Leveraging our Campus IT in the Wake of the Storm

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ABSTRACT
In the hours after Hurricane Katrina demolished the Louisiana Coast, Louisiana State University soon became the center of recovery and relief efforts for the state. This was obviously an effort that spanned all parts of the institution, but as one would expect, information and communication were key to the success of all the parties involved.

In our discussion we would like to tell the story of how Louisiana State University's IT resources were key to the recovery efforts in our state.

Our organization was equipped to put phones, computers, telephone and networking services in the hands of the volunteers who were administering the triage hospital and acute care facilities on our campus. A hotline was established and staffed 24 hours in the weeks after the storm where citizens could get information. Our network operations center opened their doors to fellow universities in the state to recover their systems and redirect their web pages and communications. Computer labs were dismantled and the systems used in all aspects of the recovery where PCs were needed. We leveraged our partnerships with vendors such as Microsoft, IBM and Cisco to get equipment and supplies where they were needed.

We would like to share our story with others so that they will hear firsthand what Louisiana State University's IT department did in the wake of the storm. We hope this will open discussion and dialog that will help other universities understand the power of their resources should they be faced with a disaster of this magnitude.

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1. INTRODUCTION
Louisiana State University's Information Technology Services (ITS) played a critical role in relief efforts following Hurricane Katrina, and continued to do so on a smaller scale following Hurricane Rita. The university was temporarily transformed during the first week of September 2005 into a central hub for relief efforts, and the mission of ITS was transformed accordingly.

Technical support infrastructure, information management and physical accommodation of personnel and services from responding agencies suddenly became our primary goals; nearly all available ITS personnel were assigned to either directly or indirectly contribute to these efforts. Our Customer Support group, along with Public Access Computing support personnel, provided a significant source of available resources for a wide range of duties during the crisis. In the process we gained valuable experience and learned important lessons with regard to crisis response and management, and discovered both the profound strengths and ultimate limitations of an IT support staff in the midst of a high-stress situation for an extended period.

2. THE SETTING
Louisiana State University is the state's flagship university, located in Baton Rouge, near the Mississippi River. Baton Rouge itself is approximately 75 miles upriver (northwest) from New Orleans and is directly west of the Florida Parishes, which lie north of Lake Ponchartrain. Our university has a population of approximately 30,000 students and 4,500 faculty and staff. Our Information Technology Services department consists of about 160 full time personnel and a large number of student workers.

Baton Rouge was on the western fringe of the area affected by Hurricane Katrina as it passed near the border between Louisiana and Mississippi. The city was affected by high winds and intense rainfall, and much of Baton Rouge lost power during the storm. Power would not be fully restored to the city for about a week. Despite this, Baton Rouge escaped the devastation visited upon points east. Louisiana State University in particular remained intact and powered throughout the majority of the disaster. Although there was initial power loss during the storm, power was restored to the entire University in short order after the storm passed. Critical operations, including our Data Center, switched over to backup power during the outage.

Baton Rouge, and thus Louisiana State University, survived the storm intact, only to find itself perched on the geographical edge of phenomenal devastation.

3. KATRINA

3.1 The Oncoming Storm

On Saturday, August 27, 2005, it became clear that Hurricane Katrina was not, in fact, turning north toward the Florida panhandle as had been expected. Instead, her projected path began to shift west, toward Mississippi and Louisiana. University leadership, continuing regular meetings from the previous day, decided to close the university on Monday, August 29, the expected date of landfall. The university was to reopen on Tuesday, August 30. New Orleans had begun to voluntarily evacuate by this point, and traffic was already increasing toward and through the city of Baton Rouge. It was still unclear by that evening, however, exactly where landfall would occur.

By Sunday, August 28, the area of probable landfall had narrowed, and it became clear that Louisiana could very well be facing a significant hit. The decision to close the university on Tuesday in addition to Monday was made, with faculty and staff returning on Wednesday, August 31, and classes resuming on Thursday, September 1. Only critical personnel remained on campus throughout the storm, and emergency hurricane preparations were made at the Computing Services Center. On Sunday, Katrina became a Category-5 storm promising massive devastation, and headed on a direct path for New Orleans.

As the storm drew closer Sunday night, all of southeast Louisiana braced for the impact, and held its collective breath.

3.2 Impact

By the time Hurricane Katrina made landfall, it had dropped back down to a strong Category-4 storm with a Category-5 storm surge. Baton Rouge, and Louisiana State University in particular, weathered the storm with little relative damage. With most of the city without power, battery operated radios became a primary source of information for many residents, and with many cell towers down and service disrupted, land line phones became a critical means of communication.

