Disaster Recovery/Continuity in the Commonwealth of Virginia

CATEGORY: Disaster Recovery/Security and Business Continuity Readiness

Initiation Date: June 2008
Completion Date: August 2014

Nomination submitted by:
Eric R. Link
Interim Chief Information Officer
Commonwealth of Virginia
Virginia Information Technologies Agency

Executive Summary

Disasters are unpredictable and can strike anywhere at any time with little or no warning. Implementing IT disaster recovery plans ahead of time helps ride out catastrophes with minimal or no loss of data, hardware or revenue.

Previously, the Virginia Information Technologies Agency's (VITA's) version of disaster recovery (DR) for the commonwealth's 89 executive branch agencies was a problem. The "one size fits all" approach for executive branch agencies involved the use of tapes transported to an external site were space was not guaranteed. DR testing was extremely limited and change control was not in place. The service did not reduce risk and agencies had little confidence in the ability to recover.

Service and pricing were defined. Dedicated hardware was acquired and setup in a dedicated facility. Processes were established for hardware and software in production to be replicated to the disaster recovery site. DR information was shared and security requirements were met. Testing was implemented. Lessons learned were incorporated and additional staff involved.

The results have netted success:

- Changes in production are monitored and reflected in the plan.
- VITA and state agency staff members are more aware of the plan and/or participate in planning and testing.
- Agency customers are more confident of recovery in the event of a disaster.
- DR is improved while costs are reduced.
- The plan is tested quarterly and undergoes a significant live testing annually.
- It works.

Description of the Business Problem

Disasters are unpredictable and can strike anywhere at any time with little or no warning. Recovering can be stressful, expensive and time consuming, particularly for those who have not taken the time to prepare for such possibilities. Those who are prepared and have recovery plans in place are more likely to survive a disaster with minimal loss and disruption. This is true with information technology (IT). Implementing disaster recovery plans ahead of time helps ride out catastrophes with minimal or no loss of data, hardware or revenue.

In 2008, the Virginia Information Technologies Agency's (VITA's) faced a significant problem: disaster recovery for the commonwealth's 89 executive branch agencies.

- The existing solutions was "one size fits all" for all agencies and business processes.
- Fragile physical tapes were used.
- An external site was used for recoveries.
- Tapes had to be transported to the external site.
- Space at the external site was not guaranteed.
- Space at the external site was provided on a first-come, first-served basis in the event of a regional disaster.
- Time allocated for disaster recovery testing was extremely limited.
- Since the disaster recovery environment was very fluid, there was no real method of change control being used with any reliability.
- Agencies had little confidence in the ability to recover.
- Testing one year meant nothing the next year because there was no consistency in processes and procedures to execute the recovery.
- The DR service did not reduce risk.

Solution

The solution was an evolutionary project that took several years and could not easily fit into a project plan because of all the uncertainties about how to proceed. However, significant research was conducted at the start and throughout the process to ensure all best practices were considered. The benefits of the program did not differ from those anticipated. VITA has realized a maturity model of DR expected using Six Sigma methodology. Decisions along the way reaped more benefits than anticipated.

VITA asked agencies to complete a business impact analysis using their business continuity plan to determine their most critical business processes. VITA looked at a subsection of state agencies business impact analyses to develop groupings of processes and developed tiered services.

With service and pricing defined, business processes found their way into the correct tiers. Dedicated hardware was acquired and setup in a dedicated facility. Testing was scheduled. Recoveries improved with repetition of the testing. Documentation was constantly updated, but the processes were flawed. DR was not on people's minds.

Disaster Recovery Service	Tier 1	Tier 2	Tier 3	Tiers 4, 5, 6
Recovery Time Objective (RTO)	< 4 hours (h)	5h to 24h	25h to 48h	49h to 72h 73h to 120h 121h to 168h
Recovery point objective RPO)	Minutes to 4h	Minutes to 4h	24h to 48h	24h to 48h

VITA leadership changed the organizational culture (thought processes) by placing an emphasis on DR and how it applied to staff members' day-to-day work activities. Processes and workflows were updated. In addition, a "Disaster Recovery Toolkit" was

created that provide VITA and other state agencies with DR educational and raise awareness resources. Educational collateral included posters, slick sheets, slide decks and computer-based training modules that serve as constant reminders about how DR fits into everyone's everyday work activities.

Problems ensuring that changes to hardware and software in production were replicated to the disaster recovery site continued. When out of sync, risk is created and the time to recover is increased.

