

2011 NASCIO RECOGNITION AWARD NOMINATION

Nomination Category: Enterprise IT Management Initiatives

Data Center Optimization: California's Blueprint for Success

California Technology Agency

Office of Technology Services



Section B. Executive Summary

California is a large state with a population of 37 million people and 10,000 IT professionals in state service who run a huge IT infrastructure. In 2008, the state's IT infrastructure was costly to run, sprawling, and complex, including 365,000 square feet of data center space in more than 400 locations and 11,600 servers. The state's data center environment was redundant and out of date, costing more and delivering less than it should have.

In 2008, the Governor and a new State CIO recognized that this infrastructure was unsustainable and identified an opportunity to use best practices to optimize its data center environment while reducing costs by consolidating outdated infrastructure into high-density, energy efficient facilities that are operated collaboratively with agencies and departments as joint tenants. This spreads the costs among departments while reducing the need for duplicative data centers.

The first step was to conduct a 2008 survey of the state's IT infrastructure. After seeing the duplication in the state's infrastructure, the state CIO convened a working group to identify the best way to slash costs in the state's redundant, and sometimes antiquated, data centers. The group came up with a two-pronged approach: close old, outdated data centers on refresh cycles while clustering departments and agencies in newer, high-density, energy efficient facilities.

California's Cannery Data Center was an antiquated, 75,000 square foot data center that was due for a refresh and ripe for closure. The roof leaked, it had a high risk of disaster, high lease and energy costs, and could not be certified as a Tier III data center, as mandated by a governor's Executive Order and statute.

The state simultaneously pursued work on a new, high-density Federated Data Center (FDC) that would be designed for, and jointly run by, the tenants of the data center. This approach provided the best of all worlds; a state of the art, energy-efficient, automated data center in which tenants spread their costs to leverage a shared infrastructure while they retained control over their critical server environment. This allows other government officials to focus on executing their duties, rather than IT infrastructure.

Data Center consolidation and optimization supports the priorities of NASCIO and California's IT Strategic Plan while achieving mandated reductions of 50% of data center square footage by July 2011 and 30% in energy usage by IT equipment by 2012.

Results to date show the promise of California's approach. The Cannery closure yielded one-time savings of \$40 million in planned capital expenditures and ongoing annual savings of \$3.7 million while the FDC is a model for agencies and departments to transition from stand alone data centers into more efficient, jointly run facilities. The true benefit is to the citizens who receive their services more quickly, more securely, and in a much more cost effective and efficient manner. With data center optimization, California is moving from laggard to leader in making smart investments in shared technology, building infrastructure once and leveraging its use many times.

Section C. Problem and Solution

Problem Introduction: Old, Sprawling, Infrastructure Required Optimization

When it comes to IT, big translates to complex. When the state completed its first IT survey in 2008, California's state government included 365,000 square feet of data center space in more than 400 locations, 11,600 servers, 227,000 miles of cable, and 383,000 phones.

The state's IT infrastructure was created over decades without an enterprise plan and with little collaboration among departments and agencies. This massive infrastructure was sprawling and diverse, difficult to maintain and keep secure while the state's data center environment was often redundant and old. The diverse architecture cost more and produced less than it should have because departments and agencies could not share platforms and had to maintain duplicative hardware. In 2008, the Governor and State CIO saw an opportunity to optimize infrastructure, produce better results, and reduce costs by consolidating data center facilities into new, high-density, energy efficient facilities.

Problem: How to Reduce Data Center Square Footage, Costs, and Energy Use

In 2008, the state's budget crisis compelled the Governor and the Office of the State Chief Information Officer (now the California Technology Agency) to reduce operational and replacement costs through consolidation while investing in environmentally sound, high capacity data centers. Technology Agency consolidation efforts ran into significant barriers including departments' desire to retain autonomy. Executive level support was critical to moving forward. The Technology Agency worked closely with the Governor's office to develop Executive Order S-03-10 (EO S-03-10). Among other things, EO S-03-10 mandated that agencies reduce the total amount of energy used by 30% by July 1, 2012, and reduce the total amount of data center square footage by 50% by July 2011, while requiring that all mission critical and public-facing applications transition to a designated Tier III data center. Additionally, Legislative support was needed to provide ongoing budgetary and policy support for these efforts. Through collaboration and education, the Technology Agency worked with members to draft and pass AB 2408 (Chapter 404, Statutes of 2010) which codified these mandates.

