



# ADOA - ASET

Arizona Strategic Enterprise Technology

## Project Investment Justification

Version 01.01

A Statewide Standard Document for Information Technology Projects

**Project Title:**

**Storage Management System**

<b>Agency Name:</b>	Arizona Attorney General's Office
<b>Date:</b>	5/12/14
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## I. Management Summary\*

The Arizona Attorney General's Office (AGO) is consuming very large quantities of shared disk storage. The existing Storage Area Network (SAN) system by itself cannot continue to meet AGO storage needs and still provide redundant failover capabilities without additional investment. The AGO intends to upgrade its SAN and system backup environment to continue satisfying the data storage and disaster recovery needs of the Office.

## II. Project Investment Justification (PIJ) Type\*

Yes  No Is this document being provided for a Pre-PIJ / Assessment phase?

If Yes,

Identify any cost to be incurred during the Assessment phase.	\$
Based on research done to date, provide a high-level estimate or range of development costs anticipated for the full PIJ.	\$

Explain:

[Click here to enter text.](#)

Yes  No Will a Request for Proposal (RFP) be issued as part of the Pre-PIJ or PIJ?

## III. Business Case

### A. **Business Problem\***

The AGO data storage requirements are growing at a rapid rate. This is creating a number of challenges for the Arizona Attorney General's Office (AGO) in the area of cost, manageability, survivability, and disaster recovery. The AGO currently has 42 TB of raw SAN storage that is nearly 50% full. Half the SAN storage is physical located in the Law Building with the other half located in the Capital Center Building. The AGO disaster recovery plan and high availability failover depend on operational data being replicated between the buildings. The storage of data in each building is not growing at the same rate. SAN data storage is very fast and self-healing, but the AGO has spent as much as \$5K per TB. The existing AGO system can just barely backup 21 TB of data to tape during a normal 2-day weekend. A full backup that is initiated on Friday evening runs all weekend long until 4am on Monday morning to complete.

### B. **Proposed Business Solution\***

The AGO intends to virtualize its SAN infrastructure, add a significant volume of lower cost high density disk, and upgrade its data backup solution. The AGO virtualized its server infrastructure during the migration of its email and file servers from Novell to Microsoft technologies. A virtualized SAN environment will provide a number of enhanced data storage management capabilities including: the ability to distribute a server volume over several different disks technologies in multiple locations; the ability modify drive distribution for a sever volume on-the-fly; the ability tier data file storage by the frequency of access (e.g. store infrequently accessed data on slower high density disk); and the ability to move live production server volumes between buildings. The AGO also intends to use a portion of the lower cost/high density disk storage to perform

system backups. The AGO will be able to back up its production data to a disk backup target within a fraction of the time it takes to back up to tape. The AGO will upgrade its tape backup library system with higher density tape drives, and use the upgraded tape drives to pull a copy of the backup data saved to the disk backup target. The AGO also intends to begin encrypting its backup tapes to help improve the security of data while it is in-transit and stored off-site.

**C. Quantified Benefits\***

<input type="checkbox"/>	Service enhancement
<input type="checkbox"/>	Increased revenue
<input checked="" type="checkbox"/>	Cost reduction
<input checked="" type="checkbox"/>	Problem avoidance
<input checked="" type="checkbox"/>	Risk avoidance

Explain:

**Cost Reduction**

The AGO currently spends nearly \$2K per TB for shared SAN data storage. The majority of AGO data stored on the SAN systems is infrequently accessed. The proposed project will use higher density lower cost SATA storage for the data that is accessed less frequently. The SATA storage will cost a little over \$500 per TB.

The AGO currently saves its backup data to LTO4 tapes. We use 27 tapes every weekend to run a full backup and several more tapes during the week to run incremental backup jobs. The AGO spends approximately \$4K every three months on LTO4 tapes (Quantity of 120 LTO4 tapes x \$31.58 each). This project intends to implement disk-to-disk backups. Data will only be sent to tape once per month. The AGO will upgrade its tape backup libraries to LTO6 drives. Based on the current prices of LTO6 tapes, the AGO predicts that we will only need to spend \$2500 per year on backup tapes (Quantity of 48 LTO6 tapes used annually x \$52.69 each).

