

**Adapting to evacuation:
Using information technology for social support**

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Project Summary

Recent natural disasters forced thousands of people to relocate involuntarily and damaged or destroyed many communities. Information and communication technologies appear to have played a significant role in helping victims cope with the aftermath of the disasters. Informal reports suggest that evacuees, and people who helped evacuees, used the Internet to find family and friends, to search for updates on the state of their neighborhoods, to search for housing and jobs, and to exchange needed services, goods, and monetary aid. Many of the informal reports also suggest that great strides still need to be made if technology is to be used effectively in disasters. For instance, a flood of poor quality information, such as misspellings of people's names, made searching quickly for family and friends through people-locator sites difficult or impossible. The research focuses on how technology may have affected the exchange of help and support after an involuntary relocation in the wake of this natural disaster and in the search for family and friends lost in evacuations.

Research on the effects of disasters consistently shows that women and victims of lower socio-economic status are more vulnerable to the adverse effects of forced relocation. This research investigates how information and communication technologies played a role in the Hurricane Katrina disaster for disadvantaged populations. Specifically, in what ways did information and communication technologies enable or fail to enable significant help for these vulnerable groups.

Adjustment to effects of major disasters and involuntary relocation can take many months or even years. In order to obtain information about technology use immediately after the disaster and to assess rates of adjustment post-disaster, we will conduct two rounds of retrospective interviews and a self-report survey over the course of 4-6 months. Because this research is focused on the effectiveness of help, the study participants are residents of Baton Rouge and New Orleans who were affected by the Hurricane Katrina, and on-the-ground volunteers who have continued to work in temporary accommodations there. This research examines the coping mechanisms that displaced individuals employed to deal with the aftermath of the hurricane and the technologies they found most useful. We also examine how volunteers used technology and their ability to help those hurricane victims who did not have direct access to the Internet or cellular phones. We will study whether volunteer-run support, people-locator and in-kind donation websites were able to reach populations most needing support.

This research will simultaneously be of interest to computer scientists interested in innovative uses of technology that worked and did not work in this disaster and social scientists concerned with the processes underlying social support and disaster coping. This research would also be of interest to policy makers who need hard information about the role played by information and communication technology in the disaster and where investments need to be made to alleviate the effects of future disasters. The intellectual merit of this work is that it examines use of information and communication technologies in understudied populations during a unique disaster event. The broader impact of this work is to provide important insights for policy makers and technology developers about the types of information and communication technologies that are most useful, and would be most useful. Our findings will lead to recommendations for the design of new technologies and services that would be of most use to displaced persons in a disaster situation, especially those who are most disadvantaged.

Project Description

In the aftermath of Hurricane Katrina in August of 2005, major damage from winds and flooding forced more than 500,000 families to evacuate from New Orleans and surrounding areas. Many individuals, relocated to shelters far from the stricken area, were forced to abandon most of their possessions. They were often separated from their friends and loved ones at the time when help and support in coping with the aftermath of the disaster was crucial. The disaster literature suggests that those who were able to mobilize their social relations to provide and receive support would have been much better able to cope with uncertainty, loss, and relocation (Kaniasty & Norris, 1993). Although strangers can provide many types of aid, family, friends, co-workers, and community members provide forms of personalized information, practical help, and emotional support that strangers and impersonal organizations often cannot provide.

Information and communication technologies (ICTs) seemed to have played a significant role in helping victims cope with the disaster and its aftermath. Evacuees, officials, and volunteers who had access to these technologies used them in the immediate response to the disaster, for example, to help match evacuees with temporary housing, and in the longer term, to help evacuees maintain contact with their dispersed friends and family. Many volunteer-run services offered to connect hurricane victims with individual donors of goods (in-kind donations). Others created people-locator sites to help people locate friends and relatives lost in the evacuation. The technologies consisted of ones specially created in response to the disaster (e.g., <http://www.katrinalist.net/>), existing blogs and bulletin-board systems, such as Craig's list (<http://neworleans.craigslist.org/>), that were repurposed, as well as conventional computer and telephony mediated communication tools. These technologies and services might have reduced evacuees' sense of isolation, mitigating the negative effects of involuntary displacement.

