	<ul style="list-style-type: none"> • Deliver 99.9% network availability in Headquarters, Ross and Munroe though FY2015 to enable Agency to coordinate and communicate effectively. • Deliver 99.9% phone service availability though FY2015 to enable Agency to coordinate and communicate effectively. • Reduce the yearly number of Wide Area Network disruptions to field sites by 50% of FY2010 disruptions by end of FY2014.
Leverage technology to meet Agency business objectives.	<ul style="list-style-type: none"> • Refresh Cycles 	<ul style="list-style-type: none"> • Develop plans, to include potential total cost of ownership for: <ul style="list-style-type: none"> ○ Implementing Voice over IP, plan completed by 4th quarter FY2012 ○ Implementing Wireless into network, plan completed by 4th quarter FY2012 (delayed a year from FY2010 IT Asset Strategy) ○ Integrating soft phones in to environment, plan completed by 1st quarter FY2012 ○ Implement a Unified Communications roadmap by 2nd quarter 2012 ○ Grow the BPA audio conference system and/or TELCO lines to meet increasing requirements for large audio conferences and support telework mandate by FY12/13 ○ Provide infrastructure support, bandwidth and connectivity to cloud services as business requirements emerge.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	<ul style="list-style-type: none"> • Refresh Cycles 	<ul style="list-style-type: none"> • Implement IPv6 by EOY2015 to comply with OMB guidance to develop plans and transition to IPv6. • Implement Smart cards for network logons by EOY2012 to comply with HSPD-12 directive to use Smart Cards for network access.
Process and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	<ul style="list-style-type: none"> • Operational Excellence 	<ul style="list-style-type: none"> • Transition key processes(Change & Configuration Management, Incident Management, Problem Management, and System Monitoring) from Basic to Standard level of the MOF maturity framework by EOY2012. • Transition key processes(Change & Configuration Management, Incident Management, Problem Management, and System Monitoring) from Standard to Rationalized level of the MOF maturity framework by EOY2012. • Achieve Standard level for all operational process by EOY2012 • Achieve Rationalized level for all operational processes by EOY2014.

Table 4.5: Network Portfolio Outcomes

5. Application Portfolio

The Application Portfolio presents unique challenges in describing its objectives as each one of the current over 100 systems listed in the Application Portfolio has its own set of objectives. For example the Customer Billing System strives to produce timely and accurate bills while Columbia Vista creates generation forecasts to support inventory and revenue projections. Due to this unique situation, individual systems' objectives will be maintained in the individual asset plans that comprise the Application Portfolio; here we will only present the Agency level objectives of the Application Portfolio

Goals & Objectives

Application Objectives	Aligns with IT Asset Goals	Outcomes
Enable secure and reliable automation of business processes and functions.	ITAG 1 –P	<ul style="list-style-type: none"> Service levels established for each system to include availability, and Return To Operation requirements. Performance requirements established for major systems to include latency and peak usage requirements.
Evolve and leverage systems capabilities to meet emerging business objectives.	ITAG 2 –P ITAG 3 -S	<ul style="list-style-type: none"> Develop and buy COTS solutions that leverage and, where possible, contribute to Service Oriented Architecture and data abstraction. Develop and maintain a library of Enterprise reusable components and services to reduce development time, development costs, and maintenance costs.
Provide guidance on tactical and strategic evolution of systems that balance business unit's requirements with Agency objectives.	ITAG 6 –P ITAG 2- S ITAG 3 -S	<ul style="list-style-type: none"> Asset Plans have multi-year activities scheduled for enhancements, upgrades, and replacement for each individual system as a result of the Information Owner and Information System Owner working together to create these plans. Metrics in place, providing transparency on costs, value, and performance. Annual review of each system's Total Cost of Ownership is performed.¹⁷
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	ITAG 4 –P ITAG 3 - S	<ul style="list-style-type: none"> All systems covered by a current System Security Plan. Monitoring tools in place to detect and report on changes in application baselines. All changes to application baselines verified and validated as authorized changes.
Process and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	ITAG 5 – P ITAG 2 – S ITAG 3 – S	<ul style="list-style-type: none"> Establish an Asset Plan for all systems Implement annual updates and reviews of each system's business cases Align maintenance and enhancements with the System Development Lifecycle. Establish criteria for determining a "maintain" versus "upgrade" or "replace" decision. Maturity framework in place for software development and operations.

Table 5.1: Applications Portfolio Objectives

¹⁷ Determining value and Total Cost of Ownership must be extended to include the substantial number of Task systems maintained by NJS; although, individually each Task system represents a small to modest cost, collectively these Task systems represent a sizable investment and operating cost.

Application Portfolio Current Status

The major aspects of the Application Portfolio can be summarized as:

- Identifying business objectives, risks, and metrics for legacy systems
- Managing a growing portfolio of Software As A Service solutions
- Managing a rising bar on security and compliance requirements

The current status of the applications portfolio is discussed in detail below.

The Application Portfolio faces several challenges. The business cases for the over 100 systems have not been maintained and in many cases the original business case cannot be located. As a consequence, IT is beginning to work with the business owners (Information Owners) to identify the business objectives and risks associated with these systems¹⁸. Strides have been made in developing asset plans that cover geospatial and computer aided design systems. Development of these plans has proven to a useful vehicle to engage the business users in discussing longer term needs, enabling planning for future enhancements, identifying potential capital projects, and aiding in develop of long term budget formulation. Other areas are working to establish and mature asset plans to include their systems.

To put this in perspective, IT currently allocates 43% of its expense budget to operating the Application Portfolio with 26% being used for enhancements such as upgrades and customization to meet new business needs. Without understanding the business objectives and metrics to measure performance and value, a question of the amount of value these enhancements are providing cannot be answered. In other words, should IT be planning to allocate more or less resources to enhancements to optimize value and performance? For example, is it more cost effective to (1) upgrade versus enhance/modify the system (usually through customization) then to (2) replace the system versus upgrade.

The Capital Work Plan also needs to be factored in when discussing the Application Portfolio. The FY2012 work plan is projected to implement 22 new systems in FY2012 and 26 new systems in FY2013, see Figure 1.3, These new systems will add, on average from FY2012 through FY2015, \$1.25M in new services contract costs, see Figure 1.4. It is also projected that these new systems will also, on average, increase the Application Portfolio's annual expense costs by another \$1.3M from operations and maintenance costs to support these new systems. It is highly likely there will also be additional demand for expense funds to make enhancements to these new systems.

Since the IT budget is not growing at a rate to absorb these new obligations, IT has only two courses of action (1) reduce system enhancements under the Application Portfolio; (2) slow or curtail refreshes under the Office Automation Portfolio. IT has been using both approaches since FY2008 to absorb these new costs (approximately \$1m/year in new expense operations and maintenance costs from FY2005 through FY2009). Refreshes can no longer be delayed and two major projects, DCM and DMP, are currently in flight. This leaves reducing the number of system enhancements.

¹⁸ Note: In FY2010 Asset Plans for HRmis, Projectwise, Aircraft Services, SharePoint and others systems were initiated and are capturing business objectives and these asset plans are being used in budget formulation.

The business units have been extremely vocal in their dissatisfaction with the delay and reduction in enhancements to their systems to meet their business needs (Again, having Asset Plans in place will better highlight the resources needed to perform high value enhancements.).

A new trend has emerged over the last three years that needs to be accounted for in both the funding and staffing strategy for supporting the Application Portfolio. This trend is the adoption of Software as a Service (SAAS). This trend has IT contracting with a vendor to provide automated systems and services from the vendor owned and operated facilities. This introduces data integration, security and funding issues that need to be carefully worked out. Figure 6.1 illustrates the emerging funding issues with SAAS.

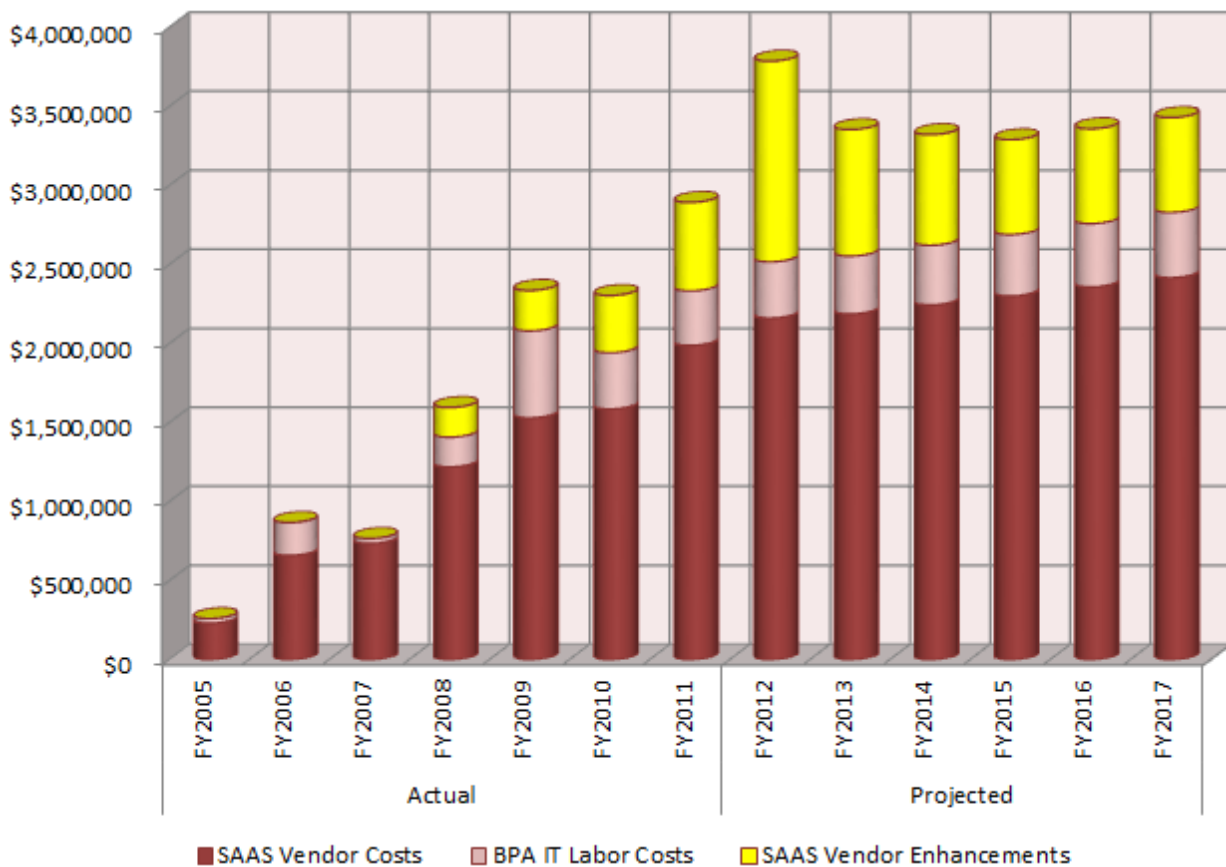


Figure 5.1: Expense Costs for Software As A Service (SAAS)

As this figures shows, costs can escalate from year to year as the business unit requests the SAAS provider to make changes to accommodate emerging and evolving business requirements (blue SAAS vendor costs). (In some cases the variability in yearly costs results from negotiated contracts including a four year refresh rate of the servers operated by the SAAS provider.)

SAAS implementation and support is an expense activity which requires IT to pay monthly services charges or lose the services. The rapid adoption and growth in SAAS costs was not anticipated or funds programmed. The necessity to pay or lose service has

increased the pressure on the funds available for system enhancements in the application portfolio.

In addition to the monthly service costs, IT labor is required to support SaaS solutions. This is counter intuitive to the concept of subscribing and having a service delivered by an external provider. The IT labor in operations and maintenance phase comes in the forms of:

- Creating and maintaining data integration with the hosted solutions,
- Working with the provider to resolve operational issues,
- Coordinating with the business unit and vendor on system enhancements,
- Coordinating with the business unit and vendor on testing system changes.

Figure 5.1 shows the growth in both the service charges and labor based on the SAAS solutions we have already adopted.

There are two additional drivers that will put upward pressure on the Application Portfolio. The first is potential regulation from NERC on what elements falls under critical infrastructure protection (CIP). This may require expansion of our system(s) that monitor NERC CIP elements.

The other driver is the implementation, with its operations and maintenance costs, of implementing a Network Operation Center (NOC) to monitor the Agency's Critical Business Systems (CBS). The NOC will provide 24 by 7 monitoring of the CBS systems.

Table 5.2 summarizes the ability of the assets in the Application Portfolio to meet the Application Objectives from Table 5.1. As can be seen from Table 5.1, the mounting pressure on the Application Portfolio expense budget has resulted in a Red rating for this portfolio's ability to "Evolve and leverage systems capabilities to meet emerging business objectives." Through a combination of maturing Asset Plans, expanding steering committees, and partnering with business units to develop long term system strategies based on business needs, IT plans to prioritize available resources for enhancements and to build justifications to grow the Application Portfolio's expense budget.






Application Objectives	Status Meeting Objectives	Comments
Enable secure and reliable automation of business processes and functions.		<ul style="list-style-type: none"> Services Levels and RTO requirements are being established through the Agency wide Business Continuity effort. This information will be leveraged by IT to identify the most critical business processes and systems that support those processes to enhance reliability and availability.
Evolve and leverage systems capabilities to meet emerging business objectives.		<ul style="list-style-type: none"> Development of existing COTS packages is hampered by a reduced expense budget and focus on capital projects. Some efforts started to develop reusable objects across NJ however common development practices need to be established to support this.
Provide guidance on tactical and strategic evolution of systems that balance business unit requirements with Agency objectives.		<ul style="list-style-type: none"> Steering committees have been established for major systems and programs so that Information Owners and Information System Owners together develop priorities.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.		<ul style="list-style-type: none"> All legacy systems are now maintained under a GSS. New systems being developed require a SSP to obtain authority to operate (ATO)
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.		<ul style="list-style-type: none"> IT, Information Systems Owners (ISO) in particular, have not been as successful a needed in influencing the selection of solutions to ensure solutions deliver the least Total Cost of Ownership. Projects and Information Owners (IO), need to actively engage ISOs in determining operation and maintenance costs. The SLC has not been implemented for routine and small enhancement projects. Complete set of metrics to measure value and performance have not been implemented. A maturity model covering software development and operations and maintenance has not been adopted.

