

Technology Adoption and Use in the Aftermath of Hurricane Katrina in New Orleans

Irina Shklovski^a, Moira Burke^b, Sara Kiesler^b & Robert Kraut^b

^aDonald Bren School of Information and Computer Science, University of California, Irvine

^bHuman Computer Interaction Institute, Carnegie Mellon University

^airina.s@uci.edu; ^bmkburke, kiesler, kraut@cs.cmu.edu

ABSTRACT

Disasters are highly dynamic situations, marked by high levels of information need and low levels of information availability. Advances in communication technologies have provided more ways to seek information and to communicate – a redundancy that can be advantageous for response to sudden disaster situations and subsequent recovery. Faced with a lack of information, people often take action and creatively adapt technologies not only to find information but also to disseminate it to others in the same circumstances. As the process shifts from immediate disaster response to recovery, newly adopted or creatively adapted technologies are used to maintain a community connection and to aid in recovery processes. In this paper we present results from a 2-year study of New Orleans musicians in the aftermath of Hurricane Katrina. We found that information technologies were used to both reconstruct a sense of belonging to a community and to restructure interpersonal communication. Mobile technologies, such as cell phones and blackberries, along with social network websites and discussion bulletin boards became important sites for reconnection both with personal contacts and with whole communities.

Author Keywords

CMC, communication, social relationships, disasters, mobility

ACM Classification Keywords

H.4.3 Communications Applications

INTRODUCTION

Hurricane Katrina was the costliest and one of the deadliest hurricanes in the history of the United States. Nearly 2000 people lost their lives in the Hurricane and in the floods that followed. Hundreds of thousands of people were displaced

and many still remain unable to return to their homes and their neighborhoods. More than two years later, current and former residents of the Gulf Coast and the city of New Orleans are still dealing with the aftermath of the disaster. Large-scale natural disasters can often affect individuals as well as whole communities, causing massive evacuations and substantial physical damage. Most people experience and respond to disasters first and foremost as individuals and families, and then as members of a community [12]. Yet it is precisely the membership in a community that can facilitate subsequent recovery through provision of functional, informational or emotional support [8].

One of the hallmarks of disasters is the breakdown of communication and the lack of information both for the victims themselves and those whose friends and loved ones may be affected. Disasters are marked by a dearth of relevant information when infrastructures are damaged and common communication technologies, such as phones, fail [18]. At such times, lack of information can increase levels of stress for disaster victims, those related to them and the community at large [13]. Lack of communication channels also prevents affected individuals to effectively draw on personal and community ties for support.

People that are caught in the fray of emergencies and disasters have a heightened need to communicate and obtain information and are willing to creatively adapt familiar technologies and to rapidly adopt and use unfamiliar technologies [10,17]. Much of the disaster literature focuses on issues surrounding communication and technological needs of individuals and communities in the hours or days that follow the incident itself [1]. However, those directly affected by the disaster also go through a lengthy process of coping with the aftermath [15]. In this paper we report results from a 2-year study of New Orleans musicians in the aftermath of Hurricane Katrina. We discuss the way our respondents adapted available information and communication technologies to cope with the information dearth in the aftermath of the disaster, to reconstruct a sense of belonging to a community and to restructure interpersonal communication. We then explore the process of coping with long-term effects of a major disaster and the issues surrounding immediate and long-term information and communication technology adoption and use.

BACKGROUND

Massive displacements, long-term relocations, widespread property damage and other destruction caused by a natural disaster can dramatically affect individuals, as well as substantially harm or even destroy communities comprised of affected individuals [24].

Scholars have defined what comprises a community in a range of different ways [2]. Yet no consensus has been reached. In this paper, we broadly define community as a collection of people held together through time and a range of other important though not always required characteristics, such as geographical proximity, common practices or unified goals [2,21].