The research proposed here is a longitudinal survey and interview research that investigates the successes and failures of information and communication technologies from the point of view of evacuees and the volunteers who tried to help them. We will assess patterns of technology adoption and use in this disaster situation and investigate how information and communication technologies such as the Internet and cellular phones helped or failed to help evacuees cope with the disaster situation. We will examine how volunteers used the Internet to provide some of the services used by evacuees, and how these services functioned during and after the disaster.

Significance of proposed research

This research will be of interest to computer scientists and other technologists interested in evaluating innovative uses of information and communication technologies in this disaster. We will investigate which approaches worked and did not work. We will evaluate what technological barriers there were to prevent help from reaching people, evidence of coordination and aggregation problems, and underlying design problems. We will investigate whether volunteer-run support, people-locator, and in-kind donation sites benefited those populations most needing support. The research also will be of interest to social scientists concerned with the processes underlying social support and coping in disasters. This disaster differs from many others because of the scale of the devastation and the degree to which thousands of people were involuntarily relocated, lost jobs, housing, possessions, and even family members. Finally, this research will be of interest to policy makers who need hard information about the role played by information

and communication technology in the disaster and where they should invest in planning for future disasters.

Research on the effects of disasters consistently illustrates that people of lower income and socio-economic status, women and minorities tend to be more vulnerable to the adverse effects of forced relocation (Norris et al., 2002). One focus of the proposed research will be on the differential effects that information and communication technologies had for these populations. It is important to understand how access and skill differences may have both stifled use of available technological resources and inspired creative technology use. Our findings may prove important for recommending potential technological advances in disaster relief now and in the future that would be of most use to displaced persons, especially those that are most disadvantaged. Although the nation's attention is currently fixed on the disaster stricken area of the Gulf Coast, we hope that our findings will be able draw attention to lasting as well as immediate effects of such a disaster on people's physical and psychological well-being and coping mechanisms they employ to deal with disaster aftermath.

Disaster-related technology use

Large-scale disasters cause involuntary relocation and loss of property as well as disconnection from close social ties and community. Although loss of property is a big stressor, disaster research repeatedly shows that loss of social contact with close ties and communities has a larger negative impact on the sense of belonging and psychological well-being of the evacuees (Kaniasty & Norris, 1993; Quarantelli, 1960). In the event of the Katrina disaster, government agencies such as FEMA, the state police and non-governmental organizations, such as the American Red, Cross focused mainly on victims' physical needs for food, safety and shelter. Yet for a disaster of a large magnitude, such as Hurricane Katrina, these institutions could not provide enough physical resources and, furthermore, were not geared towards providing people with the means to exchange critical social support, such as the ability for people to communicate with family members.

Modern information and communication technologies allowed private citizens to fill in the gaps. Volunteers, using their technical expertise and online social networks, created resources for disaster victims. Volunteers created websites and used existing discussion forums like Craigslist to organize the aggregation and distribution of information and physical goods. For example, some professional programmers took time off to create people-locator databases, to help family members and friends to find each other and communicate. Others created blogs and websites that acted as conduits for people who wanted to make in-kind donations. Some donation sites linked specific donors with specific families or groups in need, leading to more personalized support. Aside from providing disaster victims with material aid, these donations may have had a secondary effect of giving the evacuees a sense of belonging to a larger community, a feeling that somebody really cared. In effect, these innovations were sources of informational support, practical assistance, and emotional support.

Stress and social support during disasters

In addition to using sites designed to match donors and recipients who were strangers to each other, evacuees also used information and communication technologies to gain targeted social support from already existing, but now far-flung social networks. Such connections can be

critical as crisis-driven volunteer help deteriorates. Thus we need to understand (a) whether crisis-driven support could evolve into longer-term communities online, and (b) how evacuees were able to maintain social support and close ties across distance and over time.

Disaster researchers have found that social support from close ties is crucial to coping successfully with disasters (Dakof & Taylor, 1990; Kaniasty & Norris, 1993; Quarantelli, 1960). Major stressors, such as loss of property, bereavement or relocation cause physiological stress-response and often lead to poor health outcomes. Forced relocation or displacement is a major stressor. Sudden forced relocation can be extremely stressful, when survivors are faced with lack of information about their loved ones and the state of their possessions. Stressors can cause people to mobilize their existing support networks, where the greater the need for support, the greater the amount of support that is likely to be received. Personal disasters, like the death of a loved one or a change in job, are not singular events limited in time. Instead, adjustment to the event is likely to take a long time. Natural disasters, unlike the death of a loved one or a change in job, are likely to affect whole communities of people, not just a single individual or family (Kaniasty & Norris, 1993).

