

2011

Planning for Accessible Emergency Communications: Mobile Technology and Social Media

Helena Mitchell
Georgia Institute of Technology

DeeDee M. Bennett
University of Nebraska at Omaha, dmbennett@unomaha.edu

Salimah LaForce
Georgia Institute of Technology

Follow this and additional works at: <https://digitalcommons.unomaha.edu/pubadfacproc>

 Part of the [Public Affairs, Public Policy and Public Administration Commons](#)

Recommended Citation

Mitchell, Helena; Bennett, DeeDee M.; and LaForce, Salimah, "Planning for Accessible Emergency Communications: Mobile Technology and Social Media" (2011). *Public Administration Faculty Proceedings & Presentations*. 3.
<https://digitalcommons.unomaha.edu/pubadfacproc/3>

This Conference Proceeding is brought to you for free and open access by the School of Public Administration at DigitalCommons@UNO. It has been accepted for inclusion in Public Administration Faculty Proceedings & Presentations by an authorized administrator of DigitalCommons@UNO. For more information, please contact unodigitalcommons@unomaha.edu.



1.5. Planning For Accessible Emergency Communications: Mobile Technology And Social Media

Helena Mitchell, PhD^{1*}, DeeDee Bennett², Salimah LaForce³

^{1,3}Wireless RERC, Georgia Institute of Technology, United States

²Oklahoma State University, United States

^{1*}500 10th Street, NW, Atlanta, Georgia 30332-0620 – 404.385.4614

Helena@cacp.gatech.edu

Abstract

The Rehabilitation Engineering Research Centre for Wireless Technologies (Wireless RERC) Wireless Emergency Communications (WEC) project team developed prototype software for wireless devices based on regulatory requirements and conducted a series of field tests to explore the effectiveness of receiving mobile emergency alerts. Incorporated into the process were surveys that assessed how people with disabilities and emergency management used various forms of media to send and receive emergency communications. Presented are the WEC R&D findings to enhance accessibility of the Emergency Alert System (EAS), Commercial Mobile Alert System (CMAS); and explore access to popular mainstream communication modes (mobile social media).

Keywords

Emergency alerting/information, communications, social media, accessible, Internet, CMAS, EAS, emergency management

Introduction

Historically, vulnerable populations have been disproportionately affected during disasters. In many instances an individual's vulnerability can seriously impair not only their ability to prepare for a disaster but also to cope with the aftereffects of disasters [1] [2]. Previous research on support for the elderly and people with disabilities in the Southeast United States has shown (with the exception of Florida) that many states barely mention these demographics in their emergency plans [3]. While implementation of emergency alerting systems has been documented, there is still no consistent standard in practice to issue warnings or alerts across municipalities or states. The result of this gap is that communications to the elderly and people with disabilities are insufficient.

Wireless information and communications technologies (ICT) are important for people with disabilities and the elderly [4], as evident in the recent increase in ICT use among this population. Research on the use of social media has found that individuals over 65 have doubled their utilization of social media sites in one year (2008-2009), representing the largest increase of any age group during the same time period [5]. Results of the Wireless RERC's survey of user needs found that wireless technologies such as text messaging have become a key mode of communication for the deaf and hard-of-hearing and that a majority of people with disabilities indicate that accessible wireless communications would be useful during an emergency [6]. Both mobile emergency alerting and social media platforms fall into this category [7].



Since 2004 the Federal Communications Commission (FCC) has been working to modernize the Emergency Alert System (EAS) given the move from analog to a digitally-based alert and warning system in the United States. They have sought public comment on how it could be more effective and accessible for warning the American public [8]. As a result technical standards and protocols to enable commercial mobile service (CMS) providers to send emergency alerts to their customers was developed and the Commercial Mobile Alert System (CMAS) will become commercially available in 2012 [9] [10]. The WEC technical team developed several prototype systems to study the experience of individuals with disabilities receiving these emergency alerts on mobile phones. Accessible prototype systems included conventional mobile phones using Short Message Service (SMS) and web services to deliver alerts, as well as prototype software with various features to address the needs of users with sensory disabilities.

