Technology-Mediated Social Participation in Mass Emergencies

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Introduction
When a disaster or mass emergency occurs, those in the impacted area as well as concerned outsiders rush to help mitigate the effects. This call to action felt by civilians as well as formal responders has the potential to be further realized due to the proliferation of Web 2.0 technologies. Social participation in the outcome of a natural or man-made disaster is no longer limited to those local to the event; people are now flocking to social networking, microblogging and similar sites where online convergence takes place to not only discuss the disaster, but to gather and disperse timely, relevant information.

The study of social media sites in emergency has been the subject of investigation in recent years. This research includes studies on the use of community websites during the 2007 Southern California Wildfires (Shklovski et al, 2008), online forums during the 2008 Sichuan earthquake (Qu et al, 2009), and of social networking sites in the aftermath of the 2007 Virginia Tech shootings (Palen et al, 2009; Vieweg et al, 2008) and the 2008 Northern Illinois University shootings (Palen & Vieweg, 2008.) This sample of research falls under the category of Crisis Informatics (Hagar, 2006) which “extends consideration of emergency response to not only include official responders (who tend to be the focus in policy and technology matters) but also members of the public” (Palen et al, 2009.)

In my research on computer-mediated communication (CMC) in emergency, I approach the study of online social participation by taking a ground up, empirical approach that starts with the analysis of micro-level, moment-to-moment CMC interactions. Such analysis supports deep-seated understandings of online social participation and convergence. These understandings subsequently serve as the foundation upon which researchers can develop theories to use in the design of tools that promote online community support for emergency events.

CMC-Based Distributed Problem Solving in the Virginia Tech Event
Recent research colleagues and I have done on CMC in mass emergency provides examples of members of the public coming together to partake in collective intelligence (Palen et al, 2009; Vieweg et al, 2008), sensemaking and alliance, (Palen & Vieweg, 2008), help giving and receiving (Vieweg, Palen & Anderson, under review), and to establish credibility (Vieweg, Palen & Anderson, under review) among other activities.

One study in particular (Vieweg et al, 2008) that focuses on online activity in the aftermath of the tragic shootings at Virginia Tech (VT) of April 2007, relates to the workshop’s discussion of social capital and social cognition. This research involved the study of technology-mediated social participation in various online places, including Wikipedia, SecondLife and MySpace (among others), and specifically focuses on Facebook.

In the aftermath of the shootings, over 500 Facebook groups had the VT shootings as a topic. We archived 50 of these based on notable features (group size, extended activity, etc.) One group became a focal point because its purpose was for VT students to inform others of their wellbeing. Qualitative analysis of posts and discussions in this group led us to another group, where we found that a Facebook user started a discussion board whose purpose was to identify the list of victims. Interested individuals converged within the discussion to participate in the list building activity. Those who posted to the discussion were careful to establish credibility and self-policing due to the highly sensitive nature of the subject matter. Certain Facebook users positioned themselves so as to display their access to inside information or align themselves with particular affiliations (i.e. affiliation with Virginia Tech assumes one has insight into the situation that outsiders lack.) Having inside knowledge or being affiliated with Virginia Tech gives these individuals more social capital and supports distributed problem solving; they have access to information that leads the group toward their goal of identifying the list of 32 shooting victims. By performing a detailed interaction analysis of this Facebook discussion board discourse, my colleagues and I uncovered evidence of how social capital emerges based on the common identification of a goal among a previously unrelated group of users.
The publically available nature of the list, in addition to the capability of Facebook users to post information in an ongoing manner that is archived (i.e., users were able to see what information was previously posted by others) resulted in the successful compilation of the victim list. The technological affordances of Facebook allowed individual knowledge to be shared with a broad audience, which led to this instance of collective intelligence (Hiltz & Turoff, 1993) in the form of technology-mediated distributed problem solving.

Microblogging Behavior in Mass Emergencies

People faced with a mass emergency who turn to social networking and microblogging sites to communicate have pressing time constraints, and are often in a position to make potentially life-altering decisions. In striving to understand online behavior in these fraught situations, I examine CMC that takes place during emergency situations at a micro level, which leads to macro-level understandings of technology-mediated social participation.

My current research focuses on the use of Twitter in emergency situations because its features allow researchers to examine technology-mediated behavior as it unfolds, which is helpful in performing micro-level analysis within this research domain. Understanding how moment-to-moment communications emerge during an emergency leads to a broad understanding of social phenomena that take place within Twitter. Though I do not analyze communications at the exact moment of broadcast, I determine events to study and then collect data for a relevant time window for later analysis. Parameters for the collection of Twitter data are based on search terms, time of an emergency event, and user affiliation (i.e., my data are comprised of tweets sent by individuals local to an emergency and who have more than three tweets containing a search term within the designated time period.) This process of reducing the data set is necessary to provide a manageable sample of what my colleagues and I judge to be a good representation of Twitter activity. It should also be noted that though Twitter data are publically accessible, privacy issues remain. It is the responsibility of us as researchers to follow ethical guidelines regarding the rights of users, and to keep in mind that they are human subjects (Bruckman, 2002).

Once we have a manageable sample of data, we read every tweet to determine if it is ‘on topic’ or ‘off topic’ regarding the emergency event; we then focus on only the ‘on topic’ tweets. These tweets are further analyzed, and in examining them, we develop high-level coding categories that explain Twitter activity. In other words, the analysis of micro-level interactions that take place in response to a mass emergency eventually leads to theoretical understandings of Twitter behavior during that emergency.

Research with colleagues thus far includes a study of Twitter activity during the Red River floods of March-April 2009 (Starbird et al., forthcoming.) This work uncovers the “life cycle” of Twitter data—the generation, synthesis and derivation of information as well as contributions to the information cycle through innovation that take place during a 51-day period leading up to and immediately following the floods.

Additional research indicates that at the height of an emergency event, certain specific types of information are broadcast via Twitter (Vieweg et al., under review.) In further studying the Red River floods as well as the Oklahoma grassfires of April 2009, we see that when the emergencies were in the impact stage, people on Twitter were communicating information that leads to “situational awareness.”

Using an in-house data visualization tool, the E-Data Viewer, (Starbird, 2008) we depict the total number of on-topic tweets broadcast during the six-day data collection period before, during, and after the Oklahoma grassfires (see Figure 1). Each dot represents a tweet. Light gray dots represent on-topic tweets that do not include situational awareness information. Black dots represent on-topic tweets that do contain situational awareness information. The fires exacted the most damage on April 9 and into April 10, which is also when the most situational awareness tweets were broadcast.

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1 Defined by Sarter and Woods as “All knowledge that is accessible and can be integrated into a coherent picture, when required, to assess and cope with a situation” (Sarter & Woods, 1991.)
Visualizations such as this can extend to other areas of online social participation research. The micro-level analysis of data led to the development of high-level coding categories that serve as the foundation for the visualization, which helps researchers gain macro-level understandings of behavior. Though my focus is on Twitter activity in emergency situations, a similar approach can be taken to understand online behavior within other application areas and topic domains.

**Conclusion**

Research on technology-mediated communication in emergency events provides researchers with insight into instances of collective intelligence and contributory actions which then lead to understandings of online social participation. Through careful sampling, micro-level analysis and data visualizations, we begin to form the foundation upon which theoretical guidance and design implications can scaffold.

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**References**


