# Online Social Media in Crisis Events

*Investigation of recent disasters reveals use of online social media as an emergent, significant, and often accurate form of public participation and backchannel communication*

By **Leysia Palen**

My research group at the University of Colorado, Boulder, studies the relationship between human behavior and information and communication technology (ICT). The group, the connectivIT lab, includes researchers who are interested in how ICT connects people with each other and the information they seek (http://www.cs.colorado.edu/~palen/connectivIT/). Our work is cross-disciplinary, with researchers possessing skills in empirical research, social theory development, and technology design.

Our current, primary focus is on an area of research called *crisis informatics*, which examines the technical, social, and information aspects of disasters and crises. We believe that an informatics focus on matters of disasters is critical for the social good. With increasing attention from all sectors on disaster preparation, warning, response, and recovery, we hope that cross-disciplinary examination of information dissemination issues results in effective technology design and technology-related policy development for both official responders and members of the public alike. To that end, we collaborate closely with our colleagues at the University of Colorado's Natural Hazards Center (http://www.colorado.edu/hazards), an organization that conducts disaster research and serves as a worldwide information clearinghouse for social and behavioral disaster matters.

Here, I report on a particular line of inquiry within our larger research focus on crisis informatics, one that examines information generation and dissemination activities by members of the public, which is playing an increasingly critical role across all phases of disaster.[1] As social media—which includes blogs, social networking environments, person-to-person and broadcast messaging, and other Web 2.0 applications—becomes more pervasive, their use has significant implications for emergency management practice and policy. ICT enables people—disaster survivors, curious observers, and those who wish to help victims—to connect to one another and to participate in events, including through seeking and providing information peer-to-peer.

Our recent research has investigated use of social media during and after the Virginia Tech shootings and the 2007 Southern California wildfires. We also have examined the characteristics of online "social convergence" across recent crisis events.

## The Crisis at Virginia Tech

Within hours of learning about a shooting on the Virginia Tech campus April 16, 2007, we began monitoring official and unofficial news releases. An early CNN.com release mentioned students in a journalism class posting


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information on a website as events unfolded. This prompted us to decide to empirically investigate the types of online communication that developed around the tragedy.

We contacted colleagues at Virginia Tech to evaluate accessibility of the information we would need and to establish an initial sample of people to interview. Two researchers went to Blacksburg five days after the shooting and conducted 56 face-to-face interviews with students, faculty, and staff from the Virginia Tech campus as well as Blacksburg community members, among others. The rest of the research team remotely monitored newsfeeds and began to investigate social networking sites such as flickr, Wikipedia, Facebook, MySpace, orkut, and Second Life.

Interview questions focused on how people first became aware of the shootings, what they did once they knew what was happening, and how they stayed current with the situation throughout the first day. Sampling and archiving online interactions concentrated on groups with features that seemed significant: substantial membership size, exchanges around people's well-being, groups started April 16 with extended activity, and groups that demonstrated significant connections to other online activities or to the physical campus itself.

After the university sent an e-mail message at 10:16 a.m. on April 16 warning people to stay inside, students turned to text messaging and instant messaging to check on the safety of friends located elsewhere. The IM "buddy" feature helped determine who was online and thus not injured. A similar function on Facebook connected tens of thousands of Virginia Tech students, making it easier to detect who was safe by their online activity.

Activity on Wikipedia began at 11:16 a.m. Authorship traffic grew quickly. Following the university press conference at noon, large-scale problem-solving activity began over a set of websites that were focal points for the converging information as people around the world began trying to determine the identities of the victims. The distributed problem-solving activity is most accurately described as collective and bottom-up rather than orchestrated and top-down.

At 2:13 p.m., Virginia Tech confirmed the final death toll—32 people plus the shooter. Worldwide participation in online social media sites developed swiftly. The compiled information across all online lists correctly identified the victims *before* the university released their names to the public. Moreover, the names were not in the same sequence across the online lists, nor were any of the lists complete, indicating concurrent parallel problem-solving and information-gathering.

Identification of victims preceding the authorities' announcement demonstrates the problem-solving efficiency and accuracy of large-scale, highly distributed online collaboration. (Note that this does *not* suggest that VT authorities could have or should have shared information more quickly with the public. Rather, because the event had clear boundaries around the information dissemination activities, it made those activities far more observable than they otherwise are in dispersed, open-ended disaster events.) We detail these events in two papers for additional reference.[2]

## 2007 Southern California Wildfires

Over 19 days beginning October 20, 2007, more than 20 wildfires devastated a region from Santa Barbara County to San Diego County. The fires destroyed almost 1,500 homes, burned more than 500,000 acres of land, and caused massive evacuations.

