

# Observation of Katrina/Rita Groove Deployment: Addressing Social and Communication Challenges of Ephemeral Groups

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## ABSTRACT

In order to better understand the challenges specific to the deployment of collaboration technologies in crisis situations, we conducted an informal observational study of the deployment of Groove Virtual Office to various civil and military groups at the heart of the disaster zone over the course of ten days. We summarize both general lessons learned from observations of social and communication challenges in crisis situations that impact technology adoption, and make specific recommendations for improving the deployment process of Groove to enable cross group collaboration. We generally found that dynamic, informal social networks and lightweight ephemeral work groups were essential social structures in the relief effort, and we discuss the need to innovate technologies to support these alternative types of organizations. We encourage that current technology centric innovation for ephemeral workgroups is complemented by a usage centric approach to help address emergent behaviors and opportunities.

## Keywords

Katrina, Communication, Collaboration, Peer to Peer, Ephemeral Groups, Work Groups, Humanitarian Aid, Disaster Relief, Groove

## INTRODUCTION

Disaster relief efforts are fueled by the emergence of ad hoc, ephemeral works groups collaborating across organizations. Two weeks after Katrina devastated the Southern coasts of Louisiana and Mississippi, we were presented with the opportunity to observe the deployment of a peer-to-peer collaboration technology – Groove -- designed to support cooperation across these ephemeral work groups. At that time, Robert Kirkpatrick, Groove Humanitarian Solutions Architect, was deploying Groove to the Joint Force Maritime Component Command (JFMCC) in Belle Chasse, New Orleans. Shelly Farnham arranged to meet Robert en route from New Orleans at Baton Rouge, and they proceeded to spend the next ten days traveling along the southern coast of Mississippi and Louisiana, visiting military and civil communication centers, emergency operations centers (EOCs), and non-governmental groups (NGOs) working to provide relief at the heart of the Katrina damage. See Figure 1 for a full activity log. Our goal was to help set up Groove for those who requested it, observe its deployment and use in the context of an actual disaster response, and develop research questions for future deployments of collaboration technologies. The expectation is that in order to assess the effectiveness of a technology in a crisis situation, it must be observed *in situ*, and that the lessons learned from observing the deployment of the technology in an edge case can be parlayed back into more day-to-day uses.

<b>Activity Log</b>	
<b>Mon 9/19</b>	- Arrive at Baton Rouge, drive through New Orleans - Cisco Mobile Communication Unit at Pearlington Elementary School Distribution Center - Naval Postgraduate School Mobile Communication Unit at Hancock Medical Center
<b>Tue 9/20</b>	- Hancock County Emergency Operation Center (EOC) - Joint Force Maritime Component Command (JFMCC) and DJC2 at Belle Chasse
<b>Wed 9/21</b>	- DJC2, JFMCC - New Orleans EOC
<b>Thu, Fri, Sat 9/22 – 9/24</b>	- Rita “hunker down” at JFMCC
<b>Sun, 9/25</b>	- FEMA’s Katrina Interagency Support base station at Stennis Space Center - World Shelters
<b>Mon 9/26</b>	- World Shelters - Waveland Beach
<b>Tue 9/27</b>	- Hancock County EOC - Mercy Corps
<b>Wed 9/28</b>	- Hancock Joint Forces Military Communication Center - Hancock Medical Center, Mobile Medical Unit - Waveland Point of Distribution
<b>Thu 9/29</b>	- Depart

**Figure 1: Activity log over course of ten days**

The lessons summarized here were drawn from several sources. We had several in depth interviews with members of the Groove team who expressed what they themselves had learned from deploying the technology in the field. We learned from direct observation and interviews over the course of the deployment process. Finally, much of what we came to conclude about the more general real world communication challenges faced by people in the context of the Katrina relief effort came from observation and interviews with the relief workers as they struggled to meet their goals providing humanitarian aid.

In the first half of this paper we summarize the social and communication challenges that would both shape technology needs and impact technology adoption, and in the second half of this paper we summarize lessons learned from observing the deployment of Groove *in situ*, making specific recommendations for improving the deployment process of a collaboration technology to enable rapid proliferation and cross organizational cooperation.

#### **UNDERSTANDING SOCIAL AND COMMUNICATION CHALLENGES IN CRISIS SITUATIONS**

Over the past several years members of the Groove team have actively explored how to exploit a secure peer-to-peer collaboration technology to enable communication and coordination across organizations in crisis situations. In particular, how does a collaboration technology best enable communication that fosters cooperation in a crisis situation that is both technically challenged and socially challenged. It is often the case that getting a technology

into the hands of the organizations is only a small part of the problem. The larger issue is dealing with change management in emergency situations.

