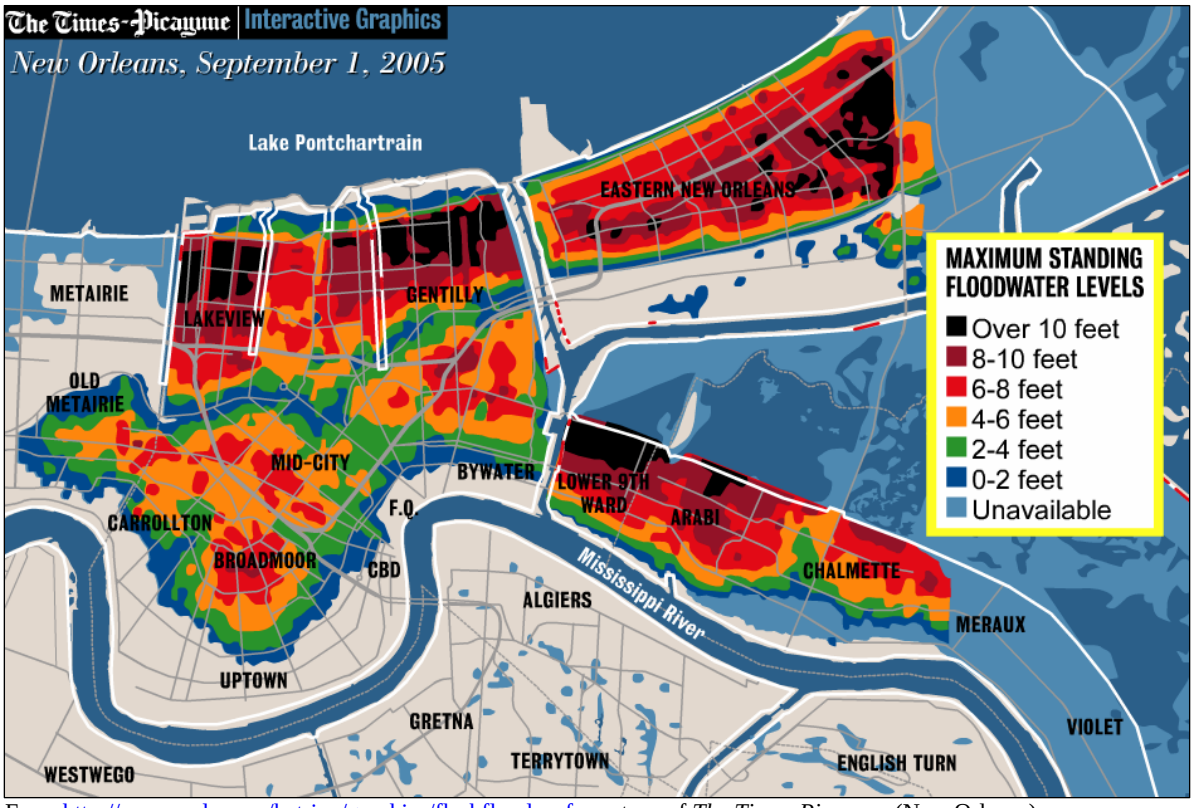
Archiving and analyzing the experience of the U.S. Technology Opportunities Program, 1994-present #2

TOP Bulletin

Updates on the TOP Data Archive, a project of the U. of Illinois Graduate School of Library and Information Science, Illinois Informatics Initiative, Community Informatics Initiative, and the U. of Michigan School of Information and Special Collections Library



From http://www.nola.com/katrina/graphics/flashflood.swf courtesy of *The Times-Picayune* (New Orleans).