Natural disasters, first and foremost, directly affect individuals and households, by forcing substantial changes in day-to-day activities and substantial stress. People affected by disasters often find themselves in uncertain situations that require high levels of flexibility and adaptation to suit rapidly changing conditions [23]. Disaster research suggests that successful response and recovery require flexibility and innovation from communities and individuals alike [22]. According to uncertainty reduction theory, people will go to great lengths to acquire information in uncertain situations, which can translate into reduced stress [3,9]. During disasters or emergencies, people will use whatever is available for this purpose. This is also a form of “informed pragmatism” associated with reduced PTSD after traumatic events [14].

Natural disasters are also information disasters, when established communication infrastructure is damaged and the flow of information is obstructed when and where it is most needed [18]. During disasters or emergencies people initially rely on friends, family and close community ties for both practical and emotional support. Support is often arranged or exchanged is through communication. The need for communication then becomes very high and people will turn to any means available. This means they will both creatively utilize familiar technologies and quickly adopt new ones for the purpose. One of the hallmarks of this process is the creativity and speed of adoption [4].

Members of the public creatively adapt technologies on hand to reduce uncertainty and to provide help and support to others around them. Prior research on disasters consistently reports that people affected by the disaster take initiative in offering help. This is a form of “active outreach” that has been shown to reduce subsequent post-traumatic stress disorder in victims of disaster events [14]. Research on emergent groups suggests people adopt a variety of ways to access and use technologies – a lot of times through others who have access. In some cases, certain people become hubs of information or form ad-hoc groups to cope with specific issues and problems. In some cases, specific people take on leadership roles in community recovery processes, in others, community recovery happens more organically through inter-

communication by its’ members, often via mediated means [17].

Communication technologies are important for both emergency communication and subsequent coping with disaster. Once technology is tested “in action” it then becomes a “fall back” that slowly (or quickly) makes it into daily life. The experience of coping with the immediate aftermath of the disaster may affect subsequent use of information and communication technologies in daily life and for future emergencies. We know that people who have experience with disaster learn from prior experiences and are better at coping with subsequent issues and problems.

In this paper we present results from a year-long study of New Orleans musicians in the wake of Hurricane Katrina. We investigated the issues these musicians encountered as they used telecommunication and transportation technologies to cope with the aftermath. We documented reports of communication technologies failures and instances when they were found immensely helpful. We also studied whether our respondents had changed their technology use practices during the slow process of rebuilding their lives. Though the focus of this study was on a specific population that tends to be somewhat more technologically savvy, we believe that the pattern of IT use is not unique to this population but is an example of the kind of behavior that is becoming more prevalent during disasters.

METHOD

We conducted 40 interviews with musicians in the city of New Orleans. Teams of two researchers approached musicians at various venues in April/May of 2006 for semi-structured 45-minute interviews. The interviews focused on what the musicians did to cope with the storm, how they kept in touch with family, friends, and other musicians, and whether and how they used information and communication technologies before, during and after the hurricane. We examined the way they used face-to-face contact, cell phones, and the Internet as means of response during and recovery after the storm. Approximately a year later in May of 2007, we re-interviewed 33 of the original 40 musicians. We also conducted an on-line survey of over 100 New Orleans musicians, recruited from a pre-hurricane listing of New Orleans musicians from the Louisiana Music Directory.

ANALYSIS

All of the interviews were audio-recorded with the consent of the interviewees and then transcribed. Transcripts were coded for references to the use of information and communication technologies during and immediately after the hurricane and over the course of subsequent year between the interviews by two coders. The online survey asked questions based on the outcomes of the interviews and featured a set of questions on technology adoption and use.

RESULTS

The initial sample consisted of 40 New Orleans musicians and music professionals. All but 2 of our respondents had evacuated during the hurricane and 28 had returned to New Orleans at the time of the first interview in April-May 2006. Of the dozen respondents that were living outside New Orleans at the time of the first interview, four had moved back by May 2007. 32% of the musicians that responded to the online survey in March-May 2007 lived outside of New Orleans. All but 4 interviewees and 89% of the survey respondents reported owning and using cell phones after the Hurricane. All of the respondents reported using the Internet for information and communication both before and after the Hurricane.