Problem and Opportunity: the Cannery Data Center-Old, Antiquated, Costly

One of the state's main data centers, the Cannery Complex, was ripe for consolidation. Issues with the Cannery included:

- Antiquated infrastructure. Heating, cooling, and power supplies were not up to current standards. The roof leaked when it rained, requiring the placement of tarps to cover vital equipment;
- Old computing equipment that utilized outmoded designs that wasted power, failed to take advantage of new technology, and required more staff to run than new equipment;
- The Cannery could not meet the state's requirement that all data centers be certified as Tier III data centers;

- The Technology Agency needed to lead in complying with targets for reducing power and data center square footage as required by EO S-03-10 and AB 2408;
- High risk of disaster. The Cannery was located in a floodplain near a railroad track. The state's other primary data center also was clustered in Sacramento. A single disaster could have knocked out both of the state's major data centers;
- Poor physical security for a critical data center; and
- Duplication with existing state data centers that could take the Cannery's work.

Solution: Out with the Old: Closing the Antiquated Cannery Complex

With the Cannery complex ready for a refresh of much of its equipment, the Technology Agency seized the opportunity to reduce data center square footage, reduce one-time and ongoing costs, and significantly improve energy efficiency. The project decommissioned more than 75,000 square feet of raised floor space at the Cannery Complex, which was replaced with 7,000 square feet of existing, LEED Platinum-certified high-density data center space in Vacaville, CA. By closing the Cannery, the Technology Agency:

- Avoided \$40 million in one-time costs to upgrade the Cannery while reducing lease and energy costs by \$1.2 million in the first year and \$3.7 million annually thereafter;
- Used refresh cycles to upgrade data centers to remotely managed servers and mainframes, virtualized servers, and a modern virtual tape system;
- Deployed a modern infrastructure that includes features such as redundant and independent power sources, and redundant cooling air conditioners;
- Reduced the security risk of catastrophic failure due to disaster as a result of an improved location and a varied geographic disaster profile;
- Reduced staffing, such as onsite engineers, needed to maintain the infrastructure of the antiquated Cannery Data Center; and
- Reduced the state's raised floor data center square footage by 75,000 feet, helping the state meet the Governor's IT data center and energy usage priorities as outlined in S-03-10 and AB 2408.

Solution: In with the New: The High-Density Federated Data Center

As the Technology Agency began closing the Cannery, the agency also began to develop a joint, high-density data center that would provide a model for departments and agencies to comply with the requirement to consolidate mission-critical and public-facing applications within Tier III equivalent data center environments. That effort, the Federated Data Center (FDC), is a high-density, Tier III facility that gives agencies a means to reduce their data center footprint and the energy used by their computing environments in support of AB 2408 and S-03-10. Three tenants were able to quickly move into the FDC, reducing their data center footprint and lease costs.

The FDC is a collaborative undertaking first formed by the Data Center Working Group, comprised of the Technology Agency, Department of Corrections and Rehabilitation, Prison Health Care Services and Department of Health Care Services. The working group collaborated to define how the state should consolidate facilities and

simultaneously build out a new environment. The team considered several options to reduce costs, including maintaining existing facilities, but found that closing old facilities and bringing the state's program areas into jointly run facilities would provide the best, lowest-cost data center services solutions to departments and agencies in the long run.

By working closely with anchor tenants to determine their specific requirements, the FDC serves as a model for future data centers in the state. A key result of this partnership is a modular approach where customers build their requirements into the design of the computing environment, allowing agencies to meet their mission-critical security and reliability requirements while keeping costs down.

With the FDC, tenant departments leverage a shared infrastructure, which ensures redundancy, reliability and energy efficiency through state of the art automation and high-density computing. The FDC balances fully managed services and traditional collocation options. By leveraging a shared foundation, departments get lower costs, high availability, and security. Each FDC tenant receives secure rack space with redundant power, a 20 gigabit secure network backbone; a virtual firewall in every rack; a storage area network to support Fiber Channel connectivity between servers and storage; and 24x7 support. FDC tenants can easily contract for additional services, including shared SAN storage, rapidly provisioned servers, offsite disaster recovery services and more in a flexible, scalable framework that is based on actual needs. All this allows the tenants to more efficiently focus on their primary services. With the success of the FDC, the state is seeking to move all its key data centers into a highly virtualized environment in order to find further efficiencies.