Using the TOP Data Archive to study human resilience: How community-based organizations used social networks and information technology for hurricane recovery[1]

Kate Williams (U of Illinois) assisted by Rebecca Carter and Heather Defore (U of Michigan), Jennifer Marie Hill (Northcentral U), Tracey Hughes (U of California San Diego), and Aiko Takazawa (U of Washington)

The TOP Data Archive contains information from and about 606 projects which won grants from the Technology Opportunities Program of the US Department of Commerce. The information was originally collected to facilitate the work of the agency. Each TOP project was a partnership of local organizations aiming to use information technology to address local issues. Awards were made from 1994 to 2005. A dataset, however, is often a doorway to new data collection, and this study of how local organizations responded to the 2005 hurricanes is an example. Examining a subset of TOP projects that were in the path of disaster, the study advances a theory of community resilience

The TOP Data Archive is a distributed physical-plus-digital collection documenting how local communities use new technologies. To use the collection, to add materials, or for more information, contact Kate Williams, The Graduate School of Library and Information Science, University of Illinois at Urbana-Champaign, 501 E. Daniel Street MC-493, Champaign, Illinois 61820-6211 USA, tel (217) 244-9128, or email katewill@uiuc.edu. We gratefully acknowledge support from and partnership with the Benton Foundation.

November 2007

Social networks as theoretical and empirical framework

The starting point for this study is that society is made up of social networks. Individuals or groups of people are the nodes in this network, and the relationships or the resources shared are the ties between them. One resource shared across our social network is help, help of all kinds. One of the most-referenced papers in the social network tradition is Granovetter's Strength of Weak Ties study (1973), which found that people in managerial or technical professions tend to find new jobs through their weak ties, people they see less often or know less well. More recently Williams (2005) found that people in poor communities making use of IT tend to rely for help on their strong ties, people they see more often and are more intimate with. Studies do suggest that class matters, that strong ties matter more at lower socioeconomic levels of society. In general, social network research theorizes communities as self-activating networks. (Lin 2001)

Personal experience of the 1995 Kobe, Japan, earthquake on the research team along with a survey of the disaster studies literature provide empirical verification of the role of social networks in such crises. Not only are people's existing social ties activated, new ties also form. Kajitani (2005) reported that 80% of the survivors of Kobe were saved by their friends and neighbors. Our first-hand experience in Kobe was that helping after the earthquake depended on activating existing ties. Shaw and Goda (2004) detail how in Kobe local support networks were able to form and evolve, relying on preexisting networks but later incorporating new ties. And on a general level, they and others describe the subsequent "renaissance of volunteering" that swept across Japan the year after the earthquake, as weak ties became stronger in what was a national crisis.

Referencing studies of Kobe and other disasters, Quarantelli (2005) observes relief agencies as sometimes dysfunctional hierarchies of power, and Stephenson (2005) and Perrow (2005) recommend that the agencies active in any given recovery effort will function better once they reconceptualize themselves as nodes in a social network of help. A knowledge base in the social network matters: Kano (2005) examines first aid training of laypersons and projects that this will enable public mobilization post-disaster, and Rautela (2005) calls attention to valuable and yet vulnerable traditional knowledge regarding soil stability and drought management among Himalayan people. And network position matters: university students in North Carolina were well buffered from Hurricane Floyd compared to the local non-student population (Van Willegen et al 2005).

Work on information technology and disasters has just gotten underway, but is certainly of interest. Putnam (2002) finds that disaster response does tend to involve use of IT. Hagar and Haythornthwaite (2005) saw how the 2001 foot-and-mouth crisis led a farming community to make dramatic use of a local PC recycling/training/information sharing project and has called for more research into what she calls crisis community informatics. This study of how local people use IT in crisis recovery parallels Williams (2005), which brought to light how local groups use IT to help address daily problems of life in poor communities. Just as our entire species is implementing a whole new infrastructure built on digital tools, natural hazards[2] as well as wars and social strife are engulfing more communities worldwide. More attention to how people in local social networks use IT in disasters can help us understand communities and help them sustain themselves through crises acute or chronic. Can communities help themselves with technology? Can they bootstrap themselves into the digital world?

Our approach

In addition to advancing theory and addressing an pervasive social problem, this study demonstrates a new methodology. Case studies have been the basis of community informatics thus far, and have the practical advantage of localness and the conceptual advantage of specificity and nuance. But they cannot easily establish generalizability. For this larger datasets are needed. The method here illustrates the usefulness of a large dataset combined with GIS and other data as a methodological framework for collecting new data.

