

Using Contingency Planning Model to Mitigate the Impact of the Inevitable Disaster at the Class Level



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ABSTRACT: : *This paper discusses the need to establish a contingency plan at the university class level to mitigate the impacts of a disaster. It places the class room plan in context of the contingency plans of higher organizational units. It related the authors' experience with multiple natural disasters and how those experiences can be used to establish a contingency plan that is appropriate to the reader's environment.*

Keywords: Disaster Recovery, Pedagogy, Contingency Planning

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1. Introduction

It has been estimated by FEMA (Federal Emergency Management Agency) that as high as 40% of businesses will not reopen after a disaster and that another 35% will fail within two years (Mullen, 2014). This failure rate does not apply to universities. Most universities are large enough to have a formalized disaster recovery plan in place that will mitigate the consequences of a disaster. Additionally, many universities are government entities so permanent closing is not an option. If your university has not established a disaster recovery and business contingency plan, guidance for developing a structured plan can be found in Moturi and Karugu (2014). Closing a university and its classes following a disaster is not an option because there is a contractual arrangement between the faculty and staff and the university, between the students and the university, and between the students and faculty of an individual class. The syllabus is a contractual arrangement between the students and instructor that stipulates the content and structure (Parks and Harris, 2002). This contract is subject to renegotiation regarding timing and perhaps what materials will be covered, but a class normally cannot be terminated due to the consequences of a disaster. In practical terms this agreement means that the course must be completed once the disaster has passed.

The difference between a disaster and the normal “*issues*” that often arise are the scope and duration of the impact. A disaster impacts almost everybody in the effected region. This will include the students, staff and faculty of the university. The duration of a disaster is usually measured in weeks with lingering after effects that can take months to be remediated.

This article looks at contingency planning on the micro level and considers steps that can be taken to complete a class after a disaster has occurred. The paper begins by reviewing disaster planning and recovery processes in general and then

focuses on the relationship between the students and faculty member in a classroom setting subsequent to a disaster. Unfortunately, it is written from the perspective of instructors who have experienced a number of hurricanes and other weather related disasters. The article is divided into a background section on contingency planning followed by sections on specific challenges that the authors' encountered in continuing class room activities following a disaster. A key point is that the university will establish an adjusted schedule for the term in which the disaster has occurred. The new time frame will most likely have approximately the same ending time but will be missing from one to multiple weeks.

2. Background

The cash flow model employed by universities is very different from most businesses. A significant portion of the cash inflows is in the form of unearned tuition revenues. Hence, universities have an obligation to provide the education services that have already been purchased. A contractual arrangement exists between the workers, i.e. faculty and staff and the university, between the students and the university, and between the students and the instructor of a given class. The syllabus is a contractual agreement between the students and faculty as to the content and structure of the class (Parks and Harris, 2002). This contract is subject to renegotiation as to the timing and perhaps materials that will be covered, but this contract generally cannot be terminated due to the consequences of a disaster. In practical terms this means that the course must be completed once the disaster has passed.

The context of the response to a disaster is dependent on the actions of a hierarchy of organizational units. This structure is often referred to as an "onion" model or "bulls-eye" model due to the number of concentric circles or layers illustrating the relationship of the different organizations who respond in the event of a disaster. Figure 1 shows this model as it relates to a university located in Escambia County, Florida.

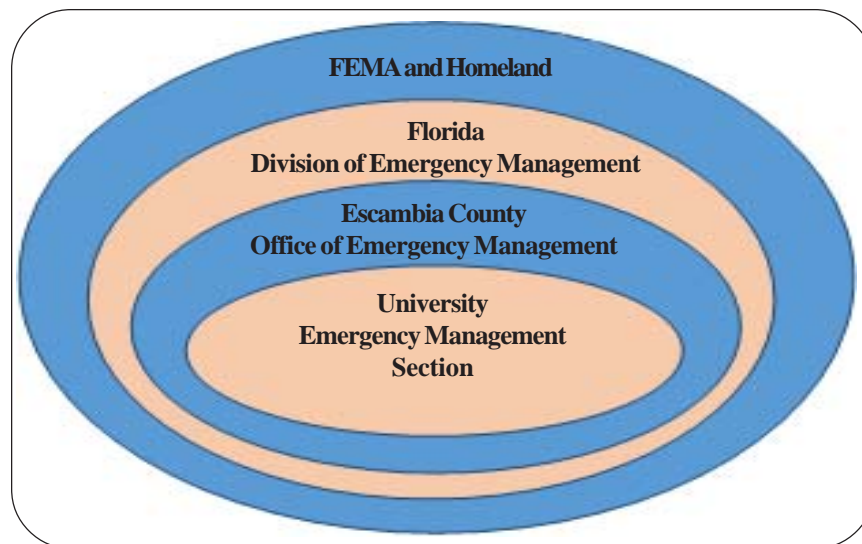


Figure 1. Bulls-eye Model of Emergency Management Agencies for Escambia County, Florida

In Florida, the hierarchy starts at the national level with FEMA and Homeland Security. The next level of authority is at the state level with the Florida Division of Emergency Management. Florida law requires each county to have an emergency agency; for Escambia County it is the Office of Emergency Management. The University then has its own emergency planning section which is a function of the office of Environmental Health and Safety (EH&S) within the University Police Department.