**Problem Avoidance**

The typical AGO full backup initiated on a Friday evening takes approximately 52 hours to complete and utilizes 27 LTO4 tapes. As additional storage is consumed and the time required to complete a full backup continues to grow, the AGO will not be able to complete a full system backup during a normal weekend. As the backup window starts to run into Monday morning and users open up data files to perform their normal daily work, the AGO backup system will not be able to backup open files to tape. With this project, the AGO will start using disk-to-disk backup technology, and a full backup can be completed within a single evening.

**Risk Avoidance**

The AGO does not currently have enough available SAN disk space to store a complete copy of all AGO data in both the Law and Capital Center building data centers. Should one of these main AGO buildings be affected by a flood or fire, the AGO staff may have to wait months while the information technology department attempts to recover from the disaster by acquiring and implementing the additional disk space needed to restore the remaining operational data. This project will be deploying enough disk space in both

the Law and Capital Center building data centers to store a complete and operational backup of all AGO data.

The current AGO backup system does not encrypt the backup tapes. Should a tape be lost during transit or stolen while in storage, the data on the tape will be easily read by anyone with a LTO4 tape drive and the proper software. This project will implement tape encryption to protect backup data stored off-site.

#### IV. Technology Approach

##### **A. *Proposed Technology Solution\****

The AGO intends to integrate a number of new technologies into the existing AGO server and SAN environments including: DataCore SanSymphony storage virtualization software; NexSan SATA data storage systems; and LTO6 tape drives.

##### **B. *Technology Environment***

The existing AGO data storage environment is provided by a pair of XioTech SAN systems, one in each of the main AGO buildings (e.g. Law and Capital Center). Each XioTech SAN has 21TB of raw disk storage for total of 42TB of SAN storage. The XioTechs are interconnected with single mode optical fiber. Each disk in the current SAN environment is dual connected (single connection to each XioTech SAN controller) providing full redundancy in case of a disk, fiber, controller, or facility failure. The AGO also has Cisco fiber channel SAN switch located in each building. The fiber channel switch connects the server infrastructure to the SAN infrastructure. Each physical AGO server (that is likely running multiple virtual servers) is connected to the local building fiber channel switch, and each XioTech SAN controller is also connected to the local fiber channel switch. The two fiber channel switches are connected to each other.

In the first fiscal year of the project, the AGO intends to add two NexSan 36TB storage systems to the existing SAN infrastructure, adding 72TB of storage for a new grand total of 114TB of SAN storage at the AGO. The AGO will be adding two more NexSAN storage system the following fiscal year increasing the total AGO SAN storage to 186 TB.

The AGO will setup two new virtual servers (one in each of the main buildings), and load the DataCore SanSymphony software on each server. The DataCore servers will virtualize the SAN environment and operate as the central point of access for the AGO server environment.

The existing AGO backup infrastructure is comprised of CommVault backup software, a backup server, multiple backup agents (e.g. servers that are backed up), two LTO4 tape libraries (one in each of the main Phoenix buildings), and an LTO4 tape drive in Tucson main.

The NexSan storage systems will be configured to provide a disk backup target to the CommVault system. The CommVault system will be configured to backup all production server volumes to the disk backup target during the normal backup window from 12

midnight to 4 am. The two tape libraries in Phoenix will be configured to back up the disk backup target at least once per month.

In the second fiscal year of the project, the tape libraries will be upgraded with LTO6 drives. The CommVault system will be configured to encrypt the backup tapes.

