



State of Nevada
Governor's Finance Office
Division of Internal Audits

Audit Report

**Enterprise Information Technology Services
Information Technology Governance**

Report No. 18-08
June 14, 2018

EXECUTIVE SUMMARY

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Objective: Strengthen IT governance, ensuring effective and efficient use of state IT resources and funds

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Collaborating with agencies to complete a five-year cost benefit analysis to consolidate data centers into the Switch data center facilities will help ascertain potential consolidation efficiencies and effectiveness. This will ensure agencies, including EITS, are determining the best use and least cost options for the state. Consolidating data centers could result in a net savings to the state of up to \$27 million.

Consolidating data centers allows for cost efficiencies. Efficiencies include cost avoidance and increased reliability, redundancy, and connectivity for data access. For example, consolidating data centers into Switch will help the state avoid the cost of replacing the 40-year-old Carson data center at a cost of \$19.5 million. Increasing redundancy and connectivity may help eliminate single points of failure, such as power, network connectivity, and fire detection. Additional cost efficiencies could include reduced utilities and overall footprint. Agencies would have to pay only for the power use of their networking equipment and the space occupied in the Switch facility.

There is fundamental value in consolidating data centers that does not equate to cost savings. Planning, implementation, and execution of disaster recovery solutions may be easier and quicker because the necessary networking equipment is in one place, easing replication and failover initiation. Cybersecurity may also be improved through consolidation. With fewer data centers, servers, and storage to manage, physical security becomes easier, less costly, and requires fewer resources.

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Requiring all agencies' IT teams to use the same networking software could enhance inter-agency operations and allow EITS and agencies' IT teams to assist each other more quickly and effectively when network issues arise. Training time could be reduced for IT staff transferring to other agencies and buying power could be leveraged to reduce the cost of the networking software. EITS and nine agencies with their own IT teams were surveyed: only four agencies use the same network performance monitoring software as EITS; no agencies use the same data backup and disaster recovery software as EITS; and two agencies do not use the same anti-virus application as EITS as required by the Governor's cybersecurity directive dated March 1, 2013.

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Establishing state policies and standards for IT procurement will help ensure agencies' purchases comply with security requirements, leverage buying power, and reduce software and hardware training for employees. Policies would define the high-level goals and objectives. Standards would define specifications for items, such as desktops and laptops to ensure they are capable of running the standard state software, including computer operating systems, productivity suites, and anti-virus applications. EITS is not notified of agencies' IT projects costing less than \$50,000; due to this threshold, EITS might not be aware of all software and hardware purchases made by the agencies.

Agencies may not be aware of IT security requirements when purchasing or upgrading software and hardware.

Create an IT Project Management Certification Program.....page 19

Creating an IT project management certification program would assist agencies implementing IT projects. Providing a program for agencies could help control costs and improve project results. Project management helps ensure risks are defined and issues mitigated before they occur. Improved communication and managed expectations from customers, team members, and stakeholders increase with project management. Agencies lack experienced project management staff to provide oversight for IT projects. Professional training would offer agencies beneficial project management knowledge. Attending project management training outside of the state could be costly and take more time than training provided by the state. In-state training would be more cost efficient and has the added benefit of customizing topics for project requirements specific to the state.

Develop Guidelines to Comply with Statute and to Assist Agencies' Annual Strategic IT Plans.....page 22

Developing guidelines would assist agencies in building annual strategic IT plans. This will ensure EITS complies with NRS 242.115, is aware of agencies' IT plans, and verifies plans are consistent with the direction of state technology. EITS receives agencies' Technology Investment Notifications; however, agencies are not required to inform EITS of their short and long-term IT plans.

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Ensuring that the Information Technology Advisory Board (ITAB) meets every three months pursuant to statute to function as a high-level advisory board will ensure compliance with NRS 242.123, NRS 242.131, and provide additional knowledge and resources for EITS. ITAB ensures the state's strategic IT plan is consistent with evolving technology, Governor's goals and strategies, and available resources. Statute requires ITAB to meet every three months to provide this high-level oversight. ITAB met only three times from October 2016 through February 2018.

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INTRODUCTION

At the direction of the Executive Branch Audit Committee, the Division of Internal Audits conducted an audit of the Department of Administration (department), Enterprise IT Services (EITS).

Our audit focused on EITS' oversight role for the state's Information Technology (IT) resources and funds. The audit's scope and methodology, background information, and acknowledgements are included in Appendix A.

Our audit objective was to develop recommendations to:

- Strengthen IT governance, ensuring effective and efficient use of state IT resources and funds.

Division of Enterprise IT Services Response and Implementation Plan

We provided draft copies of this report to the department and EITS officials for their review and comments. Their comments have been considered in the preparation of this report and are included in Appendix B. In its response, EITS accepted our recommendations. Appendix C includes a timetable to implement our recommendations.

NRS 353A.090 requires within six months after the final report is issued to the Executive Branch Audit Committee, the Administrator of the Division of Internal Audits shall evaluate the steps EITS has taken to implement the recommendations and shall determine whether the steps are achieving the desired results. The administrator shall report the six-month follow-up results to the committee, department, and EITS officials.

The following report contains our findings, conclusions, and recommendations.

Strengthen IT Governance, Ensuring Effective and Efficient Use of State IT Resources and Funds

EITS can strengthen IT governance, ensuring effective and efficient use of state IT resources and funds by:

- Collaborating with agencies to complete a five-year cost benefit analysis to consolidate data centers;
- Requiring agencies' IT teams to use the same networking software;
- Establishing policies and standards for IT procurement;
- Creating an IT project management certification program;
- Developing guidelines to comply with statute and to assist agencies with annual strategic IT plans; and
- Ensuring Information Technology Advisory Board meets per statute to function as a high-level advisory board.

Strengthening IT governance helps ensure the direction of state technology is aligned with the Governor's strategic priorities for an efficient and responsive state government. This could result in a net savings for the state of up to \$27 million.

Collaborate with Agencies to Complete a Five-Year Cost Benefit Analysis to Consolidate Data Centers

EITS should collaborate with agencies to complete a five-year cost benefit analysis to consolidate data centers into the Switch data center facilities. A cost benefit analysis would help agencies ascertain the potential efficiencies and effectiveness, and associated costs from consolidating into the Switch data center facilities. This will ensure agencies, including EITS, are determining the best use and least cost options for the state. Consolidating data centers would increase cost efficiencies and operational effectiveness. In addition, the EITS Carson City data center is in need of extensive upgrades. Moving the EITS Carson City data center into the Switch facilities could avoid repair and replacement costs, resulting in a net savings for the state of up to \$27 million.

The State Controls Valuable Data

The state controls valuable data relating to its constituents. This data could include financial or credit information, health care information, and social security numbers. When determining the benefits of consolidating data centers, the value of this data should be considered.