It is important to understand that not all disasters reach all levels of the model. A major hurricane, category 3 or higher, will have a regional impact and will involve all of the different levels. A less severe event such as a ruptured water pipe in a building on campus would involve only the university. In a single day during the spring semester 2014, our area received an enormous amount of rain that washed out streets, flooded homes, and closed the university. This disaster involved coordination between the university and county emergency management units. Earlier in the spring 2014 semester, an ice storm closed most of the highways from the Florida/Alabama border east for a several counties. This storm also closed the university and involved coordination between the university, county and state emergency management units.

The difference in goals and chain of command between the academic and administrative sides of the university can result in miscommunications between the professor and the students in the class regarding the procedures the students should follow in the event of a disaster. For example, following hurricane Ivan, our campus was closed for a period of two weeks. Any materials that professors had stored in their offices on campus were inaccessible during this two-week closure.

2.1 Restoration of Services

After a high impact disaster, almost all services will have been disrupted. While a faculty member normally has no control over the order in which services are restored, it is worthwhile for an instructor to understand the basic recovery steps in order to better coordinate with the students in a disrupted class. The initial goal of the of the emergency management agencies is to take care of the needs of the survivors (Florida Division 2104). When caring for the survivors, rescue is the highest priority followed by meeting the short term needs such as food, water and shelter. After all of the survivors have been accounted for and are safe, the cleanup and restoration efforts begin. After meeting the needs of the people impacted by the disaster the focus becomes the restoration of services. Initially, most of the services have been disrupted.

Power is one of the highest priorities in the restoration process. Normally, it takes a long time to restore power to all customers. After Hurricane Ivan there were still customers in some of the outlying areas without power four weeks after the hurricane had made landfall. Electric power is critical because it is necessary to run many of the other public utilities. In coastal areas where hurricanes are more likely to occur, power companies have been through the restoration process several times and normally are very good at restoring power. Generally, the first priority is to restore power to critical infrastructures such hospitals and other emergency services. Next, power is restored to areas that have the largest number of users. The authors' experience is that the power company often will not be able to estimate the time when service will be restored to a specific area such as the area where the university is located.

Water and sewer are also high priority items. Significant parts of these systems that are gravity driven, there is a need for electric power to operate many of the system components. Water and ice are critical items following a disaster and often need to be trucked in to support the residents of the affected areas until services are resumed.

Driving in the post disaster area presents numerous challenges. A number of streets will be impassable, and there is no easy way to find out what routes are still open. Most likely, all of the traffic lights are out so that every intersection becomes congested with traffic trying to negotiate the intersection. Because of the lack of traffic control, speeds are reduced and trip times grow dramatically. For people who have not evacuated the area, emergency managers generally urge everyone to remain in their residences until the streets are safe for travel. Another factor is that almost all service stations are non-operative; hence, if you don't start with a full tank you are likely to run out of gasoline without the possibility of refueling.

One key service as it relates to the purpose of this article is the restoration of communications. Communications can be subdivided into wireless, above ground and below ground. Below ground communications is the classic telephone network. This link tends to be very reliable and has limited points for failure. Digital Subscriber Lines (DSL) run over this network, so it is conceivable that Internet connections can be restored fairly quickly. The weak link in below ground communication is the junction boxes located at the end of each quarter mile where the groups of wiring are connected. The above ground wiring is often the cable television system. The issue with above ground communication is that many of the telephone poles likely will have been damaged. The lack of cable TV programming is not a major issue for the class, but many people obtain their Internet access via the cable system. Wireless is depended on the cell phone towers being up and functional. Many of the communications towers were down after Hurricane Ivan, and as a result, coverage was spotty and the network was difficult to access due to the high demand.

3. Contingency Planning

Contingency planning as described by Whitman and Madford (2014) consists for four major components: Business impact analysis (BIA), Incident Response Plan (IR), Disaster Recovery Plan (DR) and Business Continuity Plan (BC). Historically these components have been developed and implemented at the organization level. In this paper, we examine how a professor and the students within the professor's class can use these components to aid in developing a contingency plan for mitigating the impact of a disaster.

