Information Technology

June 20, 2016

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IT overview

- The Information Technology Asset Strategy covers the technology assets hosted in the Bonneville User Domain (BUD).
  - 0.6 percent ($103 million) of the BPA's plant in service total capital assets ($17,236 million)
  - 3 percent ($32.8 million) of the BPA's planned fiscal year 2016 capital spend ($1,067 million)
  - 2.6 percent ($87 million) of the BPA's departments planned FY 2016 expense spend ($3,293 million)
- Information Technology BUD assets include:
  - Circuits, servers and storage devices.
  - Desktop systems, printers, copiers, faxes and phone systems.
  - Software, including applications provided as Software as a Service (SaaS). The software systems covered by this strategy include:
    - Critical business systems that must operate and be available around the clock (24/7).
    - General business systems which enable BPA to manage its staff, finances, facilities, supply chain, transmission assets and services.
    - Web applications and task systems that enable BPA staff to more efficiently perform their work.
- This strategy does not cover technology assets residing on the operational grid network. Grid network systems monitor and manage the status of the electric grid. These systems include our supervisory control and data acquisition (SCADA) and Automatic Generation Control (AGC) systems.

Program objectives

- There are two major outcomes to the strategy:
  - Evolving the infrastructure to meet emerging security threats and providing reliable services while lowering operations and investment costs to enable those cost savings to be used to meet business needs.
  - Meeting strategic and emerging business needs by providing business solutions which deliver demonstrable positive net value and benefits to the agency and the Northwest.

PHYSICAL ASSETS
- IT hardware refresh rates are established to optimize value and reliability.
- Investments are created, selected and executed through leading practice-based portfolio and project management practices.

RELIABLE, EFFICIENT & FLEXIBLE OPERATIONS
- IT systems enable decisions regarding scheduling and marketing of power and transmission services (supports Commercial Operations Strategy).
- Business Information Systems optimize the value and reliability of agency decisions.

SUSTAINABLE FINANCES & RATES
- Business value based investment prioritization supports affordable investments.
- IT efficiencies initiatives supports long-term financial health.

Challenges

Compliance

- Increasing NERC-CIP Regulation
- Rising bar for security
  - Evolving threats
  - Cyber Security Operation Center
  - Refactor/replace legacy system to address security vulnerabilities
- Federal Guidance
  - Implementing ICAM/HSPD-12
  - OMB cloud first guidance
- COOP and Disaster Recovery

IT challenges

- Rate of change in IT
- Rise of cloud based solutions
- Managing expense commitments for project execution, enhancement requests and covering net new O&M costs
- 25 percent of current IT workforce is projected to retire by 2020 and 50 percent by 2025

Strategic partnership

- Aligning IT and business objectives through asset plans (identifying new out-year projects and investments)
- Developing strategies to address aging applications/business systems
- Prioritizing development and deployment of business solutions based on agency's strategic priorities and net value
- Identifying and tracking business value