In this quick response research, we show how the unidirectional model of information dissemination from officials to the public, which has been historically and conventionally the basis for emergency response, increasingly fails to account of growing forms of backchannel communication—that is, peer-to-peer communications that are not part of the official discourse of the event.

During the 2007 wildfires, people in the affected region used social media to learn critical information about the fires. In particular, they needed information that affected them locally, as much of the news media broadcasts were far too general and often incorrect. Though we cannot empirically say that use of social media was widespread, its use in this event was significant for some people. Our focus in this research was therefore to understand *how* technology was being used rather than *how much*. Because we predict future changes in the disaster information arena in response to more pervasively available ICT, we studied the Southern California events to understand critical instances of ICT improvisation and adaptation that might foretell future behavior.[3]

We conducted online research and face-to-face interviews, asking about ICT use for keeping in touch during the fires; evacuation experiences; information seeking; and volunteering of time, goods, or services, including online participation and information generation. We disseminated a questionnaire through personal and professional contacts and posted solicitations on local forums and online newspapers as well as discussion groups on Craigslist, Facebook, and Flickr. Our data, therefore, are not representative of the entire affected population; they instead tell us about the experiences of a sample of technology users during the wildfires.

Of the 307 people who accessed the questionnaire, 279 completed it. In this technology-oriented group, a majority (54 percent) indicated they used mobile phones to contact friends or family to get tactical information about the fires (road closures and fire line status); a significant majority (76 percent) consulted information portals and websites advertised in traditional media. Alternative news sources and individual blogs were consulted by 38 percent of this particular population, while 15 percent accessed discussions on web forums. Just 10 percent of this population accessed photo-sharing sites such as Flickr or Picasa, and just under 10 percent used Twitter. More than a third (36 percent) reported posting information or participating in discussion groups online, although the majority simply reported

searching for information online. Respondents exchanged information through posting and text messaging (20 percent), discussion boards or community online forums (16 percent), posting on personal blogs (9 percent), sharing photos (8 percent), and broadcasting via Twitter (4 percent).

Respondents felt they lacked information they needed over the course of the disaster, a not uncommon feeling in emergency events. Although traditional media and official communications were reported as helpful by many, it was reported as problematic by others, and respondents actively sought accurate, up-to-date information specific to their area by consulting their peers. Some people came to serve as "information brokers" in the event using various media and sources to disseminate information. They distributed information about road closures, fire line encroachments, shelter openings and closings; they annotated maps; and they created and participated in community web-based forums. Some had experience with fires or insider knowledge through personal networks and connections to government personnel; others were local residents who established e-mail lists and contributed to discussion groups. In this disaster, community forums were increasingly seen as reliable, authoritative sources of information. A few new community sites were created, and existing community sites became critical places for obtaining and sharing accurate, up-to-date information.

Our data suggest that social media support critical information distribution activity among members of the public that we believe needs to be better integrated with official disaster response activities.

## Online Social Convergence

In addition to examination of specific events, we have also surveyed online participation across recent disaster events to begin to characterize that emergent activity over a broader scale. Online behavior parallels the social phenomenon of geographical social convergence that occurs at every disaster event. Social convergence, however, is no longer limited by geographical access; online access creates ways for people far afield to participate.

One increasingly common form of participation takes place on photo-sharing sites. In another study, we examined this activity more closely, investigating 29 Flickr groups across six notable disasters that occurred between December 2004 and October 2007 (the Indian Ocean earthquake and tsunami, London bombings, Hurricane Katrina, Virginia Tech shootings, Minneapolis bridge collapse, and Southern California wildfires).[4]

We found that a new practice around disaster response is emerging in Flickr, where a few central users immediately establish a new Flickr group as news about a disaster event becomes known. Such activity began in the earliest days of Flickr (which was launched in 2004), but has increasingly become more uniform. New groups see themselves as "image aggregators" and are used as repositories not only for images of the hazards and their effects on the built and social environment but also for screenshots of news media broadcasts and other online activities occurring elsewhere, such as virtual memorials in Second Life.

The results of these collective research activities move us in directions of policy change, innovative technology design, and new theory about social interaction in disaster events. For policy reform, the findings from this work suggest that future emergency management needs to incorporate mechanisms within organizational processes for supporting and leveraging publicly-disseminated information. For technology design, the empirical work on social behavior provides a realistic understanding of the power of large-scale interaction from which to generate new tools and services. These implications for policy and technology development are driven by careful consideration of human needs and the power of large-scale social interaction. We hope that this program of research and development will support growth and positive change in disaster emergency warning, response, recovery, and education. *e*

## Endnotes


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