In the Business Impact Analysis (BIA) phase, the question can be posed as what material should be covered if there are eight

weeks left in the semester as opposed to the originally scheduled 10 weeks. The first point to consider is that all of the originally scheduled course content is important and should be covered. One option that should be avoided is to simply truncate the class to match the new time period available following a disaster. Often, the final chapter or chapters of a textbook bring all of the previously covered materials together into a coherent picture or story. The final chapters can also cover some of the most important learning objectives in the class. For example, in most junior level management of information courses within business schools, the final chapter covers computer security (Kronke 2014) or systems analysis and design (Baltzan 2014). Just as adjustments to the class schedule in the syllabus because of illness or other unplanned events are made, the professor must adapt the schedule to cover the remaining materials within the new timeframe following a disaster. The remaining material needs to be prioritized with the least important material being highly summarized or deleted.

At the classroom level, almost all instructors have more experience than they would like in dealing with incidents. There is an Incident Response plan included in most university hand books that regulates and defines a wide range of different various incidents. In terms of this article, the existing knowledge and experience of most professors is sufficient coverage of the topic.

The disaster recovery plan for an individual instructor is heavily influenced by the magnitude of the disaster and the DR plans of the organization and community. Typically, data stored on a university network drive is backed up both on and off site at regular intervals. Data stored on an office computer is in most cases the responsibility of the user. This means that in many, if not most cases, there is no backup system in place. This is a setting for disaster or at a minimum a real inconvenience at not being able to access your data.

The lack of a formal backup system has the potential for multiple consequences that can severely impact the class. While hardware has become progressively more reliable, hardware crashes still occur. In the authors' experience, if a hard drive is going to fail, it tends to do so very early in its life cycle. Later failures do occur, but the system is usually taken out of production before the hardware fails. Our experience is that software is much more likely to fail than hardware. Software failures can result from an unstable operating system or malicious actions such as malware being inserted into the software by hackers. Because of these potential threats to hardware and software, it is important that the logical and physical security of the hardware and software systems continue to be maintained throughout a disaster. Regardless of the cause, the result is that users can no longer access their data. In the CIA (confidentiality, integrity, accessibility) triad, the characteristic of accessibility is threatened without proper backups (Whitman 2003). Considering these risks within the context of this paper, a natural disaster can result in both instructors and students not being able to access the classroom data stored in the university's computer system.

The micro level or classroom contingency plan should address how the instructor will continue to conduct the class in spite of the challenges associated with a natural disaster. Issues facing the classroom instructor fall into four categories: materials, communications, location and technology. Materials include items such as text books, class slides and other classroom resources that are generally not computerized. Communications include both face-to-face meetings such as office hours, and electronic communications such as telephone and email. The location and technology issues are dependent on the format of the class. The appropriate communication for the class during a disaster needs to be selected. Depending on whether the class meets face-to-face at a scheduled place and time; meets from multiple locations at a single-time, such as in a Tandburg class held in multiple locations over a closed circuit televised connection; or is an online class that is asynchronous in terms of both class time and location.

Communications availability is normally not within the control of the class room instructor, the instructor will need to make alternate communication arrangements to maintain control of the class. Many instructors have replaced their manual slides with Microsoft PowerPoint presentations as the vehicle for delivering their classroom lectures. Since instructors will often modify their PowerPoint lectures, even during a class; the editing and distribution lectures using PowerPoint slides are part of normal classroom operations. Classroom support includes technology such as projectors, Internet, and remote site systems such as used in Tandberg classes. The authors' experience is that many of these items are out of the instructor's control regarding the sequence and timing of their return to service. For this reason, a documented contingency plan is critical for continuing a class after a disaster.

3.1 Notes From Having Been There and Done That

This section addresses the issues that the authors' have experienced in their classrooms during natural disasters and

suggests plans for dealing with these issues. One of the first items to consider is materials. The textbook is integral to the structure and content of most courses. Given that students have usually paid a high cost for their textbooks, it generally follows that textbooks are a critical element of the class materials. The authors' experience is that the impact of a disaster on a classroom can vary depending upon the severity of the disaster. Following Hurricane Ivan, between 15 and 20 percent of the students no longer had their class notes or textbooks. Some of the students lost not only their residences but also their vehicles. Hence, it was unlikely that students would purchase textbooks, even if replacement textbooks were available. Hurricane Dennis had a similar effect but at a lower level as only 5 to 10 percent of the authors' students were significantly affected. Even a very short and localized disaster can have an impact. As an example, the record rainfall that occurred in our area during spring 2014 flooded some students' residences. Two students had their cars flooded destroying their class notes and textbooks. In this smaller-scale disaster, the instructor was able to loan the two students desk copies of the textbook, and the students obtained copies of the class notes from another student. In large-scale disasters, the instructor placed desk copies of textbooks on reserve in the campus library. One item was placed on two-hour reserve, and another item was reserved for overnight checkout. Our contingency planning included having at least two backup copies of the textbook, with one textbook stored at the instructor's home and the other copy stored at the instructor's university office. Before placing classroom items on reserve in the university library, instructors should become familiar with the library's reserve policy.

