Social Media and Virtual Platforms:
The New Situational Awareness for Emergency Management Professionals

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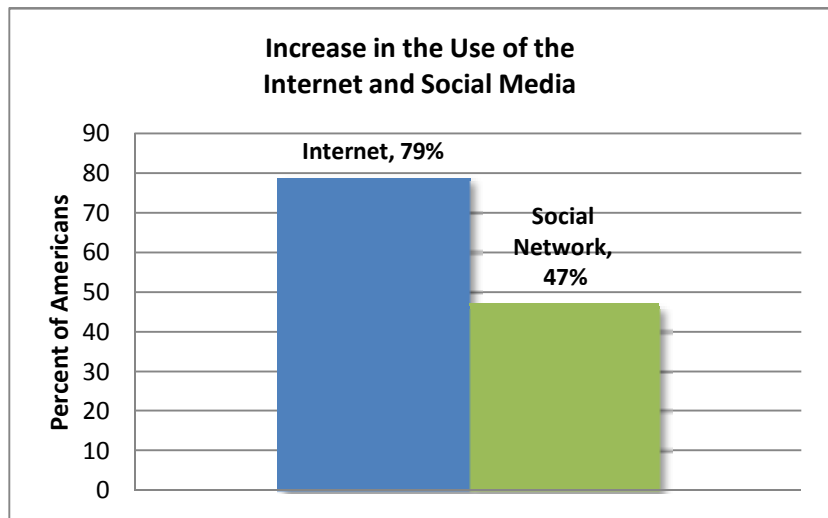and Disaster Response

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Introduction

The death of Osama Bin Laden, on May 1, 2011, sparked a record 12.4 million tweets per hour. The first "news" of the American Navy Seals raid on Osama Bin Laden in Pakistan was posted to a blog by a Pakistan citizen twenty minutes before the actual broadcasts on CNN about the raid [1]. These unconfirmed reports made by social media alerts are what supported the news stories that informed millions of one of the most significant events in the last decade. The reality of the current culture in America is that citizens are constantly connected and communicating through social media. Now, varying levels of discussion, as measured by "tweets" on Twitter, Facebook "likes" or YouTube videos watched, mark an event's significance. A new trend is emerging among the general public: more people (fifty-seven percent) are more likely to communicate and share information online than in face-to-face interactions [2].

The speed and ways, in which information is now being shared, via online social networks, are presenting both new opportunities and challenges for emergency managers who are looking to harness the power of social media to support emergency response operations. The traditional "top-down" method of disseminating information is being radically changed through the influence and adoption of social media.   Currently, according to the Pew Research Center, seventy-nine percent of American adults have reported using the Internet and nearly half (forty-seven percent) say they use at least one social network [3]. Social network use has nearly doubled in the last five years by older adults and businesses.

Increase in the Use of the Internet and Social Media

Internet, 79%

Social Network, 47%

Percent of Americans

90
80
70
60
50
40
30
20
10
0

Emergency management professionals are now either experiencing or observing this shift in information sharing from a centralized process to the decentralized process led by social media networks such as Facebook, Twitter, YouTube and Flickr. These social media tools provide emergency managers with a quick way to interject into the online conversations of other industry professionals and state, local and

international communities. While there is much valuable information on isolated uses, successes and lessons from social media use among emergency management professionals, there is little information that acknowledges the lack of streamlined understanding of the background and actual technical uses of social media tools. This paper will illustrate the usefulness of social media through selected case studies and will describe the exact functions of some of the most popular and widely used social networking tools in the industry. This paper provides a description of tools and their functions, discussion of the common concerns of social media usage (rumor control, documentation, etc.) and a how-to guide on engaging in social media networks.

Methods

Quantitative and qualitative data sources and detailed case study information, based upon first-hand usage and observations, were obtained that related to social media use for and among emergency managers. Data sources included domestic and international reports, web sites, newspapers and professional journals. These data sources were analyzed for social media developments and specific uses among emergency managers for emergency preparedness and disaster response. Text was analyzed for emerging trends or conceptual categories.

While this article applies to social media usage for a domestic audience, there are numerous examples of international uses as well. There are currently government agencies that are adopting individual social networking sites, and many other organizations, which are utilizing multiple social networking sites to create a multi-platform network approach. Future research, focus groups and test studies should investigate both domestic and international uses for social media.