Overall, respondents had reported adopting new technologies and often changing the way they have been using familiar technologies. Though most had used the Internet and cell phones in some way to find each other after the hurricane and to keep in touch later on, some expressed skepticism about being able to retain and maintain relationships with friends and professional contacts that had become long distant.

Immediate response

Hurricane Katrina made landfall on August 29, 2005, causing severe damage along the Gulf Coast in Louisiana and Mississippi. In the confusion of the massive evacuations from the New Orleans area, families and friends lost track of each other. Many of our respondents were working musicians and reported being on tour and outside of New Orleans on August 29th. This meant that they were separated from family and friends and often had little information of their whereabouts and their well-being. For example, one of our respondents described his experience as follows: “we all just were going to get flights where we needed to go, and I didn’t know where my wife was because there was no- there was no phone service [in New Orleans].”

Those that weren’t on tour at the time of the hurricane nevertheless lost touch with friends and band-members. Few had expected to be gone for more than a day or two during the evacuation and made few arrangements to contact each other outside of New Orleans. Given the severity of the forecasts, some had tried to at least make sure that friends and family knew they were evacuating to avoid unnecessary worry: “I sent out a bulk email when I decided to evacuate, saying, “OK, I’m getting the hell out of here, so whatever happens, you know I’m not here. I don’t know where I’m going, I don’t know for how long, I don’t know what’s going on, but I’m getting the hell out of Dodge. And if you try to email me and I don’t’ email back, I’m not sitting in my attic with an axe and a bottle of Jack Daniels, I’m someplace else.” Others evacuated at the last minute and found they could not easily find friends or family for weeks afterwards. As one respondent described not being able to get in touch with her friends and colleagues: “I knew she’d been in horrible traffic, because

we just knew how bad it was getting out, and I couldn’t talk to her [best friend] for a week. It was really horrible. I couldn’t find my drummer either, for a long time.”

Getting in touch

Finding out about the well-being and location of friends and family quickly became a priority for most of our respondents. Not knowing was stressful and getting in touch in any way became a stress-relief. The storm severely damaged the communications infrastructure due to line breaks, damage to wireless base transceiver stations and power failures. People that owned cell phones with a New Orleans area code quickly discovered that, while they could in some cases make outgoing phone calls on their cell phones, they could not receive calls. Many also soon found out that text messaging functions on their phones remained functional [19].

Despite problems with service, our respondents perceived cell phones as central to their ability to find information and stay in touch after the Hurricane. Several of our respondents went so far as to adopt cell phones if they didn’t already have them. As one respondent explained: “Those that didn’t have cell phones got cell phones because you couldn’t communicate without cell phones.” When it became clear that the evacuation was going to last longer than just a few days some of our respondents switched to the number local to their evacuation area both because they wanted a working phone and as a safety measure: “I got a new number just because I was sick of not being able to use my phone. I got it in Alabama, and in fact I kept it, because I felt that if this hurricane season kept going, I just wanted to keep having it.”

The majority of our respondents described text messaging as their only, very limited form of communication for several days after the disaster: “It was real tough for a while, you know, I kept trying to call people and we found out really quickly that cell phones weren’t working, so we went to text it, and text messages do work.” Although some of our respondents had used text messaging before the hurricane, the majority adopted the practice after the hurricane: “I had never text messaged before in my life, and then I figured out that was how we could communicate.” In fact, of the 75 musicians that had responded to our survey in April of 2007, 75% (55) reported using their cell phones for text messaging at least occasionally with 50% (38) having learned to text-message during or soon after the hurricane. As one of our respondents commented: “most of my friends here [New Orleans] didn’t even know how to answer a text message or what it was, you know, until the hurricane.” Necessity is the mother of invention and as the need for communication mounted, our respondents were willing to rapidly adopt new to them technologies.