That is, how do we best facilitate the changes in routine organizational behavior that are required when dealing with an emergency that a) often clears out much of the existing social and technical infrastructure, and b) requires immediate attention because failure is measured in terms of the loss of human lives. In the case of the Katrina relief effort, the entire economy came to a stop. Almost three weeks after Katrina, at the time we started our study, the mayor had only just opened several of the parishes in New Orleans for residents to return. Very few stores were open, and even fewer restaurants. Inspectors were still going through the buildings, looking for gas leaks or bodies. The area was largely still evacuated, and many of those who chose to stay were feeding themselves through the distribution centers. At the heart of the damage in Mississippi, on the path of the epicenter of the Katrina, entire neighborhoods had yet to receive electricity. Relief and recovery efforts were further delayed as people again evacuated as another hurricane, Rita, hit the coast further West in Texas.



**Figure 2: Cell phones primary tool for communication.**

Much of the governmental and medical staff was evacuated, and many were choosing to not come back. Standard communication channels such as phones and email were still inoperable five days to three weeks after Katrina. Immediately following Katrina, a sense of lawlessness had broken out because of the permissive environment created by the lack of policing agencies. In a sense, new social and technical structures had to emerge out of a slate struck entirely clean. In such a context, many military, governmental, and non-governmental agencies and private volunteers arrive on the scene with the common goal of coordinating relief efforts, but are faced with numerous challenges.

### **Restoring Technical Infrastructure**

At the most basic level, individuals and organizations have difficulty communicating because they have no electricity, cell towers are inoperable, and their Internet access is either out or unstable. At first, people had to rely on runners to literally drive to points of communication. Many cell towers were operating within a week, and it was striking to observe the extent to which personal cell phones were the primary form of communication both at the personal level and in the context of relief work. We asked many people what was their primary form of communication, and almost universally they answered “my cell phone”. On several occasions, while stationed in communication centers, we observed a surge of people pouring out of doors for the best reception on their cell phone when the power suddenly went out. See Figure 2. Cell phone connectivity was also problematic in those first few days because the increased demand for use made it difficult to get through on the remaining working towers.

Although cell phones were often the first communication technology available following Katrina, people would have difficulty contacting each other because there is no cell phone directory for personal cell phone numbers. Coordination in the days following Katrina relied heavily on the exchange of cell phone contact information through

face-to-face meeting. Furthermore in many cases people were not accustomed to communicating to their management through personal cell phones, and reported that while they would communicate to their peers and friends, they would not communicate to their seniors, delaying their access to information.

We also asked people what was their biggest communication challenge, to which many relief workers answered that they could not get online. Those with cell phone cards on their laptops had the most stable, persistent, and mobile access to the Internet. For many relief workers, their only access to the Internet was provided by volunteer organizations that brought in mobile communication centers. See Figure 3.



**Figure 3: Naval Postgraduate School mobile communication unit, brought in to set up 802.11 wi-fi hotspots.**

### Finding People and Resources

As millions evacuated the area people were quite concerned about the status of their friends, family, and colleagues and often had to resort to leaving notes on houses or in known community centers to find each other. See Figure 4. People were also squarely faced with the task of securing resources. How would they meet their basic needs for food, water, and shelter, given that their standard resources for meeting these needs were unavailable? Where were the distribution centers, how do they reach their insurance agencies, their schools, their banks, and medical centers? In response to these needs, many online databases with person profiles emerged within days following Katrina, some including information about resources needed and resources available. Over time, more centralized data stores emerged. However these systems faced their own challenges: integrating different data types, handling duplications, managing rapidly out of date status information, and making some sensitive information (e.g. health information) available as needed but secure against potential abuse.

On numerous occasions we observed both at a personal level and within organizations that under circumstances where resources were scarce or unavailable through normal channels, people tapped into their social capital. That is, they exploited preexisting social relationships, or the relationships they had recently developed, to secure resources. The simplest example of this is the first night we arrived at Belle Chass the JFMCC communications team was eating barbecue beef, a rare treat relative to the standard military mess hall fare, particularly given the fact few stores were open. One of the military personnel had acquired the beef because he had connections with the local community. It was a common theme throughout the week that tapping into one's informal social network elicited results that were not available through traditional channels. People reported accessing these informal social networks both through their cell phone and through email. One person indicated that he often received news via email friends from afar, who were watching news channels, before he heard about it through his organization.