The state of Georgia quantified the value of data they maintain. Factors such as the cost of re-creating records for different data types and mitigation of a data breach, the political or reputational value, time to re-create data, and the opportunity cost from not having that data for a period of time were included in the calculation. Georgia's total value of data equaled almost \$327.5 million.¹ Nevada's population is approximately 29 percent of Georgia's population based on the United States Census Bureau for July 1, 2017, which would estimate Nevada's data at almost \$95 million.²

EITS and State Agencies Maintain Separate Data Centers

EITS maintains data centers to support multiple unrelated agencies, including the Governor's Office, Department of Administration, Department of Public Safety, and Department of Health and Human Services. In general, other state agencies maintain their own data centers. Each agency is responsible for the cost of their IT staff and data center operations.

Each agency is responsible for system redundancy and connectivity to help eliminate single points of failure. These failure points may include power, network connectivity, fire detection, generator, and uninterrupted power supply backup systems.

Moreover, each agency is responsible for planning, implementing, and executing disaster recovery solutions. In addition, each agency is responsible for cybersecurity, including threats to state information and personally identifiable information.

Federal and State Governments Consolidate Data Centers to Reduce Costs

Federal and state governments are increasingly looking to leverage best practices and technology initiatives that have been successful in lowering costs and improving customer experience in the private sector. Data center consolidation is a well-known initiative that has had significant returns on

¹ "Leveraging Cloud for Disaster Recovery in Government", accessed February 16, 2018. <https://www.fedinsider.com/leveraging-cloud-for-disaster-recovery-in-government/>.

² "United States Census Quick Facts", accessed February 15, 2018. <https://www.census.gov/quickfacts>.

investment for large private corporations, and is a promising opportunity for state governments to implement.

The federal government's Office of Management and Budget mandated a Data Center Optimization Initiative to develop strategies to consolidate inefficient infrastructure, optimize existing facilities, improve security posture, achieve cost savings, and transition to more efficient infrastructure. The initiative called for saving \$2.7 billion between 2014 and 2018, and closing 52 percent of federal data center inventory.³ Moreover, Nebraska and Utah have also initiated similar data center consolidation strategies.

Other States Have Saved By Consolidating Data Centers

Other states have encouraged or mandated the use of consolidated data centers within state enterprise or third party vendor data center facilities for their state agencies.

Nebraska consolidated their individual agency IT data centers and saved over \$5 million due to the reduction of expenses related to facility maintenance costs and elimination of duplicate network equipment. In addition, Utah is saving \$4 million annually and Ohio State University is saving \$1 million annually due to consolidation of their agencies' data centers.

The National Association of Chief Information Officers' (NASCIO) 2017 State CIO Survey noted that 55 percent of states plan to deliver or obtain IT services by downsizing state-owned-and-operated data centers. NASCIO's 2016 State CIO Survey noted 42 percent of states had completed data center consolidation, 47 percent said consolidation was on-going, and 11 percent said consolidation was planned.

State Has Master Service Agreement with Switch for Efficiency and Effectiveness Opportunities

EITS originally entered into a contract with Switch in April 2011 to house data and disaster recovery IT equipment and to provide communication redundancies for the state network. In October 2017, the Purchasing Division entered into a master service agreement with Switch, expanding Switch's data center facility services to all state agencies and political subdivisions.

Switch Data Center Facilities Offer Efficiency and Effectiveness Opportunities

Switch's data center facilities are designed to host mission critical servers and computer systems, with fully redundant subsystems including cooling, power,

³ OMB Memorandum 16-19, Subject: Data Center Optimization Initiative (DCOI), August 1, 2016.

network links, storage, and compartmentalized security zones controlled by biometric access.⁴ In addition, Switch's data center facilities use 100 percent renewable energy to operate, offering greater energy efficiencies and sustainability.

Customers of any Switch data center facility also have access to Switch CONNECT, an over \$5 trillion telecom purchasing cooperative managed by Switch. The cooperative includes over 50 telecommunication providers, and Switch customers have received cost reductions for telecommunication services.⁵

An ancillary benefit to moving to the Switch facilities is the support of a local business as Switch's headquarters are located in Las Vegas. Money spent in locally owned businesses stays in the economy and strengthens the economic base of the community.⁶

Consolidating Data Centers into Switch Offers Cost and Operational Benefits for Agencies

Agencies could consolidate their IT data centers into the Switch data center facilities if their cost benefit analysis reveals greater benefits than costs. This could help ensure agencies are aligned with the Governor's strategic priorities of efficient and responsive government.

Benefits Include Agencies' Cost Efficiencies

Consolidating data centers allows for cost efficiencies. Cost efficiencies include cost avoidance and increased reliability, redundancy, and connectivity for data access. Increasing redundancy and connectivity may help eliminate single points of failure. These failure points may include power, network connectivity, fire detection, generator, and uninterrupted power supply backup systems.

Switch has connected their Northern and Southern Nevada facilities through its private redundant fiber path. Consequently, there is no single point of failure in Switch's connection between Northern and Southern Nevada. EITS does not have dual path connectivity for SilverNet between Northern and Southern Nevada.⁷ If the connection EITS has is not operating, North and South will not be able to communicate through the network and some telecommunications will be down until the connection is fixed. EITS has determined it is cost prohibitive

⁴ Mission critical servers and systems are those whose failure or disruption in normal business hours will result in the failure of business operations.

⁵ Switch has indicated that EITS would receive a 20 percent discount on telecommunications costs.

⁶ "Why Buy Local", BuyNevadaFirst accessed January 18, 2018. www.livelocalrenosparks.com/studies.htm.

⁷ SilverNet is Nevada's wide area network, used by agencies for connection between agencies' workstations and local area networks, host computers and state application programs, and outside access to the Internet.

to install a redundant path between Northern and Southern Nevada. See Exhibit I.

