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# Using Student Case Study Research to Verify Twitter Usage in Disasters

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# USING STUDENT CASE STUDY RESEARCH TO VERIFY TWITTER USAGE IN DISASTERS

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## ABSTRACT

In disaster situations, Twitter has become a preferred means of transmitting information to the news media and the public. This study examines the inter-relationship among the various parties who share and produce information in a disaster situation. Student case studies of disaster situations serve as the primary database for analysis. A preliminary examination of the case studies and the Twitter trails of information seems to support the view that Twitter can be a source of gathering and relaying information in a disaster situation, and that first-responder agencies, the media, and the informed public can use Twitter for information they can use in decision-making.

## INTRODUCTION

While traditional media still play an important role in covering disasters and other emergencies, more and more people are going directly to the source through social media to keep informed and to protect themselves. Joe Dougherty, the PIO for the Utah Division of Emergency Management, says the job of the Public Information Officer (PIO) is "to get the right information at the right time to the right people so they can make the right decisions." Sometimes, he says, the best way to do this is through social media (Dougherty, 2013).

When Hurricane Katrina hit the shores of Louisiana and Mississippi in 2005, Facebook was just getting started and Twitter didn't exist. Now, FEMA has a Twitter account with nearly 400,000 followers and FEMA director Craig Fugate has his own page, @CraigatFEMA, with over 50,000 followers. The U.S. Department of Homeland Security (HSD) indicated in the 2013 National Preparedness report that during and immediately following Hurricane Sandy, "users sent more than 20 million Sandy-related Twitter posts, or 'tweets,' despite the loss of cell phone service during the peak of the storm." New Jersey's largest utility company, PSE&G, reported that

during Sandy they used Twitter to notify the public of the daily locations of their giant tents and generators.

As reported by the Pew Research Center (2013), one quarter of Americans looked for news about the Boston Marathon bombings on Facebook, Twitter, and other social media. When the Boston Police Department posted its "CAPTURED!!!" tweet, more than 140,000 people retweeted it. The Boston community set up a Google document offering lodging, food, or a hot shower when roads and hotels were closed. Google's Person Finder, developed in previous natural disasters, was used to track lost family and friends.

This study examines the inter-relationship among the various parties who share and produce information in a disaster situation. Student case studies of disaster situations serve as the primary database for analysis. The study question was: What can be learned from student produced case studies based on Twitter feeds to help emergency managers and public officials in making decisions about disaster response?

## LITERATURE REVIEW

Social media can be an effective disaster tool if it is part of preparedness planning, disaster sociologist Jeannette Sutton told *Scientific American* (Maron, 2013). A senior researcher at the University of Colorado at Colorado Springs, she studies social media in crises and disaster. For the Boston Marathon incident, she found no consistent hashtag on Twitter, making it hard to track pertinent information. A search for the word "Boston" was problematic, she says, because it led to unrelated information like Boston tourism. As part of disaster preparedness, she says, it would be useful to teach the public how to use social media to get information from the Web and also what kind of information would be useful to post. "Tweets flow so quickly it's like a fire hose where you're trying to extract bits of information that are relevant" (Maron, 2013).

Inherent risks exist in using social media. One is misinformation. Sutton (as cited in Maron, 2013) claims that "all the fast-paced information available via social media does pose inherent risks when navigating emergency situations." Although false information eventually gets corrected by the "Wikipedia effect," Sutton notes that inaccuracies can also go viral. Rumor Control, run by FEMA, relies on local emergency personnel to correct misinformation. Another risk is fraud. The American Red Cross used cell phone technology to raise more than $5 million in the 48 hours following the Haiti earthquake in 2010, but at the same time cell phone texting and webpages were used by criminals who appealed to emotion to steal cash (Maron, 2013). After the Newtown, Connecticut, school shooting, the FBI arrested a woman who claimed to be the relative of a dead victim and solicited money via Facebook and other sources.