At times of stress, social relationships are important in providing support and buffering against negative effects of stress on psychological well being (Bolger *et al.*, 2000). In case of a forced relocation due to a natural disaster, however, evacuees' social relationships may be endangered when they are most necessary. They are forced to move away from their communities and may lose track of friends and loved ones in the chaos of evacuation. In the case of large natural disasters like Hurricane Katrina, whole communities can disintegrate (Heller, 1982; Kaniasty & Norris, 1993). As Norris *et al.* (2002) report, all types of social support, including informational support, instrumental support, and emotional support, are necessary during a disaster, and victims benefit both from receiving and providing support to kin and friends, at least initially. Cell phones and the Internet provide flexible options for contacting friends and relatives, reducing the likelihood that some of these relationships would suffer from distance and lack of interaction. Online people-locator services could help people regain contact with relatives and friends lost during moves, increasing chances of support exchange. However, we do not know if this continuity of communication actually occurred.

In case of natural disasters, whole communities may be dramatically affected, creating a situation where potential support providers are themselves in need of support. The process of recovery from natural disasters can take a substantial amount of time and can drain support resources initially available to those in need. The social support deterioration model (Kaniasty & Norris, 1993) takes into account both the lengthy temporal nature of such major life events as natural disasters and the potential declines in support over the course of recovery. Kaniasty and Norris's work suggests that in case of severe disasters, support deterioration can be a threat to individuals and communities because the need for ongoing support may be greatest when crisis-motivated support runs out (Kaniasty & Norris, 1993). In order to avoid deterioration of social support and to experience continuous benefit from available support, it is important for disaster victims to have access to robust personal and community support networks. In the event of a forced relocation, the evacuee's personal networks are likely to become geographically scattered, while community networks may be irreversibly damaged. Thus, during the early periods, people-locator services may have served both a functional and an emotional purpose – locating people

who were capable of providing social support and reducing anxiety about their well-being. The contact with volunteers and help evacuees received through donation sites, including the individualization of donations and support provided on these sites, could have had provided evacuees a surrogate community, helping them regain a sense of support and well-being from a larger group of concerned individuals. However, what happened after the crisis is not known. How did dispersed networks of people maintain contact and regain contact if they were lost? What happened when volunteers stopped volunteering? Were evacuees themselves able to restore or sustain their technologically-enabled contacts?

Socio-economic status and disaster coping

Hurricane Katrina disproportionately affected people of lower socio-economic class, completely destroying some of the poorest communities. Many of the low income African-Americans from New Orleans and surrounding areas had never been outside their neighborhood before this relocation and were unlikely to have had experience maintaining long distance relationships prior to the disaster (New York Times, 07/09/05). This population was also less likely to have had experience with communication technologies such as cell phones and the Internet. They tended to rely more heavily on government and charity-based support, and to lack resources to cover everyday expenses required to reconnect with lost friends and kin, using communication technologies (Norris et al., 2002). Although adoption of the Internet and cell phone in the US is wide spread, income, education, race and age remain strong predictors of technology adoption and use (D. L. Hoffman & Novak, 1998; Jackson *et al.*, 2003). Compared to the well-off, the low-income and low-social status people are less likely to have access to the new technologies deployed by government and non-governmental agencies to help them or skills in using them. For example, they are less likely to be able to apply online for federal assistance at the FEMA site (<http://www.fema.gov/register.shtm>) or to find out about available resources through volunteer websites (e.g., <http://neworleans.craigslist.org/>).

Historically, African Americans have lagged behind whites in their adoption of communication technologies, even those that are considered universally accessible, such as landline phones (Schement, 1995). Research has shown that a number of factors affect how new technologies, such as cell phones and the Internet, are used and to what extent. For example, previous experience with technology and skills developed from use of technology over time are crucial for expanding the range of use (D. Hoffman *et al.*, 2002). In a study of low-income African-American adults, Jackson et al. (2003) found that participants used the Internet primarily for information search rather than communication, mainly because few of their family or friends used the technology as well. Researchers also reported that participants in this study did not see a need to use the Internet for communication, because they relied on a large amount of face-to-face interaction with their communication partners. This combination of low skill and low need may have defined the scope of use of the Internet for these users.