Initially, very little information came back regarding damage to areas east and southeast of Baton Rouge. When reports did begin to come in, it seemed that although a great deal of damage had been done to much of the region, New Orleans had survived the storm with only partial flooding. It would be days before the extent of the damage to some parts of the southeastern section of the state was reported. Phone lines were generally down in most of those areas, and travel along both Interstate 12, running north of Lake Ponchartrain, and Interstate 10, running south of the lake to New Orleans, had been blocked.

At this point, the primary concern for many of our personnel was the well-being of loved ones in those areas, and cleanup after the storm. It was still expected that university operations, and thus the operations of the Information Technology Services department, would be back to normal in a few days.

4. AFTERMATH AND CRISIS

At 1:30 a.m. on Tuesday, August 30, confirmation of massive levee breaches in New Orleans was reported. By that afternoon, more than 80% of the city was under water. Baton Rouge, the closest significant metropolitan area still essentially in one piece, became a major focal point of relief efforts. In addition to the evacuees that had arrived prior to the storm, we began to experience a significant influx of evacuees and refugees from the affected areas after it had passed. The city's population literally doubled during the crisis, and the infrastructure was significantly strained as a result.

Louisiana State University was asked to convert a number of its facilities to accommodate emergency effort needs. Most notably, the Pete Maravich Assembly Center (PMAC) was used as a medical triage facility and the Maddox Field House was converted into a Special Needs facility for evacuated patients. Information Technology Services was recruited to provide equipment and support for both locations – initially installing a multitude of telephones. The ITS support efforts for these facilities, however, would expand significantly in the coming days to include everything from cabling to networking equipment to laptops to printers to databases.

In addition to efforts at the PMAC and Field House, ITS established an information hotline in our facilities. Operating 24 hours a day, the hotline provided and collected information from callers, and attempted to filter misinformation from reports regarding all aspects of the aftermath and hurricane relief. The hotline was staffed by volunteers from around campus, including many ITS personnel. In the midst of the crisis the sense of duty was so strong that some staff members worked with ITS efforts during the day and took hotline shifts at night, getting little to no sleep in order to satisfy their overwhelming determination to help as much as and in any way possible.

As the university began to see an influx of students from New Orleans based universities, who would ultimately register at Louisiana State University as visiting students until the previous facilities reopened their doors, ITS welcomed displaced staff and services from the University of New Orleans (UNO) and the Louisiana State University Health Sciences Center (LSUHSC). UNO staff arrived two days after the hurricane with a backup of the UNO website on a laptop. Our Telecommunications division quickly built a web server on existing ITS equipment and restored the UNO website at our physical site. Rack space was provided for other UNO recovery servers. Additionally, extensive efforts by Telecommunications resulted in a recreation of the UNO address space, and email service for UNO was established though our outsource provider, Outblaze.

UNO and LSUHSC staff were given accommodations in the LSU Systems building and in our training lab at ITS. Some public access computing facilities were shut down and PCs from these labs were used to provide equipment for visiting staff. These machines had to be re-imaged to be suitable for our guests' use, and were moved into place as quickly as possible thanks to the efforts of our Public Access Computing personnel.

Finally, ITS established contact with three of our largest partner vendors – Microsoft, IBM and Cisco – to acquire equipment for emergency use and on-site support and services during the relief

efforts. Our staff worked closely with these vendors to make the best use possible of their generous donations and assistance.

On Tuesday, September 6, classes resumed at Louisiana State University. Relief efforts were still in full swing, however, so in addition to our continuing contributions to these efforts, ITS had to simultaneously return to maintenance and normal operation of services for the university to support its primary role as an academic institution.

5. CUSTOMER SUPPORT/PAC EFFORTS

During the first week following Katrina, virtually every member of our IT organization was directly involved with relief efforts, and the list of individual tasks represented a wide variety of activities. While these efforts were distributed among all of the various divisions and groups within ITS, our personal experiences were primarily related to the efforts of the Public Access Computing and Customer Support groups. The deployment of resources by these two groups provided an extensive and representative view of the efforts of ITS as a whole. The lessons we learned from this experience were profound, and impossible to foresee until we were faced with the aftermath of the storm.

5.1 Availability of personnel

Prior to our involvement in the relief efforts, it was necessary to establish the availability of our personnel. Beginning the day after Katrina hit, full time staff were contacted by phone, primarily to make sure they were okay, and that their families and loved ones were safe. Secondarily, if personal priorities were stable, we asked them to aid in relief efforts on campus. The first day only a handful of staff were capable of being contacted, and were able to come to campus to work. The second day, however, we were able to establish a somewhat larger team of full time staff and began attempts to actively track down as many of our student workers as possible.