Aligning IT and business objectives

Portfolio	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Applications	Ops Log Replacement	Cascade Upgrade/Replacement		Columbia Vista Upgrade	Pisces Upgrade	Billing Upgrade	Cascade Upgrade		Columbia Vista Upgrade	Pisces	Billing	Cascade	
	CAISO Replacement	Stream System Improvement				CAISO Upgrade		Stream System			CAISO		Stream System
	EE Lighting Calculator	NERC CIP 5 Access Control		TAS Line Upgrade	Treaty Non Treaty Upgrade	EE Lighting	TCIS Netcracker Upgrade		TAS Line	Treaty Non Treaty Upgrade	EE Lighting	TCIS Netcracker	
	2020 BPA Solar Power Forecasting			Fleet Upgrade	Vegetation Upgrade			Solar Power Upgrade	Fleet	Vegetation Management			Solar Power
	Structured Data Management (SDM)						Upgrade SDM					SDM	
	Safety &Health Analytics	Demand Response (post demo)				Safety & Health		Demand Response			Safety & Health		Demand Response
	ATC Optimization - Scenario & Analytics							ATC Opt					ATC Opt
	IT Service Management	TAPM Replacement							TAPM				
	Facilities CMMS	CBS Data Re-architecting				CMMS Upgrade					CMMS		
	TCIS Netcracker Upgrade	Customer Portal							Custom Portal				
	AMS Replacement						AMS Upgrade					AMS	
	Complete Business Information System Strategy					Business Information System (BIS) Upgrades						BIS Upgrades	
	Data Management (Structure & Unstructured)			Disaster Recovery capabilities for General Business Systems				Data Management Upgrade					
	Adopt Maturity Model	Advance Level in Maturity Model		Advance Level in Maturity Model									
	CSC2: Inventory of Authorized & Unauthorized Software (Software Repository is used -only authorized software is used and unauthorized software is denied)												
	Power Reporting Analytics	REV System Replacements or Upgrades					Power Reporting					Power Reporting	
	Market Evolution Work	Energy Efficiency (Post 2028 Discussion)					Market Evolution	Energy Efficiency				Market Evolution	Energy Efficiency
	Endur Replacement	PNNL Situational Awareness						Situational Awareness					Situational Awareness
BPA KSI	ComOps								ComOps Systems Upgrade				
	Execute on Business Information Systems Roadmap									BIS Upgrades			
	Asset Management								Assement Management Systems Upgrade				

Legend: Efficiencies | End of Life/Replacement | Upgrade | Expand | Compliance | BPA KSI

New systems that we are developing today will need to be upgraded in five years and either upgraded again or replaced in ten years.

IT Long-Term

Category	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Workforce - Adopt rotation program to aid in managing J's aging federal workforce and contracting for services to aid in managing J's 60% contractor workforce.	Use Rotation Program to manage expected 50% retirement of federal IT workforce to program entry level positions creating long term career paths										
	Increase use of Managed services for contractors		25% CFTE via Managed Services				50% CFTE via Managed Services				70% CFTE via Managed Services
Project Management - Expand use of Agile development to reduce delivery time and to lower costs	25% Agile	50% Agile	75% of all new development using an Agile methodology								
Asset Management - Implement discipline of using business value to prioritize investments and ensure existing systems deliver more value than the cost to operate	100% of discretionary investments Prioritized using Net Economic Benefit Ratio	Systems with Operation costs greater than identified benefits are either scheduled for upgrade, preplacement, retirement or have an exception in place to allow continued operations									
Adopt cloud based services and move General Business Systems and virtual desktop infrastructure to cloud. This aligns with OMB guidance to consider cloud services first and with FITARA/OMB objectives to reduce and close federal tiered datacenters		Agency email migrated to cloud 50% of home and work drives migrated to cloud	100% home of drives and work drives migrated to cloud	50% of on premise General Business Systems migrated to the cloud	100% of on premise General Business Systems migrated to the cloud	On-premise General Business Systems servers and storage decommissioned					

IT Long-Term (continued)

Category	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Service Delivery - Adopt maturity Models to ensure reliable and cost effective service delivery and software development.	Achieve level 1 of maturity model for both Development and Ops		Achieve level 2 of maturity model for both Dev and Ops		Achieve level 3 of maturity model for both Dev and Ops	Identify value associated with part or all of IT at level 4	Achieve level 4 of maturity model for both Dev and Ops				
Enterprise Architecture - Adopt and implement Enterprise Architecture (EA) based on Gartner's maturity model for EA practices.	Level 2 of the maturity model (EA team trained, governance defined, and stakeholders aware of EA)		Level 3 of the maturity model. ("Functioning" level includes high project compliance & use of EA tools)		Level 4 in 6 of 8 Dimensions ("Integrated" level of repeatable EA processes, broad support)		Level 5 in 4 of 8 Dimensions ("Ubiquitous": EA processes are inherent to business and IT operating model.)	Achieve a minimum of Level 5 in all 8 Dimensions of the maturity model.			
Enterprise Information Management - emphasis on Data Quality (DQ) and Master Data Management (MDM) using Gartner based maturity model for DQ/MDM.	Establish DQ/MDM practice • Establish EIM team governance, and organization • Establish data principles, standards, policies, and guidelines • Re-verify and re-validate the maturity targets Implement guidance for "doing just enough MDM for business analytics"										
Data/Business Analytics - Enable self-service analytics from Business Intelligence to big data analysis leveraging Gartner's maturity model for Business Intelligence (BI) and Business Analytics (BA).	Establish BICC Team • Re-verify and re-validate the maturity targets • Establish standards for data virtualization		Achieve a minimum of Level 3 (Standards: BICC team established. Tools and data process are standardized across the enterprise)		Level 4 (Enterprise: BI support cross enterprise-wide decision processes, Enterprise information architecture guides the design of new systems.)		Achieve a minimum of Level 5. (Transformative: Enterprise views information as a strategic asset with focus on business value where decisions are made in pursuit of the enterprise's strategic goals. Decision processes include decision simulations that incorporate decision-making best practices and optimization technologies.)				