Data loss is a significant problem. The average failure rate of commercial hard drives ranges from 1.7% for drives during their initial year of use to over 8.6% per year for drives that have been in operation for 3 or more years (Pinheiro 2007). It is estimated that 44% of all data loss is caused by hardware or systems malfunction with an additional 3% being caused by natural disasters (Statistics 2014). The estimated average cost of each data loss is \$3,957 (Smith 2003). It is possible to recover data from a "crashed" hard drive but the cost and delay can be substantial. Costs can range from \$500 to \$5000 depending on the type and severity of the data loss. The time required to retrieve and restore the data can vary anywhere from a few hours to several weeks. The loss of classroom data during an active class can be devastating. Therefore, it is critical that instructors develop a contingency plan for providing class materials in the event of a disaster.

The functioning of communications system in the aftermath of a significant event range from difficult to non-existent. It may be helpful to think of the system as broadly having 3 components: a sender, transmission media, and the receiver. Our university is configured to support a single Internet connection. During Hurricane Ivan this link was severed so that full Internet access remained on campus but there was no connectivity to sites outside the campus. It took about two weeks before connectivity to sites outside the campus was restored. Students and faculty in the community went through a period of between 1 week and 6 weeks to restore Internet access to their homes. Given the higher numbers of individuals with smart phones, Internet access may be improved after future disasters. It should be noted that the cell system can often be accessed via SMS (short messaging system) even if the network is giving the user a "no circuit available" message.

If no connectivity exists, then all of the course materials used in the class must be provided manually. One option is to keep course materials on file at the library. Course materials may include printed copies of the instructor's PowerPoint presentations, instructor notes, and several copies of the textbook that students may checkout and use in the library. In addition, the instructor should reserve in the library a sufficient number of copies of the documented contingency procedures that student are expected to follow in the event of a disaster. Students can do homework assigned in the prepared instructions and submit the assignments to the librarian for filing until retrieved by the instructor. During extended periods of non-connectivity, the instructor can meet with the students in the library at predetermined times to administer exams.

If email connectivity is not available through normal campus channels, the instructor could use Google.Docs to communicate electronically the instructions and course materials. These would be stored in a document or directory set up in Google.Docs that the instructor shares with each student in the class. The Instructor may also be able to communicate with the students through email service other than the standard university email system. At the start of the class or at the first indications of a slow onset disaster, the Instructor will need to obtain an email address for each student that is different than their university or college email address. This will allow continued communications until the regular university services are restored. These same, alternate student emails could be used in sharing the Google.Doc class folder if it is desired to facilitate communications between students. It needs to be noted that many students have a "privacy" hold on their email address and these cannot be shared with the rest of the class.

3.2 General Comments of Post Disaster Preparedness.

In years past there was a campaign in the state of Florida on disaster preparedness with the slogan was "*The first 72 is on*

you”. The underlying message of the campaign is that help is on the way but it may take 72 hours before help arrives. Hence, there should be enough water, food, medicine, and other necessary supplies for each individual in the household to last 3 days without replenishment. Instructors may consider taking time in class to discuss disaster preparedness with the students.

General considerations after a disaster should include the availability of power and water. Power can be obtained from a home generator until the power grid is restored. Caution needs to be taken when connecting electronics such as a computer to a home generator. The power produced is not “clean” so the power fluctuations can damage electronics. A home generator may correct some of these issues, but a better solution is to connect an uninterruptible power supply (UPS) to the generator then connect the electronic devices to the UPS. Appliances should be plugged directly into the generator unless a breaker has been installed to separate the house from the power grid. This device prevents back powering the grid which can create a hazardous situation for the linemen who are trying to restore the grid.

Clean, potable water is necessary for life. Disasters often disrupt the water supply by either breaking the supply or contaminating it. A short term source of potable water that is often overlooked is the hot water heater in most homes. A hot water heater will contain between 30 and 50 gallons of potable water that is accessible via the spigot on the bottom of the tank. When water service is restored, residents should run the water in their bath for a few minutes before using any other faucets. This process is recommended because often there is silt or other particulate matter that needs to be flushed out of the system prior to use. The particulate matter can clog up the valves in sinks and lavatories but is unlikely to clog the larger valve in the bath.

4. Conclusions

Disasters are going to happen. By the nature of a university environment there will be a temporary break in class followed by resumption under constrained circumstances. While the majority of the recovery procedures are beyond the capabilities of the classroom instructor there are a number of actions that can be done to mitigate some of the adverse impacts on the classroom.

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