Table 5.2: Status of Applications Portfolio in Meeting Objectives

Risks

In reviewing the risks with application subject matter experts, it has been determined a number of risks have been mitigated downward in terms of likelihood and consequence. Risk ACE10 has been mitigated to a level that in future reports it will be dropped from the heat map and Risk Table. Risks ACE1 and ACE4 will be combined as will ACE6 and CBS3. The mitigation steps have been updated to reflect process and additional strategies. Four new risks, ACE12 - ACE15, have been identified and added to the Risk Table and Heat Map.

ID	Risk	Mitigation
ACE1	Failure to fund resources to enhance systems at levels to meet business units' expectations.	<ul style="list-style-type: none"> Implement Steering Committees for key systems to prioritize expense efforts. (<i>Established for Customer Services, Transmission, and Business Enterprise Systems</i>) Continue to work with business units to develop business cases for both capitol and expense projects.
ACE2	Failure to implement controls which enable support teams to support development, test, and production with current available resources.	<ul style="list-style-type: none"> Implement change management processes under the Data Center Modernization project. (<i>Change management process implemented</i>) Implement a maturity framework for software development. (<i>Being explored</i>) Leverage automation and tools to reduce manual activities and increase productivity. (<i>Ongoing</i>)
ACE3	Failure to maintain trained employees to prevent putting pressure on IT support staff to make up the difference.	<ul style="list-style-type: none"> Lack of regular training and an influx of new HR staff are creating this problem. Could be addressed by IT establishing a formal Application Training group that could provide ongoing system training. IN FY2011 transferred NJS personnel HR to aid in training and business knowledge.
ACE4 (Combined with ACE1)	Failure to fund the operation and maintenance of new systems added to the Agency and Enterprise Portfolio.	<ul style="list-style-type: none"> Implement Steering Committees for key systems to prioritize expense efforts. Continue to work with business units to develop business cases for both capitol and expense projects.
ACE5	Failure to prepare IT support staff for evolution of HR and Financial systems move ERP.	<ul style="list-style-type: none"> Continue to work with Oracle to understand their timeline for Fusion implementation. Stay current with vendor tool releases, as Oracle aligns the application infrastructure with fusion requirements. In FY2012, develop ERP strategy.
ACE6 (Combined with CBS3)	Failure to plan and prepare staff and resources to support new products (e.g. Wind Integration, Dynamic Transfer, Smart Grid)	<ul style="list-style-type: none"> Turned out that we didn't need much retraining for Wind, etc. Work on the first phase was completed by NJC with existing staff. More concerned about the pressure this puts on the expense budget since these are not capital projects.
ACE7	Failure of Information Owners to understand their role in supporting their systems.	<ul style="list-style-type: none"> The Cyber Security XAT is intended to provide appropriate training and awareness of Information Owners understanding of risk. Increased efforts in ATO processes and documentation have helped Information Owners will be engaged in developing asset plans covering their systems. <p>(<i>Training has been successful, this item may be drop in future reports</i>)</p>
ACE8	Failure to coordinate between IT and business units to ensure resources are marshaled and positioned to meet business units' current and future needs.	<ul style="list-style-type: none"> Implement Steering Committees for key systems to prioritize expense efforts. Continue to work with business units to develop business cases for both capitol and expense projects. Combination of creating Asset Plans in FY2011/FY2012, establishment of Asset Strategy has aided in mitigating this risk.
ACE9	Failure to position resources to address and meet emerging compliance requirements (e.g. A123, NERC CIP, eDiscovery, NIST standards, etc.).	<ul style="list-style-type: none"> A123 process tracking has been added as a IT target for FY10 A permanent position has been filled to support existing NERC/CIP system support for IT (ProWatch) Cyber Security (NJB) has added staff to address NIST standards and testing for new systems.
ACE10	Failure of financial systems	<ul style="list-style-type: none"> Combination of training IO and ISO coupled with COTS work,

(drop)	(HRmis, FMS, CBS, Asset Suite) to have adequate controls to comply with A123.	has mitigated this risk to a level where it will be drop from future reports.
ACE11	Failure to meet current and evolving security implementation and operations requirements.	<ul style="list-style-type: none"> Continue to provide NIST based training to IT support staff i.e. CISSP, C&A, etc. Security engineers have been added to the staff to assist operation managers with managing security risks and issues Projects have been initiated to address POAM items such as Patch Management, Centralized logging.
ACE12	Failure to have a mechanism in place to align resources (staff, and support of service contracts) to securely and reliably maintain newly delivered systems	<ul style="list-style-type: none"> Work with APSC to ensure adequate resources are in place to cover any new service contracts and labor costs as criteria for approving a new project. Investigate possibility of benefiting organization(s) transferring a portion of their saving to the maintenance organization to cover new expense from the delivery of new systems/applications
ACE13	Failure to maintain a stable work force to ensure reliable and secure maintenance of existing systems and to facilitate system development.	<ul style="list-style-type: none"> Senior IT leaders will develop staffing strategy to address possible alternates to reduce contractor turnover in key positions.
ACE14	Failure to perform adequate Business Process Re-Engineering resulting in poor adoption of automate solutions, rework of systems increasing system enhancements costs, and development overruns.	<ul style="list-style-type: none"> Training of business owners and project managers on System Life Cycle 2.0 on the requirements and purpose of business process modeling Educate project technical leads and sponsors on need to ensure business process models are complete and of sufficient quality to ensure success of both system development and maintenance
ACE15	Failure to have a Software as a Service (SaaS) strategy to control costs and risks associated with adoption of SaaS services to include an exit strategy.	<ul style="list-style-type: none"> Develop cloud strategy to include covering the selection, implementation, use, and exit strategy for cloud services such as SaaS. Ensure decision to implement a cloud service includes a robust business case Ensure robust risk analysis performed on potential cloud services prior to adoption

Table 5.3: Agency Commercial and Enterprise Portfolio Risks

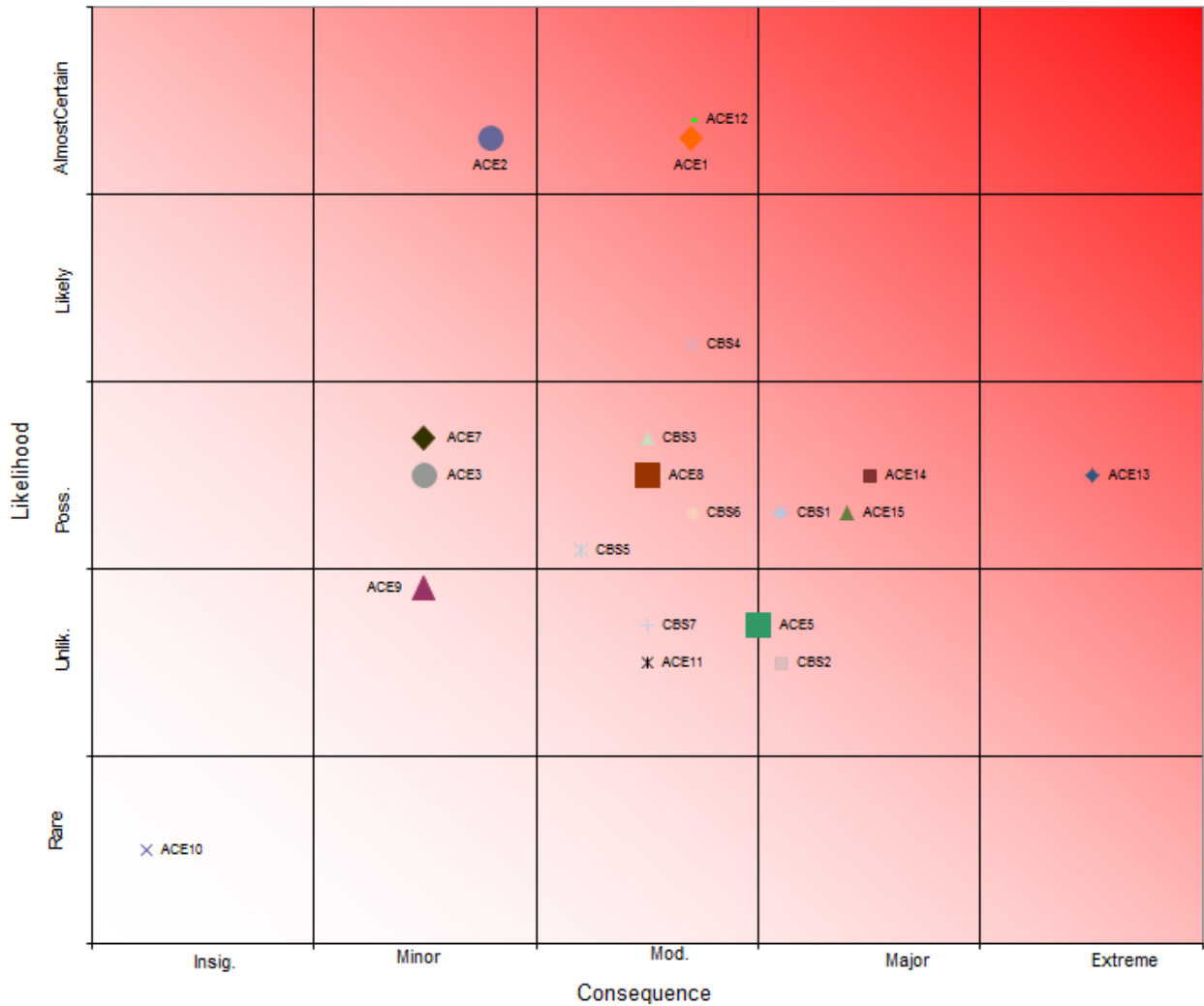


Figure 5.2: Application Portfolio Risk Map

ID	Risk	Mitigation
CBS1	Failure of non-critical business infrastructure to support critical business systems service availability of 99.99%	<ul style="list-style-type: none"> • Continuous feedback to J infrastructure team and to Facilities on ways to improve reliability. • NJC staff actively involved in the design of infrastructure architecture. • System and application redundancy both in-site and geographical. • Out hosting critical applications to experienced data centers with advanced high availability infrastructure, facilities, and processes.
CBS2	Failure of Internet Service Provider to provide 99.99% availability required for critical business systems.	<ul style="list-style-type: none"> • Circuit contracts negotiated to include availability requirements. • Provision redundant circuits with separate paths to ensure availability requirement is met.
CBS3	Failure to anticipate changes in business (e.g. Wind Integration, Sub Hourly, Dynamic Transfer, Regional Dialog, TPIP, Smart Grid, etc) and to have resources marshaled to enable these process changes.	<ul style="list-style-type: none"> • Work with Risk management and the business lines to anticipate market and industry changes as far ahead of time as possible. • Build in sub-hourly capability into in-flight application development projects to the extent possible.
CBS4	Failure to have adequate access to business analysts and subject matter experts to address the expanding scope of requests from business units.	<ul style="list-style-type: none"> • Stress the risk to business clients of not having adequate participation in IT projects.
CBS5	Failure to have adequate back up for key system support personnel (single point of failure -SPOF).	<ul style="list-style-type: none"> • Cross train staff and rotate individual roles to eliminate SPOFS.
CBS6	Failure to have adequate resources to support dispersed geographic locations.	<ul style="list-style-type: none"> • To the extent possible use remote technologies such as monitoring, server control, and change detection/configuration management to mitigate the lack of on-site staff at ADC.
CBS7	Failure of Commercial Off The Shelve (COTS) solutions to provide responsive service, adequate quality control, and continuous service (e.g. disruption due to buy outs or bankruptcies).	<ul style="list-style-type: none"> • Hold COTS code in escrow to be accessible by BPA staff in the event of vendor business failure. • Use contract hold-backs as incentives for vendor to perform to BPA's satisfaction. • Review contracts before each renewal for possible renegotiation of the service level based on past performance of the vendor and future BPA needs. • Meet with vendor technical staff regularly to provide feedback on their performance.

Table 5.4: Business Critical Systems Portfolio Risks

Strategies

Portfolio Strategy	Benefits	Challenges/Issues	Outlook
<p>Asset Plans; Develop individual system asset plans covering maintenance, enhancements, eventually replacement.</p>	<ul style="list-style-type: none"> • Builds partnership between IT and business units • Identifies out year support costs • Establishes performance and value metrics • Identifies risks • Tracks life cycle and helps set replacement/retirement targets • Individual plans will contribute Application Portfolio which will contribute to IT Asset Strategy. 	<ul style="list-style-type: none"> • Business units and IT are not accustomed to developing and using metrics • Most business units are not accustomed to thinking more than a year ahead on their system needs • It will take time and resources to develop asset plans covering the major IT systems 	<ul style="list-style-type: none"> • Efforts are underway to begin developing asset plans for the top five Critical Business Systems and top five Agency Commercial Enterprise systems • Development of system level asset plans is already in the System Development Life Cycle, systems being delivered in FY2011 will need to provide the maintenance team with the initial asset plan • Steering committees have been established for several key system, i.e., FMS and HRmis, which can be leverage for managing asset plans
<p>System Architecture: Develop plans to leverage existing system capabilities, improving interoperability and for implementing Service Oriented Architecture.</p>	<ul style="list-style-type: none"> • New systems will be implemented to leverage and reuse existing capabilities instead of delivering similar/redundant capabilities, which drives up Agency's IT Costs • Reduces time to deliver new systems • Improves interoperability and reduce data integrity issues 	<ul style="list-style-type: none"> • Project managers and project sponsor are accustomed to thinking in terms of best of breed and business unit needs & benefits versus Agency needs benefits • Project managers and sponsors often view considering Agency needs as unwelcomed scope creep with a negative impact on their project's budget and timeline 	<ul style="list-style-type: none"> • The project management is maturing to ensure Agency needs are considered and included into project where feasible and appropriate. • The IT department has not developed mature system architecture nor a comprehensive approach to implementing a Service Oriented Architecture. Availability of resources is slowing progress; outlook is for continued constrained resources and slow progress through FY2014.
<p>Application Performance Monitoring; Move to proactive monitoring of quality of service.</p>	<ul style="list-style-type: none"> • Combines incident and problem management to identify most problematic alerts. • Identifies problems and implements corrective actions (where possible) to avoid service disruption • Aligns with industry best practices 	<ul style="list-style-type: none"> • Establishing response thresholds and developing corrective action scripts is labor intensive - requires a commitment of resource to receive benefit. • Organizational boundaries coupled with roles and responsibilities have impeded deployment of application monitoring in the past • Project managers have not been including application monitoring capabilities as a system requirement 	<ul style="list-style-type: none"> • Limited application monitoring may be feasible in FY2011, resources constraints may delay until FY2014 • Including requirement for application monitoring in SLC will ensure new systems being delivered with this capability. Updating the SLC and requiring systems designs to address application monitoring can occur in FY2011, so that systems being delivered after FY2012 have this capability as they are implemented into production.