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IT Capital and Expense Spend Profile

Spend Profile ($M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total Expense	$85.3	$83.8	$95.0	$97.1	$98.4	$100.5	$101.1	$101.8	$102.5	$104.5	$105.2	$106.4	$107.6	$108.9	$110.1	$117.5
Operational Expense		$78.8	$90.0	$92.1	$96.8	$98.9	$99.5	$100.2	$100.8	$101.5	$102.2	$103.4	$104.6	$105.9	$107.1	$108.3
Expense to Execute on Capital		$5.0	$5.0	$5.0	$1.6	$0.5	$2.4	$0.9	$1.3	$3.0	$3.0	$3.0	$3.0	$3.0	$3.0	$9.2
Total Capital	$31.2	$31.2	$25.0	$25.0	$25.0	$2.5	$12.0	$4.7	$6.5	$14.8	$15.0	$15.0	$15.0	$15.0	$15.0	$15.0
Total(Capital + Expense) Spend Profile	$116.5	$115.0	$120.0	$122.1	$123.4	$103.0	$113.1	$106.5	$109.0	$119.3	$120.2	$121.4	$122.6	$123.9	$125.1	$132.5

- Discretionary investment levels:
  - FY2017-FY2019 set at $15 million.
    - Spending profile includes Asset Management and Business Information Systems KSIs; these efforts will need to be prioritized ahead of other discretionary investments.
    - Spending profile does not include the Commercial Operations KSI.
  - FY2020 and beyond discretionary investments will need to compete at the agency level for funding - capital only includes capital for sustain .
    - Increasing capital for discretionary projects will require an increase in expense to plan project and support new asset after it is put into production.
- Sustain capital funding:
  - FY2017-FY2019 is set at $10 million per year.
    - Supports hardware refresh rates of servers, storage, network devices, etc.
    - Supports use of cloud for disaster recovery.
  - FY2020-FY2024
    - Supports on premise datacenter and network hardware refresh rates.
    - Although capital and expense spending will be held constant, spending levels may need to be adjusted between years to align refresh rates with actual deployments.
      - Delays in equipment deployment will result in changes to refresh dates.
      - See Appendix C of FY2016 IT Asset Strategy for refresh tables.