Project Management and Communication Environment:

Both the Cannery and FDC projects were managed by Office of Technology Services (OTech) staff utilizing dedicated Project Managers and communications teams. Defining and maintaining the scope of the two projects was critical as Technology Agency senior managers had an overall vision for data center optimization while maintaining the operational autonomy and scope for each project. The project teams used the California Project Management Methodology and collaborated extensively with the departments involved with projects including department staff, CIOs, and OTech staff. Primary communication efforts consisted of:

- Bi-weekly user-forum meetings with customers;
- Weekly planning meetings with customers' IT staff;
- Weekly meetings with customer program staff;
- Weekly/monthly briefings of Agency CIOs, as needed;
- Presentations at the IT Council, Technology Services Board, and CIO Academy;
- One on one planning meetings with every customer as their schedule allowed;
- Blogs and posts to the Technology Agency's website at project completion.

Timeframe: Move dates for the Cannery are as follows:

- South Annex – planned 8/2009, Mainframe moved 5/2009

- Cannery – planned 3/2010, Mainframes moved 6/2010
- Cannery – planned 5/2010, Open Systems Moved 12/2010

FDC planning began in 2009. The facility officially began operation November 2010.

Section D. Significance of the Project

California's data center optimization effort furthers critical priorities of NASCIO and California's Statewide IT Strategic Plan including infrastructure consolidation and optimization, cost reduction, shared services, developing innovative approaches to common problems, and governance. The initiative is significant for several reasons:

- The State of California, which long failed to optimize its IT infrastructure, and therefore paid more and got less for its IT dollar, is reducing one-time and ongoing costs, consolidating operations, and improving data center efficiency;
- The closure of an antiquated data center and transition to a newer, cost-effective facility designed with tenants' specific needs in mind provides a model for California's ongoing consolidation efforts;
- The data center optimization effort is a significant step to achieving statutory targets and principles espoused in the state's IT Strategic Plan;
- This effort shows what can be done working collaboratively with departments to develop solutions to problems; and
- This effort provides a map for other states. If California can consolidate its complex data center operations, other states can also succeed.

In addition, immediate results from the project include:

- Closing an antiquated data center facility rather than paying to keep it open;
- Saving on one-time costs of \$40 million that would have been required to upgrade the Cannery to keep it open; and
- Reducing energy usage by 77%.

California is moving from laggard to leader in data center consolidation. The FDC model sets the stage for future data center consolidation and shows that it can be done with the right executive support. California's data center consolidation efforts are a road map to modernize, consolidate, and rationalize California's IT program. AB 2408 standardizes IT governance, defines targets to achieve cost savings and reduce energy usage from IT operations 30% by 2012 among other improvements.

Section E. Benefits of Data Center Optimization Initiative Projects

In line with NASCIO priorities, the Cannery move consolidated and modernized an old data center, resulting in significant operational and cost benefits to the state, its agencies, and citizens who rely on the state to protect their data. Benefits include:

- Consolidation has reduced the state's operating servers from 11,600 to 8,200;

- A 77 percent reduction in energy use. The energy utilized by OTech data center facilities in 2009 was 16,296,520 kilowatt hours, post migration this has been reduced to 3,723,000 kilowatt hours in 2011;
- Avoiding \$40 million in capital costs that would have been required to upgrade or replace the Cannery Complex;
- Reduced lease and utility expenses by more than \$3.7 million annually, since the functions of the Cannery were moved to other, existing, more modern data centers that provide greater power and cooling efficiencies;
- Improved security standards and tools increase the privacy and security of personal data contained within critical applications;
- Improved system reliability: Improved infrastructure and maintenance and support for business applications has improved system reliability; and
- Achieving state Green IT goals and objectives: Data center consolidation is a critical component of the state's Green IT initiative that will significantly increase efficiency while reducing utility usage and departments' operational costs.

FDC Provides the following benefits to agencies, departments:

While the following benefits accrue directly to agencies, California taxpayers are the ultimate beneficiaries of a government that costs less and does more:

- Operational efficiencies: Economies of scale and collective buying power give small departments access to Tier III services they historically could not afford;
- Increased system reliability: Improved architecture and shortened upgrade cycles provided through data center consolidation will increase the reliability of critical applications and office productivity tools;
- Process improvements through simpler implementation of new applications: The FDC's established virtual environment simplifies and shortens implementation of new applications;
- Increased focus on business application support: with a shared, stable infrastructure, IT staff spend less time on infrastructure and more time supporting and improving business applications;
- Transforming government through increased ease and pace of scaling up infrastructure and applications including:
 - An established infrastructure designed for flexibility and expansion reduces the time required to respond to changing business requirements;
 - Improved cost management capabilities; and
 - Leveraged buying power and economies of scale allow the state to negotiate better pricing for hardware, software and services. As standards are implemented, training costs for staff should be lowered. Standard approaches to cost tracking associated with services will allow leadership to manage the true cost of ownership required to maintain the State's technology infrastructure.