**Figure 4: On the destroyed beach of Lake St. Catherine, people from the local community left notes to find each other at the remains of their community center.**

### **Developing Situational Awareness and Common Operating Perspective**

Because of the difficulties with communication and the rapidly fluctuating nature of emergency situations, people were also challenged by insufficient situational awareness and/or common operational perspective. That is, they were not always aware of the circumstances surrounding them, such as the road is closed or it is flooding in a neighboring parish. To the extent that they were aware of their situation, their information was often localized, and they did not have a shared awareness with other organizations. Given the lack of situational awareness and how other organizations were filling aid niches, there was a lot of potential for duplication of efforts in some areas while in other areas there was a gap in the aid needed.

This effect was exacerbated because the mobility of the groups was very high. We would often hear through word of mouth that an agency was interested in using Groove, but it would be relocated by the time we arrived on the premises. Many groups' offices were quite literally housed in RVs. As a consequence of this mobility, people often would not know what other organizations were in the field. Within a matter of hours or days, groups needed to develop an awareness of each other, what each group was doing, where were the gaps in aid that need to be filled, and then which niche of aid each group was best adapted for at the time and place. Even as people developed cross-organizational awareness, their knowledge of whom would be the appropriate person to talk to would be become out of date because many of the groups were comprised of volunteers with high levels of rotation in their staff. In many cases, the only point of communication for developing such situational awareness and cross group relief coordination was the regularly scheduled face-to-face meetings at the EOCs (Emergency Operation Centers). EOCs are developed specifically to provide a meeting point for various relief groups to interact with each other in a particular region. Even in this case, when we visited the New Orleans EOC, we observed that the mobility of the groups and individuals was so high the EOC administrators had stopped trying to maintain a directory of whom was in the room, but rather expected that people would walk around to the various tables to discover each other. See Figure 5.

As mentioned earlier, people opportunistically used their social connections to develop situational awareness such as where were the gaps in aid. For example, we spent several days at the World Shelters site, a small organization that was donating inexpensive shelters and had a volunteer set up crew. While we visited various groups over the course of our Groove deployment efforts, we asked people if they knew whom would be best served by the World Shelters structures. Through our work at the Hancock Medical Center, we met the facilities coordinator who was happy to have two shelters in which to clean out sensitive medical equipment. Thus an awareness of the shelters' availability and the hospital's needs was made through our relationships with both World Shelters and the Hancock Medical Center.



**Figure 5. At the New Orleans EOC, different groups sat at different tables.**

### **Developing Cross-Organizational Trust**

Even if they are aware of each other, people from different organizations do not always want to share their respective information, because developing trust across organizations can be very difficult. People in crisis situations are generally willing to share information and collaborate to the extent that their superordinate goals of providing immediate aid remain prominent. However, this willingness to cooperate often decays back to day-to-day possessiveness around their information once the crisis is over. Again, we observed that personal connections aid in the development of collaborative relationships across organizations. In Groove workspaces trust would often develop through initial pair wise interactions. That is, a few people across organizations would develop a trusting relationship, begin to collaborate around shared information, and then others from their respective organizations would be pulled in. However, these tentative relationships are easily disrupted as the organizations' security concerns brings in others who start mandating whom could talk to whom, and the degree to which information should be shared.

### **Developing Leadership and Decision-making Structures**

Another challenge is developing the appropriate leadership and decision-making structures across organizations. Difficulties arise in emergency situations because there is no single point of authority, which can be particularly problematic as independent people approach the situation with unsolicited resources that need to be allocated with some sensitivity. The role of strong leadership, which may often be lacking, is to emphasize the common purpose across organizations, and help the organizations piece together how they will accomplish these goals.

A related problem is the differences in expectations about communication and decision-making hierarchies across types of organizations. The military, for example, has a very top down decision-making structure. This is in sharp contrast to many of the grass-roots, ephemeral work groups that emerge in response to crisis situations, which have more lateral, emergent decision-making structures. We heard a story from an art group that had set up an ad hoc

point of distribution (outside of the authority of any of more official NGOs or military groups), that when required to carry ID cards, they had each and every member adopt the title “Director” to reflect the equality of their decision-making power in the group. If approached by another organization with the question “do you have the authority to make this decision” each one could say “yes”.