Exhibit I

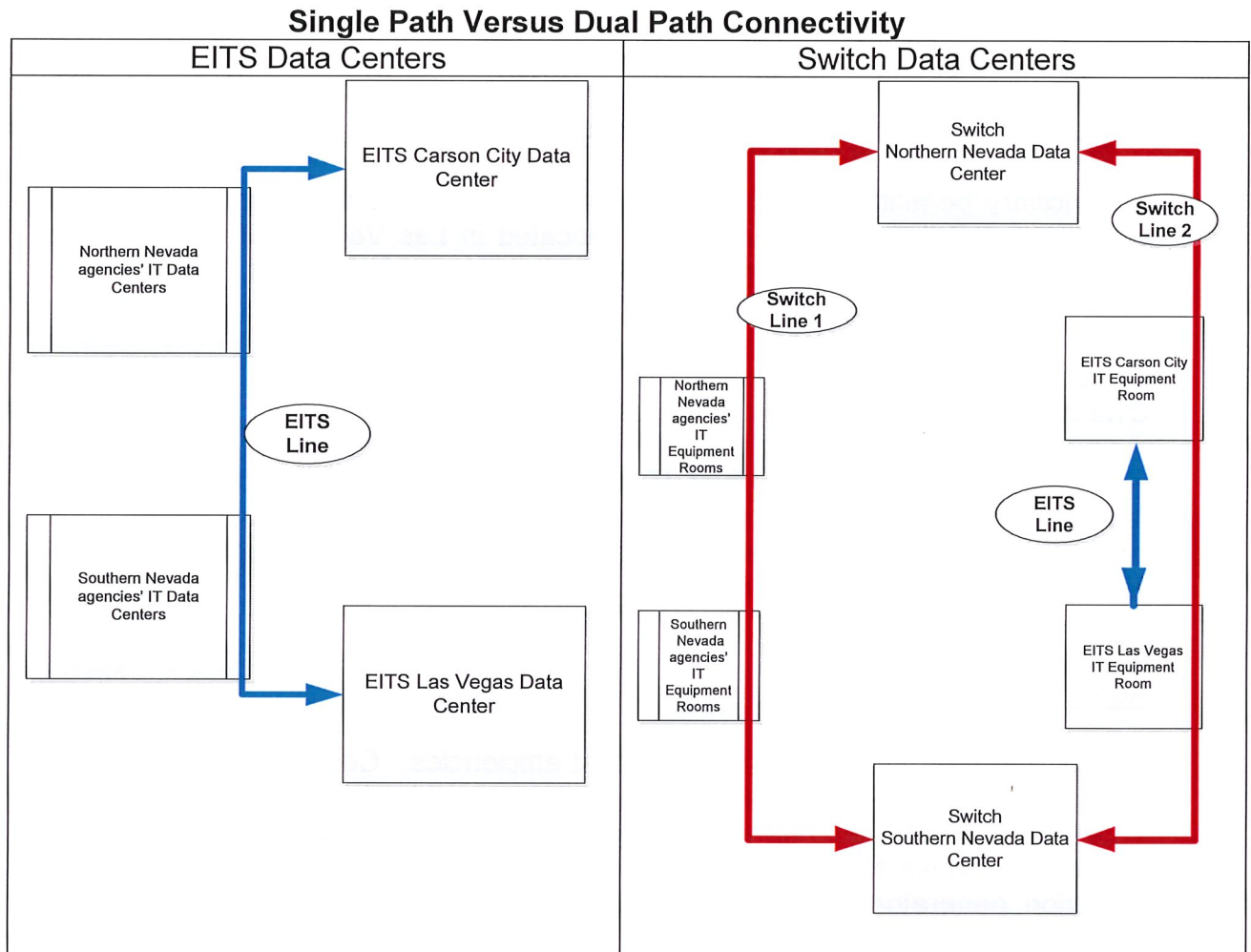


Table Notes:

EITS and agencies with IT data centers will need to maintain limited networking equipment, such as switches and routers, on-site after consolidating servers and storage to the Switch data center facilities.

EITS reports it would be cost prohibitive for all agencies to upgrade their individual data centers to include the increased reliability, redundancy, and connectivity that the Switch data center facilities offer.

Benefits Include

Agencies' Operational Effectiveness

There is fundamental value in consolidating data centers that does not equate to calculable cost savings. Planning, implementation, and execution of disaster recovery solutions may be easier and quicker because the necessary networking equipment is in one place, easing replication and failover initiation. In addition,

cybersecurity may be improved through consolidation. With fewer data centers, servers, and storage to manage, the physical security becomes easier, less costly, and requires fewer resources.

Benefit of Using Switch to Replace
EITS Carson City Data Center

Using Switch to replace the aging EITS Carson City data center could result in a net savings for the state of up to \$27 million. The Carson City data center is over 40 years old and is in need of substantial infrastructure and equipment repairs. In June 2016, State Public Works Division conducted a facility condition analysis based on a visual survey of the EITS Carson City data center. The HVAC system, including chillers, and air conditioner units were among equipment needing replacement. Servers, storage, and network equipment produce significant heat and require chillers and air conditioning units to cool the data center. This will require a substantial capital investment into the aging data center.

We determined there would be a net savings for the state of up to \$27 million if EITS moved their Carson City data center to Switch's data center facility. The net savings is calculated based on estimated known cost differences identified by EITS; however, there are others cost that would be incurred if either option were chosen. Certain costs, such as a utility power stabilizer and additional circuit lines to connect to Switch's fiber line, would be incurred whether EITS remained at the Carson City data center or moved to the Switch data facility.

See Exhibit II for net savings for a ten-year period based on estimated known cost differences if EITS moves the Carson City data center to Switch's data center facility.

Exhibit II

Estimated Net Savings for Moving to Switch

Description	Remain at Carson City Data Center	Move to Switch Data Center Facilities
Network lines upgrade/install - upgrade current line and install 2nd line between Carson City and Las Vegas ¹	\$ 5,000,000	--
Communications costs: Switch offers a 20% discount ²	\$ 55,700,000	\$ 44,600,000
Data center recurring costs ³	\$ 1,800,000	\$ 1,200,000
Data center building replacement ⁴	\$ 16,000,000	--
Inflation applied to building replacement cost	\$ 3,500,000	--
Ten year monthly costs for equipment at Switch ⁵	\$ 8,000,000	\$ 17,200,000
Total estimated known cost differences ⁶	\$ 90,000,000	\$ 63,000,000
Estimated Net Savings	--	\$ 27,000,000

Table Notes:

¹EITS current network line between Carson City and Las Vegas is 10Gbs (data moves at 10 gigabit per second). Upgrade of the current line and installation of a second redundant line would increase the line speeds to 100Gbs (data moves at 100 gigabit per second) each.

²Current communication costs include network and telephone connectivity through carriers such as ATT.

³Data center recurring costs include debt service for the current data center and utilities at 100 percent of current costs for the option to remain in the Carson City data center. The cost of utilities for the Carson City data center under the option to move to Switch decreases at a rate of 20 percent per year until year five where it will remain at 20%. Most, but not all network equipment would be moved to the Switch data center facility within 5 years under the option to move to Switch. Limited network equipment will need to remain at the Carson City data center under the option to move to Switch.

⁴A replacement building for the forty-year old Carson City data center would be required by the 10th year if the decision was made to remain at the current Carson City data center. EITS has indicated that if the data center were to remain in Carson City, a replacement building would be required in the next ten years to meet current standards of security, efficiency, redundancy, resiliency, and connectivity.

⁵Current monthly costs for EITS disaster recovery (DR) systems at Switch are approximately \$33,250 per month. EITS would maintain the DR systems and move additional equipment to Switch for either option. Under the option to stay at the Carson City data center, EITS estimates the current monthly Switch costs to double to \$66,500 per month. Total costs for the 10 years (120 months) would be \$7,980,000 (rounded to \$8 million). Moving to Switch would require additional space and monthly bandwidth usage. In discussions with Switch, EITS estimates the ten year cost to be \$17,200,000.

⁶Reflects only costs associated with net savings. Total costs for both options would be greater than the total estimated known cost differences because costs that would be the same for both options were not included. For this analysis, only costs that were different for each option were included.

EITS Management of Switch Data Center May Achieve Additional Efficiencies and Strengthen Cybersecurity

EITS is the appropriate entity to assist agencies with managing server maintenance and virtualizing servers. Under NRS 242.111, the EITS Administrator has the responsibility to ensure the use of information systems to meet the requirements of the agencies is at the least cost to the state.