Concurrently, research on multi-format platforms revealed that social media has emerged as tools used in emergency communications [11] [12] [13] [14]. Social media has already been used in the 2007 Virginia Tech shooting [15], 2007 California wildfires [16], 2010 Haiti earthquake [17], 2010 Hawaii tsunami warning [18], 2011 Australian floods [19], the Egyptian civil unrest/revolution of 2011 [20] and the 2011 Japan earthquake and tsunami [21]. Early in 2011, Craig Fugate, Administrator of the Federal Emergency Management Agency [22] (FEMA), attested to the usefulness of social media [23].

Wireless Emergency Communications And Accessibility

As evident from the list of emergencies in the previous section, wireless technology and social media are becoming a means by which we stay connected, informed and in some cases warned during disasters. The federal government and wireless industries are currently exploring this evolution and working toward deploying solutions in mobile emergency alerting.

Mobile emergency alert field trials and findings

A series of 12 field trials were undertaken to examine the accessibility of mobile emergency alerts. EAS message formatted trials are referred to herein as the “WEC method” because EAS messages are not currently sent to mobile devices in accessible formats. The WEC method was used in the first nine trials as follows; “The National Weather Service has issued a Tornado Warning for Test County until 10:15 am.” The SMS message was limited to 160 characters and contained a hyperlink to a web page containing the alert’s full content, formatted for accessibility and mobile viewing. The CMAS message format was used in the three CMAS field trials as follows: “Tornado Warning for Atlanta until 3 pm EST. Take shelter. NWS.” CMAS messages were limited to 90 characters with the EAS attention signal and vibration cadence, and did not include a hyperlink. In both EAS and CMAS tests, the mobile devices were loaded with client software capable of presenting alert content with accommodations for blind / low vision (text-to-speech) and hearing impaired users (specific vibrating cadences). Simulated emergency alerts were sent to each participant’s mobile phone; an observer monitored for system failure and usability problems. Before and after each test, participants completed a questionnaire to gather data on their experience.

Two focus groups were conducted to assess if American Sign Language (ASL) video enhanced the understanding of textual alerts for people who are deaf. Participants



conversant in ASL and comfortable reading English, were presented with conventional text alerts, as well as text alerts coupled with video clips presenting an ASL translation.

The majority of participants in both the “WEC method” trials (95%) and the CMAS trials (85%) received alerts via television (TV). In the pre- and post- test questionnaires for EAS, 92% confirmed information by turning on their TV. In the CMAS tests, 100% said they would confirm by turning on their TVs, indicating a link between CMAS (phones) and EAS (TV/radio) for obtaining and verifying emergency information. Ninety percent of EAS and 93% of CMAS trial participants indicated an interest in a mobile phone alerting service. Participants noted that although television was the prevalent method, it was not the preferred method because the information was not consistently accessible (lacks captions, video description and/or ASL interpreters). The attention signal was often not heard by a person with significant hearing loss, who would need to be looking at the television at the time the alert began scrolling or they would miss all or part of the emergency information. If a person’s primary language was ASL, some English text might be lost in translation. Anecdotal evidence reveals that EAS alerts via television broadcasts are inconsistent in their use of audio. People who are blind or have low vision will hear the alert signal, but often, the text crawl is not presented in an audio format; and when directed to news outlets for further information, video description is rarely available and news persons often direct viewers to “look here” when pointing at maps or “read the website or phone number at the bottom of the screen.” Despite FCC efforts to modernize the EAS, accessibility barriers still exist, in part because the viewer must rely on additional information sources to gather all the salient details.

More than 78% of all participants using the WEC method, stated the wireless emergency alerting system was an improvement over other methods they currently used to receive emergency warnings and alerts. Of deaf and hard of hearing participants, 72% considered the alerting of the accessible client software to be an improvement. The lower satisfaction of the WEC method with this population appears to be due in part to the accessibility features of the mobile devices not being sufficient in addressing their particular accessibility needs. Of blind and low vision participants, the percentage shoots up to 83%.

