



**Establishment of State's Second Data Center
Business Continuity and Disaster Recovery
North Carolina
Office of Information Technology Services**

National Association of State Chief Information Officers
2008 Recognition Awards Nomination
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B. Executive Summary

B.1 Organization Overview

The Office of Information Technology Services (ITS) reports directly to the Office of the Governor and has responsibility for the management of enterprise IT assets. The ITS mission is to provide technological leadership and infrastructure in support of the economic, social, and intellectual development of the citizens of North Carolina. A major focus area in North Carolina is optimizing information technology investments by focusing on the consolidation of local area networks, voice, data center (servers), security, desktop and service desk operations and services.

In North Carolina, Information Technology (IT) is vital to ensuring the continuity of essential services. Our approach consists of two primary elements: enterprise management of common shared technical infrastructure, and enterprise technical service offerings. As North Carolina led the country with the consolidation of mainframe computers in the 1980's, it also has been a leader in risk and business continuity management.

On May 8th, 2008, ITS announced a new 'green' program which will be led by the Data Center Systems Director. This position expands upon the initial 'green' technology and environmentally friendly approach in use at the second data center (SDC) and the ITS data center in Raleigh.

B.2 History and Timeline of the Project

A statewide Business Impact Analysis performed in 2005 identified the need for a fully redundant, round-the-clock disaster recovery capability. We were straining our external disaster recovery (DR) vendor's capacity, which is the largest DR service provider available to ITS. The State CIO initiated an evaluation of alternatives which supported having a second data center in-state. Working with the Governor's Office and the General Assembly, approval was obtained to construct a second data center within North Carolina. Purchase of the property was approved by the Council of State on August 1, 2006 and construction began on September 13, 2006. ITS led the project management of the construction and technical build-out of the facility. Other state agencies collaborated with ITS on environmental and infrastructure requirements throughout the project.

The construction project was completed on time and within budget and the state took ownership on October 15, 2007. The first full-scale disaster recovery test at the SDC will be conducted in June 2008. State agencies will not be limited to the number of times they can perform business recovery exercises at the second data center thus allowing for quick and continuous improvement to their BCPs.

The complex series of events that led to the construction and implementation of the second data center is evidence of the State's commitment to sustaining services for its citizens.

C. Description

C.1 Business Problem

A full scale statewide Business Impact Analysis (BIA) initiated on April 1st, 2005, which included fifty-five agencies, Boards and Commissions identified multiple deficiencies for business continuance and disaster recovery. The State CIO evaluated the common areas of strengths and weaknesses and created action plans to resolve all minor findings, while continuing to evaluate the major findings. This process provided all agencies with opportunities for improvement using statewide resources. In addition to the overall statewide results, each participating agency received an individual analysis of both its BIA and BCP. Currently, all agencies' BCPs are collected and evaluated annually to provide the State CIO with an on-going enterprise overview.

The statewide BIA also identified the following areas of major concern:

- The need for a fully redundant, round-the-clock disaster recovery capability as a high priority
- The state's IT growth was causing a strain on the outside vendor's single recovery site capacity
- The potential of being 'bumped' by another client of the DR vendor
- The potential of the DR vendor not having resources available for us in the event of a large scale disaster
- Cost of the contract with the DR vendor was escalating
- Critical business programs and consolidation requirements were growing; and
- The finite floor space and power capacity at the main ITS data center nearing maximum usage levels

The State CIO initiated an evaluation of other options including partnering with nearby states or utilizing a private industry firm in the Research Triangle Park in NC. These were deemed not viable and the final analysis of disaster recovery for the state's critical business functions and the magnitude of impact that certain disasters would have upon them validated the necessity for the state to have its own second data center.

C.2 Solution Overview

Working with the Governor's Office and the legislature, approval was obtained to construct a second data center within North Carolina. Purchase of the property was approved by the Council of State on August 1, 2006 and building began on September 13, 2006. The legislature authorized a total of \$32.8 million to build and begin equipping the center. The construction project was completed on time and within budget and the state took ownership and control of the new facility on October 15, 2007. The new data center more than meets the business requirements with an N+1 architecture and ample room for future growth. The first full-scale disaster recovery (DR) test at the SDC will be conducted in June 2008.