		<ul style="list-style-type: none"> • Need to develop consensus on application monitoring capabilities 	
<p>System Development Life Cycle(SDLC): (Rebranded System Life Cycle, SLC)</p>	<ul style="list-style-type: none"> • Use System Life Cycle as a change agent to ensure new development follows industry best practices. • Incorporate Least Total Cost of Ownership 	<ul style="list-style-type: none"> • Maturing the use of the SLC through the maintenance cycle will require both training and change management. Maintenance currently is accustomed to simply making business requested changes with minimal adherence to SLC. 	<ul style="list-style-type: none"> • System work products called out by the SLC are being created by projects. Through training coupled with change management these work products will be maintained to improve and control the evolution of systems to meet emerging business requirements and to identify when systems should be upgraded or replaced.
<p>Software Maturity Model: Adopt a maturity model to quality and predictability of software development and maintenance activities.</p>	<ul style="list-style-type: none"> • Provides guidance for developing or improving processes that meet the business goals • Provides guidance for quality processes, and provide a point of reference for appraising current processes • Provides essential elements for effective and continuous process improvement 	<ul style="list-style-type: none"> • Currently there is large diversity in the approaches project and maintenances teams use in developing and maintaining systems. Change management will be needed to select and adopt a common model. • Staff resources will be engage in assisting in the implementation of critical infrastructure process changes under Microsoft Operation Framework. Attempting to engage in too much too fast may stress staff resources and lead operational instabilities. 	<ul style="list-style-type: none"> • Adopting a software maturity model my need to wait until FY2013/2014 due to the amount of change involved in adopting the infrastructure ITIL based Microsoft Operations Framework which impacts the same resources need to adopt a software maturity model.

Table 5.5: Application Portfolio Strategies

Asset Portfolio Outcomes

Application Objectives	Strategy	Asset Portfolio Measures
Enable secure and reliable automation of business processes and functions.	<ul style="list-style-type: none"> • Leverage System Life Cycle • Application Performance Monitoring 	<ul style="list-style-type: none"> • Health and status monitoring will be implemented for all systems by FY2013. • Performance and quality of service monitoring will be implemented for top 50% of critical business systems and top 10% of agency commercial enterprise systems by FY2014.
Evolve and leverage systems capabilities to meeting emerging business objectives.	<ul style="list-style-type: none"> • System Architecture • Leverage System Life Cycle 	<ul style="list-style-type: none"> • Develop Service Oriented Architecture by 1st quarter FY2013. (delayed from FY2010 asset strategy) • Develop system architecture by EOY2013
Provide guidance on tactical and strategic evolution of systems that balance business unit's requirements with Agency objectives.	<ul style="list-style-type: none"> • Asset Plans • System Architecture 	<ul style="list-style-type: none"> • Establish individual asset plans for the top ten resource intensive critical business systems and top ten agency commercial enterprise systems by the second quarter FY2011.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	<ul style="list-style-type: none"> • Leverage System Life Cycle System 	<ul style="list-style-type: none"> • System Security Plans will be reviewed and updated annually or upon major system enhancement.
Process and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	<ul style="list-style-type: none"> • Leverage System Life Cycle • Software Maturity Model 	<ul style="list-style-type: none"> • Identify software maturity to govern development and maintenance by 2nd quarter CY2012.

Table 5.6: Applications Portfolio Outcomes

6. Capital Work Plan

Goals & Objectives

The Capital Work Plan is a collection of capital IT projects prioritized by the Agency Prioritization Steering Committee (APSC), approved by the CIO, and executed by the IT Project Management Office (PMO). The Capital Work Plan does not in of itself have assets, rather assets delivered under this plan fall under the Network, Data Center, Office Automation, or Application Portfolio.

Capital Work Plan Objectives	Aligns with IT Asset Goals	End-Stage Targets
Deliver maintainable and cost effective solutions for APSC prioritized projects.	ITAG 2 – P ¹⁹ ITAG 3 - S	<ul style="list-style-type: none"> Ability to fund future maintenance costs of a project is a decision criterion in prioritizing and approving a project. (No project is allowed to deliver a solution that has not validated the ability to support operation and maintenance). Solution selections adhere to BPAM Chapters 660 and 661. A solution with projected annual operations and maintenance costs greater than 15% of investment costs is required to receive CIO exception.
Information System Owners advise and assist projects in the use of technology to meet project objectives.	ITAG 6 - P	<ul style="list-style-type: none"> Capital projects are captured in asset plans and forwarded to the IT PMO for APSC consideration. Information System Owner and NJ business analyst are involved in developing “To-Be” business processes, and an Analysis of Alternatives prior to product selection.
Projects balance the immediate needs of the business units with the overarching Agency’s strategic objectives in the selection and delivery of solutions.	ITAG 3 - P ITAG 2 - S	<ul style="list-style-type: none"> Develop and/or buy COTS solutions that leverages and, where possible, contributes to Service Oriented Architecture and data abstraction. Projects utilize the library of Enterprise reusable components and services to reduce development time, development costs, and maintenance costs. Projects contribute to a library of Enterprise reusable components and services to reduce development time, development costs, and maintenance cost.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	ITAPG 4 –P	<ul style="list-style-type: none"> Projects adhere and appropriately apply requirements to deliver on the Security Authorization Process/ Risk Management Framework (i.e. System Security Plans created or updated, Security Assessment Report created, and Authority to Operate obtained).
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	ITAG 5 – P ITAG 2 – S	<ul style="list-style-type: none"> Projects deliver systems following the System Lifecycle (SLC). Selection of solutions follows BPAM chapters 660 and 661 guidance.

Table 6.1: Capital Work Plan Objectives

¹⁹ Each objective relates to a single primary goal indicated by “P”; objectives may also relate to secondary goal, indicated by “S”.

Asset Current State

The major aspects of the Capital Work Plan can be summarized as:

- The number of projects IT typically maintains in the Capital Work Plan has tripled since FY2009 to support critical Agency projects that include RODS Replacement, Regional Dialog, Transmission Process Improvement Projects (TPIP) and other key Agency initiatives
- 67 projects are in inception, alternatives analysis, system planning, execution, not started or on hold, representing a commitment of \$48.5m in FY2012, \$38m in FY2013, and \$5.5m in FY2014 to complete
- The expense portions of a project (inception, alternatives analysis, contract development and negotiation, and business process developments) ranges from 7% to 15% of a project's capital investment
- Projects deliver efficiencies to the Agency, not IT, while IT absorbs and manages the new expense operations and maintenance costs from delivering new systems (annual operations and maintenance costs range from 10-18% of the capital investment)
- The continuing demand for new projects and increasing desire for hosted solutions is escalating the strain on the expense portions of the other IT Asset portfolios
- Availability of business-line subject matter experts is being stretched to support all projects in flight
- IT resources have had heavy contractor augmentation to support the tripling of projects

The current status of the Office Automation Portfolio is discussed in detail below:

The IT Project Management Office (PMO) has a framework, which the PMO is continuously improving, for prioritizing and executing on projects. In conjunction with the Chief Technical Officer and Software Development & Operations manager, the PMO has consolidated the Project Management Handbook and System Development Life Cycle (SDLC) into the System Lifecycle (SLC), which covers the execution of projects from initiation through post implementation. This process also incorporates and follows the BPAM Chapters 660 and 661 guidance on capital investments.

The PMO maintains, and reports monthly on, key project performance metrics on all projects in the Capital Work Plan. These performance metrics can be accessed from the PMO website at [PMO Dashboard](#). Executive/Lead Sponsors, with the assistance of Project Managers, are required to present to the Agency Prioritization Steering Committee a justification for spending or time schedules that exceed planned levels by more than 10%. The Capital Work Plan, including authorized spending levels, is also maintained on the PMO web site at [PMO Work Plan](#).

Although the projects create business cases in the project's inception phase, we are only now evolving to the maturity of updating the business case as part of each phase gate approval, after solution selection and after system delivery in the post implementation phase. To date projects have not provided analysis on how well the solution met the business objectives nor have the projects been challenged to implement metrics that

measure the solutions on-going performance and value. These activities are specified in the SLC and IT is currently maturing to incorporate these activities into projects and both the Application and Data Center Portfolios.

The continuing demand for IT projects has stressed the number of IT personnel to support projects, resulting in the PMO managing this stress by hiring additional contractors to support the projects. The PMO has brought on project managers, business analysts, technical leads, and developers to support the current extensive Capital Work Plan. Business lines Subject Matter Experts (SME) have also been stretched to support the Capital Work Plan. Projects are dependent on these SME for planning and execution. These SMEs cannot be augmented by contractors due to the SMEs specialized knowledge. The availability of SMEs can impact the rate at which a project is conducted.

Figures 1.6 from Chapter 1, shows the net value the current Capital Work Plan will deliver to the Agency and figure 1.4 shows the net new increase in operations and maintenance costs. The Agency is receiving the benefits from the Capital Work Plan and IT is challenged to manage and control the increased operations and maintenance costs.

Figure 1.5 shows the rapid increase in capital spending that has led to the current portfolio of projects. There is an expense cost of 15% to 20% of the capital spend associated with each project. The combined effects of increased expense spending to support projects and additional new operations and maintenance (typically 10-18% of implementation costs) from delivering projects is creating stress on the IT expense budget. In order to fund these rapid increases in project related expenses, discretionary spending in the Office Automation Portfolio and the Application Portfolio has been curtailed. To absorb the new operations and maintenance costs, the Application Portfolio has reduced the funds available for system enhancements with the result of business units expressing dissatisfaction with the slower pace in evolving their systems to meet their emerging business needs.






Capital Work Plan Objectives	Status Meeting Objectives	Comments
Deliver maintainable and cost effective solutions for APSC prioritized projects.		<ul style="list-style-type: none"> Solutions being developed are selected based on business needs that drive requirements and comply with the BITA. This combination is intended to address maintainability and cost effectiveness. However, more work needs to be done on deeper process driven requirements and having an accepted well-defined approach to delivering a methodology for assessing post-delivery cost effectiveness.
Information System Owners advise and assist projects in the use of technology to meet project objectives.		<ul style="list-style-type: none"> ISOs are generally aware of projects and are involved in review and approval of project documents from project inception to closure. ISOs are involved in solution alternatives and selection. Work is being done to strengthen that involvement and find an appropriate balance between the implementation of new technology and integration with the existing technology.
Projects balance the immediate needs of the business units with the overarching Agency's strategic objectives in the selection and delivery of solutions		<ul style="list-style-type: none"> Solutions are chosen to meet specific business needs and in concert with the Agency strategic objectives. This process needs to continue to improve its formality and consistency.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.		<ul style="list-style-type: none"> Federal laws and regulations are constantly evolving/changing. Our compliance mechanisms are in the process of stabilizing across the portfolio.
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.		<ul style="list-style-type: none"> We have a maturing PMO and governance process that does align with industry practices. We are taking additional steps to improve and strengthen those processes and practices to assure the most effective TCO that can be achieved.

Table 6.2: Status Capital Work Plan in Meeting Objectives

Risks

In the past two years, the PMO has been investing resources and attention in improving processes and reducing risks associated with the IT Capital Portfolio. As a result of these efforts, 16 of the 20 previously identified risks have mitigated to either to extremely low probably of occurring or low impact. These risks have been dropped from Table 7.3, Capital Work Plan Risks, but have been included in Appendix D for reference.

ID	Risk	Mitigation
CWP02	Failure to assure well defined business process to drive project requirements	Perform a business readiness assessment as part of early initiation and planning stages to assure business processes are well defined or such definition needs to be incorporated into the project plan. Improved project execution through combination of adding a Requirement Management Lead and updating SLC 2.0.
CWP06	Failure to assure increased O&M expense budget for post-delivered project systems	Provide a formal mechanism for O&M recipients to properly reflect budget changes needed to support newly delivered projects. This should include any work necessary to decommission existing applications/systems being replaced by the new delivery.
CWP12	Failure to evolve the PMO, (<i>The PMO has made strides in maturing project management and this risk may be dropped from future strategies.</i>)	A maturity plan will be developed for the PMO, which will include a clear definition of what that means, and a “ladder” to achieve it. This ladder will include all of the necessary secondary and tertiary components, such as Change Management, Sponsor/Leader, Business Process, Stakeholder, and IT.
CPW20	Failure to provide a consistent integration plan for standalone and grouped (program level) projects	A standard Integration Plan will be modeled that can be used by all projects and multi-project programs. It will be developed to provide a baseline onto which individual requirements can be added. This model will be vetted through architects, IT managers, and select business representatives for appropriateness and completeness.