Utah State emergency management department PIO Joe Dougherty (2013) was interviewed for a video for ESMG 4200 *Disaster Response and the Public* about the use of social media in disasters. By far the fastest and most effective means of reaching the public, he says, is Twitter. While all the public doesn't use social media, most listen to the radio or watch television during a disaster. Every news organization and journalist is on Twitter and they follow local emergency

service agencies. When they get information from a trusted source on Twitter, like a fire station chief or a county or municipal PIO, they quickly broadcast the information to the public. Radio is fast but Twitter is even faster, Dougherty says (2013). He tells how Twitter beat the shock waves from the Virginia earthquake to New York City. As soon as people felt the earthquake in Virginia, they tweeted messages about it.

Facebook pages are also easy to set up in a disaster, says Dougherty (2013). However, people have to know a specific Facebook page's address in order to join in the discussion. It is important to plan for social media before a disaster and to get people following agency Twitter and Facebook pages prior to the emergency. If they are following on Twitter, the agency can send out updates and the Facebook page location when the event happens. For example, Facebook was used effectively in Utah's Washington County during the floods of 2010 (Dougherty, 2013). The county posted the location of sandbags. When they ran out at a location, someone let them know on Facebook and they were able to let the public know a new site for sandbags. This all happened very quickly.

Websites are still valuable tools, but are not easily changed. Sometimes they can only be changed by IT people and they may not be available in an emergency situation. A better approach, says Dougherty, is a blog. Blogs can be set up to have information and pictures. The newest information is always on top. Blogs can be updated by email from cell phones so that the public always has the latest information. State and local use of social media was tried out during the Great Utah Shakeout in Spring 2013. People who followed the state Twitter account @UtahShakeOut and the Facebook page at https://www.facebook.com/UtahShakeOut were kept up-to-date throughout the exercise. The state also posted the numbers of people involved in the exercise and the names and social media information for agencies participating in the exercise. Schools, hospitals, and government agencies appreciated the feedback and recognition. (Readers can follow Dougherty's Twitter account @utahemergency by going to http://twitter.com/utahemergency.)

**FEMA use of Twitter during Disasters**

Since 2010, the Federal Emergency Management Agency (FEMA) has used Twitter during all stages of a disaster, including before the event strikes, during the actual event, and after (Modern Business Associates, 2011). Prior to a disaster, FEMA monitors local weather reports (and tweets) and advises the public. As an example, in the case of floods, FEMA's posts on Twitter outline the parts of the U.S. experiencing flooding, share information about flood preparedness, and give advice to people about what they can do. The agency relies on official information, including forecasts from the National Weather Service and links from official emergency management agencies. FEMA typically re-tweets information from other government agencies. They use a tool to shorten .gov web addresses and can track how many hits each individual link draws.

The agency also uses social media to try to predict what a state might need to do to prepare for a potential disaster. For example, in its first attempts to use social media in September 2010 as

Hurricane Earl moved up the East Coast, by monitoring Twitter, FEMA could see that tourists on the Outer Banks in North Carolina were evacuating, but many residents were not. That gave FEMA and state agencies the information they needed to make search and rescue plans for those residents.

Emergency agencies determine what people are saying by tracking hashtags. In the snow and ice storms in February 2011, the most commonly used hashtag was #snomg. During those storms, FEMA monitored what was happening by using HootSuite, a Twitter-adaptable program that displays all tweets using a given hash tag. During that storm, FEMA could tell Oklahoma was getting hit by ice and Chicago residents thought the storm had missed them—that was until they started tweeting as the storm got worse.

During the summer 2013 Arizona fire that tragically killed 19 wildland firefighters, the emergency officials, the media, and the public followed the event using the hastag #YarnelHillFire. Public officials used Twitter to monitor public comments and provide updates. The media used Twitter to get official updates and follow public opinion as well as to direct their audience to more in-depth coverage. Twitter and other social media also provided people from across the nation and the world a means to share in the grief of the local community. A Twitter message on June 30 summed up the feelings of many first responders: "Never forget that firefighters have a dangerous job. We mourn those killed today. 19. Takes your breath away. #YarnelHillFire" (MichaelB1850).