Text-messaging, though available to everyone, was not the only cellular phone technology that was used for getting in contact. Two of our respondents owned Blackberry cell phones, which remained operational despite the hurricane. They became instrumental in getting friends and family in

touch: “Everybody else’s phone wasn’t working, so everybody could get through to me, but they couldn’t get through to everybody [else], and everybody would call me, and then once I talked to everybody, I exchanged numbers, and tell them where this person is, and they’d call them up.”

While text-messaging and cell phones were crucial for getting in touch, many also relied on the Internet for communication. Several of our respondents had evacuated with their laptops. This allowed them to remain in contact with family and friends throughout evacuation once they were able to re-establish an internet connection in their new location. The portability of the laptop allowed our respondents to take everything related to their routine online communication along with them. Having a laptop gave a sense of familiarity to online communication and enabled our respondents to retain some routine behaviors in the midst of the upheaval of the evacuation. One of our respondents explained this as follows: “You just close it [the laptop] and leave with it, and you have all the e-mails with you, and so we could communicate with people that way.”

Although mobile technologies, such as laptops, were useful during evacuations, many of our respondents did not own laptops before the hurricane. Yet as the length of the evacuation increased and the uncertainty over what, if anything, survived at home, many reported buying laptops as way to become mobile. Even those that had taken their desktops with them during evacuation reported feeling compelled to “become more mobile.” One of our respondents put it this way: “I wasn’t aware of if my house was flooded or not. I thought it was, because I’d heard that everybody’s house was flooded. As soon as I got my FEMA check, I went to the Apple store in Chicago, and I bought a laptop, and I had them move my system over to my laptop. So it’s not new technology, but it was new to me – new to go wireless, to be mobile.” A number of our respondents who did not have laptops pre-evacuation and who were able to obtain government support during or soon after evacuation reported spending their “FEMA money” on laptops. Many remarked that purchasing a laptop to replace lost equipment suddenly seemed more appropriate: “I bought a laptop, it just seemed better.”

Though the hurricane had passed, our respondents repeatedly pointed out the likelihood of something similar happening in the future. People who live in hazard-prone areas and who have experienced disasters are likely to adopt practices that help mitigate future hazards [6]. Many of our respondents openly admitted that there will be “the next one” and explained many of their actions as forms of disaster preparedness. Adoption of mobile technologies such as laptops and cell phones was seen as practical and relevant to disaster preparedness. Even if these technologies were not optimal for their purposes, they were a necessary step given the dread of the next hurricane season.

Not everybody had easy access to the Internet immediately after the disaster. Our respondents described using friends’

computers, libraries and Internet café’s to access their email, because getting in contact was paramount. As one respondent explained: “I was in Lafayette trying to use the computers at the library ... ‘cause I don’t know if my friends are alive, you know” and another remarked: “e-mail is a huge way of people getting in touch with each other who were not in the city.”

Despite these interpersonal communication efforts, many people were difficult to locate. As word of who was alive and who was where traveled via text messages and email, some people found themselves inundated with messages, while others fretted over the fate of their friends and family. While some watched media coverage in hopes that media would interview friends or family who stayed behind in New Orleans, others searched for those that had evacuated and, sometimes, took matters into their own hands. Several of our respondents who found themselves in the position of information centers had both access and technological know-how to create websites with lists of people who have “checked in”. For example, one of the webmasters of the local New Orleans radio station WWOZ, explained the impetus for creating the WWOZ “safe” list this way: “to reduce the amount of e-mail I was getting, which was just really hard to do, I just ended up starting to put a huge list together of all the musicians and staff and volunteers that we knew were all right. And it started to work. The response was really overwhelming, you know. People were like, yeah really thanking us for that.”