Table 6.3: Capital Work Plan Risks

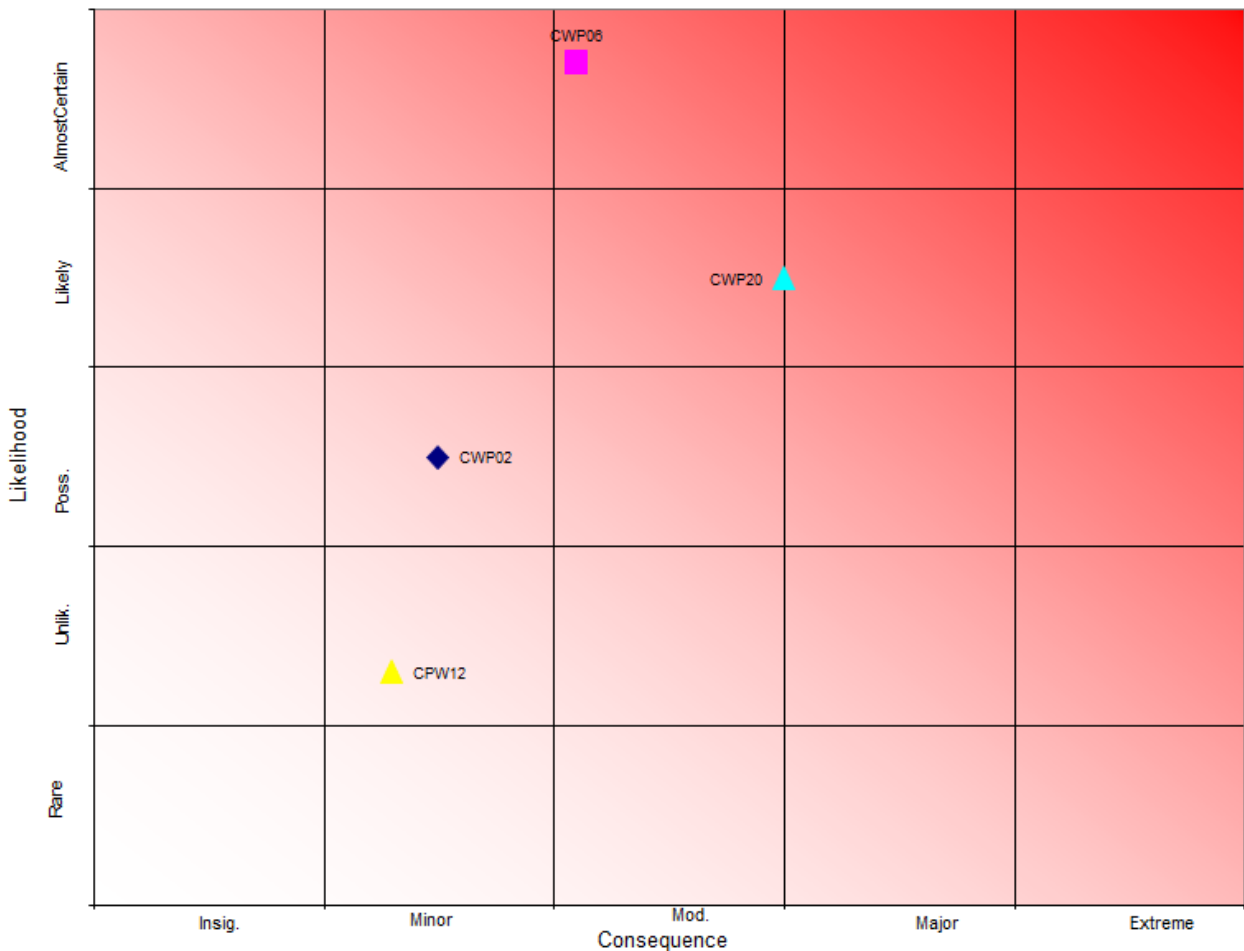


Figure 6.1: Capital Work Plan Risk Map

Strategies

Strategy	Benefits	Challenges/Issues	Outlook
Align Project Management Office Handbook (PMOHB) with System Development Life Cycle (SLC): Ensures Project management processes and SLC are aligned and embody best practices for project management and system development.	<ul style="list-style-type: none"> • Ensures project management practices follow SLC and lead to creating key work products such as: <ul style="list-style-type: none"> ○ System Security Plans ○ System level Asset Plans ○ Operation and Maintenance costs ○ System Requirement Specifications 	<ul style="list-style-type: none"> • Training and communication on the SLC and project management will be required until the practices are uniformly adopted • Emphasis on SLC has been on capital projects, need to ensure maintenance teams adhere to SLC as well. 	<ul style="list-style-type: none"> • Chief Technical Officer (CTO) and Project Management Office(PMO) is working to together to issue next revision of SDLC (re branded as System Life Cycle (SLC) v 2.0) that ensure project management practices and System Life Cycle are aligned. • CTO and Project Management Office are planning SLC training for new project teams. <p>Completed and Implemented FY2011</p>
Develop Asset Plans: Leverage the Asset Planning phase of the SLC to aid identifying capital projects and major expense projects, and to refine operations & maintenance costs.	<ul style="list-style-type: none"> • Aids in identifying total costs of ownership by developing ongoing operations and maintenance costs • Aids in identifying potential capital projects in the out years 	<ul style="list-style-type: none"> • IT asset planning is a new discipline for BPA, framework, process, and work products are still being developed. • In order to be successful, asset planning requires a partnership between business units and IT with both taking a longer multiyear view of business/system needs. • Asset plans will tend to be business unit focus, challenge will be to strike a balance between Agency needs business units needs. 	<ul style="list-style-type: none"> • PMO is leveraging and helping to lead development of business unit level asset plans to identify and prioritize capital projects. • PMO approach can be leveraged to build multiyear capital programs.
Agency Prioritization Steering Committee (APSC) oversight: Leverage APSC to ensure project deliver solutions lead to lowest total cost of ownership and projects are prioritized based on agency needs.	<ul style="list-style-type: none"> • The APSC is comprised to representatives from across the business units and is positioned to add in: <ul style="list-style-type: none"> ○ Project prioritization ○ Review of operations and maintenance costs ○ Adhering to least total cost of ownership 	<ul style="list-style-type: none"> • Parochial thinking and immediate needs of business units may override agency objectives of selecting solutions with least total cost of ownership or pushing back on solutions with usually lager operations costs. 	<ul style="list-style-type: none"> • PMO has adopted practices and reporting that is adding in maturing review and decision making surrounding projects to include examining total cost of ownership and operations and maintenance costs.
Mature System Life Cycle (SLC) practices: Improve quality of work products and understanding of their use.	<ul style="list-style-type: none"> • Quality Work products are produced that aid in developing and delivering solutions, meeting compliance requirements, and controlling costs. 	<ul style="list-style-type: none"> • Lack of clarity on project team members on what is required in various project work products (in some cases why). 	<ul style="list-style-type: none"> • CTO has developed evaluation criteria for System Requirement Specifications and System Design Specification and is working to develop evaluation criteria for other key work products. • The PMO has developed evaluation criteria for all phase gate approvals to ensure project met the objectives of its current phase and has adequately planned for successful delivery in the next phase.

Table 6.4: Capital Work Plan Strategies

Capital Work Plan Outcomes

Capital Work Plan Objectives	Strategy	Asset Portfolio Measures
Deliver maintainable and cost effective solutions for APSC prioritized projects.	<ul style="list-style-type: none"> • Mature SLC • APSC Oversight • Mature Asset Plans 	<ul style="list-style-type: none"> • All completed capital projects will undergo reviews to ensure delivery of: <ul style="list-style-type: none"> ○ Solutions that adhere BPAM Chapter 660 and Chapter 661 guidance. ○ Updated business cases in the SLC post implementation phase ○ IT asset plan accepted by IT Asset Manager and Information Solution Owner • All project over \$1M must produce and have acceptance by the IT Asset Manager a metric plan that measure business value and performance before moving into the execution phase.
Information System Owners advise and assist projects in the use of technology to meet project objectives.	<ul style="list-style-type: none"> • Mature SLC Adherence • Mature Asset Plans 	<ul style="list-style-type: none"> • Beginning 3rd quarter FY2012, CTO will review Analysis of Alternatives using standard criteria embodied in radar chart to measure quality and completeness of Analysis of Alternatives, to ensure technology alternatives are explored and discussed. • Beginning 4th quarter FY2012 all projects must have CTO and IT Asset Manager signed off on Analysis of Alternatives to moving to start of development.
Projects balance the immediate needs of the business units with the overarching Agency's strategic objectives in the selection and delivery of solutions	<ul style="list-style-type: none"> • Mature APSC Oversight 	<ul style="list-style-type: none"> • All projects will be prioritized by the APSC based on the project's ability to meet business units and agency objectives and value to the Agency. • All projects with projected operations and maintenance costs greater 15% of implementation costs must receive an exception from the CIO to move into execution phase.
Services are delivered and asset components maintained in compliance with Federal laws and regulations.	<ul style="list-style-type: none"> • Mature SLC Adherence 	<ul style="list-style-type: none"> • System Design Specification must be reviewed and signed off by CTO (SLC system planning phase deliverable) prior to start of system development. • All projects must deliver completed System Security Plans or be covered by an existing plan.
Processes and practices aligned with industry practices to deliver secure, reliable services with the least total cost of ownership.	<ul style="list-style-type: none"> • Mature SLC 	<ul style="list-style-type: none"> • SLC is reviewed and update on at least an annual basis.

Table 6.5: Capital Work Plan Outcomes

IT Prioritization Processes

The IT prioritization continues to mature, moving towards incorporating and aligning business strategy and asset planning. This can be seen in Figure 1.9, a high level domain view of the [System Life Cycle](#) (SLC), which SLC is now in a Wiki and accessible on our intranet.

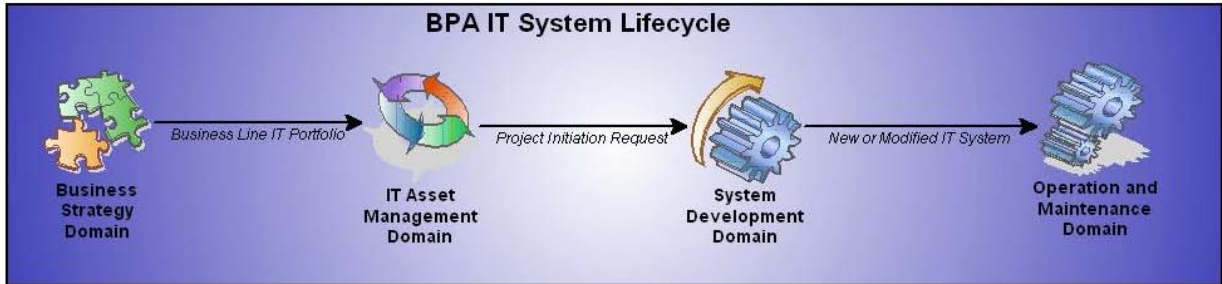


Figure 1.9: BPA IT System Lifecycle

For the last several years, IT has been concentrating on maturing the System Development Domain and Operations & Maintenance Domain. Since FY2010, attention has been focused on developing the IT Asset Management Domain which is improving our ability to identify and prioritize projects in the 1-3 year timeframe. We are beginning to focus on maturing the Business Strategy Domain which will both improve short term prioritization and provide longer term project prioritization, aiding in ensuring projects are aligned to meet enterprise business objectives. Below we will briefly discuss the prioritization processes we are currently using for capital projects and system enhancements, how they have matured, and how we will be improving them.

Work Plan Prioritization Processes

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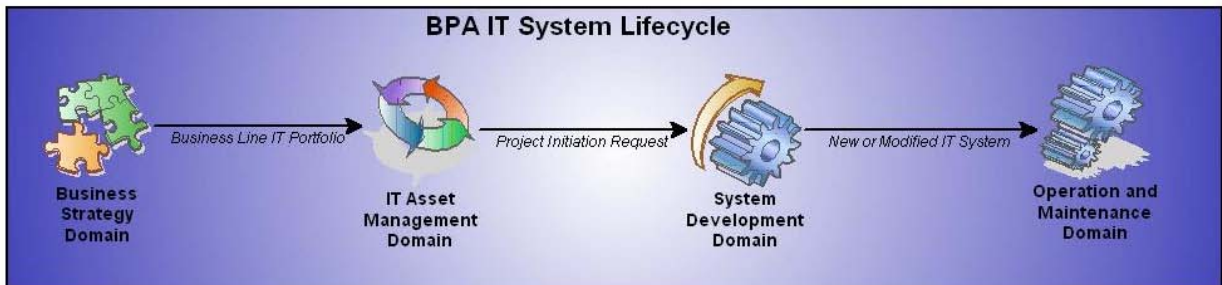


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Currently capital prioritization focuses primarily on the current (year 1) and next operating year (year 2), with some attention given to year 3. In previous years, the process began with a call letter being sent to the business units requesting them to submit their proposed capital projects, which typically only spanned the next one to two operating years. We are now transitioning to a point where the PMO is working with the business units to identify the projects for the out years. We plan to mature to using the asset plans to identify out year projects. These asset plans will be developed with increasing cooperation between the business unit and IT resource managers to plan the evolution of their existing systems and the addition of new systems to meet evolving business needs and objectives. The next step in this path would include ensuring individual asset plans aligned with the Agency's overarching business strategy. This step includes maturing the IT Asset Strategy to combine and improve the alignment among individual category Asset Plans and the Agency's Business Strategy.

Today, once the projects from the business units have been collected, they are brought to the Agency Prioritization Steering Committee (APSC). The APSC is composed of representatives from each business unit, corporate, and NJ for infrastructure projects. At this point very little work has been done on the projects other than identifying the business need, potential business benefit, and a ballpark cost estimate. Each business unit prioritizes the projects within their area and presents their portfolio to the APSC. The APSC then merges the business units' portfolios into a single prioritized Agency IT project portfolio. To date, the prioritize process has depended on the APSC's individual and collective business acumen and understanding of the Agency's business strategy to prioritize the projects. The PMO is working on establishing criteria to be used as an aid in the prioritization process. An early draft is included in Appendix F. The PMO is responsible for project execution which includes sequencing and project initiating based on availability of staff resources and project dependencies. The APSC prioritization process spends most of its attention in managing the projects that are near cutoff line – those projects either just above or below the spending cutoff line. The business units have been given the flexibility to manage projects within their own portfolio if it does not impact other business units approved projects either in terms of funding or other resources.

The result of this effort is a Capital Work Plan. Figure 1.10 is snap shot of a portion of the work plan. The FY2012 Capital work is dynamic and maintained on the PMO web site. The work plan as of November 2012 has been included in Appendix F.