## Twitter as a News Service

Twitter serves also as a news service, not only a social network. This is particularly true where tweeters are victims of the disaster. As eye-witnesses of the harm from the disaster, they become first line reporters of what is happening. A study of the 2009 flooding of the Red River in North Dakota (Starbird, Palen, Hughes, & Vieweg, 2010) showed that 10 percent of tweets were new information. However, much of the valuable information resulted from copying or adapting information from others (derivative information) and combining information (synthesis). The researchers found that fully 80 percent of the information was generated by people living the disaster, with the remainder being generated by the local and national media (Starbird, Palen, Hughes, & Vieweg, 2010). And the majority of information that was retweeted was news because it didn't exist elsewhere or on the Internet.

Another factor that made Twitter unique was that Twitter didn't only serve as a means of broadcasting news, but also as a platform for informational interaction. This provided a way for people to navigate through the enormous amounts of information, placing "virtual signposts" which they could follow. People retweeted information they felt was important, adding to the enormous amount of information out there, but also signaling to their followers that this was information they needed to pay attention to. Tweeters use retweeting, copying or adapting information and combining information, as a way of organizing information and making sense of the many messages.

Twitter may also be a valuable source of information for policymaker decision-making as well, although there is some doubt as to whether policymakers can synthesize the enormous amount of information in time to arrive at a consensus about what the information is really saying. Nevertheless, public officials and policymakers can get feedback from their followers on Twitter.

## Social Media Protocol

While the use of social media has become the norm in the coverage of disasters and emergency situations, most agencies still do not want their personnel initiating or involved in social media during the event. Some would NOT have their people use social media at all. Agencies need to have social media protocol in place so that first responders and other personnel are clear about the agency policy and the ramifications if they engage in social media.

An article in *The Counselor* (Association of Fire Districts, 2011) about social media policies recognizes that emergency services personnel have the right to use social media for personal purposes, but not in their functions as first responders without the permission and approval of their agencies. It says, "This policy is not intended to limit your right to freedom of speech or expression; but as we are a public entity, it has been put in place to protect the rights of this organization, its members and the public we are sworn to protect" (2011). The suggested policy states: "No information, videos or pictures gathered while on Department business (this includes emergency calls, meetings, drills, details, trainings or anything obtained on organization property or at organization functions) may be shared or posted in any format without the approval and written consent of the District's Public Information Officer" (Association of Fire Districts, 2011).

Further, "members and employees are prohibited from disseminating or transmitting in any fashion photographs or images of individuals receiving emergency medical assistance. Any such transmission may violate [state] laws and/or the HIPPA privacy rights of such individuals and may result in a criminal and/or civil proceeding being commenced against members and employees violating this provision of the policy" (Association of Fire Districts, 2011). This policy may seem harsh; yet it protects both the agency and the first responder.

## About Twitter

Started in 2006, Twitter is an online social networking service that enables users to send and read short 140-character messages called "tweets." In 2007, hashtags using the # (pound) symbol were introduced in order to identify and quickly search for a group of messages. In 2013, Vine was introduced, allowing short looping videos of six seconds or less to be linked to Tweets. While business and news were early adopters, by 2009 Twitter had gone mainstream and many celebrities were using the social media. In March 2015, Twitter had 288 million active users, tweeting 500 million messages daily. 27 percent of the users were outside the United States; 80 percent use mobile devices. Twitter supports 33 languages. Headquartered in San Francisco, it

had 3600 employees (50 percent engineers) located in 11 U.S. offices and 19 international offices (Twitter, Inc., 2015; Miller, 2009; Sippey, 2013).