These decision-making structures have a very meaningful impact on information flow. For example, one person in the JFMCC indicated that the military, while operationally very flexible (with people able to take on many roles), was not very flexible in terms of social hierarchy. His job, nominally communications support, evolved during the Katrina relief effort into providing a trusted conduit for information to flow to various chiefs of staff, because more junior people do not directly approach senior persons with sensitive issues. For groups accustomed to having social scripts determined by rank, it can be difficult to know how to interact with people if they do not know someone’s relative rank, or they are without a rank as is the case in some of the more ephemeral groups.

### **Tension between Enabling Aid and Minimizing Abuse**

Many of the difficulties in coordinating aid across the organizations can be ascribed to having to simultaneously provide aid and minimize opportunities for abuse. The most obvious example of abuse is that of the looters. Other noteworthy examples are cases of people selling contaminated water, or evacuees taking three aid checks rather than one. In response to these abuses policing officials imposed curfews, restricted access to and from neighborhoods, required relief workers to acquire identification cards, and so forth. See Figure 6. All of these measures were required to minimize abuse of looters and other such “sharks”, but also considerably slowed down aid.



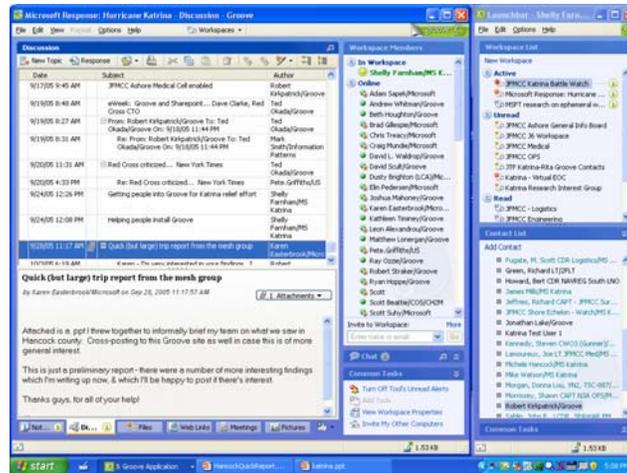
**Figure 6. Check points going in and out of New Orleans.**

The tension between providing opportunities for aid and minimizing abuse further exacerbates some of the difficulties experienced in developing trust among the informal, ephemeral groups and the more authoritative groups working at the bequest of the state. However each type of organization is needed. Some of the more ephemeral work groups can provide more immediate responses to disasters, and often fill overlooked gaps. For example, along the beach of Waveland a woman started an impromptu distribution center with a barbecue grill in the back of her house. Neighbors heard about it, and started bringing extra food over. The impromptu distribution center had to be moved to the Pearlington Elementary School as it grew to feed over 700 people, before the Red Cross arrived to take over. Unfortunately these more ad hoc, ephemeral groups are often viewed with the same suspicion as the “shark” organizations. However they fill a very important void, and reflect a strong sense of agency in a community to take care of itself in a time of need, a sense of agency that should be encouraged.

In sum, many social and cultural factors influence the development of effective collaboration among individuals and groups in crisis situations. It is extremely important to understand these factors, and how they influence the extent to which people can successfully coordinate with each other, when considering how to best develop new technologies to aid humanitarian relief efforts.

## GROOVE

Groove is a peer-to-peer technology that enables communication, file sharing, and coordination for ad hoc groups across organizations, making it an ideal application for collaboration around relief efforts. Unlike web-based services it a) allows people to work in group workspaces whether or not they are currently connected to the Internet, b) provides status information for those in workspaces, and c) securely shares any content in workspaces because it is stored on participant machines and encrypted for transport. Groove provides a communication and data synchronization infrastructure without any centralized point of failure, enabling people to reliably share and integrate information across locations, while mobile, and with intermittent Internet access. Groove also enables ad hoc access to colleagues across organizational boundaries, providing a conduit for information sharing. See Figure 7.



**Figure 7. Groove user Interface. Workspace on the left, open to discussion. Launch Bar with list of contacts and workspaces on right.**

In early discussions with members of the Groove team, we found that they strongly advocated Groove as much more than just a collaboration technology. The peer-to-peer infrastructure has a profound impact on participant's ability to develop trusting relationships, because no centralized authority maintains control of the data. No shared content is kept on a server, rather it is replicated across all machines and encrypted for transfer. In other words, Groove provides a virtual neutral ground, where all people can approach the table knowing they are on an even playing field. The peer-to-peer technology reduces many of the barriers to negotiations inherent in cross-organizational interactions: removing excuses to not share info, providing a neutral space to foster compromise, and exposing differences in expectations and goals.