W/P Sort	ID	Portfolio Plan	Type	Stage of Project	Status	Trend	Program	Project	PMO Team Lead	Project Manager	Lead Sponsor
0	ITT130	A-TS	Cap	Inception			T	NERC ATC State Awareness Tool (NERC-SAT)	J. McKenney		
1	ITP81	A-PS	Cap	Execution	!	↗	REV	Slice Computing Application (SLICE)	L. Sims	S. Clevinger	T. Roberts
2	ITP84	A-PS	Cap	Execution	✓	→	REV	Regional Dialogue Scheduling System (RDSS)	L. Sims	J. Foley	B. Lamb
3	ITP83	A-PS	Cap	Execution	✓	→	REV	Loads Obligations & Resource Analyzer (LORA)	L. Sims	R. Tydeman	R. Mackay
4	ITC83	A-C-KS	Cap	Execution	✓	→	REV	Customer Billing Phase 2 (CBC-Billing2)	L. Sims	M. Evans	C. Maichel
5	ITC85	A-C-KS	Cap	Execution	✓	↗	REV	Customer Contracts (CBC-Contracts)	L. Sims	E. Albertson	K. Graves Pyrch
6	ITP86	A-PS	Cap	Execution	!	→	REV	Revenue Forecasting (RF)	L. Sims	C. Whitlow	E. Evans/E. Adelman
7	ITP87	A-PS	Cap	Execution	✓	→	REV	Rates Analysis Model (RAM)	L. Sims	D. Ulrich	TBD
8	ITC79	A-C-KS	Cap	Execution	!	→	REV	Customer Data Management (CDM)	L. Sims	D. Ulrich	C. Maichel
9	ITC80	A-C-KS	Cap	Execution	!	→	REV	Customer Portal (CP)	L. Sims	S. Ybanez	C. Maichel
10	ITT103	A-TS	Cap	Execution	✓	→	TPIP	Transmission Asset System - Inside the	J. McKenney	C. Davis	R. Batchelor
11	ITC100	A-TS	Cap	Execution	!	↘	RODS	RODS Retirement (RODS)	J. McKenney	A. Macklin	L. Buttress
12	ITT115	A-TS	Exp	Execution	✓	→	TCSR	OATI Infrastructure Enhancement (OIE)	J. McKenney	K. Stokke	
13	ITT116	A-TS	Cap	Execution	!	→	TCSR	Long Term ATC Management Tool (LTAMT)	J. McKenney	B. Ryan	M. Manary
14	ITT117	A-TS	Cap	Execution	✓	→	TCSR	NERC ATC Standards System Implementation	J. McKenney	K. Stokke	M. Manary
15	ITT118	A-TS	Cap	Execution	!	→	TCSR	Competition Implementation for Tariff	J. McKenney	K. Stokke	M. Manary
16	ITT108	A-TS	Cap	Execution	✓	→	T	Telecommunications Circuit Management	J. McKenney	B. Lueb	J. Brown
17	ITC88	A-C-F	Cap	Execution	✓	→	Corp	Dynamic Modeling (DM)	L. Sims	D. Valentine	D. Carbonari
18	ITP89	A-PS	Cap	Execution	✓	→	P	Streamflow Model Replacement (PSMR)	L. Sims	C. Whitlow	E. Pytlak
19	ITI97	IT	Cap	Execution			IT	IT Infrastructure Life-Cycle Refresh (IT-LCR)	G. Callaway	J. Engelhardt	J. Green
20	ITP93	A-PS	Cap	Execution	✗	↘	Corp	EE Central (EEC)	K. Silva	R. Keanini	M. Weedall
21	ITP80	A-PS	Cap	Execution	!	→	P	Trade Management System (Gateway)	L. Sims	D. Valentine	A. Draper

Figure 1:10 Sample of IT Work Plan

To date the work plan has been viewed as being comprised of capital projects. As BPA adopts more Software as a Service (SaaS) solution this creates a potential problem. SaaS solutions are all expense projects; the APSC, IT, and the Agency will have to develop a mechanism to handle a large expense project when capital resources had been programmed. It will not be known until an analysis of alternatives is performed that SaaS will emerge as the preferred and cost effective solution. This creates a problem in trying to forecast and budget capital or expense for future projects. At this time there is no mechanism to exchange capital for expense to accommodate SaaS solutions. IT has absorbed the expense cost for SaaS solutions; however, this lack of ability to exchange funding adds additional stress to an already heavily constrained IT expense budget.

Given the tight expense resources, the APSC has begun factoring in the expense costs associated with project initiation and planning. The availability of expense funds to carry

a project through execution (capital funding) has become a factor, as of FY2012, in prioritizing and approving projects to move forward.

A final new criterion for project prioritization and APSC approval to move a project into execution is the ability to reliably maintain the new asset or service in the case of SaaS. This means, if the project delivers a new asset or service that requires a net new expense cost, the means to offset this new expense requirement must be identified either through increasing the IT expense funds or by reducing funds for system enhancements.

Appendix A: Information Technology T Asset Planning Process

The planning process for the strategy is being developed in a manner that integrates the maintenance and evolution of the strategy into an annual cycle and into routine IT processes and practices. This integration is depicted in Figures A.1 through A.3. Figure A.1 shows the relationships between the strategic planning process and the asset management planning process and their major work products. The BPA Agency Strategy will form the key guidance that primarily drives²⁰ the business initiatives and secondarily drives²¹ the IT strategy. Currently, most of the BPA business guidance to IT comes directly from the individual business units versus Agency Strategic Planning.

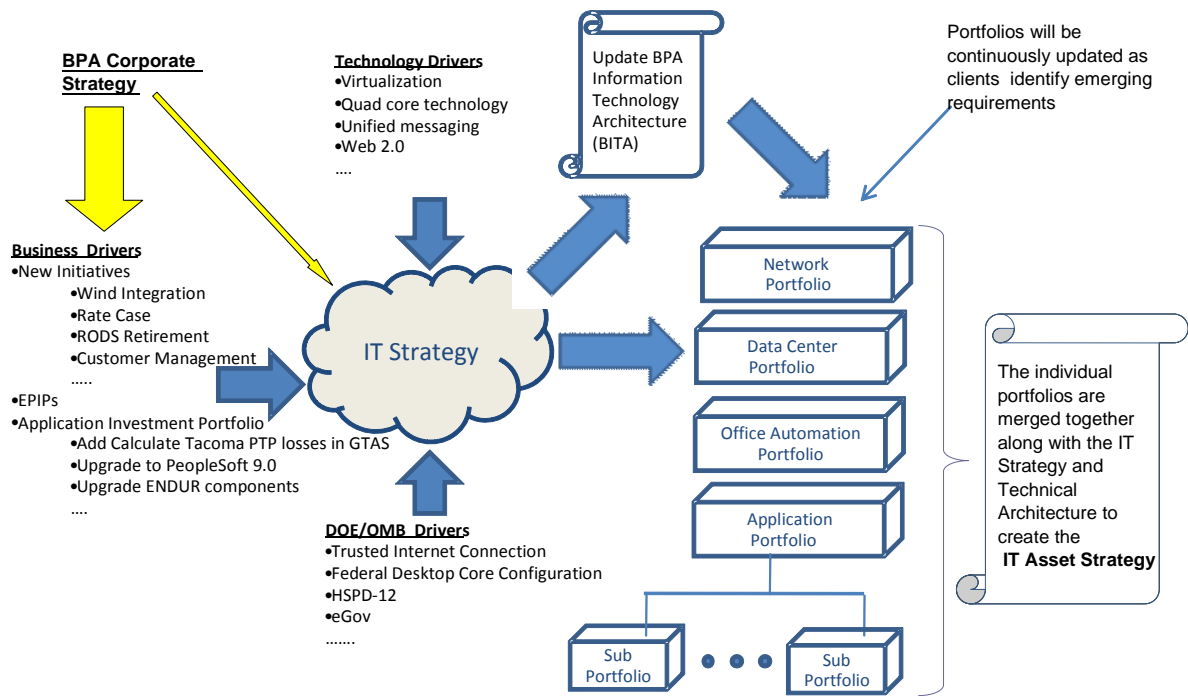


Figure A.1: Relationships between Drivers, IT Strategy, Information Technology Architecture and Asset Portfolios

²⁰ Thick yellow arrow from BPA Corporate Strategy to Business Drivers

²¹ Thin yellow arrow from BPA Corporate Strategy to IT Strategy

The Application Portfolio contains 113 systems²², a number which varies as new systems are delivered and old systems retired. The official inventory is maintained on the NJS, Software Development and Operations, web page:

<http://bpaweb/orgs/orgs%20main/AgencyIT/SoftDev/default.aspx>. The Application Portfolio has been further divided into sub portfolios for

- Critical Business Systems: Systems that must be up and available on a 24 hour basis to support the marketing and scheduling of power and transmission²³.
- Business Systems: Systems that support creating or forecasting budgets and financial activities such as time and labor.
- General Purpose Systems: Systems that support various activities such as monitoring fuel utilization or air craft maintenance.
- General Task Systems: These are typically web base application such as People to People awards or the BPA phone directory.

Figure A.2 shows the relationship between key Agency and IT work products and how they're used to maintain and evolve the IT Asset Strategy. The individual Asset Plans for the sub portfolios are updated throughout the year as new business or compliance requirements emerge. The information in the individual Asset Plans are collected and are used to both inform and shape the annual IT Strategic Plan. In a similar fashion there is a feedback loop between the BPA IT Architecture (BITA), IT Asset Strategy, and Asset Plans. The BITA sets the technology direction for the Asset Strategy and Asset Plans. The Asset Plans reflect the ability of the various assets to evolve and adhere to the technology standards established in the BITA, this relationship also informs and influences the timelines and standards proposed in for the next iteration of the BITA. Emerging business requirements, which are first identified in the Asset Plans, will also influence and help shape the BITA.

²² The Application Portfolio also supports a substantial inventory of Task systems such as People to People, BPA Directory, etc.

²³ Included in these critical systems are externally hosted Software As A Service systems for power (MCG) and transmission (OATI) scheduling.

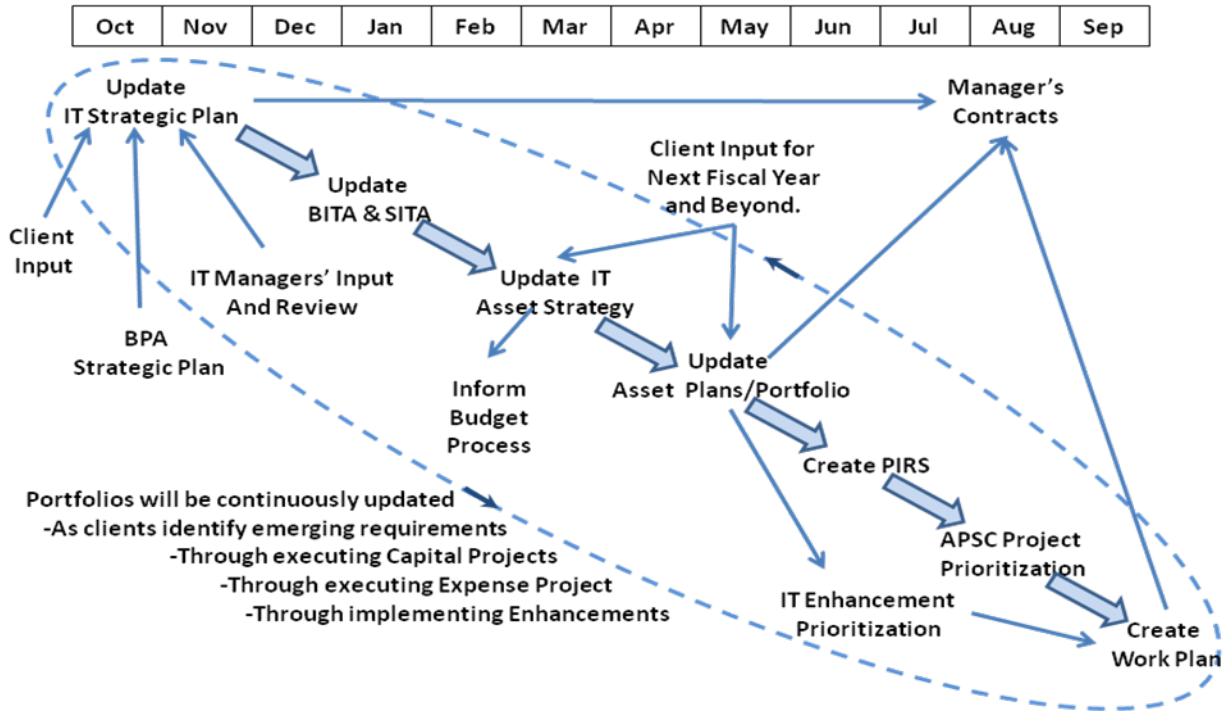


Figure A.2: Annual Cycle for Maintaining and Updating IT Asset Strategy

Figure A.3 shows the integration of asset plans into the Software t Life Cycle (SLC).

This integration ensures several important activities occur:

1. As new assets are delivered the Asset Plans are updated to include these new capital assets
2. Asset Plans are updated with emerging business requirements throughout the life of an individual asset
3. Asset Plans are reviewed on at least an annual basis
 - a. Performance metrics are collected and reviewed
 - b. Risks are identified and reviewed

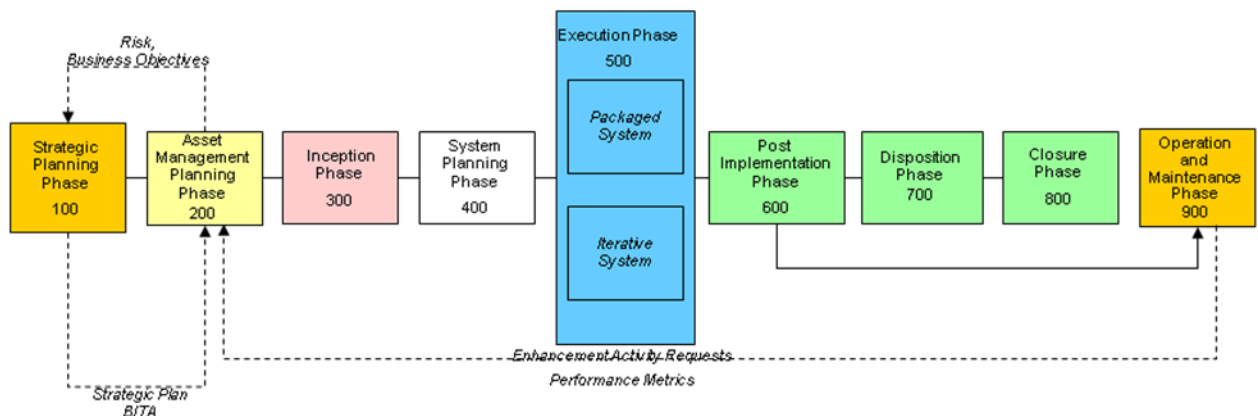


Figure A.3: Integration of Asset Management Planning into the Software Development Life Cycle

In addition to the four Asset Portfolios, IT maintains a Capital Work Plan. This work plan contains all of the capital projects that have been recommend for approval by the Agency Prioritization Steering Committee (APSC) and have been approved by the Chief Information Officer (CIO). The capital projects will create a capital asset following the methodology of the SLC. These assets will belong to one the four asset portfolios once delivered to production. The current capital work plan has been included in Appendix A.

Appendix B: Microsoft Operation Framework

(A Way Forward to Achieve Operational Excellence and Deliver Greater Business Value)

BPA IT must lower costs while at the same time powering innovation and growth to provide greater business value. According to Gartner,²⁴ staying ahead of these ever increasing business demands requires a methodical approach to assessing how best to align business imperatives with the IT investments that enable the greatest business impact. Microsoft²⁵ has built a robust and systematic process for assessing IT infrastructure and other capabilities needed to build a dynamic IT roadmap. This transformative and iterative process shifts IT from a cost center focus into an innovative business growth enabler. Microsoft's process is built on established industry best practices such as the Information Technology Infrastructure Library (ITIL)²⁶ and seminal work completed at the Massachusetts Institute of Technology (MIT) presented in the Harvard Business Review.²⁷

Optimization is a structured, systematic process of assessing maturity across IT capabilities, then prioritizing projects to progress towards a Dynamic state. The process begins with a starting point, "where our IT infrastructure and platform is today—the As-Is," and a destination, "where we want it to be—the To-Be." Optimization focuses on aligning or modifying the configuration of the Agency's IT assets and resources to advance the business towards its desired destination. As a result, IT becomes a more strategic partner to the business.