While personal messages make up much of what is on Twitter, news has become a major part of the social media. In 2008 when the Mars Phoenix Lander found ice on Mars, NASA used Twitter to break the news. On January 15, 2009 a Twitter user was the first to announce a plane crashed in the Hudson River. On April 15, 2013 a witness reported hearing two loud booms near the Boston Marathon finish line. On January 7, 2015 as news broke about the attack at the offices of French magazine *Charlie Hebdo* people everywhere turned to Twitter (Stricker, 2015). In addition to news and information, Twitter is also used for marketing.

## Twitter as a Marketing Tool

Marketers use trends on Twitter as a tool to identify popular topics, influencers, and audiences. A number of tools are valuable in doing this. When signed in to Twitter.com on a desktop or laptop computer, Trends are listed in many places, including the Home, Notifications, Discover and profile pages. Official mobile apps and mobile.twitter.com display Trends on the Discover timeline. Hashtags.org Analytics indicates which hashtags are trending, quickly and accurately, predicting beforehand topics of discussion on Twitter. Hashtagify helps businesses accelerate their growth, brand awareness and marketing effectiveness through intelligent Hashtag Marketing, by amplifying their reach, identifying and reaching the right influencers, and making smarter marketing decisions to secure new business. Mastering hashtag marketing is really about connecting with the hashtag influencers, and becoming an influencer. Hashtagify Pro finds the top 100 current influencers for any hashtag, providing information about who to connect with and how (Hashtagify.me, 2015).

Trending topics are those topics being discussed more than others. "Twitter Trends are automatically generated by an algorithm that attempts to identify topics that are being talked about more right now than they were previously. The Trends list is designed to help people discover the 'most breaking' breaking news from across the world, in real-time. The Trends list captures the hottest emerging topics, not just what's most popular" (Twitter, 2010).

Twitter makes money by selling advertising and its data so companies can analyze consumer trends and gain insight on brands and competition (Gadkari, 2013). Twitter offers three major advertising methods for reaching its users (Anderson, 2014). The most popular advertising method is promoted tweets. Marketers can place tweets in users' timelines like any ordinary tweet. An algorithm that puts these promoted tweets on the timelines of the most appropriate users. A second form of advertising is promoted accounts which permits marketers to put their information in users' "Who to Follow" section or on users' timelines. Finally, the third advertising method Twitter uses is "Promoted Trends."

## PROBLEM STATEMENT

This study attempts to answer the following question: What can be learned from student-produced case studies based on Twitter feeds to help emergency managers and public officials in making decisions about disaster response?

## METHODOLOGY

Students in a crisis communication class were asked to use hashtags (#) or the search feature in Twitter to find a stream of tweets related to a specific disaster event or other emergency situation. They followed the tweets to links that provide more information or stories about the disaster. Then they copied and pasted the information in the Twitter feeds in chronological order so that the Twitter feeds provided a story of the event. They included the date of the tweet, the Twitter user name (in this format: @fisherhouse), and the source category from the list below with each Twitter message. Students were asked to record a minimum of 15 tweets, although some reported fewer. In addition, they provided comments about their experience using Twitter to search for details about a disaster event.

Students were asked to identify the tweets in four categories according to source of the tweets:

1. Media coverage of the event
2. Public reaction to the event
3. Official statements about the event
4. Other information or sources

The information was categorized into four groups based on source. Sources which were identified numerous times were described as influencers. Grounded theory was used to develop themes and propositions related to the questions in the problem statement (Glaser & Strauss, 1967). Students self-selected tweets they would report. Of potentially thousands of tweets on a topic, the students selected only enough tweets to tell a complete story using Twitter posts.

## FINDINGS

The following table summarizes the source information from case studies of 14 student respondents (R1-R14). Students reported a total of 286 Twitter messages, 90 (31.5%) from the media, 105 (36.5%) from the public, 48 (17%) from public officials, and 43 (15%) from other sources. Most of the others were corporate or non-profit agency sources. Five other tweets from the #BostonMarathon bombing were made by Dzhokhar Tsarnaev (@J_tsar), convicted of the Boston Marathon bombing, who was active on Twitter even after the explosions. Influencers are those sources that were identified numerous times by the students.