Two New Orleans musicians who owned a small web-development company and who had evacuated to the New York area organized another such list. In the beginning it was a list designed just for friends, but it quickly ballooned to hundreds of postings: “we have this company and so after the storm we actually set up a place where we could go and register there, like, location, e-mail, and it was just for our friends because, you know, what happened after the storm, everybody’s cell phone went out. We e-mailed some people and then they told other people and then, you know, pretty soon 500-600 people. So that was my little contribution to the relief effort.” The ability to contribute to the relief effort gave these musicians a sense of purpose and a modicum of control over the situation, even if minimal. Another respondent told us how she had found out about this list: “I went online when I got [to evacuation location] and just started emailing everyone I possibly could and got emails back from people saying, “go to this site, we’re making a database of who’s where and with whom and in what condition.” Problems with familiar ways of communication and a common understanding of the need to find out about friends and family led to creative uses of technologies that did work. Those that had the knowledge and access worked on setting up lists, while those that had access to the Internet, looked up information for those that did not: “people who didn’t have the Internet, they knew someone who did, and would find out that they needed information and would say oh I will look it up for you.”

Our respondents described expending a lot of energy simply to find each other. These efforts not only served to reduce stress, but also to regain a sense of inter-connectedness and community in evacuation. As one respondent commented: “you realize when you’re looking at this list, New Orleans is the type of place where I’m, like, wow, I actually have hundreds of friends here because you’re looking at a list and I’m, like, wow, I know so many of these people, and you start thinking about everybody.” The “safe” lists not only provided vital information about the safety and whereabouts of friends and family, they also created a sense of community presence and hope. As one respondent put it: “So if we had not had the internet, the internet, really, really saved us all. It kept us in touch with each other, to find people.”

Finding out information

Although getting in touch with friends and family was crucial, finding out what happened to the city in general and to personal property specifically was also important. While coverage of events in New Orleans on TV and in newspapers was extensive, our respondents found it wasn’t specific enough. Media often sensationalizes disaster coverage at the expense of providing specific information of interest to affected publics [4,18]. As one of our respondents expressed his frustration: “24 hour news - and they don’t tell you anything, they’re showing these devastated flooded areas - and they don’t know what the information is.” In fact, at times, sensational reporting could lead to misinformation: “CNN kept showing that picture over and over again: the wall falling out, so you could see in all the rooms of this house, and that was just a few blocks away. But in reality, that was not representative of the damage in the neighborhood. But then again, we didn’t know that, and I think [that was] the scariest thing.”

Once again, the Internet was crucial for getting more precise information about sustained damage. The local newspaper, New Orleans Times-Picayune, ran a website www.nola.com that featured a set of discussion boards arranged by neighborhood [7]. The majority of our respondents mentioned finding at least some of their information here: “nola.com and that was real pivotal help. That was more neighborhood-specific. They had different categories of neighborhoods that they could check up on. You could go into message boards kind of thing that were Marigny – Bywater neighborhood-specific, and find out what was going on.” The most important questions most our respondents were trying to answer were whether there was water in their neighborhood and how high it rose. Many reported finding maps and satellite images very helpful: “you’d click on this square that you thought was maybe in your neighborhood, and it wasn’t absolute - there were parts of New Orleans that you couldn’t see, but I saw our neighborhood. And I could tell where, if we had water - what was damaged. You could see the rooftops. It was an aerial shot of the neighborhood - and that was wild, that you could actually see it.”

In some cases, those that had access to the Internet became information hubs, distributing what they found out via cell phone calls, text messaging and email to those who weren’t able to access such information with ease. For example, one of our respondents was fortunate that not only did house have no damage, but he retained Internet access after the hurricane. He became a source of information for his friends and family who did not have such access: “I stay on the internet about eighteen hours a day in Lake Charles. Slept six hours and I got back on the internet, I looked at blogs and everything. It was really funny because I couldn’t call them on the phone but they would receive my texts. And so people depended on me to read websites and see what was going on in New Orleans.”