Because Groove provides a secure venue for exchanging information, while at the same time providing a neutral territory for collaboration, it has received a lot of support from Strong Angel (see Carr, 2005), a group developed specifically to explore how to enable civil-military communication in crisis situations. Robert, as a member of this group, was particularly interested in using Groove as a tool to develop collaborative relationships between military groups and civil groups following Katrina.

### Groove Usage

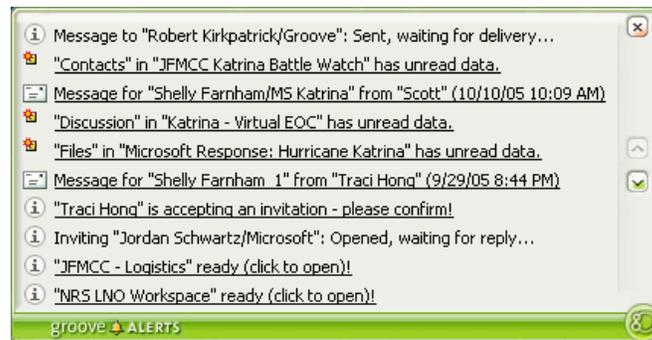
An examination of the more active Groove workspaces provides a valuable picture of when Groove was successfully used. We found that the most active group workspaces were those requiring moment-to-moment, time-pressured updates in communication across locations and across organizations, often around reasonably complex information requiring file sharing and data synchronization. For example, At Microsoft, a Groove workspace was created to enable discussion of how various individuals and technologies across the organization could be mobilized to help the relief effort, enabling the formation of a web based people-finding service within a matter of days as volunteers coordinated with each other. Another such Groove workspace was the JFMCC "battle watch", which was actively used as we waited out the Rita hurricane to enable communication among several command and control

communication centers and ships. Similarly, members of MercyCorps in the field used Groove to provide situation reports that could be tracked by their main offices.

The ability to create simple data forms in Groove workspaces that allowed for asynchronous data entry, which could later be synchronized, also seemed particularly valuable. A Groove workspace form was created for the Red Cross to register thousands of evacuees across various shelters, so that they could each individually register evacuees but then synchronize their data once they had Internet access. Similarly, being able to maintain updated status information around patient progress was a particularly appealing feature at the Hancock mobile medical center.

Given the time-pressured nature of these cross-location, cross-group collaborations around workspaces, we also observed Groove being used as a communication dashboard. People would leave Groove open and running at all times while attending to their other desktop activities. They would track for alerts of new messages or content in their Groove workspaces (See Figure 8), and attend to the presence information in the contact list in their Launch Bars.

In sum, Groove proved to be a powerful collaboration tool because it enabled communication across both organizational and hierarchical boundaries, where workspace membership and information sharing was enabled through trusted relationships.



**Figure 8: Groove alerts provides time sensitive information such as messages received and new files content in workspaces**

### Barriers to Groove Usage

Although Groove was actively used in some scenarios, several Groove advocates expressed some frustration in deploying it following Katrina. Relief workers are over-worked and under a lot of stress, and have little time or no cognitive ability to adopt a new technology. Many organizations do not allow its personnel to individually install applications, requiring buy-in and coordination with IT staff. The general consensus was that Groove would be most effectively deployed if it was installed on users' machines and they were trained in its use prior to the disaster situation.

Unfortunately, given the situation-specific nature of its most powerful use in a crisis, that is, monitoring communication and data flow across locations and across organizations in a time-pressured situation, people might not understand the value of the application or take the time to learn it in advance. As such, users should be able to easily acquire Groove and learn its key functionality in the field. We found that for the most part, once Groove was installed, people seemed to be able to use its basic features fairly easily. The alerting and communication features were "sticky", in the sense that they encouraged users to leave the application running on their machines so that they could attend to incoming messages as they arrived. See Figure 8. The only specialized knowledge required for adoption was for the use of the forms themselves, given that they do require some familiarity with web controls and databases.

For a crisis situation, deployment should be optimized for rapid proliferation of the technology through both formal and informal social relationships. As discussed in the previous section, both types of such relationships were valuable in coordinating relief efforts across organizations. Like many collaboration and social networking technologies, Groove's success depends on the ability to achieve critical mass in a workspace. We found that once enough people were in a workspace, and others became aware that they also needed to join a workspace to have access to the right people and information, they would take the extra effort to do so. However we also observed

several points at which people would discontinue the installation because of difficulties encountered during the process, decreasing the likelihood of achieving critical mass.