The Optimization model and the characteristics of each stage are summarized in Figure B.1. BPA is currently between the Basic and Standardized stages. Much of BPA IT services are reactive and somewhat ad hoc in nature. We must mature to a full Standardized stage and then evolve to the Rationalized stage and then eventually to the Dynamic stage. Note that with progression to higher stages, cost reductions are possible due to the use of industry best practices. At the same time we will be able to provide better and more focused services and serve the Agency more effectively.

²⁴ Gartner 2008 Study, "Making the Difference: The 2008 CIO Agenda"

²⁵ Microsoft 2009, "Taking the Lead: Gaining a Competitive Advantage Through Infrastructure and Platform Optimization"

²⁶ See ITIL website at <http://www.itil-officialsite.com/home/home.asp>

²⁷ Ross, Weill, Harvard Business Review, November 2002

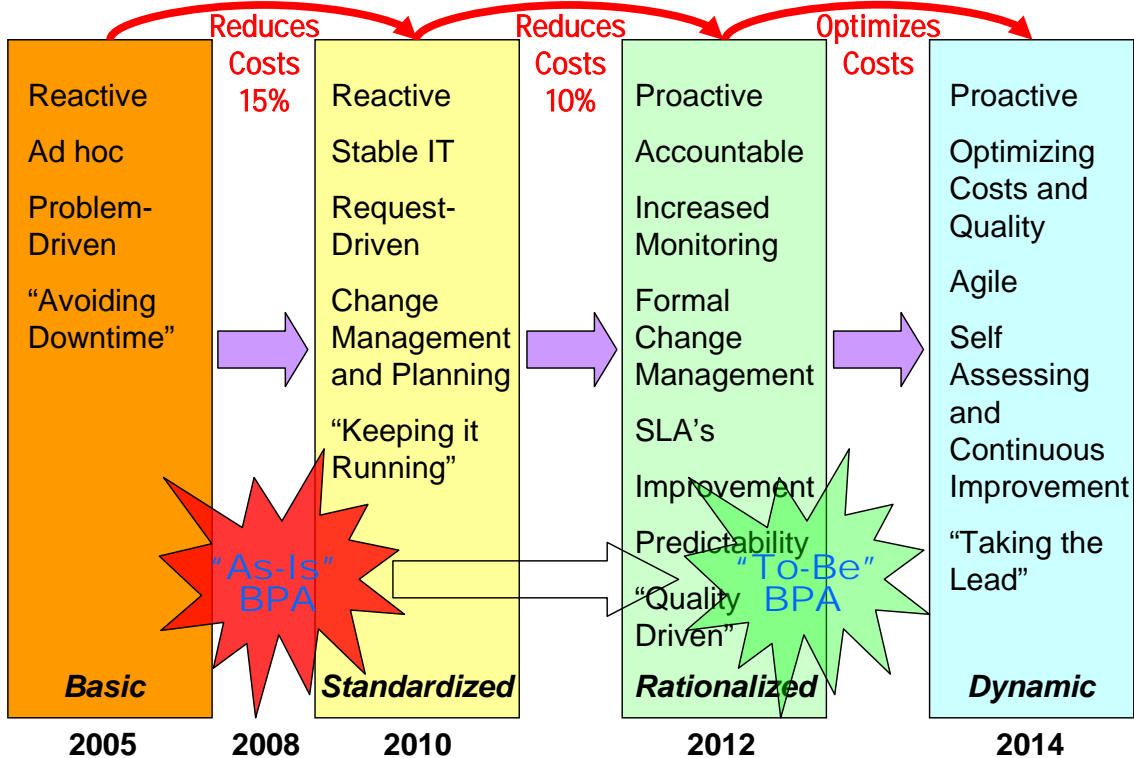


Figure B.1: Organizational Optimization Model—Stages of Maturity

Figure B.2 shows the basic steps of how we need to move from where we are to get to the Rationalized stage. There are two key ingredients:

- Talent Management that includes best practices, standard processes, effective tools, and training
- Demand Management that includes prioritized activities with efficient and effective solutions.

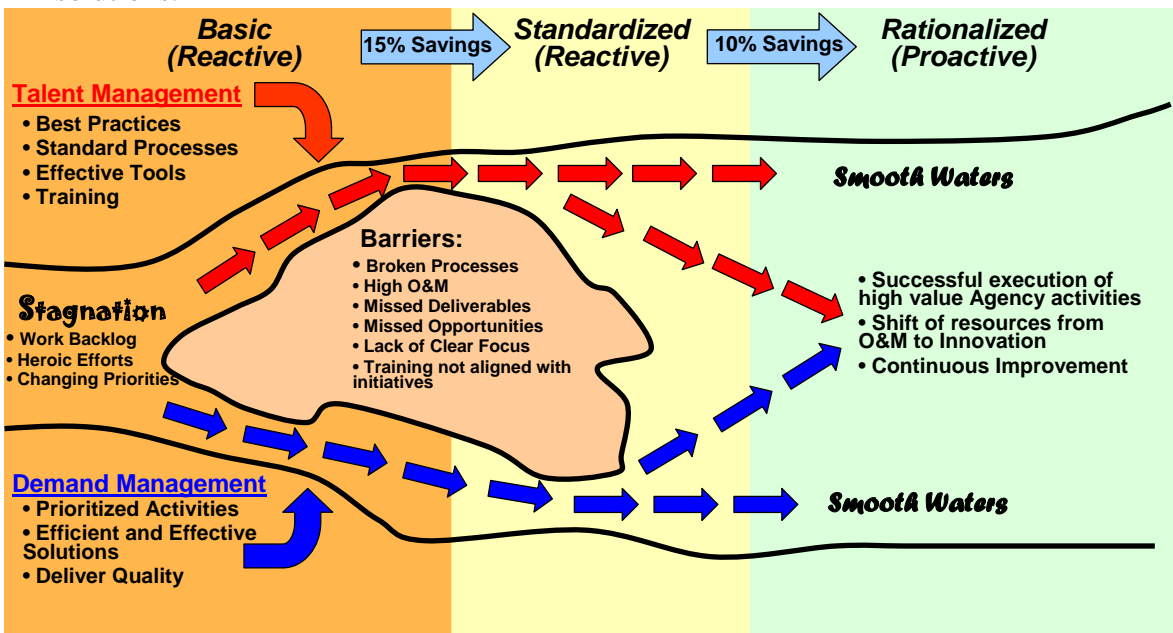


Figure B.2: Improving the "Flow" of IT Work by Removing Barriers to Success

The specific means by which we will accomplish this transformation will be by addressing twelve processes that will reduce IT operations labor while yielding improved service delivery and improved operational reliability. Working concurrently on all twelve may introduce operational instability and overly stress staff resources. In FY2011/FY2012, IT will be focusing concentrating on five key processes (processes in red below):

- **Operations Management/Systems Monitoring (Monitoring and Alerts)**
- **Incident Management**
- **Problem Management**
- **Change Management**
- **Configuration Management**
- Performance Management
- Storage Management
- Backup and Restore Management
- Capacity Planning Management
- Database Management
- Security Management
- Policy, Procedure, and Process Governance

Appendix C: IT Device Refresh

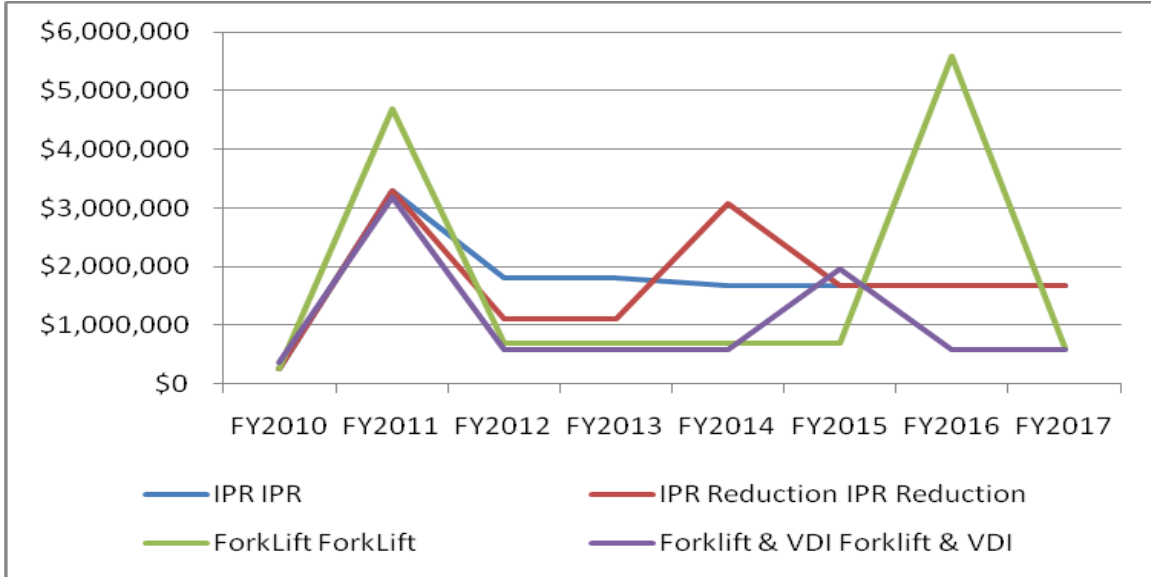


Figure C.2: Desktop Refresh Seneraio Expense Costs

Notes

Architectural standards were established to cover Applications, Data Center, Network, and Office Automation Assets to contend with the cost and complexity arising from a heterogeneous IT hardware and software environment with a multitude of disparate and awkwardly interconnected applications systems that were in place across BPA when NJ was formed. These infrastructure standards allowed IT to evolve to a more homogenous hardware environment, reducing and containing costs. Due to the complexities of interdependent software systems coupled with applications’ longer lifecycles, the efficiencies in the software have been slower to achieve and will require diligence, discipline, and time to be fully realized.

Software efficiencies: IT has adopted a standards based component approach to hardware; this coupled with the relatively short lifecycle of hardware has allowed IT to achieve significant infrastructure efficiencies in a very short time. The software industry has made several attempts to move in a similar direction with software with limited success, the latest and most promising being the move toward a Service Oriented Architecture. As a consequence of the combination of the state of the software industry, the relatively longer application lifecycles (on average 10+ years) and BPA’s own business requirements, it will take more discipline and time to contain operations and

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maintenance costs for the assets covered by the Applications Portfolio than for infrastructure assets.

Appendix D: FY2009 Capital Risks

Risks

ID	Risk	Mitigation
CWP01	Failure to address change management as a separate but integrated project delivery component	Continue to reinforce executive commitment to the Change Management methodology recently adopted by the Agency. Incorporate CM milestones in Project Management schedules. Assure that a CM effort is structured with each project.
CWP02	Failure to assure well defined business process to drive project requirements	Continue to reinforce process development efforts, including process governance and process change control within the business environments to be ready for future project needs. Perform a business readiness assessment as part of early initiation and planning stages to assure business processes are well defined or such definition needs to be incorporated into the project plan.
CWP03	Failure to properly estimate projects	Create, review, assess, and adjust milestones within project timelines to provide for estimating next phases of a project. Project timelines should have a "level of confidence" rating.
CWP04	Failure to adequately schedule, budget and resource the requirements and analysis phase of a project	Projects need to increase the time and expense allocation for the requirements and analysis phase prior to beginning execution. With the majority of capital projects being COTS/GOTS requiring various levels of integration into the existing architecture, 20%-35% of the project effort needs to be allocated to the planning stage.
CWP05	Failure to address post-project resourcing requirements to adequately forecast larger maintenance portfolio needs	O&M resources should be brought into project teams prior to delivery (the UAT period or earlier) at the forecasted % of time believed needed for post-delivery support. A review and adjust milestone for O&M projections will be incorporated into the Transition Stage of the project.
CWP06	Failure to assure increased O&M expense budget for post-delivered project systems	Provide a formal mechanism for O&M recipients to properly reflect budget changes needed to support newly delivered projects. This should include any work necessary to decommission existing applications/systems being replaced by the new delivery.
CWP07	Failure to collect proper data for reporting Earned Value	EVM is a goal of the PMO, and can only be achieved with the proper quality data needed. The data needs to be identified and processes/systems need to be in place to collect and apply the data. With the proper data, EVM can be a valuable and useful tool for tracking capital projects. It is anticipated that the PMO can leverage the delivery of the MSPI project to assist in this effort.
CWP08	Failure to adopt strong PM standards	While a goal of the PMO is to put into place strong PM standards, the adoption of these standards relies on not only the PM, but the team, the sponsors and the change management efforts. These standards will continue to be reinforced through reporting, communications, and stakeholder management.
CWP09	Failure to maintain strong project sponsorship	The PMO will continue to drive a maturing sponsor community for projects. This will require sponsor awareness and commitment to proper sponsor roles and responsibilities, including sponsor expectations regarding communication, reporting, escalation, and change control.
CWP10	Failure to enhance training and education for PMO resources	To support a strong PMO and PM standards, the PMO will develop and apply an education pathway for PM's and support staff to assure that standards are met and are supported.
CWP11	Failure to provide an adequate, effective and scalable governance model	The Capital Work Plan has doubled over the last two years and is projected to maintain this level for the next two years, with a reduction in capital projects in the long range projection. A governance model

		will be created that allows for expansion and contraction of the capital portfolio, without a disruption to PMO leadership.
CWP12	Failure to evolve the PMO	A maturity plan will be developed for the PMO, which will include a clear definition of what that means, and a “ladder” to achieve it. This ladder will include all of the necessary secondary and tertiary components, such as Change Management, Sponsor/Leader, Business Process, Stakeholder, and IT.
CWP13	Failure to develop and use an effective risk management plan, and factor it in to the project schedule and budget	Projects will be required to develop and manage a Risk Management Plan. These plans will be folded into a portfolio risk management plan and factor into a PMO Risk Management Plan. These plans will be used to keep the various approval bodies informed (e.g., APSC, ACPRT/CAB) as well as be standard reporting for sponsors and stakeholders.
CWP14	Failure to account for business risk in projects	Business risks will be addressed by the project and the Business Risk Management Plan will be co-managed by the PM and the business Steering Committee/Functional Sponsors. This will keep the project informed of potential risks the project cannot control, and provide for additional aspects of business partnering.
CWP15	Failure to provide metrics/benefit audit handoff to business owners	The projects will, in partnership with the receiving business partners, develop an appropriate measurement methodology of business value to compare to the original documented project benefits, and serve as an audit tool for the business after delivery and closure of the project.
CWP16	Failure to properly Close Out projects	Attention will be given to the Transition Stage, and proper, complete, and formal closure of the projects. This will include all necessary SLC, contract, and financial closure requirements, as well as the proper handoff to IT O&M.
CWP17	Failure to meet business targets	Commit to only those project targets that have a high “level of confidence” factor. Do not include “stretch goals” as part of targets.
CWP18	Failure to address CWP stress on the rest of the IT organization	Taken separately, the PMO can (with the compliance of IT management) hire contract support to build out a multitude of projects. But this expanding workforce, even if only with CFTE, requires expanded management oversight, system support, and general IT support that needs to be taken into account. The PMO model will provide for the needed scalability across IT.
CWP19	Failure to address CWP stress on the SME requirements for optimum delivery of a project and the change management associated with it	Capital projects are not relegated to technology only. The business partnership requires part-time to fulltime Subject Matter Expert involvement. The PMO will incorporate SME availability/stress components as part of business readiness assessments and planning commitments.
CPW20	Failure to provide a consistent integration plan for standalone and grouped (program level) projects	A standard Integration Plan will be modeled that can be used by all projects and multi-project programs. It will be developed to provide a baseline onto which individual requirements can be added. This model will be vetted through architects, IT managers, and select business representatives for appropriateness and completeness.

