In an emergency, word spreads fast and far

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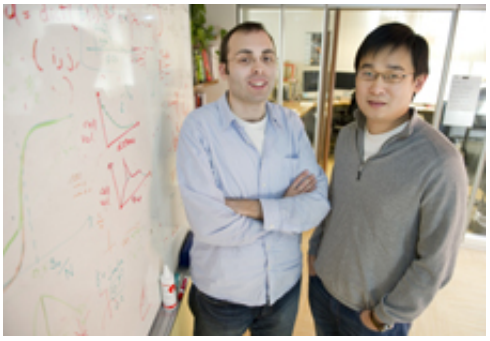

James Bagrow, left, and Dashun Wang found that large-scale emergencies trigger a sharp spike in the number of phone calls and text messages sent by eyewitnesses in the vicinity. Credit: Mary Knox Merrill.

(PhysOrg.com) -- Large-scale emergencies, such as bombings and plane crashes, trigger a sharp spike in the number of phone calls and text messages sent by eyewitnesses in the vicinity of the disaster, according to a research study by network scientists at Northeastern University.

The findings, reported in the online-only scientific journal *PLoS ONE*, could transform the ways in which real-time communications tools, such as smart phones, help policy makers and emergency personnel respond to potential tragedies. The social networking web site ushahidi.com, for example, became a very popular tool for tracing the needs of victims of last year's earthquake in Haiti.

"Our work may have important implications for policy-makers who want

to rethink how emergency response tools are used," said coauthor James Bagrow, a postdoctoral research associate for Northeastern's Center for Complex Network Research. "The sheer objectivity and volume of our data could help save lives."

Albert-László Barabási, director of the Center for Complex Network Research, and Dashun Wang, a PhD candidate at the center, also contributed to the report.

The researchers analyzed anonymous billing records of 10 million mobile phone subscribers in a western European country from 2007 to 2009. They compared call activity in the immediate aftermath of eight unplanned emergencies with eight scheduled activities, including rock concerts and sporting events.

Bombings and plane crashes—the most threatening disasters—elicited the greatest spike in call activity, as well as the most rapid decline in call volume. Concerts and sporting events, on the other hand, induced a more gradual increase and steady decline in call volume.

"People demonstrated an urge to use a cell phone as a response tool immediately only after extreme emergencies," said Wang, who noted that eyewitnesses tended to call members of their social network within minutes of the anomaly.

News of the most dangerous events often spread quickly and efficiently from an eyewitness to individuals as many as four links removed from his immediate social contacts, said Bagrow. Less threatening emergencies, such as minor earthquakes and blackouts, showed little propagation beyond the immediate social links of an eyewitness.

"Information spreading is actually very rare," he said. "This means that a population's innate reticence to communicate may naturally suppress

false information and may explain why the disaster myth" — the belief that panic is a common, widespread reaction to an emergency — "continues to hold, even with today's constant communication."

Provided by Northeastern University

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