Evacuees from Lower 9th ward of New Orleans and other mainly low-income neighborhoods may have been the most destitute and in need of support and least likely to receive the attention they needed due to lack of social contacts, overcrowded shelters and many other factors. Low-income populations may have also been less likely to use available Internet services for people-finding and donation-seeking purposes themselves, due to access or skill-level issues. However, we hypothesize that they may have benefited from these services through volunteers that worked

in shelters and temporary accommodations. Anecdotal evidence suggests that volunteers and on-the-ground helpers may have acted as relays and mediators of technology-based services. Over the course of the last few months, mass media reported a number of accounts where shelter staff obtained donations and support for their charges by contacting online resources with specific requests and posting information about their shelter populations on people-locator websites. However, it is unclear whether differences in access to technologies had a substantial effect on what kind of support was obtained by the evacuees. It is possible that those who used Internet-based resources themselves rather than through relays derived greater benefit, not only through the receipt of better donations, but also through development of personal relationships with individual donors.

Although we have been using as a shorthand terms such as “the Internet” and “Information and Communication Technologies,” we recognize that these technologies offer many services and can be used in many ways. In order to be able to provide the right mix of capabilities for disaster-recovery situations, it is important to learn what aspects of information and communication technologies are most helpful to evacuees. A major goal of our research is to specify which types of services are most useful.

Synergistic research

The research we propose here fits into our long term research agenda, examining the social impact of the Internet (R. Kraut *et al.*, Forthcoming; Robert Kraut *et al.*, 2002; R. Kraut *et al.*, 1998a; R. E. Kraut *et al.*, 1998b; R. E. Kraut *et al.*, 1996; Irina Shklovski *et al.*, Forthcoming; Subrahmanyam *et al.*, 2000)

One recent project, supported by NSF IIS-0208900 examines the way that people who have voluntarily changed residence use the Internet to retain ties with the people and community left behind and to become integrated into a new community. This national, longitudinal study showed that adjustment to a new environment after relocation usually consists of two parts – the practical aspects of finding a job, home, doctor and other resources for daily living and the emotional acceptance of the new location (Shklovski, Cummings, Kraut, 2005). We found that social relationships and technology use (including both the Internet and cell-phone) helped people make both practical and psychological adjustments to moving. Although both men and women derived considerable benefit from these technologies overall, there were interesting gender differences (Shklovski & Mainwaring, 2005). For example, men seemed to be able to make more friends in the new location more quickly than women. Although women had a harder time emotionally adjusting to the move overall, they benefited if they knew people in the new location prior to the move. Women also were more active in using technology to communicate with contacts they left behind and with new contacts they met after the move. These gender differences suggest that in the case of Katrina evacuees, it may be important to focus attention on women, especially those that have been separated from their family and friends.

In addition to our long-term research on the social impact of the Internet, our students have been studying technology use in the aftermath of Katrina. In one project, they have examined the motivations among volunteers who developed in-kind donation sites like “Family to Family” (<http://relief.blogs.com/family/>) and the problems that these sites encountered. These donation sites had both successes and failures. For example, in one successful case, a woman who had

been feeding a whole town from her small deli received a truck full of goods from the readers and participants of the “Hurricane Katrina Direct Relief” blog (<http://gracedavis.typepad.com/katrinablog/>). However, a communication breakdown occurred on “Katrina: If you want to help” blog (<http://wheretosenddonationsforkatrina.blogspot.com/>), resulting in a single family receiving 40-50 boxes of donated goods, far more than they could use or even store. This research also suggests that the structure of the sites influenced their success. Centralized sites such as http://gracedavis.typepad.com/katrinablog, with a single moderator, had little problem inspiring trust among volunteers, but often failed to generate a sense of community among the volunteers or between volunteers and evacuees. In contrast, sites with no centralized authority, such as Craigslist, were able to generate community among the participants, but had difficulty vetting both volunteers and recipients.