EITS is responsible for multiple unrelated agencies' IT services, including the Governor's Office, Department of Administration, and Department of Public Safety. Adding limited EITS services for other agencies within the Switch data center, such as server maintenance and virtualizing servers, should not

exponentially increase EITS labor or costs. Switch offers these services at a retail rate. Although there would be a cost for EITS services, the cost will likely be less than the Switch retail rate.

Additional efficiencies and strengthened cybersecurity may be achieved if EITS manages certain maintenance services, such as updating and upgrading servers for the agencies at the Switch data center facilities. In addition, virtualizing servers within and across agencies could more fully utilize the physical server resources.⁸ This reduces the number of physical servers and strengthens cybersecurity.

Managing Server Maintenance Increases Efficiencies

Consolidating labor resources by having EITS manage server maintenance at the Switch data center facilities could have an additional cost savings annually. It is more cost effective to have two or three EITS staff travel to the Switch data center facilities to perform maintenance on multiple agencies' servers at once rather than each agency sending one or two staff to perform the server maintenance. Agencies' IT teams could focus on users' IT needs and assist with accomplishing agencies' missions.

Virtualizing Servers Offers Efficiencies and Strengthens Cybersecurity

Virtualizing servers could offer efficiencies and strengthen cybersecurity. By utilizing virtual servers, there are less physical servers; therefore less maintenance and less equipment needing replacement. Provisioning virtual servers with the exact amount of memory and storage resources needed could allow for additional cost savings. For example, two agencies may each have a physical server with excess capacity. The two servers could be combined into one physical server supporting two virtual servers to reduce costs. In addition, fewer physical servers need to be secured. Advanced threats have fewer entry points, and the oversight necessary to defeat these threats becomes less time- and labor-intensive.

Cost Benefit Analysis Considerations

Consolidating data centers to Switch data center facilities may have costs that should be considered as part of the cost benefit analysis. Moving to a consolidated data center is a labor-intensive process and will require up-front costs to move and setup equipment. Agencies need to ensure they have included costs and sufficient time in the planning. In addition, a portion of the

⁸Server virtualization attempts to increase resource utilization by partitioning physical servers into multiple servers, each running its own operating system and applications.

monthly rental charges for consolidation includes bandwidth usage.⁹ If bandwidth usage is underestimated and the agency goes over their contracted allowed bandwidth, additional charges would apply.

In addition, the agencies will no longer have the ability to physically access servers. Remote access to servers should be set up and advance planning if a trip is necessary to the consolidated data center would be required.

State Agencies and City of Henderson Consolidated Data Centers within Switch

EITS consolidated two of their disaster recovery servers at the Switch data center facilities, one in Northern Nevada and one in Southern Nevada. This offers a separate physical environment in which state IT operations can be restored in the event of a disaster at the EITS data center.

The Secretary of State Office (SOS) also consolidated IT disaster recovery servers into the Northern Nevada Switch data center facility. Their cost benefit analysis indicated a negligible cost difference between moving to the EITS 40-year-old onsite data center and moving to the Switch data center facility. For approximately the same cost, SOS servers are housed in a data center facility where SOS is not responsible for maintaining and upgrading infrastructure and receives benefits of increased reliability, redundancy, connectivity, and security for data access.

The City of Henderson consolidated their servers and storage into the Las Vegas Switch data center facility. Their onsite data center was 12 years old and needed major upgrades such as chillers and generator replacement. Based on their cost benefit analysis, the City of Henderson will save approximately \$500,000 annually for the next five years.

⁹ Bandwidth is the rate at which data can be transferred to a computer from a website or internet service. Larger bandwidth results in faster and more efficient speed of internet activity.

Conclusion

Collaborating with agencies to complete a five-year cost benefit analysis to consolidate agencies' data centers into the Switch data center facilities will help agencies ascertain the potential efficiencies and effectiveness from consolidating. This will ensure agencies, including EITS, are determining the best use and least cost options for the state. Consolidating data centers would increase cost efficiencies and operational effectiveness and could result in a net savings for the state of up to \$27 million.

Recommendation

1. Collaborate with agencies' IT teams to complete a five-year cost benefit analysis to consolidate their data centers.

Exhibit III

Estimated Benefits

Recommendation	Benefit
Collaborate with agencies' IT teams to complete a five-year cost benefit analysis to consolidate data centers	\$27 million
Total	\$27 million

Require Agencies' IT Teams to Use Same Networking Software

EITS should require all agencies' IT teams to use the same networking software. Agencies continually upgrade networking software to maintain and manage their data. Purchasing the same networking software upon upgrading could enhance inter-agency operations. In addition, training time could be reduced for IT staff transferring to other agencies and buying power could be leveraged to reduce the cost of the networking software.

Same Networking Software Could Enhance Inter-Agency Operations

Using the same networking software could enhance inter-agency operations. EITS and agencies' IT teams might be able to assist each other more quickly and effectively when network issues arise.

Agencies Not Using Same Networking Software

We surveyed EITS and nine agencies with their own IT teams and found only four use the same network performance monitoring software as EITS.¹⁰ No agencies use the same data backup and disaster recovery software as EITS. Additionally, only two agencies within Department of Health and Human Services use the same data backup and disaster recovery software as each other. More significantly, two agencies are not using the same anti-virus application as EITS. See Exhibit IV.

¹⁰ The ten agencies surveyed were EITS; Department of Health and Human Services – Division of Child and Family Services, Division of Health Care Financing and Policy, Division of Public Behavioral Health, Aging and Disability Services Division, and Division of Welfare and Supportive Services; Nevada Department of Corrections; Department of Employment, Training, and Rehabilitation; Department of Motor Vehicles; and Nevada Department of Transportation.

Exhibit IV

Agencies' Networking Software Compared to EITS

Agency	Network Performance	Data Backup	Disaster Recovery	Anti-Virus
DHHS - DCFS ¹				
DHHS - DHCFF ²				
DHHS - DPBH ³				
DHHS - ADSD ⁴				
DHHS - DWSS ⁵				
NDOC ⁶				
DETR ⁷				
DMV ⁸				
NDOT ⁹				

Table Notes:

¹DHHS – Department of Health and Human Services.

²DCFS – Division of Child and Family Services.

³DHCFF – Division of Health Care Financing and Policy.

⁴DPBH – Division of Public and Behavioral Health.

⁵ADSD – Aging and Disability Services Division.

⁶DWSS – Division of Welfare and Supportive Services.

⁷NDOC – Nevada Department of Corrections.

⁸DETR – Department of Employment, Training, and Rehabilitation.

⁹DMV – Department of Motor Vehicles.

¹⁰NDOT–Nevada Department of Transportation.

	Agency uses same software as EITS
	Agency uses different software than EITS; however uses the same software as another agency
	Agency uses different software than EITS and other agencies

Network performance, data backup, and disaster recovery software from different vendors do not operate the same and require training to use properly. Assistance by EITS or other agencies would be difficult if the same networking software is not used by all agencies. In addition, software is usually proprietary; one vendor's system will not read data saved by another vendor's system. If the systems used in restoring data are compromised, it may impede EITS or other agencies in assisting with data restoration. In today's technological climate, it is imperative IT teams are agile and able to recover from issues and disasters quickly. All agencies using the same networking software could significantly reduce recovery time.