Expense Spending

Expense spend from FY2014 - FY2030
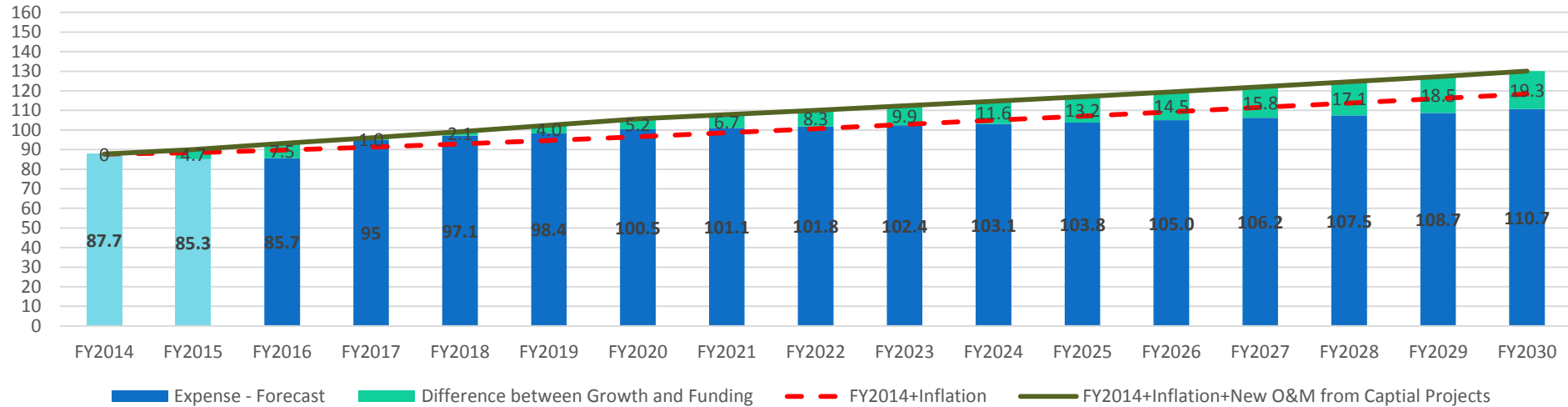
Expense Drivers:
- Inflation
    - Impacts labor costs
    - Software contracts typically increase at a faster rate than inflation
- Capital investments require on average 20 percent of investment cost in expense to move a project from initialization and planning phase to reach execution (when capital can be executed),
- On average, net new operations and maintenance costs historically average 8.2 percent of the investment

Uncertainty Drivers

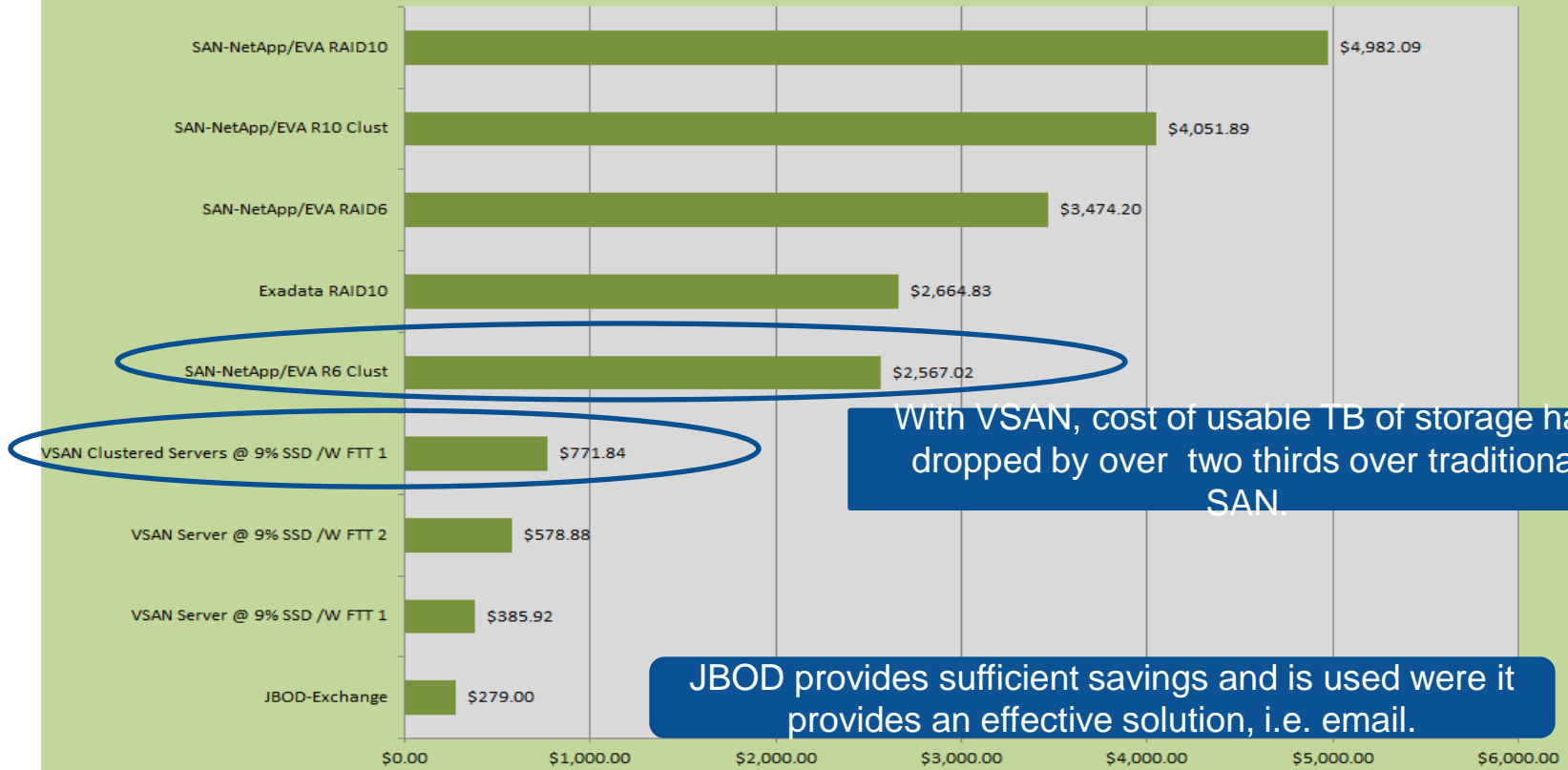| Uncertainty driver	Impact	
	Expense	Capital
Adoption of larger number of cloud-based solutions than planned.	**Increases**	**Decreases**
Unplanned regulatory compliance due to emerging security threats.	**Increases**	**Increases**
Unplanned emerging business needs resulting in unscheduled projects.	**Increases**	**Increases**
FITARA requires all IT acquisition to occur under the CIO. As IT acquisitions that have been occurring in other organizations (often referred to as shadow IT) are identified and moved/consolidated under the CIO, the IT budget will appear to increase.	**Increases**	**Neutral**
Budget constraints may push out developing and/or implementing our strategy roadmap resulting in the delay of projects which shifts spending to the out years.	**Defers**	**Defers**
Upon completion of KSI strategies we may find that we have underestimated the cost to implement projects on KSI strategies' roadmap.	**Increases**	**Increases**