It soon became clear that a lot of financial support could be obtained via the Internet and many turned to the Internet to fill out applications: “I just hit the computer hard, and just applied for everything.” Musicians also notified each other about these opportunities and help each other fill with the appropriate paperwork: “we were in Key West, and a friend, who’s another musician called us and was like there’s this grant at the Lincoln Center, and you have to apply that day - and we found a coffee shop, and our guitar player who doesn’t really speak English - we were all trying to help him with his application until they almost kicked us out of the coffee shop, and send it off - just before the deadline.”

Not only is this a “where there is a will, there is a way” sort of thing, but what we are seeing is that communication and information technologies can help a distributed community continue to function in helping each other cope with the disaster. Part of this coping was instrumental – finding out information about friends, family, fate of possessions, opportunities for financial support. The other part of this coping is feeling connected and regaining a sense of community despite the upheaval of the evacuation.

Long Term Effects

Disaster researchers have documented instances of adoption and creative uses of technology in disaster response. However, few have followed post-disaster recovery to understand whether these technologies are used in recovery processes and how they may be integrated into daily life. The longitudinal nature of our study allowed us to follow up with our respondents over the course of year after the hurricane. In this section we present findings from the second set of interviews and results from the online survey of New Orleans musicians.

Technology adoption

In the first few months after the disaster many respondents reported choosing to switch to more mobile technologies as they replaced lost equipment. For example, many switched from desktops to laptops, added wireless Internet and eschewed landlines in favor of cell phones. As one respondent commented: “after the hurricane a lot of people let their landlines go.” Although the city of New Orleans

had made efforts to offer free wireless Internet, many residents installed their own wireless access: “before the storm none of my neighbors had wireless. Now there’s like ten signals in my house.” Eight months after the hurricane, several of our respondents still owned cell phones with non-local area codes, some even keeping two handsets with different numbers. Many explained this as having learned that just one area code can be unreliable “I still have it and I walk around with two phones”. This could be seen as a form of “risk-avoidant” technology adoption.

Yet another year later, by the time of the second interview, several of our respondents had acquired landlines. A number of respondents lamented problems with cellular reception in New Orleans. None of the cell phone owners were ready give up their handsets quite yet, but several felt they were forced to acquire landlines. While laptops were seen as essential for making work and work-related information instantly mobile and for keeping connected when on the move, desktops offered a better quality user experience. Our respondents described managing these differences by making sure that the most important information was always backed up on something mobile, but conducting more work on desktop machines. This drifting back to conventional, land-based technologies suggests that mobile technologies may have been more effective immediately after the flood and less so later on when both usability and reliability became important considerations.

Integration into daily life

Despite the benefits of text messaging immediately after the hurricane, many of our respondents had stopped using this functionality once phone service became more reliable in the area or once they obtained cell phones from a different area code: “text messaging – ... now it’s like, why bother, man? Just call.” Several respondents referred to text messaging as an “emergency technology.” To them, text messaging was important to master but only as a fall back option next time disaster strikes “I will definitely need to brush up on that [texting]... [it’s a] great emergency technology”. Others appeared to seamlessly integrate the new method of communication into their daily life, even switching to handsets that offered better text messaging capability “I had a horrible phone before that to text... so I switched phones, I got a better phone, and now I’m getting very good [at texting]”. Many respondents also pointed out that the disaster experience had taught them that text messaging worked better than calls when reception was limited – a lesson that many every day casual users rarely learn: “now everybody’s hip to the text message, if you can’t get through.”

In the hours after the disaster, the need to communicate took precedence over habits and preferences for specific communication mediums. People needed information and it did not matter how it was obtained. Yet once familiar forms of communication became available, many switched back. Nevertheless, text messaging persisted as a common form

of communication for many respondents even a year after the disaster “I use it more, it comes in handy.” Even though many of our respondents no longer used text messaging, the skills gained through necessity were regarded as useful and important for future coping with adverse circumstances.