C.3 Solution Selection, Elements and Approach

The ITS project management team conducted extensive research and analysis of industry best practices and strategized with data center consultants on the facility design. They were very much 'hands-on' conducting the site selection and evaluation and they worked closely with the architect and the general contractor. This approach kept the project running smoothly and on schedule.

ITS engaged Duke Energy Economic Development to assist us in locating a potential site. This service is performed by Duke (as a no-charge service) to assist their electrical customers; electric supply was a key factor in our site selection. Based on climate data and other factors, 20 counties were found acceptable as potential locations. We evaluated over 20 sites which included existing facilities, business parks, and green field sites. One criterion given was the site must have passed the rigorous pre-qualifications set by the NC Department of Commerce. Other NC state agencies that collaborated with us were the Department of Crime Control and Public Safety's Emergency Management Division; Department of Environmental and Natural Resources; Department of Administration's State Property Office and State Construction Office; and the Department of Insurance. Once the site was selected, the US Dept of Interior assisted in defining protective measures for an endangered flower, the Dwarf Flowering Heartleaf, which is located on the property.

A site in Rutherford County just off a major state highway was selected. This location was highly desirable due to the ease of access from multiple points within our state such as Charlotte and Asheville, as well as interstate quality highway access from our primary data center in Raleigh. We also wanted to be near an airport for quick and easy access by hardware vendors should the need arise.

The site is 16.93 acres; approximately four of those acres are designated as a conservation area for the endangered wildflower. Several key reasons this lot was selected were because it had the highest elevation with excellent slope for drainage, a positive soil boring and compaction report, and this location allowed us to have private access independent of the primary access road in the park. From a security perspective, the property across the road will never be developed because it is deemed 'farmland preservation'. In addition to the multiple perimeter security features we have put in place, there is a natural barrier on the north east side of the property. If there was a problem with access via the primary highway, there are five alternate routes to reach the site using secondary roads that all feed back to a major highway.

Additionally, with the assistance of an independent third party, Environmental Systems Research Institute Inc. (ESRI) working in conjunction with the US Department of Homeland Security Protective Security Division for NC, a risk evaluation and Buffer Zone Protection Plan were performed to analyze and assess the perimeter security of the physical location and surrounding area.

C.4 Solution Architecture

North Carolina now has a state of the art tier III second data center, recently named the Western Data Center (WDC), which allows complete independence from external DR suppliers should a crisis occur. Hosting for ITS and other state agencies will be shared between the two data centers and agencies will have the capability to test

their BCPs anytime during the year utilizing the fully functional WDC. Agencies will not be limited to the number of times they can perform business recovery exercises thus allowing for quick and continuous improvement.

The WDC was equipped through a combination of relocating equipment from the Raleigh data center and purchases of new equipment. State surplus office furniture was also put to reuse in the WDC.

The WDC structure is a one story precast concrete building approximately 53,000 gross square feet with four different security levels which supports IRS and PCI Credit Card Industry requirements. The lateral load resistance system for wind and seismic forces is composed of the precast load bearing wall panels that are designed as concrete shear walls that are 10" thick and 12' wide. The electrical and mechanical support areas are comprised of a chiller room, a switchgear room, a UPS room, a battery room and a generator room all of which are interior spaces. A loading dock with a receiving area, warehouse and staging areas are located on the south side of the structure. The main control room, network rooms, media storage room and telecommunications rooms are located directly adjacent to the south wall of the data room. Administrative and support areas consist of offices, open office areas, a work room, a conference room, and a break room. A war room is situated with direct access to the data room. Security offices are located within the facility immediately after passing through the high security entrance.

The data center is a raised floor area with 2' x 2' floor tiles and a 3' plenum space. The 15,000 square feet of uninterrupted raised floor space at 150 watts/square foot will accommodate growth in number of servers, density of servers, and storage to support key Enterprise and agency-specific applications. This includes redundancy in power, cooling, and fiber with additional capacity to be provisioned at a future date. Mechanical equipment includes three – 2500 KVA diesel generators; two - 500 ton chillers for the data center; one - 55 ton make-up chiller; two - 15,000 gallon underground fuel tanks; and one - 50,000 gallon underground concrete tank to store water with two - 625 ton induced draft cooling towers mounted above it. A combination of FM-200 for the data center, wet and dry pipe sprinkler systems throughout the facility are in place for fire protection.