Most effective social networking applications allow new users to join the relevant group or social network through one click in an invitation email. The Groove installation process required a number of steps, with the entire process for a person to set up Groove taking a minimum of twenty minutes, and up to several days, even with help. This makes rapid proliferation difficult, in part because after people were set up with Groove, they did not feel empowered to then turn around, create new workspaces, and help others install Groove.

A related barrier to rapid deployment across organizational boundaries was the organizations' desire to manage account information, again slowing down proliferation and reducing the individual's sense of agency in the workspaces. A central IT person is required to create activation keys and provide identity information. However people need to be able to control their own profiles to a certain extent, so that they might adjust identity information depending on the workspace. As mentioned in the previous section of this paper people acquire both resources and information through both formal and informal social relationships. As such, being able to adjust identity information across workspaces, depending on the context of the social group, is a very important feature.

Just as informal relationships sometimes help provide access to information, sometimes formal relationships inhibit use. For example, people are often reluctant to share status information with their management, as such tools for plausible deniability around presence should be integrated into the system (e.g., the ability to show that one is offline even though one is not), to encourage comfort in using the system even in the presence of the demands of management.

## **APPROACHES TO TECHNOLOGY INNOVATION**

The prevalent approach to cutting edge technology innovation is – and has for long been – technology centric. We need technology centric innovation to experimentally develop new technologies. However, as these technologies emerge from the research labs and incubation projects, we often experience deep frustration as we try to fit them into real world usage. We discover that the world does not work exactly as we thought it would, that people do not embrace the new functionality with the enthusiasm we had expected. We suggest that the technology-centric approach alone may not be the most efficient way to transform raw technology into useful products. The previous report from the Katrina/Rita disaster response illustrated the challenges of creating technology that really works and is useful for ephemeral workgroups. It is not just a question of making each of the deployed technologies more stable, more user-friendly, and more feature-rich. It is a question of finding ways to address the opportunities and needs of the users by composing, stretching and juxtaposing from the entire palette of existing and emerging technologies. We need to watch carefully how the interplay between human and social behavior on one side and emerging technology opportunity on the other side suggests entirely new paths for computing.

As such, we should adopt a two-pronged approach to innovation: technology centric innovation complemented by an orthogonal effort which we call “usage centric innovation”. Even a brief observation of people at work in very real-world situation – as conducted in the context of the Katrina/Rita disaster – provided invaluable insights about their needs and the challenges they face, and it provided lessons about the usefulness, functionality gaps, and usability of many new technologies that were put into use. It also showed us glimpses into emergent behaviors and human capabilities, pointing to opportunities that go beyond any single technology deployed.

## **CONCLUSION**

Both more formal, government-sponsored agencies and the more dynamic, informal social networks and light-weight ephemeral work groups are essential social structures in a disaster relief effort. However these organizations face a number of technical and social communication challenges that inhibit cross-organization collaboration. Relief work is cognitively demanding, relief workers are very mobile with high rotation rates, and across organizations people have difficulty developing trusting relationships because of concerns around sharing sensitive data and differences in social and decision-making structures. Many new social technologies have emerged in the past few years that may help to overcome these challenges should they be deployed as a part of relief efforts – e.g. mobile technologies, web based email, and social networking applications.

We examined the deployment of one such technology to disaster relief workers, Groove, to better develop research questions to guide future innovation. Groove is a peer-to-peer technology that enables groups across organizations to monitor communication and data flow across locations in a time-pressured situation. Our primary conclusion was

that Groove was extremely valuable once adopted, enabling complex information sharing and trust development across organizations and across social hierarchies through interpersonal communication. However we also found the deployment process should be streamlined to enable people to more easily acquire Groove and learn its key functionality in the field. Our observations from the Groove deployment provided us with a unique opportunity to better understand how the interplay between human and social behavior on one side and emerging technology opportunity on the other side suggests entirely new paths for computing. In the future, we hope to further explore several questions raised by our observations. ? How do we best support rapid proliferation and adoption of technologies in a crisis situation through social relationships? How do we support both the advantages of emergent, ephemeral works groups on the "permissive edge" (e.g. immediacy of response, filling overlooked niches) and the advantages of the persistent organizations (e.g. control in permissive environments, access to resources, broad mobilization)? How do we best support both the informal and formal communication channels, enabling people to tap into their social capital in times of crisis to gain access to resources?

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