As our research team began to assemble the TOP data archive, Hurricane Katrina hit the US Gulf Coast. In reflecting on its terrible impact on local communities, we saw a need to assess the work of TOP in light of such crises, to know the role that local technology capacity may play in recovery.

In order to repurpose the TOP data most usefully for research, we added new data to it. This included information on the geolocation (latitude and longitude) of each TOP project. This made it possible to use publicly available hurricane data to identify which TOP projects might have been affected by the unusually destructive 2005 hurricane season. The Federal Emergency Management Agency makes public its disaster declarations,[3] which are based on county-by-county damage assessments and determine the type of recovery money that local people and organization can then apply for.

Figure 1 on the next page provides the FEMA maps used to obtain information about Hurricane Katrina. Similar maps were also used for the other most destructive hurricanes of the season: Dennis, Rita, and Wilma. The maps show different levels of eligibility for assistance (primarily as loans) after Hurricane Katrina, so they indicate the range of destructive impact.

Manually importing the FEMA data into our maps of the TOP projects resulted in a set of maps for each hurricane, as in figure 2 below. Across all the states and all the hurricanes, 48 TOP projects were found that could have been affected in some way by the hurricanes. They might have been directly in the hurricane path, or they might have been in areas that were strained or stressed to provide help and support, often long term, to adjacent communities which had evacuated. The research team sought out these projects and carried out nine phone interviews with managers to obtain the details on how they were impacted, how they responded, how they played a role in community recovery.