- During testing, VITA found that 22 percent of the problems reported could be directly linked to this issue.
- A quarterly report was developed that compared hardware, operating system and patching production assets to same assets in disaster recovery.
- Pulling information from a properly implemented, updated configuration management database (CMDB) and putting logic in place to flag discrepancies between the assets resulted in a very low-cost way to reduce risk.
- The CMDB and logic was used at both the system administration and management. The existing change management system was updated to include a flag that the
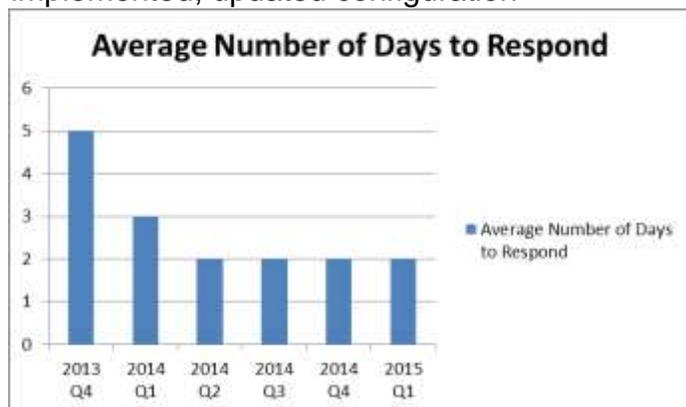
change owner is required to acknowledge when making a change to a production asset or system that has a DR component. The average number of days to respond to change controls that have DR impact flagged dropped by 60 (as shown above).

- Follow-up emails were sent with quick escalations to management when DR assets issues were not addressed.

Over time, the number of issues captured by the systems decreased at a steady rate showing that the process was maturing and reduced risk.

VITA began an internal, dry run on a quarterly basis to check that changes had not introduced issues into the infrastructure. Smaller, more granular dry runs provided opportunities to implement smaller storage area network (SAN) consistency groups to minimize the risks of stopping replication and train a larger group of engineers to execute DR scripts.

The next area of focus for the program was on the technologies that were being used to recover in case of a disaster. Many different solutions were developed by VITA with agency input, but a few stood out and produced a variety of benefits.

- Implementation of a boot from a storage area network (SAN) solution reduced recovery times by 25 percent by using asynchronous replication (near real-time).
- Eliminating physical tapes as a backup mechanism has resulted in huge gains. Expenses required to transport tapes was eliminated.
- Failures associated with the fragility of tapes were eliminated.
- For larger amounts of data, recovery time was increased by more than 75 percent.
- The restore process was standardized regardless of hardware.
- Automation of the collection of state information systems for the most accurate recoveries possible was developed.
- Remote recovery was developed. It has shown significant benefits in RTOs since the DR site is a long distance from the primary data center resulting in a five-hour per resource increase in productivity with easier ability to manage shift work to keep staff rested and fresh.

Technology innovation included the boot from SAN, disk backups and the use of a wiki for easily accessible documentation.

Security staff members were involved throughout the improvement process to ensure all security standards were met. Communication with stakeholders was ongoing using existing meetings and e-newsletters, stakeholder participation in DR exercises and smaller face-to-face meetings to meet individual agency needs. Because the work was ongoing and fluid, the communications planning was ongoing and fluid.

Benefits of the project

The enhancement to the DR program in Virginia means faster recovery times, allowing state employees to perform them jobs in service to citizen, businesses, the governor and General Assembly, and other stakeholders. For example, faster recovery means police can access driver records when making traffic stops, social agencies can provide needed services, etc.

It is not possible to quantify the cost benefits in total over the past life of the project or the future life of the DR program that has been established although some cost savings have been noted above. However, the qualitative benefits are numerous and significant:

- VITA and the 89 state agencies it serves have a DR recovery plan that is consistent and reliable.
- Changes in production are monitored and reflected in the plan.
- The plan is tested quarterly and undergoes a significant live testing annually.
- More VITA and state agency staff members are more aware of the plan and/or participate in planning and testing.
- DR is improved while costs are reduced.
- If follows best practices (outlined in the references below).
- It supports policies and goals of the state, governor and national chief information officers (outlined in the references below).
- The DR program permits the state and state officials/employees to efficiently execute their duties in providing government services in the event of a disaster.
- It works.

* * *

This project supports the governor's and state's goals and priorities and NASCIO priorities:
- NASCIO State CIO Priorities for 2014: B. Priority Technologies 8) Disaster Recovery / Business Continuity
- Governor's Policy Priorities: Government and Citizens #6
- Governor Appoints Cybersecurity Commission: Responsibility #3
- Virginia Performs 2014 Strategic Plan

This project meets wide variety of DR best practices for business continuity, such as:

- Department of Homeland Security and Federal Emergency Management Agency (FEMA)
- Forbes "Business Continuity and Disaster Recovery Best Practices from the Availability Trenches"
- TechTarget "Disaster Recovery Best Practices: Avoiding DR Interdependency Predicaments."