Findings

A. The Social Media Landscape

Every social networking site shares the same primary objectives: to communicate a message and to drive a digital conversation. Secondary to these objectives is a suite of uses for individuals, small and corporate businesses, and government agencies that includes brand exposure and presence; connecting to and learning about target audiences; building buzz around a brand, topic, cause or event; and establishing trust and credibility. Marketers and organizations know that to ensure a message reaches the masses; they must go where the masses are. This is why Facebook and Twitter are two of the most widely adopted and used social networking sites for business and organizations because of their high usage by individuals.

The following social networking websites will be discussed in this article: Facebook, Twitter, YouTube and Flickr. While there are nearly 200, and counting, different social networking sites available, the top two most popular networking sites are Facebook and Twitter. A 2011 Forrester study concluded that of all the United States adults engaging in social networks, ninety-six percent are using Facebook and thirty-eight percent are using Twitter [4]. The lines between business and personal use have also blurred to create a platform for the widely used social networking tool, YouTube. Flickr, a geotagged photosharing website, was chosen for this study due its visibility in company searches, as it will appear under a company's name in any Google or similar search engine query.

Emergency managers can interact with text and images provided by citizens to assess, track and verify events. Emergency managers who engage in networks like Facebook, Twitter, YouTube and Flickr know that their content will be communicated to a mass of social media users, who will, in turn, spread messages to other networks including those of other organizations, family, friends, and colleagues.

B. Social Media Tools

Facebook

Facebook was made famous first by its rapid and ever-increasing growth since its creation in 2005. A number of statistics provides a picture of who these users are. Facebook currently has six hundred million users; a third of those users access Facebook on a mobile phone [5]. Roughly seventy percent of Facebook users live outside of the United States. Many young Americans are searching for and obtaining news information related to current events, emergencies and entertainment; forty-eight percent of them obtain news information from friends' Facebook posts. The largest growing category of Facebook users is women ages fifty-five and older [2].

Facebook is available for anyone who has an email address. Once an email address and name are provided, a Facebook user can create a profile. The profile may be detailed or simple according to user preference, with customizable privacy settings. Information such as location, description, address and phone number, quotes, and more personal interests (books, movies and music) can be shared. Once a profile is created, one can search what organizations or known contacts are also using the site and request to be "Facebook friends." Status updates, pictures and video can be shared through private messages or on the "wall." Each profile has a "wall" or a page where posts from other users are visible to any friends with user-designated access.

Twitter

Twitter is a microblogging website that allows users to create a public or private streaming of messages with a maximum of one hundred-forty characters called "tweets." The Pew Research Center's 2011 Twitter Update Report cited that thirteen percent of online United States adults use Twitter and over half (fifty-four percent) of Twitter users access the service on a mobile phone [3]. Twitter usage by Americans nearly doubled from 2008 to 2010.

Twitter's purpose is to allow users to share "what's happening." The information feed is a strength of Twitter. By "following" an organization, one is essentially subscribing to view tweets, or messages, in a running "timeline." To discover what organizations or people are on Twitter is as simple as searching names in Twitter's search bar. Twitter provides an opportunity to establish a "voice" by posting information, reacting or responding to tweets from others and/or "retweeting," which is essentially

quoting another person's information and sharing it on your own Twitter account, thereby snowballing information. Twitter's relevance to the emergency management community continues to increase as its user base grows and successful emergency response case studies emerge.

YouTube: Video Sharing

Created in 2005, YouTube is currently the largest online video sharing community with billions of views per day [7]. YouTube allows anyone to create an account and upload videos. Videos range from low production (e.g.: cell phone videos) to high-level production videos such as music videos, advertising and promotional spots. Many noteworthy emergency management professionals have an official YouTube account where users can subscribe, receiving an update each time a new video is posted. Videos ranging from simple emergency preparedness tips to hazard mitigation planning to compiled news reports related to crisis events can be found on the website. An advantage of using YouTube to share videos is that it requires no cost, and the upload process is relatively simple. The comment feature for most videos allows users to dialogue and share further information regarding a video's content.