Appendix D.1: FY2009 Capital Work Plan Risks

Appendix E: FY2012 Capital Work Plan

The Capital Work Plan is dynamic and updated after each APSC meeting. [The Capital Work Plan](#) is maintained on the PMO website.

WP Sort	ID	Portfolio Plan	Type	Stage of Project	Status	Trend	Program	Project	PMO Team Lead	Project Manager	Lead Sponsor
0	ITT130	A-TS	Cap	Inception			T	NERC ATC State Awareness Tool (NERC-SAT)	J. McKenney		
1	ITP81	A-PS	Cap	Execution			REV	Slice Computing Application (SLICE)	L. Sims	S. Clevinger	T. Roberts
2	ITP84	A-PS	Cap	Execution			REV	Regional Dialogue Scheduling System (RDSS)	L. Sims	J. Foley	B. Lamb
3	ITP83	A-PS	Cap	Execution			REV	Loads Obligations & Resource Analyzer (LORA)	L. Sims	R. Tydeman	R. Mackay
4	ITC83	A-C-KS	Cap	Execution			REV	Customer Billing Phase 2 (CBC-Billing2)	L. Sims	M. Evans	C. Maichel
5	ITC65	A-C-KS	Cap	Execution			REV	Customer Contracts (CBC-Contracts)	L. Sims	E. Albertson	K. Graves Pyrch
6	ITP86	A-PS	Cap	Execution			REV	Revenue Forecasting (RF)	L. Sims	C. Whitlow	E. Evans/E. Adelman
7	ITP87	A-PS	Cap	Execution			REV	Rates Analysis Model (RAM)	L. Sims	D. Ulrich	TBD
8	ITC79	A-C-KS	Cap	Execution			REV	Customer Data Management (CDM)	L. Sims	D. Ulrich	C. Maichel
9	ITC80	A-C-KS	Cap	Execution			REV	Customer Portal (CP)	L. Sims	S. Ybanez	C. Maichel
10	ITT103	A-TS	Cap	Execution			TPIP	Transmission Asset System - Inside the Fence (TAS)	J. McKenney	C. Davis	R. Batchelor
11	ITC100	A-TS	Cap	Execution			RODS	RODS Retirement (RODS)	J. McKenney	A. Macklin	L. Buttress
12	ITT115	A-TS	Exp	Execution			TCSR	OATI Infrastructure Enhancement (OIE)	J. McKenney	K. Stokke	
13	ITT116	A-TS	Cap	Execution			TCSR	Long Term ATC Management Tool (LTAMT)	J. McKenney	B. Ryan	M. Manary
14	ITT117	A-TS	Cap	Execution			TCSR	NERC ATC Standards System Implementation (NASSI)	J. McKenney	K. Stokke	M. Manary
15	ITT118	A-TS	Cap	Execution			TCSR	Competition Implementation for Tariff Compliance (CITC)	J. McKenney	K. Stokke	M. Manary
16	ITT108	A-TS	Cap	Execution			T	Telecommunications Circuit Management System (TCMS)	J. McKenney	B. Lueb	J. Brown
17	ITC86	A-C-F	Cap	Execution			Corp	Dynamic Modeling (DM)	L. Sims	D. Valentine	D. Carbonari
18	ITP89	A-PS	Cap	Execution			P	Streamflow Model Replacement (PSMR)	L. Sims	C. Whitlow	E. Pytlak
19	ITI97	IT	Cap	Execution			IT	IT Infrastructure Life-Cycle Refresh (IT-LCR)	G. Callaway	J. Engelhardt	J. Green
20	ITP93	A-PS	Cap	Execution			Corp	EE Central (EEC)	K. Silva	R. Keanini	M. Weedall
21	ITP80	A-PS	Cap	Execution			P	Trade Management System (Gateway)	L. Sims	D. Valentine	A. Draper
22	ITI95	IT	Exp	Execution			IT	IT Process Maturity (IPM)	G. Callaway	E. Buxton	S. Ducar
23	ITI92	A-C-IBS	Cap	Execution			Corp	Prowatch Phase 2 (PW2)	K. Silva	P. Hamlin	P. Jeter
24	ITP92	A-PS	Exp	Execution			Corp	EE Tracker (Tracker)	K. Silva	E. Downey	M. Weedall
25	ITC89	A-C-IBS	Exp	Execution			Corp	Electronic Official Personnel Folder (e-OPF)	K. Silva	E. Coffey	R. Fox

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26	ITT104	A-TS	Cap	System Planning
27	ITI86	IT	Cap	System Planning
28	ITC91	A-C-IBS	Exp	System Planning
29	ITP90	A-PS	Exp	System Planning
30	ITC97	A-C-KS	Cap	System Planning
31	ITI104	A-C-IBS	Cap	System Planning
32	ITC96	A-C-FO	Cap	Alternatives Analysis
33	ITI94	IT	Cap	Alternatives Analysis
34	ITT126	A-TS	Cap	Alternatives Analysis
35	ITP94	A-PS	Cap	Alternatives Analysis
36	ITC87	A-C-IBS	Cap	Inception
37	ITI100	IT	Exp	Inception
38	ITI103	IT	Cap	Inception
39	ITC102	A-C-KS	Cap	System Planning
40	ITC94	IT	Cap	Inception
41	ITT122	A-TS	Cap	Inception
42	ITC105	IT	Cap	Inception
43	ITC106	A-C-IBS	Cap	Inception
44	ITC108	A-C-IBS	Cap	Inception
45	ITC107	A-C-IBS	Cap	Inception
46	ITC109	IT	Cap	System Planning
47	ITT127	A-TS	Cap	Inception
48	ITT128	A-TS	Cap	Inception
49	ITP95	A-C-EFW	Cap	Inception
50	ITT119	A-TS	Exp	Not Started
51	ITT120	A-TS	Cap	Not Started
52	ITT125	A-TS	Exp	Not Started
53	ITT129	A-TS	Cap	Inception
54	FY12-0002	A-PS	Cap	Not Started
55	FY12-0013	A-C-F	Cap	Not Started
56	FY12-0016	A-C-EFW	Cap	Not Started
57	FY12-0017	A-TS	Cap	Not Started
58	FY12-	A-C-	Cap	Not Started

↘	TPIP	Work Planning and Scheduling System (WPSS)	J. McKenney	B. Lueb	R. Furrer
→	IT	Data Center Modernization (DCM)	G. Callaway	J. Engelhardt	Y. Gill / J. Green
→	Corp	Business Continuity Portal (BCP)	K. Silva	P. Hamlin	S. Cannady
→	P	Renewable Inventory Application (RIA) Revision	L. Sims	D. Valentine	A. Draper
→	Corp	AMS Calculations and Reporting Enhancements (AMS-CaREs)	L. Sims	P. Hamlin	H. Tieu
→	Corp	Wireless Pilot (WP)	K. Silva	K. Rohm	M. Callaghan
→	Corp	e-Discovery	K. Silva	E. Coffey	J. Hairston
→	IT	Desktop Modernization Project (DMP)	G. Callaway	J. Cockerham	L. Buttress
→	T	Digital Signatures - Transmission (DST)	J. McKenney	L. Johnson	M. Miller
→	P	Columbia Vista Short Term Replacement (CV-STR)	L. Sims	J. Foley	S. Kerns
→	Corp	PeopleSoft Optimization (PO)	K. Silva	E. Downey	R. Fox
→	IT	Value Added Reseller (VAR)	G. Callaway	J. Cockerham	L. Buttress
→	IT	IT Disaster Recovery (ITDR)	G. Callaway	T. Clouse	
→	CISD	Customer Data Management Phase 2 (CDM2)	L. Sims	D. Ulrich	C. Maichel
→	IT	IT Asset Management (AM)	G. Callaway	J. Cockerham	L. Buttress
□	TAS	Transmission Asset System - Outside the Fence (TAS2)	J. McKenney	TBD	R. Batchelor
→	IT	IT Plan Of Action And Milestones (POAM)	G. Callaway	P. Litwinczuk	J. Green
→	Corp	Fleet System (FLEET)	K. Silva	K. Rohm	M. Callaghan
→	Corp	ePerformance (ePerf)	K. Silva	E. Downey	A. Fickes
→	Corp	Health and Safety (HS)	K. Silva	E. Downey	S. Hale-Mockley
□	IT	IT PATCH Management (PATCH)	G. Callaway	L. Johnson	J. Green
□	TAS	TAS Cascade Enhancement (TCE)	J. McKenney	TBD	H. Juj
□	TAS	TAS Lines (Lines)	J. McKenney	TBD	R. Furrer
□	Corp	Land Acquisition Tracking (LAT)	K. Silva	M. Carnes	B. Maslen
□	T	Network Integration Transmission Service (NITS)	J. McKenney	TBD	M. Manary
□	T	FERC Reciprocity Compliance (FRC)	J. McKenney	TBD	M. Manary
□	T	Aircraft System Upgrade (ASU)	J. McKenney	TBD	R. Stewart
□	T	NERC ATC Phase 2 (NASSI2)	J. McKenney	TBD	R. Furrer
□	P	ISAAC Enhancements (ISAAC)	L. Sims	TBD	B. Lamb
□	Corp	Budget System Implementation (BSI)	K. Silva	TBD	V. Lefler
□	Corp	CEQ Tracking (CEQ)	K. Silva	TBD	J. Sharpe
□	T	Work Planning and Scheduling System Phase 3 (WPSS3)	J. McKenney	TBD	R. Furrer
□	Corp	Pollution Prevention	K. Silva	TBD	J. Sharpe

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	0018	EFW		
59	FY12-0019	A-C-EFW	Exp	Not Started
60	FY12-0020	A-C-IBS	Cap	Not Started
61	FY12-0021	A-C-IBS	Exp	Not Started
62	ITI105	IT	Cap	System Planning
63	ITC101	A-C-KS	Cap	On Hold
64	ITC103	A-C-KS	Cap	On Hold
65	ITC104	A-C-KS	Cap	On Hold
66	ITI102	IT	Cap	On Hold
67	ITI101	IT	Cap	On Hold

		& Abatement (PPA) Field Tools			
<input type="checkbox"/>	Corp	External Doc Application (EDA)	K. Silva	TBD	R. Yarde
<input type="checkbox"/>	Corp	Facilities System (FS)	K. Silva	TBD	B. Scott
<input type="checkbox"/>	Corp	E-Commerce Phase 2 (EC2)	K. Silva	TBD	M. Callaghan
➔	IT	CBS Independent Switchover (CBSIS)	G. Callaway	T. Clouse	J. Viskov
<input type="checkbox"/>	CISD	Customer Portal Phase 2 (CP2)	L. Sims	S. Ybanez	C. Maichel
<input type="checkbox"/>	CISD	Customer Billing Center Phase 3 (CBC3)	K. Silva	TBD	C. Maichel
<input type="checkbox"/>	CISD	Customer Contracts Management Phase 2 (CCM2)	K. Silva	E. Albertson	C. Maichel
➔	IT	DMZ Modernization (DMZ-Mod)	G. Callaway	L. Johnson	J. Green
<input type="checkbox"/>	IT	Unified Messaging (UM)	G. Callaway	TBD	J. Green

**Appendix F: Draft Criteria for Prioritizing Capital Projects
APSC Decision Criteria**

Purpose:

- To help facilitate the APSC’s discussion for project requests and decision making
- To provide an objective scorecard in approving or not recommending the investment based on strengths and perceived gaps

Indicate by circling either yes/acceptable or no/inadequate for each consideration. Indicate your overall recommendation at the end of this document.

Considerations (for all requests)			
	Yes / Acceptable	No / Inadequate	Notes
Agency Alignment	Project leads a Cross Agency Target (XAT), Key Agency Target (KAT) or is in a Balance Score Card (BSC).	Project can not be traced to XAT, KAT, or BSC.	
Compelling business case	Investment was/is anticipated in the IT Asset Strategy. High confidence in IT and business’s ability to maintain asset once delivered.	Investment can not be traced to the IT Asset Strategy. Low confidence in IT and business’s ability to maintain asset once delivered.	
Financial Benefits	The anticipated ROI is favorable and TCO is acceptable by both the business and IT.	Return on Investment (ROI) and/or Total Cost of Ownership (TCO) is absent or unrealistic.	
Portfolio Allocation Available	Request is or can be accommodated within portfolio’s allocation and has Executive Management support as a high priority investment.	Unknown how request will be funded or Executive Management support is absent.	