Governor Directed a Consolidated and Integrated Approach for Cybersecurity

The Governor's cybersecurity directive on March 1, 2013 stated "EITS will move forward with a consolidated and integrated approach to cybersecurity."¹¹ The consolidated and integrated approach to cybersecurity would "provide improved capabilities to monitor, manage, and response to threats against our data and IT systems."¹²

As a result, agencies are required to use the same anti-virus software as EITS for workstations. This allows EITS to continuously monitor workstations and respond to attempted virus intrusions on SilverNet.

In 2014 the network experienced two million attempted intrusions on SilverNet's firewalls per hour. As a result of the consolidated and integrated approach to cybersecurity, EITS was able to reduce the number of monthly security incidents from 155 to 30 (80 percent decrease).¹³

However, not all agencies have complied with the Governor's cybersecurity directive. Nevada Departments of Corrections and Transportation continue to use different anti-virus software as EITS.¹⁴ This impedes EITS's ability to monitor, manage, and respond quickly to threats against the state's data and IT systems.

Same Networking Software Could Reduce IT Staff Training Time

IT staff transfer between agencies that use different networking software. IT staff should be trained on software to ensure sufficient understanding and best use of the software. However, many agencies do not have the time or resources to offer professional or in-house IT training for the software used. Using the same networking software could decrease training for IT staff transferring to other agencies.

¹¹ Office of the Governor Directive dated March 1, 2013.

¹² Office of the Governor Directive dated March 1, 2013.

¹³ Jessica Hughes, "Nevada Cybersecurity: Enterprise Solution Reduced Incidents by 80 Percent", *govtech.com*, November 10, 2014, <http://www.govtech.com/security/Nevada-Cybersecurity-Enterprise-solution-reduced-incidents-by-80-percent.html>

¹⁴ State agencies surveys.

Buying Power Could be Leveraged to Reduce Costs

Buying power could be leveraged to reduce the cost of the networking software. Implementing an enterprise-wide software contract from the same vendor could offer volume discounts, thereby reducing the cost of networking software.

Other States Require Same Networking Software

Other states require the use of same networking software across all agencies. For example, Nebraska and Ohio require their agencies' IT teams to use the same networking software as their states' enterprise IT agency. This allows quicker assistance from the enterprise IT agency and offers discounts when purchasing the software.

Conclusion

Requiring all agencies' IT teams to use the same networking software could enhance inter-agency operations and allow EITS and agencies' IT teams to assist each other more quickly and effectively when network issues arise. In addition, training time could be reduced for IT staff transferring to other agencies and buying power could be leveraged to reduce the cost of the networking software.

Recommendation

2. Require agencies' IT teams to use same networking software.

Establish Policies and Standards for IT Procurement

EITS should establish state policies and standards for IT procurement which will help ensure agencies' IT purchases comply with IT security requirements, leverage buying power, and reduce software and hardware training for employees. Policies would define the high-level goals and objectives. Standards would define specifications for items such as desktops and laptops to ensure they are capable of running the standard state software including computer operating systems, productivity suites, and anti-virus applications.

Agencies' IT Purchases May Not Comply with the State's IT Security Requirements

EITS should establish standards to help ensure software and hardware purchases comply with the state's IT security requirements. This would limit possible security issues for the state's infrastructure and hindrances for both agencies and EITS. If software or hardware does not comply with the security requirements EITS must limit or deny the use until adequate security protections are in place.

Software and hardware available for purchase can outpace IT security restrictions of the state's network infrastructure. Agencies are required to submit Technology Investment Notifications (TIN) to EITS for IT investments costing \$50,000 or more. However, EITS is not notified of agencies' projects less than \$50,000. Due to the cost threshold, EITS might not be aware of all software and hardware purchases made by the agencies. Establishing standards for software and hardware and updating them based on technology changes will help ensure IT purchases comply with security requirements.

Agencies Not Aware of IT Security Requirements

State agencies may not be aware of IT security requirements when purchasing or upgrading software and hardware. This can compromise IT security and delay implementation of software or hardware. For example, Department of Health and Human Services (DHHS) purchased Microsoft Office 365 prior to EITS having all necessary infrastructure security requirements in place. EITS had to deny DHHS from using the Microsoft 365 email functionality until such security requirements were functional.¹⁵ This contributed to an implementation delay for the email functionality of over 17 months.

¹⁵ Microsoft 365 is a cloud-based version and requirements such as email encryption were not in place.

Enterprise-Wide Solutions Leverage Buying Power

A policy to purchase enterprise-wide solutions would leverage the state's buying power and help ensure volume purchase discounts are received from vendors. EITS could work with agencies to identify enterprise-wide solutions to eliminate purchases of different software and hardware for similar purposes.

EITS used an enterprise-wide solution when purchasing anti-virus software. "By purchasing an enterprise solution, the state was able to avoid about \$35 million in costs if they had purchased it using the standard, agency-by-agency procurement method."¹⁶

Agencies Purchase Different Software for Similar Purposes

Some agencies purchase different software for similar purposes. This results in possible loss of leveraged buying power. Four divisions within Department of Health and Human Services use case management software to assist their clients.¹⁷ Within these divisions, twelve programs manage their work using case management software. Only two programs use the same software, one program in Division of Public and Behavioral Health and one program in Division of Child and Family Services.

EITS is working towards several enterprise-wide solutions to eliminate purchasing different software for similar purposes. Some of these solutions include the Statewide Hybrid Cloud system for email, office suite productivity (Microsoft Office 365), and E-signature application. However, there may be additional opportunities to purchase enterprise-wide solutions. EITS can use TINs to help determine the need for enterprise-wide solutions and assist with the procurement process.

Employee Training Time Could Be Decreased

Employees transfer between agencies that use different software and hardware. Employees should be trained to ensure sufficient understanding and best use of software and hardware. However, many agencies do not have the time or resources to offer professional or in-house training for the software or hardware used. As more enterprise-wide applications are implemented and the same

¹⁶Jessica Hughes, "Nevada Cybersecurity: Enterprise Solution Reduced Incidents by 80 Percent", *govtech.com*, November 10, 2014, <http://www.govtech.com/security/Nevada-Cybersecurity-Enterprise-solution-reduced-incidents-by-80-percent.html>.

¹⁷The four divisions within Department of Health and Human Services are Aging and Disability Services, Child and Family Services, Public and Behavioral Health, and Welfare and Supportive Services.

hardware is used, training could decrease for employees transferring to other agencies.

Other States' Enterprise IT Agencies Issue IT Procurement Policies and Standards

Other states' enterprise IT agencies issue state IT procurement policies and standards. For example, Nebraska and Ohio's enterprise IT agencies have issued IT procurement policies and standards to help ensure IT purchases comply with IT security requirements, leverage buying power, and reduce software and hardware training for employees.