### **C. Selection Process**

The AGO considered a number of alternatives when researching the best manner in which to increase its electronic storage capacity:

#### **Option 1 – Do Nothing**

The AGO is only just approaching 50% of its total SAN storage capacity. The AGO could continue to use the remaining available capacity to store new data. There is no immediate capital expenditure associated with this approach. The AGO could likely wait at least another year before making a decision on how to best expand its storage capacity. However, the AGO would begin to use the failover redundancy storage that is in-place which provides a means to recover from a disaster event (e.g. facility loss due to fire or flood.). If the AGO lost access to one of its main buildings and the AGO had encroached on its failover redundancy storage, it would affect the ability of the AGO to perform its core function for several days. Depending on the extent of the damage, the AGO would have to procure replacement product, IT staff would have to rebuild multiple servers, and restore data volumes from tape. It is conceivable that some server volumes would remain unavailable for weeks until such time that additional disk space was obtained, configured, and restored.

#### **Option 2 – SATA SAN Drives**

The AGO has reviewed two different brands of shared SATA storage (e.g. Dot Hill and NexSan.) The AGO prefers the NexSan product over the Dot Hill even though the Dit Hill product is \$4K cheaper. The AGO has had poor experience with HP MSA storage devices. The HP MSA storage devices were made by Dot Hill and were difficult to manage and administer.

The AGO could add shared SATA storage to the SAN environment without virtualizing. The AGO could use lower cost storage capacity for disk backups and server volumes that contain non-critical data. However without SAN virtualization, server data volumes that contain critical data could not be tiered over multiple disk technologies. Any one particular server volume would have to be configured to utilized either all SATA or all fiber channel storage. The AGO has a significant amount of critical data that is infrequently accessed. Infrequently accessed data should be stored on cheaper and slower storage technology. The cost of 72 TB of SATA based SAN storage is \$38.7K (\$537.50/TB). The cost of 96 TB of fiber channel SAN storage is \$168K (\$1,750/TB).

#### **Option 3 – File stubbing**

A file stubbing system can be used to archive files to slower media based upon inactivity. File stubbing is a process that moves inactive files to slower media and replaces the original file with a short-cut (e.g. file stub). When a user attempts to access a file stub, the system automatically initiates a restore process to replace the stub with

the original file and serve it up for user access. The file restore process can take minutes to run and complete. The AGO had a chance to utilize the CommVault File Archiver in conjunction with HP MSA storage device. Performance was poor. The user community can be impatient, and waiting 2-3 minutes for a file to restore is frustrating. File stubbing does not work on system files or data files that have to be accessed by system process. If a system process attempts to access a stubbed file, it will return an error and abort the process. File searching initiates a restore of stubbed files. A search for a file on a volume can cause all stubbed files on the volume to be restored. Restoring an entire volume of stubbed files will likely max-out a server volume (e.g. run out of space) and halt the system.

**Option 4 – Fiber Channel SAN Drives**

Traditionally when the AGO needs additional shared storage, we purchase more fiber channel storage for the existing AGO SAN systems. The cost of 96 TB of fiber channel SAN storage is \$168K (\$1750/TB). If the AGO chose to purchase only fiber channel storage, there would be no need for data tiering as all the data storage would be striped over identical disk technology. However, the existing AGO SAN environment does not support active/active data replication, only active/passive. Active/passive data replication feature of the AGO SAN environment maintains an identical copy of the AGO data on the mirrored SAN in the opposite building. However, the AGO server environment does not have the ability to access the mirrored data until the system configuration is modified. Meaning, if the AGO experiences a facility loss, there will be a few hours of downtime as the AGO server infrastructure is configured to utilize the surviving copy of data. The existing AGO virtualized server environment is physically distributed over two buildings. A virtualized SAN environment has the ability to provide active/active data replication feature. Should the AGO experience a facility loss, a virtualized SAN environment can continue to provide shared storage access to the servers. Given constant access to its storage environment, the surviving AGO servers will continue to function with no interruption in service.