In the CMAS tests, 81% of visually impaired participants and 64% of participants with hearing impairments found the CMAS alerts to be an improvement. Post-test discussion, revealed that the WEC method received higher rates of approval because more detailed information could be provided, versus the very limited information allowed by the 90 character restriction and hyperlink prohibition prescribed by CMAS rules.

All ASL focus group participants agreed that ASL video alerts would be a useful tool for people that are deaf and literate in ASL. Some participants felt that the combination of text and ASL together gave them a fuller understanding of the message than either on its own. One surprising result of the evaluation was the difficulty of understanding some phrases typically used in NWS alerts, such as “take cover” or “low-lying area”; these idiomatic expressions do not translate well into Deaf English or into ASL, therefore the word choice used in text or ASL alerts should be carefully considered and vetted amongst this population.



Social Media's potential for alerting people with disabilities

According to Harris Interactive, 65% of U.S. adults use social media (2011). The Red Cross conducted a survey entitled Social Media and Disasters [24], which found 16% of respondents have used social media to obtain information about an emergency and 69% of respondents felt emergency response agencies should monitor and respond to postings on their social media sites.

A recent Wireless RERC survey on the use of wireless technologies and social media by people with disabilities for emergency communications [25], identified similar trends in receiving, verifying and sharing alerts (2010/2011). Despite reports that social media platforms are not fully accessible to people with sensory disabilities [26] [27], approximately two-thirds of the respondents indicated use of social media. Facebook was the most widely used to receive and verify a public alert and 23% of the respondents have received an alert via one or more social media sites. Although desktop computers and laptops were the primary means to access social media (41% and 31%, respectively), 25% of respondents use more than one type of device (e.g., desktop and cell phone) to access social media.

	Received alert	Verified alert
Facebook	11.6%	8.6%
Twitter	4.6%	2.5%
Listservs	4.2%	2.1%
Yahoo	3.8%	2.3%
YouTube	1.3%	1.0%
MySpace	1.3%	0.7%
Google Buzz	1.2%	0.8%
LinkedIn	0.0%	0.6%
Foursquare	0.3%	0.3%

Social media outlets used by respondents with disabilities to receive and verify alerts.

	Percent
Desktop only	23%
Laptop only	12%
Cellphone only	3%
Desktop and laptop	6%
Desktop and cellphone	7%
Laptop and cellphone	7%
Desktop, laptop, cell	5%
TOTAL	63%

Devices	Yes (%)
Desktop computer	41%
Laptop computer	31%
Cellphone	22%

Do you access social media on the following devices? (exclusive/nonexclusive)

A survey conducted by the FCC's Emergency Access Advisory Committee (EAAC), asked "Do respondents use a mobile phone, Smartphone or computer for media or text-

Also available via the conference website www.aegis-conference.eu



messaging;” options included “social networking services such as Facebook or Twitter [28].” Eight-nine percent stated they used mobile social sites, with 41% using it almost every day [29].

To ascertain if there was a connection between social media use by the public and its use by emergency management entities, an assessment of the use of social media by states and municipalities was conducted. Each city/municipality and state website was analyzed to determine whether social media platforms were used for emergency alerts; only places that specifically used social media in an emergency alerting capacity were counted. Social media platforms were categorized under either general public safety or emergency alerts. The term “emergency alert” refers to departments such as the Department of Emergency Management and Department of Emergency Preparedness. Of the 100 largest cities in the United States [30], 45% of cities and 74% of states use social media to disseminate emergency information. These usage rates set a precedent and expectation amongst the American public to be able to receive emergency information via social media. As Craig Fugate of FEMA observed “Rather than trying to convince the public to adjust to the way we at FEMA communicate, we must adapt to the way the public communicates ... We must use social media tools to more fully engage the public as a critical partner in our efforts [31].” Included in this should be people with disabilities, but our research indicates that there is not widespread acknowledgement within government of the communication needs of people with disabilities during emergencies.

In addition, we evaluated whether or not government services were targeting or mentioning people with disabilities. Some cities/municipalities and states had website links for people with disabilities in conjunction with emergency planning, but only a couple of sites explicitly correlated social media, emergency communications, and people with disabilities.