Steps to Contain Costs

- Efficiencies
  - Introducing virtual SANS and JBOD in FY2014/FY2015 has dropped the cost of a terabyte of usable storage to less than a third of the cost of traditional SANs.
  - Since Q4 FY2014, IT FTE levels have dropped by 60 FTE (315 contractors in Q4 FY2014 to 255 contractors as of April 2016).
  - To increase the quality and reliability of IT services, and to aid in managing costs, BPA will adopt maturity models for software development and for operations/service delivery.
- Business value
  - BPA will continue to mature it's ability to identify and track business value from discretionary investments.
    - Business cases currently estimate the expected business value the investment will generate.
    - The expected business value is becoming a key determining factor in prioritizing and approving discretionary investments for execution.
    - Investments/projects will be required to demonstrate that the investment will generate sufficient business value to recoup the original investment and offset any net new O&M costs
    - A new asset health indicator will measure if systems are delivering net positive business value (annual business value – annual O&M costs). Corrective action will be taken to either:
      - Restore positive business value (enhancement or upgrade) .
      - Replace the system with another system that will deliver net positive benefits.
      - Retire the system.

Questions

Storage costs

Storage Cost per TB

	JBOD-Exchange	VSAN Server @ 9% SSD /W FTT 1	VSAN Server @ 9% SSD /W FTT 2	VSAN Clustered Servers @ 9% SSD /W FTT 1	SAN-NetApp/E VA R6 Clust	Exadata RAID10	SAN-NetApp/E VA RAID6	SAN-NetApp/E VA R10 Clust	SAN-NetApp/E VA RAID10
■ Without Backup(Generic Configuartion)	$279.00	$385.92	$578.88	$771.84	$2,567.02	$2,664.83	$3,474.20	$4,051.89	$4,982.09

With VSAN, cost of usable TB of storage has dropped by over two thirds over traditional SAN.

JBOD provides sufficient savings and is used were it provides an effective solution, i.e. email.

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Financial Disclosure

- This information was made publicly available on June 20, 2016, and contains information not sourced directly from BPA financial statements.