Conclusion

Establishing state policies and standards for IT procurement will help ensure agencies' IT purchases comply with IT security requirements, leverage buying power, and reduce software and hardware training for employees. Policies would define the high-level goals and objectives. Standards would define specifications for items such as desktops and laptops to ensure they are capable of running the standard state software including computer operating systems, productivity suites, and anti-virus applications.

Recommendation

3. Establish policies and standards for IT procurement.

Create an IT Project Management Certification Program

EITS should create an IT project management certification program (program) to assist agencies implementing IT projects. Providing a program for agencies could help control costs and improve project results. Project management helps ensure risks are defined and issues mitigated before they occur. In addition, improved communication to and managed expectations from customers, team members, and stakeholders increase with project management.

Agencies and EITS May Lack Experienced Project Management Staff

Agencies and EITS may lack experienced project management staff to provide oversight for IT projects. Professional training would offer agencies beneficial project management knowledge; however, attending project management training outside of the state could be costly and take more time than training provided by the state. In-state training would be more cost efficient and has the added benefit of customizing topics to include project requirements specific to the state.

The program, coordinated by EITS management team, would provide training, guidance, and direction, ensuring staff has the knowledge to adequately manage their agencies' IT projects. Agencies would continue to determine their individual business needs, identify technology solutions, obtain necessary funding, and manage the processes for implementing chosen solutions.

The program could be developed, in part, by collaborating with the Office of Project Management (OPM).¹⁸ OPM is managing the project to purchase and implement the state's new Enterprise Resource Planning system. OPM is obtaining knowledge and expertise; identifying best practices and processes; and developing templates and checklists, which could be used to develop the project management certification program.

Improved Project Management May Have Assisted Department of Motor Vehicles Project

On January 24, 2018, the Department of Motor Vehicles (DMV) terminated its contract for the system modernization project. According to the Division of Internal Audits report C18-01 Nevada Department of Motor Vehicles System Modernization Project, neither the contractor nor DMV effectively satisfied their responsibilities for this project. Improved project management by DMV in

¹⁸The 2017 Legislative session authorized the establishment of the Office of Project Management (OPM) to assist in choosing and implementing the financial package for the Enterprise Resource Planning project now known as the Silver State Modernization Approach for Resources and Technology in the 21st Century (SMART 21).

enforcing project deadlines and holding contractors responsible for performance shortfalls may have kept the project moving forward to completion.¹⁹

Improved Project Management May Have Assisted Department of Health and Human Services Project

In August 2016 DHHS purchased Microsoft Office 365 suite, a cloud based product.²⁰ As this purchase was considered an upgrade to DHHS' existing Microsoft Office product, a Technology Investment Request was not required to be submitted. As a result, EITS was unaware of this project.²¹

EITS had not yet installed email protections such as Data Loss Protection and email encryption for Microsoft Office 365 Outlook. DHHS requires these email protections to support their workflow and ensure HIPPA data and PII are safeguarded while emails are in transit.²² Therefore, EITS denied DHHS the ability to use the email functionality, but allowed the use of the other programs within Microsoft Office 365.

EITS approved DHHS use of Microsoft Office 365 Outlook in February 2018 following EITS implementation of the email protections. Improved project management by DHHS could have uncovered the email protection security issue prior to the implementation of Microsoft Office 365.

Improved Project Management May Have Assisted EITS' OTIS Project

In December 2017, EITS reported that the project for the Offender Tracking Information System (OTIS) for Department of Public Safety Parole and Probation Division had to be restructured and re-estimated due to insufficient project management. Improved project management may have avoided the OTIS project over runs doubling the cost estimates and increasing the target completion date by 12 months.

EITS Can Use TIN to Identify Program Candidates

EITS can use the Technology Investment Notification (TIN) to identify candidates for the program. Agencies are required to identify the staff responsible for the IT

¹⁹ Division of Internal Audits report, C18-01 Nevada Department of Motor Vehicles System Modernization Project.

²⁰ Microsoft Office 365 suite includes programs such as Word, Excel, PowerPoint, and Outlook.

²¹ As of February 22, 2018, EITS replaced Technology Investment Requests with Technology Investment Notifications.

²² HIPPA is the Health Insurance Portability and Accountability Act of 1996 and PII is personally identifiable information.

project on the TIN. EITS could offer project management training for staff who does not have program certification.

SAM Requires Project Management Oversight

State Administrative Manual section 1620 requires agencies to have qualified IT project managers, quality assurance managers, and project oversight staff for large IT projects. However, there are no state training classes or certification programs offered to assist agencies with obtaining project management knowledge.

Other States Require Project Management for IT Projects

Other states require their agencies to have project management for IT projects. For example, Kansas, Nebraska, and Ohio have their enterprise IT agency functioning as the project manager or offering project management assistance through training, mentoring, or consulting to their state agencies.

Conclusion

Creating an IT project management certification program would assist agencies implementing IT projects. Providing a program for agencies could help control costs and improve project results. Project management helps ensure risks are defined and issues mitigated before they occur. In addition, improved communication to and managed expectations from customers, team members, and stakeholders increase with project management.

Recommendation

4. Create an IT project management certification program.

Develop Guidelines to Comply with Statute and to Assist Agencies' Annual Strategic IT Plans

EITS should develop guidelines to assist agencies in building annual strategic IT plans. This will ensure EITS complies with NRS 242.115, is aware of agencies' IT plans, and verifies plans are consistent with the direction of state technology.

Develop Guidelines to Comply with Statute

EITS should develop guidelines to assist agencies in building annual strategic IT plans. This will ensure that EITS complies with NRS 242.115.

NRS 242.115 1(c) requires EITS to develop guidelines to assist state agencies in the development of short and long-term plans for their information systems. EITS should ensure the guidelines define information to be included in the plan, such as description of projects, estimated dates of implementation, compliance with the Governor's goals and priorities, assistance from EITS if necessary, and submission date to EITS.

Assist Agencies with Annual IT Plans

EITS should develop guidelines to assist agencies in building annual strategic IT plans. This will ensure EITS is aware of agencies' short and long-term IT plans and will allow EITS to incorporate the agencies' technology direction into the overall state technology direction. This information could also assist EITS in determining the state technology direction.

There are several methods, including meetings with agencies' Information Security Officers and submissions of Technology Investment Requests, in which EITS is made aware of agencies' IT plans. However, this information is either discussed informally in meetings or limited to short-term projects greater than \$50,000. Receiving formalized annual strategic IT plans from the agencies would give EITS a comprehensive understanding of the technology direction of the agencies' short and long-term plans.

Conclusion

Developing guidelines would assist agencies in building annual strategic IT plans. This will ensure EITS complies with NRS 242.115, is aware of agencies' IT plans, and verifies plans are consistent with the direction of state technology.

Recommendation

5. Develop guidelines to comply with statute and to assist with agencies' submission of annual strategic IT plans.

Ensure ITAB Meets Per Statute

EITS should ensure that the Information Technology Advisory Board (ITAB) meets every three months pursuant to statute.²³ ITAB is intended to function as a high-level advisory board. This ensures ITAB complies with NRS 242.123 and NRS 242.131, and provides additional knowledge and resources for EITS.