Flickr: Photo Sharing

Flickr is a website primarily used for photo sharing but also enables users to upload videos. Similarly, to Facebook, users can "tag" friends, organizations or family in the pictures of videos in which they appear. Organizations like the Cambodian Red Cross Disaster Response Team post picture updates on Flickr for response initiatives and can provide a link to their official website. Geotagging, or providing exact coordinates of one's location, is another feature of Flickr (see below for a description of geotagging) that can be used by emergency management personnel.

Blogs and Wikis

Blogging gives the public the ability to publish their thoughts easily and quickly online. Blogs that are published are generally available for all to read. Blog posters have the ability to post whatever content they want. Many sites also allow blogs to be commented on, allowing a two-way discussion between the public and the author. One example of this type of service is Word Press.com (http://wordpress.com/).

Wikis are a similar type of social media website. A wiki allows users to create their own webpage. Quick editing of pages and organizing different information is a benefit of a wiki. A wiki can also allow commenting and the important two-way flow of information. Arguably, the most famous Wiki is Wikipedia (http://www.wikipedia.org/), a free internet encyclopedia created and maintained by the users.

Integrated Social Media Platform Approach

While each social network can stand alone as an autonomous networking tool, the tools can create new advantages through combining two or more for an integrated approach. For example, a tweet, or message, posted to Twitter may contain a link to a company's website or YouTube channel. Each social network represents a unique cluster of people, and linking various clusters increases the likelihood of information being spread quickly and to a large audience.

Geotagging/Volunteered Graphic Information (VGI)

Geotagging is the process of adding location information to social media posts, videos or photos. When the public uploads any of these media to the internet, they may have the ability to add a geotag to their post. Emergency managers, especially on the state or regional level, can get a picture of the amount of destruction that is occurring in an area through such posts. With internal Geographic Information Systems (GIS) or through free online sources (such as Google Earth™, www.google.com/earth/index.html, these posts can be plotted on a map, which will give a high angle view of what is occurring in the community. Many social networks, like Facebook, Twitter and Flickr are making their services compatible with geotagging, which can most easily be accomplished when updating social media by use of a smart phone. Smart phones allow users the choice to activate geotagging or keep locations confidential.

C. Integration with Mobile Technology

Contributing to the growth of social media and their applicability to situational awareness is an increase in the number of people who access these services via handheld mobile devices. Currently, ninety percent of mobile subscribers in the United States and in Western Europe access the internet on their mobile devices, over eight-five percent of new mobile handset devices worldwide allow Internet access [8]. It is expected that by 2014, mobile internet usage will surpass internet access from desktop computers [7].

Smart phones, or phones that allow web access and application uses, coupled with instant access to social networks have created a new climate for both communities and emergency managers to interact. Over one third of active Facebook users access Facebook Mobile through a personal mobile device [7]. With sharing almost every facet of one's life on a social network becoming a societal norm, second-by-second coverage of a disaster or emergency event can be acquired and distributed through a tweet, Facebook post, YouTube video or picture by use of a handheld mobile device. Accessing Facebook, Twitter and other social networks from a mobile phone while on the go enables a user to post an update about location and surroundings, feelings and the people around them. As the adoption and usage of smart phones with these capabilities increase, so will the use of social media on these devices.

Social media have the potential to provide emergency managers with an advantageous tool in preparedness planning, response and surveillance. Becoming aware of the current uses, successful case studies and the value of integrating social media into emergency management's best practices will allow professionals to tap into the new situational awareness that can be provided by social media.

D. Case Studies

2011 Japan Earthquake

In March 2011, researchers from Kobe City University of Foreign Studies surveyed Twitter users and tracked updates from earthquake victims in Tohoku, Japan [9]. This survey suggested emergency management officials could increase the value and validity of using Twitter in a disaster by announcing official "hashtags," or topics labeled with the "#" symbol, via multiple social media platforms. The survey also unveiled the

lack of official updates from government and mass media through the traditional communication mediums of radio and broadcast television [9]. Establishing official accounts that can be re-tweeted, or re-posted via Twitter, will increase the validity and reliability of using Twitter as a tool during a disaster event.