While this research shows the relatively affluent and technologically sophisticated people can use resources like the “Hurricane Katrina Direct Relief” blog (<http://gracedavis.typepad.com/katrinablog/>) to match gifts donors with those who need resources, we know little about the impact of such services on the participants and constraints on using them. We have also provided advice to a project focusing on those who developed people-locator sites or aggregators (Skaffidi, Shaw, Myers).

To date our involvement in Katrina research has focused on investigating the strategies founders used to create their sites and the problems they experienced. The research we propose here will look at success from the recipients’ point of view. Surprisingly, the founders of both the donor sites and the people locator sites had little evidence about the impact these services had during the disaster. Although they (and the news media) collected success stories, they had little information about failures. By sampling evacuees and volunteers who helped them on the ground, the research we propose here will provide useful information on the characteristics of the sites, technologies, and potential users that lead some to be successful and others less so. That is, our research will assess how the end users-- hurricane evacuees and volunteers who worked in shelters and at disaster site--used the services, what problems they may have encountered and what impact these services had on their ability to cope with the effects of the disaster.

Proposed study

In this study we propose to investigate the following research questions:

1. How did evacuees use technology and other means to cope with their practical needs and the lack of geographically proximal social resources
 - a. Did people locator sites and online individual donation sites help evacuees cope with material losses and increase their sense of belonging to a larger community?
 - b. Did those that utilized particular Internet services benefit more than others?
 - c. How did the use of technology affect people’s immediate and longer term social support?
 - d. Did women, in particular, benefit from technology that helped them keep in touch with their social networks? Did it help more for more or less dispersed women?
2. How did people use cell phones? Did they use them in lieu of the Internet? What opportunities do these uses suggest for cell phone Internet services, in disasters?
3. How did shelter staff and other volunteers on the ground benefit (or not) from Internet access? Which Internet services were most useful for helping evacuees communicate

with distant relatives and friends, obtain information about lost relatives and friends, and obtain material assistance?

4. How did the Internet serve or fail to serve evacuees and volunteers' use of government and quasi-government services?

These questions will help us answer some broader questions about the role of technology in disasters: What technologies are needed to help people maintain newly long-distance social relationships? What can be done to provide usable technology services in disasters for people who lack skills, experience and education?

Methods

To investigate the research questions presented above, we propose to conduct a longitudinal study comprised of an initial semi-structured interview, a follow up semi-structured interview 2-3 months later and a survey 2-3 months after the follow-up interview. Overall, we expect to spend 4-6 months on data collection activities. This mixture of quantitative and qualitative methods enables a combination of the richness and depth of qualitative data with the range and breadth of quantitative data, potentially enhancing the accuracy of the findings.

The longitudinal design of this study involves following the same people over the course of several months as they adjust to the changes forced on them by the disaster. Documentation of changes observed over time provides solid ground for making causal claims and enables deeper understanding of the pathways by which information and communication technology uses may be connected with disaster coping, social ties and psychological well-being. The initial semi-structured qualitative interviews portion of the study will enable us to use face-to-face interaction to recruit participants into our study, ensuring a better response rate during the follow-up interviews and the survey. Due to a special nature of this sample, comprised of individuals who have had to endure significant hardships, it will be important to develop personal relationships with respondents in order to ensure a better response rate.

Our first interview will be semi-structured, focusing on the way respondents used information and communication technologies and the value they did (and did not) find in them. Even if our respondents did not use the Internet and cell phones themselves, we will ask about their interactions with on-the-ground volunteers and shelter staff and potential access to information through these relays. We will also ask respondents to name several of their social ties – family, friends or acquaintances, with whom they interacted or would have liked to interact in the month following the disaster.

The follow-up interview will be customized for each person, based on the information obtained in the initial interview. We will re-interview our respondents 2-3 months after the initial interview. At this point, we suspect that most of our respondents will have made their decision regarding plans to either stay in the new location or move back to the stricken area to rebuild. We will ask questions pertaining to each respondent's unique situation and inquire about persons in their social network that they had named during the initial interview. Regardless of whether our respondents decide to stay in the area of relocation or to return to damaged communities, they will have to contend with some previously local relationships becoming long distant. Even

if they, themselves decide to return, their friends or relatives might not. In these interviews we will explore the role of information and communication technologies both in making the decision to stay or return and in coping with now long-distant relationships.