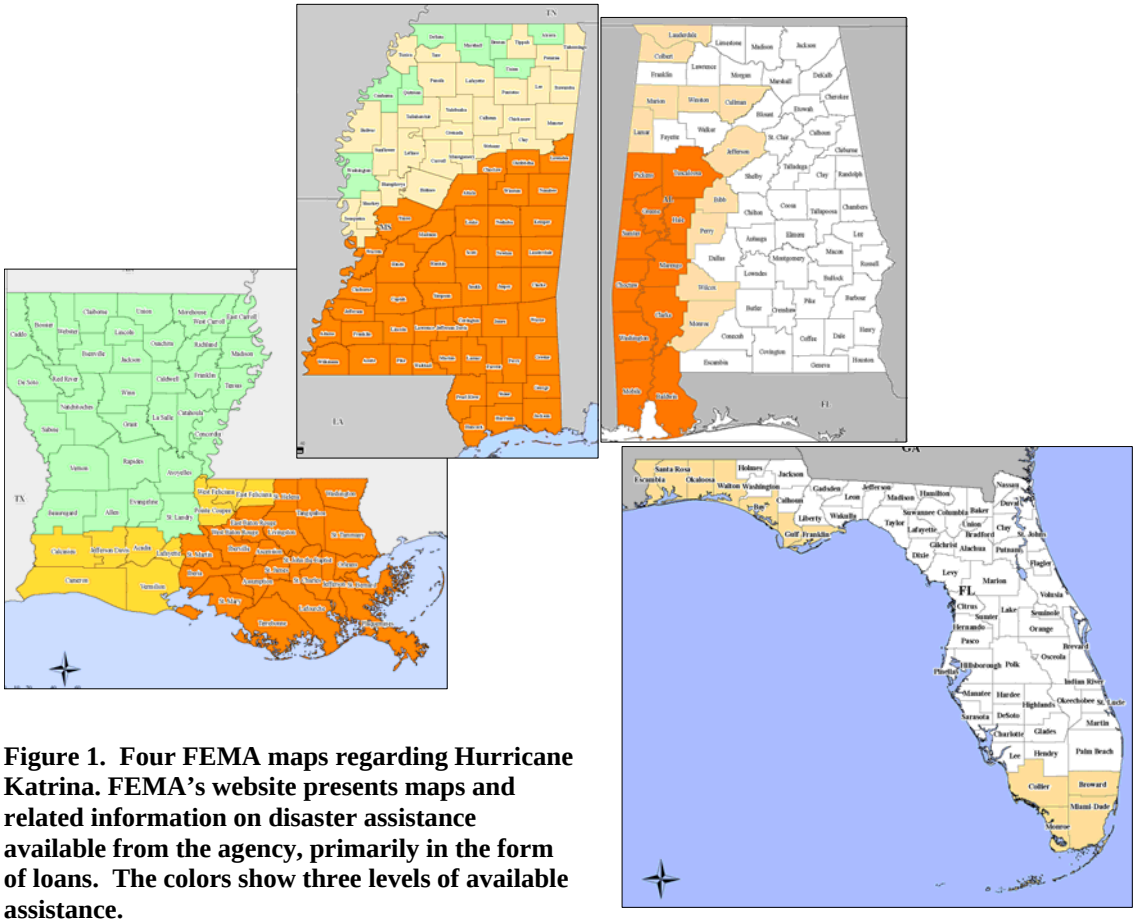


Figure 1. Four FEMA maps regarding Hurricane Katrina. FEMA's website presents maps and related information on disaster assistance available from the agency, primarily in the form of loans. The colors show three levels of available assistance.

The particular focus was on social networks and information technology. In other words: how did that project use technology in hurricane response or recovery? What social networks did they rely on to mobilize that technology, and were they strong or weak ties?

A finding of community resilience based on strong tie networks

Findings are somewhat surprising and quite hopeful. First, even under conditions where one might guess that information technology was inoperative due to electrical system failures, the failures were uneven and sporadic and where the technology could work, it was used. Electrical power tended to come back on while the communities as a whole were still quite devastated. In one case, Miami-Dade Community College, the Internet worked—via T-1 and cable networks—while the telephone network was still not functioning. So people turned to email to report in and check on others who were all quite local to them, and the campus became a virtual and actual refuge.

Each of the nine projects recounted how they made use of information and communications tools. For instance, the New Orleans Community Data Center was able to protect and then retrieve their unique database of smaller, local organizations and institutions; it proved invaluable in recovery. In Houston, Technology for All mobilized to build a community technology center/cybercafé in the Astrodome almost overnight, and recruited volunteers to help evacuees with online communication then and as they resettled locally. Austin FreeNet also mobilized to help arriving evacuees.

In addition to the narratives of IT use in the hurricanes, quantitative analysis relating to seven more extended interviews included details about who helped the projects make IT work in hurricane recovery. We used measures of residence, of frequency of contact, and duration of relationship to operationalize the strong tie/weak tie dialectic. The seven respondents described the 31 people who helped them as follows:

- 42% live in the same ward or neighborhood
- 61% have contact weekly or more often
- 81% have known longer than three years

In other words, these are relatively strong ties to the respondents, people they see quite often and have known for some time. Rather than being only localized to a neighborhood, they reflect the varied social networks of many metropolitan residents.

The Internet and such applications as email and databases were key tools in connecting people to each other—people were determined and often desperate to check on each other's safety. This involved individuals, families, and public agencies. They were also needing and using the Internet to connect with resources—be it FEMA itself or the bus maps for the cities they had landed in post-hurricane. So projects to

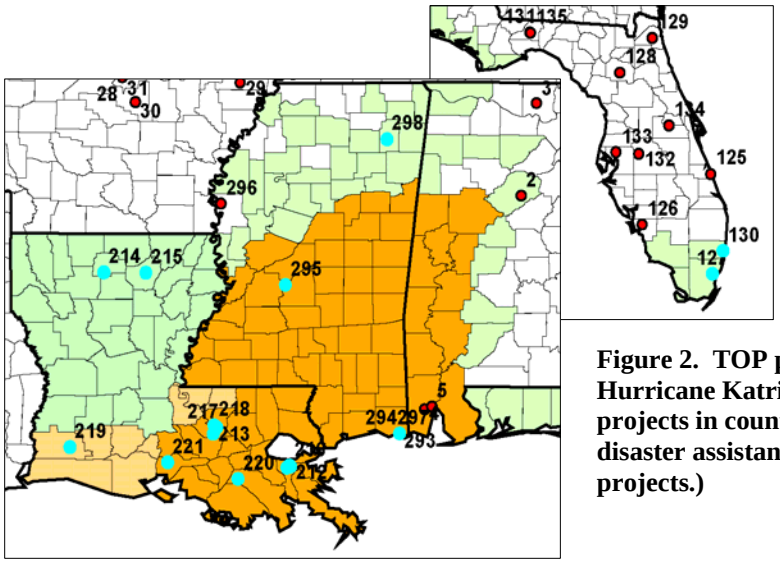


Figure 2. TOP projects located in relation to Hurricane Katrina, showing in blue those projects in counties that FEMA designated for disaster assistance. (Numbers identify TOP projects.)

establish computer access for evacuees were in fact kick started by TOP projects, whether it was in the Houston Astrodome right after Katrina or in neighborhoods across the South where survivors settled in the months after.