Mexico City

Mexico City, Mexico, has experienced both the risks and benefits of social media. Twitter has more than four million users in the country; ninety-eight percent of the citizens have a Facebook profile and thirty million people are able to access the internet [10]. The recent passing of the Veracruz Law prohibits citizens from spreading false rumors and information that may trigger panic. Mexico's current economic state and war on drugs have created an environment for drug cartels to use social media for planning and executing violent and illegal activities. At the same time, a vast majority of citizens as an absolute necessity for safety views Twitter and Facebook. Tweets are viewed as "digital warnings" that alert citizens of dangerous areas, outbursts, and dangerous events [11]. According to the *New York Times* report, "Mexico turns to social media for information and survival," many Mexicans state that they value and trust social media more than the local media outlets [11]. Internet and social media literacy are of vital interest to families, as these communication avenues are considered safety skills. While social media networks like Twitter and Facebook are used for illegal pursuits, the public forums allow watchdogs to spot this activity and, in turn, post warnings to thousands. By more citizens and officials engaging in social networks in Mexico City, knowledge and awareness are increased, and potential incidents can either be prevented or quickly responded to.

US Government and August East Coast Earthquake

Recently, the United States government has begun acting as a centralized filter for information on Twitter. As a result of the massive flood of telephone calls regarding the August 23, 2011, East Coast earthquake, the Department of Homeland Security's official Twitter account (username: @DHSgov) posted to its followers, "Quake: Tell friends/family you are OK via text, email, and social media (@twitter & facebook.com) avoid calls." This tweet was retweeted (re-posted) by over 100 other Twitter users including the White House's official twitter account. This is just one example of how the decentralized methods of social networks can be validated and given credibility by the information being sent by an official, confirmed source.

2010 Haiti Earthquake

On January 12, 2010, a 7.0 magnitude earthquake struck the island of Haiti. Damage occurred all over the island, especially in the area of Port-au-Prince, the island's capital. There were an estimated two hundred thirty thousand people killed, three hundred thousand injured and another one million people left homeless [12]. Social media provided many benefits to the response; primarily it provided a two-way communication flow about the disaster and reduced duplicate communication. CNN reported that a total of eight million dollars was raised as a result of awareness through Facebook, Twitter and text messaging during the forty-eight hour campaign [13].

Twitter, in particular, played a large role in fostering interactions about the quake. There were an estimated 2.3 million tweets focusing on the Haiti quake, with the majority of them being retweets, or second-hand information [14]. Many non-profit organizations and celebrities pledged to donate funds based on the numbers of retweets from Twitter followers. Many retweets were linked to a Red Cross text messaging campaign, which prompted anyone with a cell phone to make a contribution by texting the word "Haiti" to 90999; and, in exchange, a ten dollar charge would be added to the donor's cell phone bill [14].

Another benefit of social media was the ability to quickly ascertain information about events that were being reported in the media. As an example, it was officially reported that Secretary of State Hillary Clinton would be flying into the country to evacuate injured Americans. Clinton, in conjunction with the official White House blog, contributed to the eight million dollar total raised by the American Red Cross [14].

Another proven success factor in the use of social media in Haiti was the ability to get credible information without having to go through the traditional official means. Ushahidi, a crowdsourcing tool, pulled and validated reports and updates from Twitter, Facebook, blogs and text messages to create a map detailing impact points after the quake. Disaster response teams were able to use this information to locate and help victims [15]. Social media as a source for primary victim information meant quicker response to information requests and an additional avenue for information when an official governmental source could not be contacted. This use of social media allowed for quicker decisions and more knowledge of the status of resources being deployed within the country [12].

2004 Indonesia Tsunami

On December 26, 2004, two large earthquakes triggered a tsunami off the coast of Indonesia that killed many people. There were many disaster relief efforts occurring for this disaster; however, one of these was completely online. A wiki was set up (http://www.tsunamihelp.info/wiki/) that allowed people all across the world to find out how they could help the disaster response and relief effort. People almost instantly began posting information on what they could provide and asking how to send the help to the affected people. This site quickly became one of the top ten humanitarian websites visited (within one week of its creation) [16]. Much of this occurred simply because of the lack of official government information provided. Therefore, people turned to the internet as their source of information for assisting citizens.