We were extremely fortunate that despite the fact that many of our student workers were scattered outside of the city, all had made it through the storm in one piece. However, many of them were attending to family and loved ones, and assisting with cleanup efforts. We felt very strongly that all of our personnel should attend to these concerns as a first priority. In those cases we simply asked that they contact us once they were available to help and expressed our support and heartfelt relief that they were safe.

5.2 Consolidating resources

Ultimately, although our numbers varied from day to day, we were able to establish a group of 5 full time staff members and as many as 10 student workers in Customer Support, and 5 full time staff and up to 12 technical support student workers in Public Access Computing. In some cases, each group handled individual tasks, but often we consolidated our resources to provide as large a team as possible to assist in individual efforts. Obviously, this depended upon the nature and urgency of each need as it arose.

The primary difficulty with regard to staffing lay in the unpredictable nature of the tasks at hand. We found, at times, that we had assembled our entire team for the day, only to experience delays and constant changes of plans that resulted in our personnel remaining in a holding pattern for the better part of the day. On a few occasions, anticipating reduced need, we only brought in a fraction of our available personnel, in an attempt to allow rotation of staff and students in order to give them a break or attend to personal matters. Invariably, on those occasions unexpected needs would arise and we would find ourselves understaffed for the required tasks. Typically, in both groups, we are able to regulate the available human resources at any given time based upon past experience and statistics. However, nothing from our past could have informed our decisions during this crisis, and as such our attempts to staff appropriately were less successful than we would have liked.

5.3 Primary tasks

Our groups were instrumental in assisting with and coordinating a variety of efforts in the aftermath of Katrina.

5.3.1 Equipment distribution

The initial primary need encountered by our groups was the transportation of equipment from ITS to the PMAC, Field House, and other locations. Tight security at both locations shortened the list of approved personnel considerably. However, several of our staff were allowed to assist other groups at ITS with this effort.

The transportation of equipment itself was at first a fairly simple process and not an overwhelmingly taxing task. However, initial visits to the two main facilities left many of our staff irrevocably affected. Entering the PMAC for the first time was a shock – hospital beds lined the floors, medical staff rushed through tight aisles between them. Outside, a constant flow of helicopters landed on the track and patients were unloaded and brought into the makeshift triage center. The walkways around the exterior of the building were crowded with refugees searching through donated clothing and other items, and inquiring about missing loved ones at temporary stations around the perimeter. Many of the displaced wore stunned visages and appeared completely exhausted – physically, mentally and spiritually. Until that point, most of us had faced the more severe effects of the hurricane through news sources alone. Seeing it first hand was something entirely different.

It is a credit to the character of our personnel that these initial visits invariably bolstered their determination to help in any way possible, and to exceed all previous ITS achievements in cooperative and effective support efforts.

5.3.2 Laptops

Almost immediately after the establishment of our critical care facilities, it became obvious that a desperate need existed for mobile computing in the form of laptops. These were required for a variety of purposes in both the PMAC and Field House, but at the time ITS had a limited supply of laptops available for use. All available laptops, numerous IBM Thinkpad models, were collected. A disk image was built and our personnel helped with preparation and imaging to all available machines. This was no insignificant feat – numerous problems were encountered during the process, primarily due to the heterogeneous nature of the machines. Eventually, these problems were resolved, the laptops were imaged and wireless connectivity was successfully tested on all of them.

In addition to preparation of the laptops themselves, we helped to catalog identifying information from each machine, and tracked distribution so that once the relief efforts were concluded we could ensure return of the laptops to the appropriate personnel.

All laptops were bagged, and we distributed them to the PMAC and Field House.

As mentioned earlier, close communication with several vendors resulted in donation of equipment for the effort. In particular, Microsoft and IBM donated laptops, which provided a much needed supply for the ever growing demand in the critical care facilities. Unfortunately, traffic issues resulting from the hurricane and other factors delayed delivery of these laptops for several days. Nevertheless, when they arrived we imaged them as quickly as possible and distributed them to the facilities. The large number of laptops provided by our vendors allowed us to replace and reclaim the ITS owned laptops currently in use by relief effort staff.

When the original batch of laptops began to come back to ITS, a Telecommunications staff member came to the realization that many of them had been in use by medical personnel involved in critical care of patients experiencing a variety of maladies including dysentery, and as a result could pose a significant health threat once returned to standard use. After consulting with local hospital personnel regarding decontamination procedures for equipment, we purchased a large container of alcohol-based hand disinfectant, rubber gloves and masks, and used the disinfectant to clean the exterior of the laptops, effectively destroying any bacteria and removing other contaminants from the machines. We were very fortunate to have considered this issue, as we had been so focused upon relief support, it had honestly never occurred to any of us to do this until the last minute.