**V. Project Approach**

**A. Project Schedule\***

**Project Start Date:** 6/1/2014      **Project End Date:** 10/30/2015

**B. Project Milestones**

Major Milestones	Start Date	Finish Date
Order, install, and configure NexSan Storage	6/1/14	9/30/15
Order, install, and configure Data Core SanSymphony	6/1/14	9/30/15
Configure disk-to-disk backup	8/1/14	1/1/15
Order, install, and configure LTO6 tape drives	3/15/15	8/1/15
Configure backup tape encryption	8/1/15	10/30/15

**VI. Roles and Responsibilities**

**A. Project Roles and Responsibilities**

**Project Manager** – Manage project including task oversight, product order approval, invoice approval, and ASET reporting.

**Administrative Assistant** – Create and track project orders.

**System Engineer** – Identify and quote specific project hardware and software. Setup and configure SAN hardware, servers, and backup software. Take continuing role of migrating existing server volumes to virtual SAN environment. Manage and administer production SAN environment.

**Consulting** – Install and configure SAN virtualization software. Setup and migrate initial set of server volumes to virtual SAN environment.

**B. Project Manager Certification**

- Project Management Professional (PMP) Certified
- State of Arizona Certified
- Project Management Certification not required

**C. Full-Time Employee (FTE) Project Hours**

<b>Total Full-Time Employee Hours</b>	600
<b>Total Full-Time Employee Cost</b>	\$34,875

**VII. Risk Matrix, Areas of Impact, Itemized List, PIJ Financials**

## VIII. Project Approvals

### A. Agency CIO Review\*

Key Management Information	Yes	No
1. Is this project for a mission-critical application system?	X	
2. Is this project referenced in your agency's Strategic IT Plan?		X
3. Is this project in compliance with all agency and State standards and policies for network, security, platform, software/application, and/or data/information as defined in <a href="http://aset.azdoa.gov/security/policies-standards-and-procedures">http://aset.azdoa.gov/security/policies-standards-and-procedures</a> , and applicable to this project? If NO, explain in detail in the "XI. Additional Information" section below.	X	
4. Will this project transmit, store, or process sensitive, confidential or Personally Identifiable Information (PII) data? If YES, in the "XI. Additional Information" section below, describe what security controls are being put in place to protect the data.	X	
5. Is this project in compliance with the Arizona Revised Statutes (A.R.S.) and GRRC rules?	X	
6. Is this project in compliance with the statewide policy regarding the accessibility to equipment and information technology for citizens with disabilities?	X	

### B. Project Values\*

The following table should be populated with summary information from other sections of the PIJ.

Description	Section	Number or Cost
Assessment Cost (if applicable for Pre-PIJ)	II. PIJ Type - Pre-PIJ Assessment Cost	\$0
Total Development Cost	VII. PIJ Financials tab	\$316,610.32
Total Project Cost	VII. PIJ Financials tab	\$478,129.59
FTE Hours	VI. Roles and Responsibilities	600

### C. Agency Approvals\*

Contact	Printed Name	Signature	Email and Phone
Project Manager:	John Abretske		
Agency Information Security Officer:	John Abretske		
Agency CIO:	John Abretske		
Project Sponsor:	Margaret Dugan		
Agency Director:		Not Required	



## IX. Optional Attachments

### A. *Vendor Quotes*

## X. Glossary

## XI. Additional Information

The Attorney General's Office is the largest law office in the State, with approximately 400 attorneys and 1,100 employees. The AGO provides legal advice to most State agencies. The AGO also investigates and prosecutes consumer fraud, white-collar crime, organized crime, public corruption, drug, environmental violations, and deprivation of civil rights. As such, the AGO information system processes a wide variety of PII, HIPPA, client attorney privilege, criminal investigative, and confidential data. Each of these data categories will be stored on the proposed electronic storage system and backed up to tapes that will be stored off-site.

Links:

[ADOA-ASET Website](#)

[ADOA-ASET Project Investment Justification Information Templates and Contacts](#)

Email Addresses:

[Strategic Oversight](#)

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