Many of our respondents reported not only adopting new technologies, but also changing the ways in which they had used technologies that were already familiar to them. For example, one respondent had described learning to use bookmarks for a variety of sites saved specifically in the event of future storms or evacuations. Another described using blogs to keep information available and to get in touch with other employees of his company: “thanks to computers, you know, we’ve found a blog, so we could all communicate together. So basically you know, through technology we were able to have conference calls, and set things up.” Though these are not stunningly inventive uses of technology, these examples illustrate that the experience of a disaster catalyzed creative uses of familiar technologies for disaster response and, more importantly, for future disaster preparedness [15].

DISCUSSION

That people in disaster areas experience a heightened need for information and go to great lengths to obtain it is well documented in disaster research [5,6,11]. However, advances in information and communication technologies have dramatically increased the range of information transmission and the speed with which it spreads despite geographical distances due to evacuation [15]. Prior research suggests that obtaining information from any source during disasters, including radio and television, made disaster victims feel connected to the rest of the world despite the horror of their own situation [16]. Information and communication technologies, such as the Internet and cell phones provide a broad, multi-faceted and interactive connection with the outside world. In fact, the very promise of being informed and connected seems to motivate high rates of communication technology adoption and appropriation in times of disaster [20].

People who had experienced emergencies and disasters have learned that mobile technologies are essential in these situations. Yet technology developers still face the challenge of balancing performance and mobility demands in a way that would allow users to easily manage this compromise. Technology developers also have to contend with reliance on built in infrastructure, such as cell tower signals, wireless Internet and electricity, necessary for the technologies to function. These kinds of infrastructures can take substantial time to recover from structural damage.

Despite the proliferation of information and communication technologies, our respondents expressed skepticism regarding the usefulness of these tools for maintaining connections and coping with the aftermath of emergencies. Many expressed stark disappointment with failure of communication technologies both immediately after the hurricane and the continual delays in their recovery even a

year and a half after the disaster. Many adopted a “wait and see” attitude, ready to drop adopted technologies if they did not prove useful in rebuilding their lifestyle.

LIMITATIONS

Although this study is longitudinal in design, it’s focus on New Orleans musicians may limit the generalizability of the findings. Our respondents tended to be more educated and came from higher socio-economic backgrounds than the majority of New Orleans evacuees.

CONCLUSION

Advances in communication technologies have provided more ways to communicate – a redundancy that can be advantageous during sudden disaster situations. People that are caught in the fray of emergencies and disasters have a heightened need to communicate and obtain information and are willing to rapidly adopt and use unfamiliar technologies. This is important consideration for potentially designing extra capabilities into every-day information and communication technologies that could be used in disaster situations.

Experience of disaster also motivates technology users to adopt technologies that afford higher mobility and to develop new practices for disaster preparedness. However, these kinds of practices may not be maintained for long and may need to be encouraged via policy and community education and involvement.

ACKNOWLEDGMENTS

We thank Cristen Torrey for help with the initial data collection and analysis. We also thank Leysia Palen and our anonymous reviewers for insights and helpful suggestions in this work. This research was funded by NSF grant #0612870

REFERENCES

1. Annenberg Washington Program in Communications Policy Studies. (1989) Communication when it's needed most : how new technology could help in sudden disasters : report of the International Disaster Communications Project, Northwestern University (Evanston Ill.), Washington, D.C., 1989, 129 p.
2. Bell, C. & Newby, H. (1972) *Community studies: An introduction to the sociology of the local community*. Praeger Publishers, New York.
3. Berger, C.R. & Calabrese, R.J. (1975) Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research*, 1(2). 99-112.
4. Boyle, M., Schmierbach, M., Armstrong, C. & McLeod, D.M. (2004) Information seeking and emotional reactions to the September 11 terrorist attacks. *Journalism and Mass Communication Quarterly*, 81(1). 155 -167.
5. Carroll, M. & Cohn, P. (2007) Community impacts of large wildland fire events: Consequences of actions during the fire. in Daniel, T.C., Carroll, M., Moseley, C. & Raish, C. eds. *People, fire and forests : a synthesis of wildfire social science*, Oregon State University Press, Corvallis, 104-123.
6. Drabek, T.E. & Stephenson, J.S. (1971) When Disaster Strikes. *Journal of Applied Social Psychology*, 1(2). 187-203.