Ensure ITAB Meets Per Statute

EITS should ensure ITAB meets every three months to comply with NRS 242.123. This will help ensure ITAB is aware of and keeps current with the direction of state IT.

It is imperative for ITAB to ensure the state's strategic IT plan is consistent with evolving technology, Governor's goals and strategies, and available resources. Statute requires ITAB to meet every three months to provide this high-level oversight. However, ITAB met only three times from October 2016 through February 2018.

ITAB May Review Agencies' Strategic IT Plans

NRS 242 also authorizes ITAB to review agencies' strategic IT plans for their short and long-term goals and objectives. However, there is no evidence agencies have submitted annual plans for review.

While reviewing each agency's IT plan every year might be impractical, ITAB could create a risk assessment to determine which plans to review. The risk assessment criteria could include effects on cybersecurity and requests for leading edge technology. The ITAB review could assist EITS with the direction of information technology for the state.

²³ITAB's members include legislators, representatives of larger state agencies, the Director of Administration, the Attorney General, information technology specialists from cities and counties, and private sector representatives of the information technology industry.

Conclusion

Ensuring that ITAB meets every three months pursuant to statute to function as a high-level advisory board will ensure compliance with NRS 242.123 and NRS 242.131, and provide additional knowledge and resources for EITS.

Recommendation

6. Ensure the Information Technology Advisory Board meets per statute to function as a high-level advisory board.

Appendix A

Scope and Methodology, Background, and Acknowledgements

Scope and Methodology

We began the audit in July 2017. In the course of our work, we interviewed the Department of Administration Director and the State CIO and discussed processes inherent to their responsibilities. We reviewed applicable NRS and other state guidelines. We surveyed Nevada state agencies and other states' enterprise IT agencies to obtain an understanding of IT governance. We reviewed NASCIO website for best practices and interviewed Switch for data center consolidation information. We concluded fieldwork and testing in February 1, 2018.

We conducted our audit in conformance with the *International Standards for the Professional Practice of Internal Auditing*.

Background

IT Governance in State Government

IT has become indispensable for enabling governments to provide better services to the public more effectively and efficiently. IT governance has come to the forefront as government leaders seek to create and capture IT value. Optimal IT value can be realized from leveraging IT governance only if it is effectively adopted and adapted to suit each state's unique environment.

States' IT Governance Differs Significantly

States' IT governance differs significantly among states. Many states continue to move towards some manner of IT consolidation and shared services as a means to reduce costs and improve efficiencies. However, there is not one strategy that works for every state. Some states choose complete centralization, replacing agency-level IT teams and data centers with a central IT agency, shared facilities, and shared services. Other states choose a hybrid or federated approach, which can vary extensively. Some states issue agency-wide policies from a central IT agency, but retain data centers, other infrastructure, technology staff, and leadership in each agency or department. Still other states establish a central IT agency with some consolidated data centers, infrastructure, technology staff, and leadership.

See Exhibit V for examples of states' IT governance.

Exhibit V

Examples of States' IT Governance

State	Hybrid/Federated	Centralized
Idaho		
Michigan		
Nebraska		
New Jersey		
Nevada		
Ohio		
Utah		
Washington		

Office of CIO Organizational Structures Differ Among States

Administratively, organizational structures of the central IT agencies also differ. Some states have created a separate state Chief Information Officer (CIO) office on equal footing with department heads and other states have incorporated the central IT agency into an administration department. In addition, regardless of where the CIO is located, some states include the CIO as part of the Governor's Cabinet and others do not. See Exhibit VI.

Exhibit VI

Examples of States' Office of CIO Organization

State	Separate Office of CIO	CIO part of Governor's Cabinet
Idaho		
Michigan		
Nebraska		
New Jersey		
Nevada		
Ohio		
Utah		
Washington		

Table Legend

	Yes
	No

Nevada's Approach to IT Governance and Office of CIO Organization

Nevada has taken a hybrid/federated approach towards state IT governance. Enterprise Information Technology Services (EITS) is the central IT organization creating state-wide IT policies, procedures, and standards which agencies must follow. In addition, EITS reviews and determines the merits of all technology requests \$50,000 or more through the Technology Investment Notification process. There has been consolidation of some agencies' data centers and technology staff, such as with the Department of Administration and the Department of Public Safety. However, data centers and other infrastructure and technology staff and leadership are maintained within many of the individual agencies.

Nevada has organized EITS with an Administrator of the division within the Department of Administration. The State Chief Information Officer (CIO) is the Deputy Director within the Department of Administration. The State CIO is not a member of the Governor's Cabinet; however, the Director of the Department of Administration ensures the Governor and Cabinet members are apprised of information relating to state information technology.

Data Centers

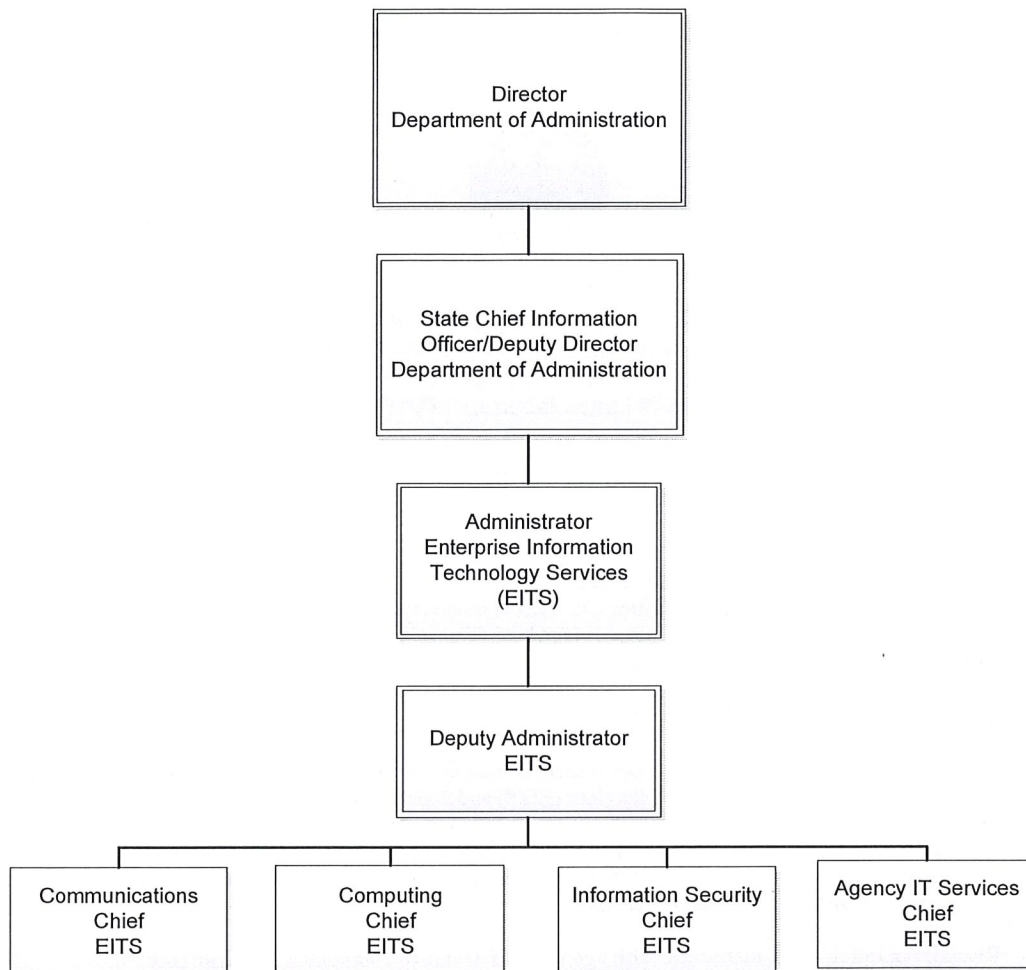
Data centers house the computer equipment and networking systems and components for an organization's information technology needs. Additionally, data centers provide physical and environmental controls to support the operation of computer systems. Large enterprise data centers allow an organization to co-locate computing equipment used by a variety of entities in an environment with continuous monitoring of access to the facility, equipment, and fire detection and suppression systems. In addition, large enterprise data centers offer duplicate power feeds from the public utility; on-site emergency generators; on-site uninterruptible power supply equipment to protect the information systems against power spikes and power outages; and duplicate systems for cooling and water detection.