5.3.3 Use of Groove distributed database

For the first several days of hurricane relief at LSU, medical personnel made use of a shared database set up as a stopgap measure for tracking admission and release of patients in the PMAC and Field House. Concerns about security issues with this database setup, as well as reliability of access and data storage, resulted in discussions with the two Microsoft representatives sent to ITS to help with relief efforts. Microsoft donated use of their Groove distributed database system, which was far more secure and reliable than the existing system.

Our groups worked with the Microsoft representatives to distribute and install the Groove software on all appropriate machines in the two primary critical care locations. Interestingly, due to initial difficulties with effective data storage during use of the stopgap database, critical care technical supervisors were initially resistant to the upgrade to Groove. However, after discussions regarding the advantages of Groove over the existing database, and explanation of impending problems if the switch was not implemented, we were allowed to continue with installation and configuration of the software. Existing data was imported into the new database.

Implementation of the Groove database allowed organizations involved with relief efforts to more accurately keep track of patients treated at our facilities. As a side effect, it was much easier to track the sheer volume of patients treated. In the first week after Katrina hit, the Groove database listed over 6,000 patients treated in the PMAC and Field House combined.

5.3.4 Lockdown

As Baton Rouge experienced a massive population influx in the days following Katrina, unfounded rumors of erupting violence and even rioting began to make their way as far as local news outlets. These rumors were completely false, but valid concerns about possible security issues for campus resulted in a general lockdown of all buildings for several days. Since our Help Desk is located directly in front of the main doors to the building, our Help Desk personnel took turns staffing the main doors. As our full time staff were involved with critical tasks in various locations, it was necessary to staff this lookout spot with the most responsible of our student workers. Certainly not the most comfortable arrangement for all involved, but given the nature of the situation at the time, it was an unfortunate necessity. Whenever possible, full time staff members were on hand and in view of the front doors as well.

After the first week of relief efforts, as security concerns abated, the lockdown was lifted.

6. RITA

As relief efforts following Katrina wound down, more of our ITS staff were reassigned to normal operations. Classes had resumed the week after Katrina, and campus had begun to return to some semblance of normality, though obviously changed by the experience and the influx of new students. In the latter part of September, however, a new tropical storm, Rita, had formed and had begun to strengthen. On September 20th Rita, having strengthened significantly in the Gulf, became a hurricane, and by September 21st had reached Category-5 status. Rita finally made landfall on September 24th as a Category-3 storm near the Texas/Louisiana border. Baton Rouge braced for another round of support and relief efforts. Fortunately, our city was once again spared the severe effects of the storm. In the end, although the Field House was temporarily reopened to provide aid, a return to the previous scope of disaster relief efforts was not necessary.

7. IN CONCLUSION - LESSONS LEARNED

The experiences shared by our Information Technology Services staff during hurricane relief efforts provided us with many valuable lessons as an organization. Additionally, our Customer Support and Public Access Computing groups learned a great deal from our specific involvement in relief efforts.

As an institution, ITS was made acutely aware of the need for equipment on hand for use in emergency situations, including phones, laptops, networking equipment and other items. We learned the value of the close relationships we've established with our vendors. We each saw first-hand the depth of spirit, compassion, flexibility and determination of the staff members we worked alongside during the relief effort. We learned to be cognizant of the modularity of architectures, and the flexibility of our infrastructure and procedures. We realized the importance of IT support involvement in top level decisions regarding coordination of University resources in a crisis. It became self evident to us that a disaster recovery plan, as part of an overall business continuity plan for the university, were absolutely critical and necessary, and that planning for a lone survivor situation was just as important as planning for local devastation.

Our Customer Support and Public Access Computing groups in particular realized that due to the impossibility of appropriate on-site staffing during a crisis as a result of unpredictable needs, a rotating on-call system for both full time and student staff would

be preferable in any future disaster. We learned to consider all ramifications of our efforts, and then assume we hadn't considered them all, and be prepared for unanticipated side issues. We found that despite our groups' fundamental commitment to serving our customers, efficiency, diplomacy and attitude become far more critical in high stress situations. We learned that although some of our staff, as a result of their high level of dedication, insisted on working consistently through the entire relief effort, it was absolutely essential to make sure that they took periodic breaks to rest, catch up on sleep and attend to personal matters. Drive and dedication are wonderful traits to exhibit, particularly during this type of crisis, but stress and exhaustion will eventually wear down even the most dedicated member of any team if not addressed. And finally, we learned that in the midst of disaster, when faced with a monumental responsibility to aid in the relief of those suffering, there is nothing more gratifying than to work cooperatively with such an impressive group of people to accomplish so much in the service of a greater good.

6. REFERENCES

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