7. Glaser, M. (2005) NOLA.com blogs and forums help save lives after Katrina *Online Journalism Review* Retrieved on 04-25-06
8. Kaniasty, K. & Norris, F. (1995) In search of altruistic community: Patterns of social support mobilization following Hurricane Hugo. *American Journal of Community Psychology*, 23(4). 447-477.
9. Kramer, M.W. (1999) Motivation to Reduce Uncertainty: A Reconceptualization of Uncertainty Reduction Theory. *Management Communication Quarterly*, 13(2). 305-316.
10. Majchrzak, A., Jarvenpaa, S.L. & Hollingshead, A.B. (2007) Coordinating Expertise Among Emergent Groups Responding to Disasters. *Organization Science*, 18(1). 147-161.
11. Mileti, D.S. & Darlington, J.D. (1997) The Role of Searching in Shaping Reactions to Earthquake Risk Information. *Social Problems*, 44(1). 89-103.
12. Morrow, B.H. (1999) Identifying and Mapping Community Vulnerability. *Disasters*, 23(1). 1-18.
13. Norris, F.H., Friedman, M.J., Watson, P.J., Byrne, C.M., Diaz, E. & Kaniasty, K. (2002) 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981-2001. *Psychiatry*, 65(3). 207-239.
14. North, C., Spitznagel, E. & Smith, E. (2001) A Prospective Study of Coping After Exposure to a Mass Murder Episode. *Annals of Clinical Psychiatry*, 13(2). 81-87.
15. Palen, L. & Liu, S.B. (2007) Citizen communications in crisis: anticipating a future of ICT-supported public participation *Proceedings of the SIGCHI conference on Human factors in computing systems*, ACM Press San Jose, California, USA, 2007.
16. Perez-Lugo, M. (2004) Media Uses in Disaster Situations: A New Focus on the Impact Phase. *Sociological Inquiry*, 74(2). 210-225.
17. Procopio, C.H. & Procopio, S.T. (2007) Do You Know What It Means to Miss New Orleans? Internet Communication, Geographic Community, and Social Capital in Crisis. *Journal of Applied Communication Research*, 35(1). 67 - 87.
18. Sood, R., Stockdale, G. & Rogers, E.M. (1987) How the News Media Operate in Natural Disasters. *Journal of Communication*, 37(3). 27-41.
19. Staff Writer (August 31, 2005) Katrina outages reveal phone system quirks. *MSNBC/Associated Press* Retrieved on April 10, 2006
20. Sutton, J., Palen, L. & Shklovski, I. (2008) Backchannels on the front lines: Emergent use of social media in the 2007 Southern California fire. *proceedings of Information Systems for Crisis Response and Management Conference (ISCRAM)*, Washington DC.
21. Urry, J. (2000) *Sociology beyond societies: Mobilities for the twenty-first century*. Routledge, London.
22. Wachtendorf, T. & Kendra, J. (2006) Community Innovation in Disaster. in Rodríguez, H., Quarantelli, E.L. & Dynes, R.R. eds. *Handbook of Disaster Research*, Springer, New York, 172-182.
23. Wachtendorf, T. & Kendra, J. (2006) Improvising Disaster in the City of Jazz: Organizational Response to Hurricane Katrina, 2006.
24. Williams, M.B., Zinner, E. & Ellis, R.R. (1999) The connection between grief and trauma: An overview. in Zinner, E. & Williams, M.B. eds. *When a community weeps: Case studies in group survivorship*, Brunner/Mazel, Philadelphia, 3-22.