IV. APPLICATIONS IN EMERGENCY MANAGEMENT

A. Situational Awareness

During an emergency event, situational awareness is one of the most important pieces of the response for emergency managers. In order to be prepared to respond to the events occurring in the community, they must be aware of what is going on. "At the start of an emergency or disaster it is difficult to determine what is actually happening. Where are events occurring, what damages are being reported and what are the greatest needs for community response?" [17]. Social media can provide real-time reporting to emergency managers and the emergency operations center. In the past, managers relied on reports from the field as well as information coming into dispatch centers. Today, by monitoring social media such as Twitter, Facebook and YouTube, they can get an actual picture of what is going on in the community.

A lot of information reported today, including what is reported in the media, comes from citizen reports. People take pictures and videos with their mobile phones and upload them instantaneously to the internet. Having someone within the Emergency Operations Center (EOC) or emergency management office monitor these websites, emergency managers can get a feel for the situation, the extent of damages, the number of people needing assistance and other points of information. This information when used by the Situation Unit or Planning Section can provide a common operating picture and can assist in critical decision-making for emergency managers and incident commanders.

Another way to see what is occurring within the area is the use of trending. Trending occurs when users are tweeting the same topic or keywords. Using services such as Trendistic (http://trendistic.indextank.com/) or the search feature on Twitter's main page can help managers monitor common tweet topics. For example, if multiple people are saying things such as, "Main Street on fire" or "Main Street destroyed," an emergency manager can find an area that may need assistance. Or, they can see the devastation first hand through posted pictures or videos.

B. Information Sharing

During the height of a disaster, often one of the first pieces of infrastructure to go down is electricity. In today's society, many people rely on television and computers to get their information and no longer have a battery-operated radio, even though the need for this is stressed during preparedness campaigns. "A crisis communication mobile application fills that void by allowing officials to rapidly push generalized or localized information to the user and pull information back from the public." [18]. With mobile technology and social media, public information officers and emergency managers can quickly disseminate information to the public through these applications that remain working through 3G, 4G and cellular systems.

Social media have proved successful in disseminating public information and provided a rapid way to reach the community. "Multi-modal warnings and alerts can be advantageous for increasing the likelihood that critical information will be received by the target audience." [19]. Today, there are even websites that provide aggregation services where a user can type a message into one site and have it broadcast over multiple platforms. Examples of these services include Hootsuite (www.hootsuite.com), Sprout Social (www.sproutsocial.com) and TweetDeck (www.tweetdeck.com). Such sites dramatically cut down the amount of time it takes to disseminate information. Prior to social media, public information officers would have to develop a press release and fax, email or phone this message to all media outlets. Now, with emergency managers working with the media before a disaster occurs, the media is notified to monitor specified websites and social media services to receive the same information without managers needing to deliver the same message repeatedly.

Outside of a disaster situation, emergency managers can also use social media to provide preparedness messages to the community. This action has two benefits. Not only does this consistently put emergency preparedness information in the forefront of peoples' minds; it also gets the community accustomed to using social media sites as a source of emergency information. Additionally, it helps to make the emergency managers become the recognized authority for such information. "Applying social media tactics to corporate and government crisis communication has several advantages. First, it brings credibility to your organization at a time when it is likely to be most needed. This occurs because the use of social media – including but not limited to blogging and podcasting – is inherently conversational and transparent allowing near real-time information to be disseminated to concerned citizens, employees, and the media." [20].

C. Rumor Control

One duty of the public information officer and the joint information center is to determine any false rumors that are circulating in the community and to combat them with the correct information.   Social media provide another avenue to identify these rumors and then correct the misinformation. By trending or social media, monitoring, public information officers can see what people are saying and help to prevent rumors from spreading. "Social media is quickly emerging as another form of communication that shapes attitudes and behaviors by allowing the public to better seek and share crisis information." [18].

If the emergency managers and public information officers do not use social media to provide information, others will. It would behoove emergency managers to use these tools to provide the correct information rather than allowing others to provide false information to the cyber world. As noted earlier, through "retweeting" or "automatic posting", rumors can quickly spread out of control. One person can post false information, and this can be picked up and reposted quickly too many other social media pages or accounts. The best way to counter this is to provide accurate and authoritative information that can also be reposted quickly throughout the community to quell rumors.

