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Emergency 2.0 is coming to a website near you; A host of social media websites could spell a sea change for crisis management. How should emergency services make best use of all the user-generated information?

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IN SEPTEMBER 1970, when wildfires displaced tens of thousands of people in Southern California, overwhelming emergency services, residents took matters into their own hands. They found a place for evacuees to gather and organised the washing of exhausted fire-fighters' clothes. Fast forward to October 2007, when wildfires ravaged the state again and residents banded together, this time in a way that wasn't possible in the seventies.

Armed with an array of online "social media" tools such as blogs, annotatable maps, photo sites and instant messenging services, they were able to gather and disseminate information on, for example, the progress of the fire, the location of evacuation areas and shelters, and which schools and businesses were closed - information unavailable through traditional channels.

"I knew that a lot of my less [tech] savvy friends were having problems getting real information from the news so I just soaked up as much as I could from the internet and regurgitated it through text messages, instant messenging, Twitter and my blog," one California resident told a team of researchers led by Leysia Palen of the University of Colorado at Boulder, who carried out a survey on the use of social media during the wildfires.

Palen's survey showed that some of the social media tools were extremely well suited to disaster response, despite not being designed for that purpose. For instance, the team found that to coordinate efforts such as rescue operations, residents made good use of the "micro-blog" Twitter. The site rolls social networking, blogging and instant messenging into one and was launched mainly to allow friends to stay in touch around the clock and on the move. Others created a map of their community using Google Maps and showed the progress of the fire, or areas where schools and businesses were closed.

Because anyone with an internet connection can access and contribute to these sites, they ended up gathering together up-to-the-minute information from far-flung rural areas that the media and the emergency services were not able to reach. In addition, many residents said the media reports were biased towards metropolitan areas and focused on the sensational, while official information sources tended to be out of date. "National news websites were completely worthless as they ignored everything except the comparatively minor Malibu fire, which burned near some celebrities' homes," said one.

The fires are just one example of how tools developed for online socialising have been co-opted to help out in times of crisis. Palen has also studied the online response to the shootings at Virginia Tech on 16 April, 2007. Her team found that the first Wikipedia page on the killings went up within an hour and a half, with an "I'm OK at VT" Facebook group starting just 20 minutes later. Online contributors also began a concerted effort to compile information on the identities of the victims in the form of a Facebook discussion thread called "You know a student is confirmed dead? Compile the list here". Palen noted that people made an effort to make sure information was accurate, for example, stating when someone hadn't been seen and was feared dead as opposed to being confirmed dead. "Instead of rumour-mongering, we see socially produced accuracy," wrote the team.

To discuss the value of such tools, how best to harness them and how emergency services, as well as locals, can make use of them, researchers are meeting this week at the International Conference on Information Systems for Crisis Response and Management in Washington DC. "Members of the public play an absolutely critical role in disaster response," says Palen. "Now we're seeing what happens when you superimpose a technological layer on top of that."

Existing online resources such as Facebook, Twitter and Google Maps are clearly useful, but some researchers see these merely as starting points. One tantalising question is whether emergency management agencies, as well as members of the public, should mine the web community for information.

The American Red Cross has started using Twitter to exchange up-to-the-minute information about local disasters with those affected, and the US Geological Survey operates a site called Did You Feel It? where citizens can report local earthquake activity.

Right now though, most agencies still see themselves as providers of information rather than engaging in information exchange with the public. For example, the US Department of Homeland Security (DHS) maintains a disaster website that automatically updates itself according to RSS feeds from multiple, disaster-related government agencies, and has a blog that officials can contribute to, but there is no input from ordinary residents. Molly McPherson, spokeswoman for the Federal Emergency Management Agency, a branch of the DHS, says: "As far as web 2 0 is concerned, that social online interaction, we're really not there yet."

Ben Shneiderman of the University of Maryland in College Park would like that to change. Last year he suggested "911 gov" websites, inspired by Facebook and MySpace but run by emergency agencies. The sites would allow victims to post up-to-the-minute information, which could then feed into official decisions such as where to send teams of relief workers. These decisions would in turn get posted online for local residents (*Science* , vol 315, p 944). Shneiderman and colleagues have submitted a proposal to develop such a site to the DHS.

Gathering the information is just the first step, however: how do you make sense of it all once it is in? To try and minimise confusion, Murray Turoff and colleagues at the New Jersey Institute of Technology in Newark are building a software program that allows officials to post specific questions - such as where are emergency supplies most needed - and then invites officials and members of the general public to vote on possible answers. Everyone who replies gets ranked for their level of authority on that subject and the votes are weighted accordingly. The program constantly updates the vote results, draws attention to issues that are still contentious and, when problems are resolved, informs the decision makers.

But even if you can organise user-generated information properly with this software, David Woods of Ohio State University in Columbus also points out that you need to avoid being distracted - by visual input in particular. He carried out simulations of a chemical release disaster with eight disaster-response professionals and found that seven failed to notice information in the traditional channels - such as whiteboards - which was missing in a video of the disaster being shown at the same time. "People get caught up in their virtual view, they start to think that it's really what's happening on the ground," Woods says.

Ron Langhelm, a former FEMA employee who now works for technology consultancy Booz Allen Hamilton in Seattle, Washington, agrees that there is potential for confusion with people providing reports through multiple mechanisms. "We need to make sure that we don't muddy that water," he says.

There are also likely to be other challenges ahead. For example, Shneiderman suggests the web should be used not just in the heat of the moment, but also as a way for people to organise themselves ahead of time. "That requires getting people to agree that, for instance, taking Mr Jones in the wheelchair from apartment 301 with you when you evacuate the area is your responsibility," he says. "But how do we get people to commit to helping one another in times of stress?"

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