	Local	State
Social Media targeting people with disabilities	2%	0%
People with disabilities mentioned with emergency communications emphasis	11%	24%
People with disabilities mentioned w/emergency services emphasis, no communications emphasis	38%	50%
People with disabilities emergency services not mentioned	49%	26%

Government Services and People with Disabilities

Mainstreaming access for all: Reaching Everyone

Features of mainstream technologies, designed initially for people with disabilities, have frequently demonstrated features that are usable for all, and consequently have been adopted by the general public [32] [33]. Exemplars of this include closed captions and audio books [34]. Closed captions and audio books are widely used by the general public, the



former in loud venues such as bars and airports, and the latter as entertainment during road trips or household chores.

Accessibility features employed specifically for people with sensory disabilities can be beneficial for all end-users depending on their access and functional needs at any given time. A deaf person and a person in a loud environment have similar access and functional needs regarding access to information, a blind person and someone temporarily blinded by smoke trying to evacuate a building have similar environmental access and functional needs. Designing and planning for the access and functional needs of people during an emergency will cast a wider net, encompassing many different types of people in a myriad of situations, whether a permanent disability, or temporary one.

WEC field test participants without a disability still wanted the audio format of text alerts, a loud attention signal and strong vibrating cadence. When asked about environmental impact on receipt of alerts, these same participants stated that noise in the environment (“people talking”, “noise in the area”) made the audio hard to hear. If only one format had been provided, the alert information may not have been accessible, and if the attention signal was not simultaneously sound and vibration, they may have never been aware of an incoming alert. This is as true for our field test participants with sensory disabilities, as it was for those without. The WEC prototype brought assistive technology functionality to a mainstream device; seamlessly incorporated so no action need be taken by the end-user to upload an application or software. The same device could be used, without modification, by a person with or without a disability to receive mobile emergency alerts.

The development of accessible mobile social media for the purpose of emergency alerting should be a key policy objective. Facebook and Twitter presently are not required to be accessible; despite this, users with disabilities are finding ways to access the content, utilizing screen reader software or web applications to render the content in accessible formats. Government utilization of social media before, during and after emergencies to communicate with the public suggests that built-in accessibility of social media websites will become more pressing. “One of the challenges we face as a nation is ensuring not only that our technological prowess empowers ALL Americans to lead better and more productive lives, but also that we harness these tools to preserve and protect the lives, property, and public safety of ALL citizens by making them universally accessible and usable [35].”

Conclusions and recommendations

At present, initial receipt and verification of alerts are still most often through the television, but as discussed, television has accessibility barriers. Among social media Facebook is currently the most popular amongst users with disabilities, however, research on state and local emergency response agencies indicates that Twitter is predominately used for emergency alerts and communications, revealing a disconnect between where citizens seek information and where agencies disseminate information. In concurrence, more research is needed to determine the factors that inhibit greater use of social media by people with disabilities to receive alerts; and reluctance of some emergency managers from using this medium to disseminate alerts.

Given these factors, redundancies and alternative sources should be put in place to ensure that people with disabilities receive the full alert and links to additional information. One



recommendation from the research conducted would be for agencies to place social media links for alerts in a prominent place on the home page of city emergency services websites, including, but not limited to police, fire, emergency management departments; as well as on the website home page of state departments that service the needs of people with disabilities and seniors. This redundancy would capture more users, as well as offer them multiple platforms such as Facebook and Twitter by which to receive the alerts.

In summation, the use of social media is increasing as well as the use of wireless devices, hence the more channels available for receipt of emergency information and alerts, the more likely a person with a disability will be able to select an option(s) that is most accessible for their use during emergencies. An informed public, taking correct action during an emergency can reduce the burden on emergency services/emergency response personnel. Incorporating social media outlets in the development of emergency communications systems and plans makes good strategic sense, and can become instrumental in preparedness, mitigation, response and recovery.