D. Solicitation of Donations/Volunteers

During a disaster, especially one of catastrophic proportions, help from the community will be needed. This may be through the use of volunteers or donations of goods to help others. Social media can be a good tool to solicit this assistance.   Emergency managers can put out their call for help to the community, specifying exactly what is needed. "Online social networks tend to generate the types of relationships that are associated with action, including collective action and mobilization." [21]. Many emergency management agencies and nongovernmental organizations, such as the American Red Cross, use social media to get the resources needed for a successful response operation.

One inherent problem with donations and spontaneous volunteers is the number of items that are received and the number of people who show up to assist. Social media can be used during an emergency.   Instead of just asking for donations, emergency managers can organizations can ask specifically for what is needed. For example, if they need canes, walkers, wheelchairs, or other items for

a shelter, they can specifically ask for these items and provide a drop-off location and time. This helps to obtain only the needed items rather than receiving items that will be disposed. This also applies for volunteers. If the need is for people with specialized knowledge or talents (e.g.: shelter workers, medical staff, cooks, etc.) emergency managers or organizations can ask for these specific talents from their community.

E. Documentation

Documentation is an additional benefit of social media that is frequently overlooked. Social media can provide time and date stamps of when information was posted or received. Also through sites such as The Archivist (http://archivist.visitmix.com/), emergency managers can keep a record of all the tweets that were sent about an incident. This will help with establishing timelines and documenting the emergency after the fact. It can also assist when discussing why a certain action was taken or why a decision was made during debriefs or after action reviews. It is of vital importance that all information be captured in reports to adequately identify lessons learned and improvement plans.

F. Recovery

Keeping information flowing after a disaster is just as important as during the event. Citizens need to know where to apply for disaster aid, where to put debris, where they can go to get commodities and a variety of other information. Social media can assist in communicating these pieces of data to the community quickly and efficiently. Additionally, social media tools can help communicate to family members that their relatives are okay. Emergency managers and organizations can publish numbers for families to call, the locations of emergency shelters and other information that will assist in stopping a call surge to the local dispatch center or emergency management office. Stressing the use of social media and mobile technology as a means, for families to reach each other after a disaster, will also allow many people to communicate without requiring action by the local emergency management or shelter operations. Social media tools can be used to collect information for FEMA's Public Assistance and Individual Assistance for disaster declaration purposes.

V. CONCLUSIONS

Implementing Social Media in Emergency Management

Often, an argument from emergency managers is that it will take a lot of staff time and effort to implement a successful social media program. However, with the advent of multiple free services, emergency managers can quickly disseminate, monitor and archive information via social media. Additionally, as social media continue to mature, there will potentially be a reduced reliance on traditional public information and use of press releases, freeing up time for public information officers and joint information centers to devote to social media.

If emergency managers embrace the use of social media prior to a disaster, their use will become second nature, making the task of employing "new" communication options less daunting during an emergency. It also allows officials to become the authority during disasters and a source of information for their community. A simple plan for the use of social media along with constant use will make their integration into the public information arena and EOC seamless.

One obstacle that many emergency managers often cite is the inability to gain access to these systems due to local informational technology restrictions. It is important to gain the support of the local elected official or decision-maker of the community. By explaining to them the importance of these tools in disaster response and highlighting how they can help citizens, there are often ways to get access to social media. In general, having a good plan and protocol for social media use, identify how social media sites will be used and why it will be advantageous to make exceptions in their computer use policies or website restrictions, will help break down the technology restriction barrier.

Finally, even if emergency managers do not use social media, the community will continue to use them. Therefore, it benefits officials to embrace these platforms. By addressing false rumors and information as well as using social media to quickly disseminate important facts, social media can ultimately help emergency managers and organizations respond to critical requests. Social media and associated technology are the current situational awareness platform for many citizens and are changing the field of emergency management. Emergency managers and responders should embrace this movement and use it as another tool in their toolbox.

As more and more people gain access to mobile technology, social network usage will continue to rise. The use of mobile technology and social networks will make it easier for citizens to update emergency and disaster event information through posts, videos and pictures. It will be important for emergency managers to track and data mine social media for emergency preparedness and response. Establishing and implementing social media strategies and processes prior to an emergency event are key factors in increasing the validity and effectiveness of using social media for crisis communication.

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