EITS Organizational Structure

EITS is one of 12 divisions in the Department of Administration and is funded by state agency service fees, transfers, and allocations. The State Chief Information Officers is a Deputy Director within the Department of Administration and oversees the development of high-level strategy, statewide policy, and coordination with federal, state, and local governments. The EITS Administrator oversees day-to-day functions of the division. EITS is comprised of four sections – Communications, Computing, Information Security, and Agency IT Services, headed by section chiefs. See Exhibit VII.

Exhibit VII

Enterprise IT Services Organizational Chart



Acknowledgments

We express appreciation to the department director and the State CIO for their cooperation and assistance throughout the audit.

Contributors to this report included:

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Appendix B

Enterprise IT Services Response and Implementation Plan

Brian Sandoval
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MEMORANDUM

DATE: May 22, 2016
TO: Steve Weinberger, Administrator,
Governor's Finance Office, Division of Internal Audits
FROM: Michael Dietrich, State CIO 
RE: Response to Executive Audit Report

Thank you for the opportunity for the Department of Administration (D of A) to be a part of the audit on the Division of Enterprise IT Services (EITS) and their oversight role for State's information technology. As always, you and your staff were thoughtful, thorough, and professional. I appreciate the opportunity to provide a response to your recommendations. In general, The D of A agrees with your recommendations and looks forward to working with the Division of Internal Audits on implementation.

Recommendation #1: Collaborate with agencies' IT teams to complete a five-year cost benefit analysis to consolidate their data centers.

Response: D of A understands and accepts the audit recommendations. We concur that additional statewide computing effectiveness and efficiency may be obtained through improved collaboration and unity with other agency IT teams, and through transitioning and co-locating disparate data centers into a single world-class facility such as Switch.

Implementation of this recommendation will require time and resources to fully implement. We are developing a proposed approach and are convening a kick off meeting with agencies later this month. A progress report will be provided in six months, but full implementation may take much longer.

Recommendation #2: Require agencies' IT teams to use same networking software.

Response: D of A accepts this audit recommendation. We will seek to achieve additional statewide networking and security efficiencies through use of common networking tools and products. Standards for antivirus software has already been established. EITS will work with the two non-compliant agencies to gain their compliance within the next six months. Also within

the next six months, we will establish an IT Procurement Working Group of agency representatives to establish statewide standards for the other types of networking software identified in the report.

Recommendation #3: Establish policies and standards for IT procurement.

Response: The D of A accepts the audit recommendation and will work to improve statewide IT procurement and standards. The EITS Division and the Purchasing Division will cooperate and work with other agencies to develop standards. Within the next six months, we will establish an IT Procurement Working Group of agency representatives to identify and prioritize areas of IT procurement for statewide policies and standards. However, the scope of this recommendation is such that additional resources and time may be needed for full implementation of policies and standards across all areas of IT procurement.

Recommendation #4: Create an IT project management certification program.

Response: The D of A accepts the audit recommendation. IT project management is important to successful implementation of information technology projects throughout the State. Better training and knowledgeable IT project managers will facilitate IT project implementation and help avoid unnecessary project setbacks.

As an initial step towards implementation, we will consult with industry experts and other states on best practices and will survey agencies on current project management disciplines they utilize to develop consensus around updated standards. We will set a goal to have revised SAM language prepared within the next six months. However, creation of a formal certification program may require additional resources for full implementation.

Recommendation #5: Develop guidelines to comply with statute to assist agencies' submission of annual strategic IT plans.

Response: The D of A accepts the audit recommendation. Additional guidelines, directions and planning information will be produced to assist agencies in the preparation of their annual strategic IT plans. We will develop guidelines for agencies within the next six months.

Recommendation #6: Ensure the Information Technology Advisory Board meets per statute to function as a high-level advisory board.

Response: The D of A agrees with this recommendation and will work with the Board to better achieve expectations. At the February 14th meeting of the ITAB earlier this year, the chairman spoke to the role of ITAB and members discussed the lack of meetings as required by statute. As a result, the board adopted the following meeting schedule for the remainder of the year: June 6, August 23, and November 14. See attached draft meeting minutes for reference. We believe this makes the department compliant with this recommendation. If not, we will work with your division to define compliance within the next six months.

Appendix C

Timetable for Implementing Audit Recommendations

In consultation with the Department of Administration (department) and Enterprise IT Services (EITS), the Division of Internal Audits categorized the recommendations contained within this report into two separate implementation time frames (i.e., *Category 1* – less than six months; *Category 2* – more than six months). The department and EITS should begin taking steps to implement all recommendations as soon as possible. The department and EITS target completion dates are incorporated from Appendix B.

Category 1: Recommendation with an anticipated implementation period of less than six months.

<u>Recommendations</u>	<u>Time Frame</u>
5. Develop guidelines to comply with statute and to assist with agencies' submission of annual strategic IT plans. (page 23)	December 2018
6. Ensure the Information Technology Advisory Board meets per statute to function as a high-level advisory board. (page 25)	December 2018

Category 2: Recommendations with an anticipated implementation period exceeding six months.

<u>Recommendations</u>	<u>Time Frame</u>
1. Collaborate with agencies' IT teams to complete a five-year cost benefit analysis to consolidate their data centers. (page 11)	TBD
2. Require agencies' IT teams to use same networking software. (page 15)	TBD
3. Establish policies and standards for IT procurement. (page 18)	TBD
4. Create an IT project management certification program. (page 21)	TBD

The Division of Internal Audits shall evaluate the action taken by EITS concerning the report recommendations within six months from the issuance of this report. The Division of Internal Audits must report the results of its evaluation to the committee, department, and EITS.