Acknowledgement(S)

The authors wish to acknowledge the contributions of the following individuals to the success of the research reported: Christina McMillian, John Morris, James Mueller, Ed Price, Jeremy Johnson, Ben Lippincott, and Harley Hamilton. This research was made possible by the National Institute on Disability and Rehabilitation Research of the U.S. Department of Education, grant # H133E060061, and in part by the Centre for Advanced Communications Policy, Georgia Institute of Technology. The opinions contained in this publication are those of the grantee and do not necessarily reflect those of the U.S. Department of Education.

References

- [1] Tierney, K. (2006). *Social Inequity, Hazards, and Disasters*, in *On Risk and Disaster: Lessons from Hurricane Katrina*, Philadelphia: University of Pennsylvania Press.
- [2] Wisner, B. (2004) *At Risk: Natural Hazards, People's Vulnerability and Disasters*.
- [3] Bennett, D. (2010). *State Emergency Plans: Assessing the Inclusiveness of Vulnerable Populations*, *International Journal of Emergency Management*, Volume 7, Issue 1.
- [4] Mitchell, H., Johnson, J., LaForce, S. (2010). *The Human Side of Regulation: Emergency Alerts*. In *Proceedings 8th International Conference on Advances in Mobile Computing & Multimedia*, Paris (MoMM 2010).
- [5] Madden, M (2010). *Older Adults and Social Media*, Pew Research Center. Available at <http://www.pewinternet.org/~media/Files/Reports/2010/Pew%20Internet%20-%20Older%20Adults%20and%20Social%20Media.pdf>
- [6] Wireless RERC (2010). *SUNspot 1 - About Wireless Users with Disabilities*. Available at http://www.wirelessrerc.org/publications/sunspot-latest-findings-from-our-survey-of-user-needs/SUNspot_Wireless%20Use%20by%20People%20with%20Disabilities_2010-08-10.doc/view.
- [7] Bricout, J.C. and Baker, P.M.A. (2010). *Leveraging Online Social Networks For People With Disabilities In Emergency Communications And Recovery*. *International Journal of Emergency Management*. Vol. 7(1) pp. 59-74.
- [8] Federal Communications Commission (2004). *In the Matter of the Review of the Emergency Alert System*, Notice of Proposed Rulemaking [EB Docket No. 04-294], Washington, DC.

Also available via the conference website www.aegis-conference.eu



- [9] 109th Congress of the United States (2006). Section 602: Warning Alert and Response Network Act of the Security and Accountability For Every Port Act of 2006 (SAFE Port Act) [PL 109-347], Washington, DC.
- [10] Federal Emergency Management Agency (2011). Personal Localized Alerting Network, [FNF-11-002], May 10, 2011. Available at <http://www.fema.gov/news/newsrelease.fema?id=54882>.
- [11] Sutton, J. L., Palen, I. S. (2008). Backchannels on the Front Lines: Emergent Uses of Social Media in the 2007 Southern California Wildfires. In Proceedings 5th International Conference on Information Systems for Crisis Response and Management, Washington, DC. (ISCRAM)
- [12] Palen, L., A. Hughes. a. L. (2009). Twitter Adoption and Use in Mass Convergence and Emergency Events. In Proceedings 6th International Conference on Information Systems for Crisis Response and Management, Gothenburg, Sweden (ISCRAM).
- [13] Sutton, Jeannette L. (2010). Twittering Tennessee: Distributed Networks and Collaboration Following a Technological Disaster. In Proceedings 7th International Conference on Information Systems for Crisis Response and Management, Seattle, Washington (ISCRAM).
- [14] Heverin, T. and Zach, L. (2010). Microblogging for Crisis Communication: Examination of Twitter Use in Response to a 2009 Crisis in the Seattle-Tacoma, Washington Area. In Proceedings 7th International Conference on Information Systems for Crisis Response and Management, Seattle, Washington (ISCRAM 2010).
- [15] Palen, L., Hughes, A. L. (2009). Twitter Adoption and Use in Mass Convergence and Emergency Events. In Proceedings 6th International Conference on Information Systems for Crisis Response and Management, Gothenburg, Sweden (ISCRAM 2009).
- [16] Sutton, J. L., Palen, I. S. (2008). Backchannels on the Front Lines: Emergent Uses of Social Media in the 2007 Southern California Wildfires. In Proceedings 5th International Conference on Information Systems for Crisis Response and Management, Washington, DC. (ISCRAM 2008).
- [17] Frank, T. (2010). Social Media Play Part in Haiti's Recovery Efforts, USA Today. http://www.usatoday.com/tech/news/2010-02-01-haiti-monitor-social-media_N.htm.
- [18] Associated Press. (2010). Social Media Helped with Hawaii Tsunami Evacuation, ABC news, Available at <http://abcnews.go.com/US/wireStory?id=9981620>.
- [19] IANS. (2011). Twitter, Facebook saviour during Australia floods, The Times of India. Available at <http://timesofindia.indiatimes.com/tech/social-media/Twitter-Facebook-saviour-during-Australia-floods/articleshow/7327761.cms#ixzz1CAJjUC7z>.
- [20] Gross, D. (2011). Google, Twitter help give voice to Egyptians, CNN. Available at <http://www.cnn.com/2011/TECH/web/02/01/google.egypt/index.html>.
- [21] Acar, A., Muraki, Y. (2011). Twitter for Crisis Communication: Lessons Learnt from Japan's Tsunami Disaster. International Journal of Web Based Communities, (in press).
- [22] FEMA coordinates the response to disasters in the U.S that overwhelm the resources of local and state authorities.
- [23] Fugate, C. (2011). Understanding the Power of Social Media as a Communication Tool in the Aftermath of Disasters. Testimony before the Senate Committee on Homeland Security and Governmental Affairs, Subcommittee on Disaster Recovery and Intergovernmental Affairs. Available at http://www.dhs.gov/ynews/testimony/testimony_1304533264361.shtm .