Project Readiness			
	Yes / Acceptable	No / Inadequate	Notes

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Business Readiness	Impact to the business has been determined (quantified) with meaningful baseline data for measuring targeted results.	Impact to the business is unknown and appears to be significant.	
Confidence and Capacity	High confidence in team's ability to execute and deliver. Investment has a clear, visible and high priority in both IT and the business.	Low confidence in team's ability to execute and deliver. Appears to be too many initiatives at one time and all seem dispersed.	
Project Readiness (Internal PMO Assessment)	There are adequate plans and controls in place to achieve the scope, schedule, and budget targets. This includes a risk plan with mitigation and management controls.	Plans and controls are absent.	
Phase Specific Considerations			
	Yes / Acceptable	No / Inadequate	Notes
Alternative Analysis (System Planning requests only)	The least TCO solution (while balancing the critical must have requirements) was approved by the IO, ISO, and CTO or a plan is in place for conducting the alternatives analysis in the next phase.	Alternatives analysis was not conducted to determine the least total cost of ownership (TCO), approved, or planned (in some cases, alternative analysis will be conducted in system planning).	
System Planning (Execution requests only)	Requirements, design, and development plans are complete and have been approved by the IO, ISO, and CTO.	Requirements, design, or development plans have not been completed or have not been approved.	
Overall Recommendation			
	Yes / Acceptable	No / Inadequate	

Appendix G: IT Key Performance Indicator

Office Automation:

Average Personal Computing Device Cost	
Measure:	Average Cost of supporting a personal computing device at BPA.
Background:	BPA is implementing a number of initiatives that will impact the cost of maintaining a personal computing device (e.g. desktop, laptop, etc.). These initiatives include moving from a target for personal computing devices of 80% laptop to 20% laptops; introducing virtual desktop infrastructure (application streaming, thin clients, etc.); leveraging automation for the deployment and maintenance of personal computing devices; and adopting Microsoft Operations Framework (MOF) to improve support processes and efficiencies. The objective is to drive the average costs of a personal computing device below the FY2010 average plus inflation; however, refreshing BPA's personal computing fleet in FY2011 through FY2012 may see a rise in the average cost before a drop is realized.
Methodology:	Review and validate BPA's cost calculation against industry standards. Adjust values and methodology to conform to industry best practices in capturing this metric. Establish baseline using existing data. Collect and report on average personal computing device cost quarterly.
Targets:	
FY2011	Establish metric collection methodology by Q4 FY2011. Establish baseline for FY2010 costs by Q4 FY2011. Collect and begin reporting Average Personal Computing Costs by Q4 FY2011.
FY2012- FY2017	Green – Average cost is at or below FY2010 baseline Yellow – Average cost is between FY2010 baseline and baseline plus inflation Red – Average cost is above FY2010 baseline plus inflation.
Owner	Loyd Towe
Software Utilization	
Measure:	Software license compliance and recovery of eligible licenses.
Background:	Desktop software license tracking has been an imprecise manual task which in the past has resulted in substantial license true-up costs to purchase new licenses. We have not been able to determine if we can redeploy under-utilized client licenses to avoid new license costs. Automating the tracking and usage of software license would ensure BPA is fully compliant with software licensing and could reduce software costs by recovering and redeploying under-utilized software.
Methodology:	Identify and deploy automated tools to enable the tracking of

	software license compliance and usage. Establish list of high value software titles for usage tracking and set usage thresholds for software recovery (removing from desktop). Report quarterly on license compliance and license recovery and redeployment.
Targets:	
FY2011 – FY2012	Identify and implement tools to track software licenses and usage. Identify key software titles for usage tracking. Establish thresholds for license recovery by title. Establish baseline for software recovery (number of eligible licenses recovered).
FY2012- FY2017	Green – 100% license compliance and recovery of >85% eligible software licenses Yellow – >95%, <100% license compliance and recovery of >65%, <85% eligible licenses Red - <95% license compliance and <65% recovery of eligible licenses
Owner:	Loyd Towe
Enterprise Printing Costs	
Measure:	Printer utilization operation and maintenance costs.
Background:	Printers tend to be older at BPA than industry averages. After three years of service, the cost of toner and other consumable supplies for a given model rapidly escalate and begin driving the cost of ownership up. After five years of service, the costs of consumables tilt the total cost of ownership to favor unit replacement. BPA needs to control cost by replacing aging, although functioning, printers. Tracking the TCO of printers and their age will help BPA move towards industry standards and control the total cost of printers. [N.B. in FY2010 BPA spent over \$800K on toner and printer consumables excluding paper]
Methodology:	Track total annual cost of printing (excluding plotters) and the cost of supporting individual models of printers to include replacement cost, consumables (excluding paper), and labor.
Targets:	
EOY2011	Establish FY2010 printer operation and maintenance actuals as the baseline for the annual cost for printing, establishing a baseline for field printing and non-field printing. Establish strategy for maintaining printers (e.g. annual refresh versus forklift replacement)
EOY2012	Implement printer maintenance strategy
EOY2013 – EOY2017	Green – Annual Printing cost is below EOY2010 baseline Yellow – Annual Printing costs are higher EOY2010 baseline and less than or equal to EOY2010 baseline plus inflation Red - Annual Printing cost is above EOY2010 baseline plus inflation
Owner	Loyd Towe

Network & Voice

Network Utilization	
Measure:	Utilization of network circuits and links.
Background:	BPA maintains server key circuits and links that are important to the communication, operation, and data transfer that enable BPA to perform its business functions securely and reliably. The utilization of these circuits should strike a balance between being over subscribed, which result in degradation of services, and under subscribed, which represents inefficient use of resources and budgetary waste. [N.B. Circuit bandwidth must be sufficient to known and expected peak loads. These peaks must be factored in utilization metrics.]
Methodology:	Baseline utilization will be established in FY2011. Utilization thresholds will be set to bracket the range between effective usage of the circuit (ensuring circuit is not under-utilized nor oversubscribed). Exceeding the upper-end utilization may cause negative performance impacts on user and systems.
Targets:	
FY2011	Establish baseline and thresholds for effective use and over subscription. Establish green, yellow, and red criteria for network utilization.
FY2012- FY2017	
Owner	NJNN Manager
Network & Voice Operations and Maintenance Costs	
Measure:	Length of time equipment has been in-service compared with industry recommended benchmarks for age related replacement of equipment.
Background:	BPA's telecommunications infrastructure has been extremely reliable, but several systems are 8 to 12 years old and no longer supported by the vendor. Although spare parts can sometimes be obtained from third party suppliers, such parts are usually reconditioned used equipment and will become increasingly difficult to locate in the future. If our HQ PBX or company-wide voicemail system fails, BPA will be unable to conduct business as usual until a replacement is obtained. In order to document the potential risk to BPA, we will compare the age of our installed telecommunications systems to industry standards for equipment life expectancies including EIA / TIA, GSA, and others.
Methodology:	Review industry standard recommendations for the expected life of telecommunications equipment. Document the standards and note any significant differences between industry sources. Identify major systems to be tracked, document the installation dates, and compare to industry standard lifespans.
Targets:	
FY2011	Establish metric based on industry benchmarks and best practices

	for maintaining telecommunication infrastructure. Identify and document key components that will be included in this metric.
FY2012 – FY2017	Green – Equipment is within industry standard guidelines for life span and does not require replacement. Yellow – Equipment is within one year of exceeding industry standard guidelines for life span and will require replacement within one year. Red – Equipment has exceeded industry standard guidelines for life span and requires immediate replacement.
Owner	James Gadsby

Data Center

Physical Windows Server Consolidation	
Measure:	Ratio of Windows Virtual Servers to Physical Servers
Background:	Historically projects at BPA have procured development, test, and production servers to host new systems. This practice has led to BPA supporting over 1100 servers, many of these servers running at less than 20% CPU utilization – far below industry recommendations – resulting in unnecessary high cost to support BPA’s systems. With improved server hardware technology and the adoption of virtualization, the number of physical server can be substantially reduced, resulting in lower hardware costs, license costs, power consumption, and cooling cost. BPA is beginning the process of moving to virtual servers. This process will see a net increase in servers in FY2011 and possibly FY2012 as new servers hosts are put in place to allow the migration to virtual servers and retirement of existing servers.
Methodology:	Quarterly report on the ratio of virtual to physical windows production and test servers. Ratio will exclude physical domain controllers (2 physical servers for each domain) and field servers. [N.B. If decision is made to host non-critical business systems at an Alternative Data Center, the decision could delay achieving targets.]
Targets:	
EOY2011	Establish FY2010 baseline number of physical production and test servers, and baseline of virtual production and test servers.
EOY2012	Green - Achieve overall ratio greater than or equal to .25 virtual servers to each physical server in test and production Yellow – Achieve overall ratio of virtual to physical servers greater than .19 and less than .25 Red – Ratio of virtual servers to physical server is less than .19
EOY2013	Green - Achieve overall ratio greater than or equal to .7 virtual servers to each physical server in test and production Yellow – Achieve overall ratio of virtual to physical servers greater

	than .6 and less than .7 Red – Ratio of virtual servers to physical server is less than .6
EOY2014	Green - Achieve overall ratio greater than or equal to 2 virtual servers to each physical server in test and production Yellow – Achieve overall ratio of virtual to physical servers greater than 1.5 and less than 2 Red – Ratio of virtual servers to physical server is less than 1.5
EOY2015- EOY17	Green - Achieve overall ratio greater than or equal to 4 virtual servers to each physical server in test and production Yellow – Achieve overall ratio of virtual to physical servers greater than 3 and less than 4 Red – Ratio of virtual servers to physical server is less than 3
Owner	NJND Manager
Maintain Operations and Maintenance Costs	
Measure:	Data center operations and maintenance costs.
Background:	IT currently has several projects in flight designed to improve data center operations and reduce operating costs. These projects include introducing new hardware, automating routine process (e.g. provisioning servers), implementing management and monitoring tools, and implementing continuous process improvements through using an IT maturity model. These projects will be fully completed in the FY2012/FY2013 timeframe. [N.B. Software licenses historically grow faster than the rate of inflation and labor at the rate of inflation while automation will be adding new software licenses and reducing the amount of labor required for operation and maintenance. The assumption is labor saving, power savings, reduced hardware requirements will offset rising software licenses and labor rates.]
Methodology:	Quarterly track data center operations and maintenance costs through a combination of work orders and ABM codes. FY2011 will establish the data center operations and maintenance expense baseline. [N.B. Re-organizations of datacenter operations and application support during FY2010 renders FY2010 as unsuitable using this fiscal year or prior years for establishing a baseline.]
Targets:	
FY2011	Establish methodology baseline by Q4 2011
FY2012 – FY2017	Green – Operations and Maintenance costs equal or less than baseline Yellow – Operation and Maintenance costs are above baseline and below or equals baseline plus inflation Red – Operations and Maintenance cost are greater than baseline plus inflation
Owner	NJND Manager
Configuration Monitoring	
Measure:	Percentage of test and production servers adhering to a certified

	baseline.
Background:	Server operating systems are required by FISMA to conform to a certified baseline. Until the advent of the Data Center Modernization Project, servers have been manually built resulting in few servers sharing a common operating system baseline let alone adhering to a common set of certified baselines. Through the implementation of automated tools and monitoring tools, new Windows 2008 servers can be delivered to into test and production using a certified baseline. In addition, changes to the baseline can be tracked and it can be determined if the changes are documented and authorized.
Methodology:	Use management software (for example, System Center Configuration Manager, VMware Vcenter, Tripwire, etc.) to validate server operating systems conform to a documented and certified baseline.
Targets:	
FY2011	Green – Deploy monitoring software to validate physical and virtual production and test server baselines conform to certified baselines. Provide weekly reports providing listing of Windows 2008 servers not conforming to a certified baseline. Yellow – Deploy monitoring software to validate physical and virtual production and test server baselines conform to certified baselines. Red – Partial implementation of monitoring software to validate physical and virtual servers conform to a certified base line
FY2012	Green – 100% of Windows 2008 production and test servers conform to a certified baseline Yellow – 99% of Windows 2008 production and test servers conform to a certified baseline Red – less than 99% of Windows 2008 production and test servers conform to a certified baseline
FY2013	Green – 100% of Windows 2008 and Linux production and test servers conform to a certified baseline Yellow – 99% of Windows 2008 and Linux production and test servers conform to a certified baseline Red – less than 99% of Windows 2008 and Linux production and test servers conform to a certified baseline
FY2014- FY2017	Green – 100% of Windows 200, Linux, and Solaris production and test servers conform to a certified baseline Yellow – 99% of Windows 2008, Linux, and Solaris production and test servers conform to a certified baseline Red – less than 99% of Windows 2008, Linux, Solaris production and test servers conform to a certified baseline
Owner	NJND

Applications

Ability to Enhance Systems	
Measure:	Ratio of estimated enhance backlog costs to enhancement budget
Background:	Enhancements are driven by planned or emerging business requirements and are discretionary in that they can be deferred without impacting a system/application's ability to function. As discretionary funding, the enhancement budget can be accessed to fund expense portion of projects and cover higher than anticipated operations and maintenance costs. IT is still in the process of working with business owners to develop and mature asset plans for the roughly 100 major systems and 400 web applications it maintains to support the Agency automation needs. As part of the maturing process, the asset plans are beginning to include estimates for the cost of planned enhancements. When enhancement funding is below the cost of planned enhancements, a backlog of enhancements emerges especially for lower priority systems. The net result includes business needs not being met in a timely manner, or not at all, and places more stress on already strained IT resources.
Methodology:	Use individual system asset plans to develop the cost for planned application enhancements spend profile by year. Track the ratio of actual enhancement costs to asset plans projected enhancement needs. A ratio of less than 1 will indicate a backlog is developing, resulting in business requirements not being met. A ratio of greater than 1 would indicate that either the enhancement resource projections were low or Asset Plans failed to anticipate high value emerging business enhancements. [N.B. This metric is an indicator on how well the Application Portfolio is (a) meeting its objective to "Evolve and leverage systems capabilities to meet emerging business capabilities", Table 6.2 IT Asset Strategy (b) addressing risk ACE1, Table 6.3 IT Asset Strategy (c) addressing risk CBS3, Table 6.4 IT Asset Strategy]
Targets:	
FY2011	Mature Application asset plans to develop estimates for projected enhancement budgets.
FY2012- FY2017	ratio of actual to asset plan projection is: Green - ratio greater than .9 and less than 1.1 Yellow – ratio is greater than .7 and less than .9 or greater than 1.1 and less than 1.3 Red – ratio is less than .7 or greater than 1.3
Owner	IT Asset Manager
Operations and Maintenance Growth	
Measure:	Application Operations and Maintenance costs.
Background:	Application operations and maintenance costs have been growing each year due to a combination of inflation and new operations and maintenance cost associated with the delivery of new systems into production. Projects are maturing to develop operations and

	maintenance costs for the new systems being delivered. These costs can be used to update new out year operation and maintenance costs.
Methodology:	Track applications operations and maintenance costs through a combination of work orders and ABM codes. FY2011 will establish the baseline for applications operations and maintenance costs.
Targets:	
FY2011	Use FY2011 to establish baseline for application operation and maintenance costs.
FY2012- FY2017	Green – Operation and Maintenance Expenses are less than FY2011 baseline plus new systems costs Yellow - Operation and Maintenance Expenses are greater than FY2011 baseline plus new systems costs and less than less than FY2011 baseline plus new systems costs plus inflation Red - Operation and Maintenance Expenses are greater than FY2011 baseline plus new systems costs plus inflation
Owner	IT Asset Manager