Our particular question—can communities help themselves with technology, bootstrap themselves into the digital world?—led to the following answer. When it came to making technology work in hurricane-affected communities, the TOP projects relied on people they had known for a long time, in other words, on other local people. Plenty more people then flocked to help, especially in the larger crises and the larger projects, like the Astrodome computer assistance to evacuees, but local, long-time contacts, pulled things together in the first place. This is very encouraging—that communities are resourceful and self-reliant in such terrible moments, in making use of technologies that most people still think of as new and complicated and hard to make work.

Bibliography

Granovetter, Mark. (1973). The Strength of Weak Ties. American Journal of Sociology, (78)(6): 1360–1380.

Hagar, Chris and Caroline Haythornthwaite. (2005). Crisis, Farming and Community. The Journal of Community Informatics, (1)(3).

Kajitani, Y., N. Okada et al. (2005). Measuring Quality of Human Community Life by Spatial-Temporal Age Group Distributions—Case Study of Recovery Process in a Disaster-Affected Region. Natural Hazards Review, (6)(1): 41–47.

Kano, Megumi et al. (2005). First-Aid Training and Capabilities of the Lay Public: A Potential Alternative Source of Emergency Medical Assistance Following a Natural Disaster. Disasters, (29)(1): 58.

Lin, Nan. (2001). Social Capital: A Theory of Social Structure and Action. London, Cambridge University Press.

Perrow, C. (2005). Using Organizations: the Case of FEMA. Understanding Katrina. Social Science Research Center. Retrieved from http://understandingkatrina.ssrc.org/Perrow/.

Putnam, Laurie. (2002). By Choice or by Chance: How the Internet Is Used to Prepare for, Manage, and Share Information about Emergencies. First Monday, (7)(11).

Quarantelli, E. L. (2005). Catastrophes are Different from Disasters: Some Implications for Crisis Planning and Managing Drawn from Katrina. Understanding Katrina. Social Science Research Center. Retrieved from http://understandingkatrina.ssrc.org/Quarantelli/.

Rautela, P. (2005). Indigenous Technical Knowledge Inputs for Effective Disaster Management in the Fragile Himalayan Ecosystem. Disaster Prevention and Management, (14)(2): 233–241.

Shaw, R. and Goda, K. (2004). From Disaster to Sustainable Civil Society: The Kobe Experience. Disasters, (28)(1): 16–40.

Stephenson, M. (2005). Making Humanitarian Relief Networks More Effective: Operational Coordination, Trust and Sense Making. Disasters, (29)(4): 337.

Van Willigen, M., B. Edwards et al. (2005). Comparative Assessment of Impacts and Recovery from Hurricane Floyd among Student and Community Households. Natural Hazards Review, (6)(4).

Williams, Kate. (2005). Social Networks, Social Capital, and the Use of Information and Communications Technology in Socially Excluded Communities: A Study of Community Groups in Manchester, England. Unpublished PhD dissertation. University of Michigan.

To cite: Williams, K. (2007) "Using the TOP Data Archive to study human resilience: How community-based organizations used social networks and information technology for hurricane recovery" TOP Bulletin (University of Illinois GSLIS) 2.

[1] An early version of this paper was presented as "A theory of community resilience: How community-based organizations used social networks and information technology for hurricane recovery" at the Yale University "Death of New Orleans" conference in November 2006.
[2] A visual compendium of global natural hazards is available at http://earthobservatory.nasa.gov/NaturalHazards/.
[3] As of November 2007, FEMA disaster declarations are available at http://www.fema.gov/news/disasters.fema.