- [24] Red Cross (2010). Social Media in Disasters and Emergencies. Available at <http://www.redcross.org/www-files/Documents/pdf/other/SocialMediaSlideDeck.pdf>.
- [25] Wireless RERC (2011). Emergency Communications Survey-Full Report-June 2011. Available at http://www.wirelessrerc.org/publications/Report_Emergency%20Communications%20and%20People%20with%20Disabilities_2011-06-22_Final.doc/view.
- [26] The BIK Project (2011). The Accessibility of Facebook Parts 1-3. Available at <http://www.bitvtest.eu/articles.html>.
- [27] Observatory on ICT Accessibility (2010). Accessibility of Social Networking Services. Available at http://www.discapnet.es/Observatorio/Accessibilidad_Observatorio_on_Social_Networks.pdf
- [28] Emergency Access Advisory Committee (2011). Report on Emergency Calling for Persons with Disabilities – Survey Review and Analysis. Available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2011/db0721/DOC-308532A1.pdf.
- [29] Ibid, p.16.
- [30] U.S. Census (2009). Annual Estimates of the resident population for incorporated places over 100,000 Ranked by July 1, 2009, Population: April 1, 2000 to July 1, 2009.
- [31] Fugate, C. (2011). Testimony before the Senate Committee on Homeland Security and Governmental Affairs, Subcommittee on Disaster Recovery and Intergovernmental Affairs.
- [32] Stanford University's Office of Judicial Affairs (2011). Interface Design. Available at <http://www.stanford.edu/dept/vpsa/judicialaffairs/about/accessibility.design.htm>
- [33] International Disability Exchanges And Studies (IDEAS) Project for the New Millennium (2005). Technology & Disability: A Global Glimpse of the Future. Available at <http://wid.org/publications/downloads/TECHNOLOGY%20-%20DISABILITY.pdf>.
- [34] National Council on Disability (2005). Information Technology and Americans with Disabilities: An Overview of Innovation, Laws, Progress and Challenges. Available at <http://www.ncd.gov/publications/2005/08022005-Inf>.
- [35] Furth, D. (2009). Keynote Speech of David Furth, Deputy Chief, Public Safety and Homeland Security Bureau, FCC. In Proceedings 2009 Wireless Emergency Communications State of Technology Conference, Atlanta, Georgia (SoT 2009).