C.5 Innovative Technology

Based on new data center design practices, we chose an innovative method using variable air flow fans for cooling the data center. We designed the cooling to be contained within fan galleries on two opposite ends of the raised floor. In each fan gallery, there are five mixed flow fans incorporating inlet silencers and discharge silencers. All fans are synchronized to operate together and utilize variable frequency drive to regulate airflow based on differential pressure between under and above the data center raised floor. These fans are vertically mounted to the floor with vibration isolators. Motorized discharge dampers extend to the underside of the floor. Airflow enters the top of the fans through the inlet silencers, exits through the discharge dampers and passes through ten under-floor cooling coils with two-way control valves for each coil. The chilled air is blown under the raised floor and exits through strategically placed perforated tiles for direct cooling of the racked systems in a hot / cold aisle arrangement above the raised floor. As the air warms and rises, it

circulates back to the fans through a return air opening. This cooling configuration allows ample space for under floor cabling management.

C.6 Communications

The local Emergency First Responders were invited as a group to visit the new facility to gain an understanding of the layout, life areas, location of critical systems, fire suppression and emergency exits. This proactive approach will support the first responders taking the appropriate actions should their services be needed.

Tours were provided for the County Manager and the County Information Technology staff, and the State of Oklahoma has also visited the WDC. The State's Technology Planning Group, comprised of agency CIOs, were provided progress reports throughout the project and have held one of their monthly meetings at the new center. Lunch and Learn sessions were held at ITS for the staff, many of which have visited the WDC. Additional tours are planned to further engage other state agencies with a first hand look at the new facility.

D. Significance

D.1 Beneficiaries

Beneficiaries from the establishment of the new data center include local hotels, restaurants, service stations, shopping centers, and the local construction companies as well as the local workforce. All 30+ positions were filled locally. State agencies now have multiple sites for hosting their applications and will benefit from the reduced recovery time of essential services during times of crisis, an improvement over prior recovery time frames.

D.2 Benefits

State agencies will benefit from the 24/7/365 full production hot site with a redundant network and server infrastructure providing redundancy and back-up for critical applications and data replication. Other major benefits are the removal of reliance on the external disaster recovery (DR) vendor, keeping money spent on DR in state, significant improvement in recovery time from days to hours, and new jobs for NC citizens. Multiple site security measures were incorporated to create anonymity for the data center.

D.3 Alignment with Policies, Strategies and Goals

The creation of the second data center is in alignment with multiple general statutes such as the NC General Statute for Business Continuity Planning (BCP). This statute stipulates that each state agency shall develop and continually review and update as necessary a business and disaster recovery plan with respect to information technology. Each state agency must submit its disaster recovery plan on an annual basis to the State Chief Information Officer. These agencies now have an alternate site in-state they can utilize for application replication and for disaster recovery.

Strengthening BCP/DR skills and procedures is an ongoing strategy in NC. As such, ITS and other state agencies actively participated in the 2008 National Cyber Exercise: Cyber Storm II, which is the largest government cyber security exercise of its kind.

E. Benefit of the Project

The WDC is operational 24/7/365 providing service delivery and system availability with operational support. This complements and backs-up the primary ITS Computer Operations in Raleigh. Financially, having the SDC in-state will offset costs paid to the out of state vendor which exceeded \$3 million in FY06 and were increasing annually at 20%. Projected costs to the outside DR vendor were \$22 million over five years.

Several of the benefits of having a second data center in our state include keeping money spent on DR in NC; reducing our recovery time from days to hours; jobs for NC citizens; and having a statewide approach to providing redundancy and back-up for critical applications.

Locally, Rutherford County and Rutherford County Economic Development Commission were extremely helpful in the site selection and analysis and have warmly welcomed us into their community. The WDC was the first major economic investment in Rutherford County in over 50 years. In addition to new jobs, key benefits of this investment to the county include being their first data center and their first tenant in a new business park. We are also their first high tech employer and brought in a significant fiber optic source. At the time we selected the site, Rutherford County had double digit unemployment. Since the data center has been built, the County has been receiving inquiries from other potential data center clients.