Overall, the goal of the interviews is to collect a variety of real-world, detailed stories about the experience of disaster evacuation, coping with loss of possessions, destruction of communities, and changes in accessibility of close social ties. We will focus our discussions on stories of finding lost friends and relatives and use of available resources for information gathering, obtaining functional and emotional support, communication and coping over the course of several months. These stories will help us understand such experiences from the displaced persons' points of view. One of the major exercises of the semi-structured interview would be the hierarchical social relational graphs, which would allow respondents to organize their relationships by feelings of closeness and current geographical distance. These relational graphs will then guide discussion of relational maintenance strategies and technology use implicated in such a process during both the initial and the follow up interviews.

The final round of data collection, conducted approximately 2-3 months after the follow-up interview, will be done in a form of a customized survey, in which a portion of questions will be based on the information gathered in the interviews. We will request that our respondents to fill out a questionnaire via mail or phone. Previously established personal relationships and the experience of locating our respondents twice over the course of 4-6 months will assist in our ability to contact as many of the respondents as possible via email and phone. The survey will assess psychological well-being of respondents, by including two measures of psychological symptoms and one measure of perceived social support. We will also use a set of measures to assess the state of select personal relationships that our respondents indicated were important to them during the interviews and a set of measures detailing their uses of information and communication technologies. Thus we expect to be able to follow a person's life over the course of several months and obtain information about changes in their behavior patterns, technology use, social relationships and psychological well-being.

Because our research method depends upon retrospective interviews and surveys among Katrina evacuees, we must ask about the quality of data collected several months after the hurricane. We believe that this is an appropriate methodology for two reasons. First, adjustment to effects of major disasters and involuntary relocation can take many months or even years. Second, previous research has shown that victims of disasters were able to recall details of the event and even their own behaviors years later with reasonable accuracy (Kaniasy & Norris, 1983). Contacting respondents several months after the disaster is likely to allow us to collect accurate retrospective recollections of the disaster and subsequent coping processes. It is also possible that we would be able to locate more respondents willing to participate in our study after they have been able to establish at least some semblance of stability in their lives.

Sample

Because this research is focused on the effectiveness of help, the study participants are residents of Baton Rouge and New Orleans who were affected by the Hurricane Katrina, and on-the-ground volunteers who have continued to work in temporary accommodations there. We are also interested in sampling poor African-American displaced population as this constituency has been

largely overlooked and under-studied, especially with respect to technology use and mediated relationships. We expect to conduct 30-40 interviews on site in New Orleans and Baton Rouge, LA, where the largest shelters were initially located. Although some people in these areas are still housed in temporary housing, others have found more permanent accommodations. We hypothesize that people, who are still dependant on temporary accommodations, may be less adjusted to the after-effects of the disaster than those who have obtained more permanent housing.

Initial interviews will identify a sample of evacuees who intend to return back to the New Orleans metropolitan area with intentions of rebuilding the life they lost there as well as those that do not intend to return. We intend to locate and re-interview our participants approximately 2-3 months after the initial interview. We will also ask our interviewees to complete one mail-in survey at the end of the 4-6 month period of the data collection. We will compare those that rebuild their life outside New Orleans with those that return, measuring their levels of psychological well-being, levels of communication with friends and family and patterns of technology adoption and use.

Contributions

At the conclusion of this research we will have a richer picture of how people cope with loss of social relationships after a major natural disaster, how they utilize information and communication technology to assist in the coping process and how gender and social status may impact their ability to utilize communication technology and the benefits they draw from it. We believe that this research will simultaneously be of interest to computer scientists interested in innovative uses of technology that worked and did not work in disaster situations and social scientists concerned with the processes underlying social support and disaster coping. Results of this research will provide important insight for more applied researchers, policy makers and technology developers towards what types of technology are most useful and how changes in skills and needs over the course of using information and communication technologies may mitigate the effects of involuntary displacement. In evaluating the effect of using available online ad hoc disaster support services, this research will help understand which services were useful and whether they were actually used as intended. On a broader level, we believe this research will contribute to the overall understanding of how information and communication technology may be used in future disasters. Our findings may prove important for recommending potential technological advances in disaster relief now and in the future that would be of most use to displaced persons, especially those that are most disadvantaged.

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