## TABLE 1: SUMMARY OF STUDENT CASE STUDIES

| | Year | Main Hashtags | Other Hashtags | #Tweets | #Media | #Public | #Official | #Other | Influencers |
|---|---|---|---|---|---|---|---|---|---|
| R1 | 2010 | #herrimanfire | #machinegunfire | 28 | 4 | 16 | 4 | 4 | @UtahRedCross |
| R2 | 2012 | #HighParkFire | | 19 | 9 | 6 | 4 | | @LarimerSheriff @9News @JeremyHubbard |
| R3 | 2012 | #sandy | | 17 | 7 | 1 | 3 | 6 | @SuperStrmSandy |
| R4 | 2012 | #hurricanesandy | #sandy | 13 | 1 | 2 | 1 | 9 | @SuperStrmSandy @NYGovCuomo |
| R5 | 2013 | #BostonMarathon | #bomb #tweetfromthebeat | 26 | 5 | 7 | 9 | 5 | @Boston Globe @TheTodayShow @BostonPolice |
| R6 | 2013 | #BostonMarathon | #tweetfromthebeat #bomb #bostonstrong | 25 | 5 | 7 | 8 | 5 | @BostonGlobe @BostonPolice @J_tsar |
| R7 | 2014 | #koreanferry | #corpses | 27 | 12 | 14 | 1 | 0 | @BBCBreaking @USAToday @CTVScottHurst |
| R8 | 2015 | #bogotaearthquake | #bogota | 54 | 14 | 35 | 1 | 4 | @USEmbassyBogota @SavageNation |
| R9 | 2015 | #babylily | | 9 | 4 | 5 | | | @KSLcom |
| R10 | 2015 | #babylily | | 19 | 16 | 2 | | 1 | @KSLcom |
| R11 | 2015 | #derailment | #Illinois | 9 | 4 | 4 | 1 | | |
| R12 | 2015 | #Vanuatu | #CyclonePam #Mormon | 15 | 3 | 5 | 3 | 4 | @UNICEFPacific @LDSChurch @sinkingislands |
| R13 | 2015 | #SolomonIslands | #Vanuatu | 10 | 6 | 1 | | 3 | @UNICEFPacific |
| R14 | 2015 | #ShakeOut #Udot | | 15 | | | 13 | 2 | @UtahShakeOut @BeReadyUtah |
| | | | TOTAL | 286 | 90 | 105 | 48 | 43 | |

## Comments

The following comments are reflective of the experience of the students as they searched Twitter for information about disaster cases. Student responder R8 followed the Twitters back to the beginning of the event and discovered that most initial tweets were made by the public. It was only later that the media picked up the story.

> As I searched for a disaster I was trying to find a disaster which was as recent as I could find. As I came across and began to read the "Tweets" I searched numerous #'s in attempt to find the first post in reference to the quake. I have determined it to be the individual noted above as 1, "@SergioCoelho13 Mar 10 01:58, Earthquake right now in #Bogotá," a member of the public with a short tweet. It also seems to me that most of the earlier tweets were by the public, even multiples in a minute. It took an alarming amount of time to finally get a post from a member of the media. As most social media sights were originally for personal use the media has taken ahold and riding the wave as they should. This chronological order of events and posts are a confirmation that if the media, emergency services departments, hosts, etc. are not watching and monitoring the social

media websites they will be left in the dark and be the last to report on a significant story (R8).

> The earthquake in Bogota was not an immense event but far enough away and just big enough to cause the posts to be heard from around the world. Members from multiple countries responded to and with tweets. In one of my searches which I was unable to replicate, there was an instance where a female reporter replied to a post by an individual in whom she assumed had information regarding the quake and that he may possibly have been there. She even asked if she could contact him by telephone. She then shortly after replied with a message apologizing she did not notice he was from another media agency. This goes to prove that media associations are watching social media and they are making every effort to get additional information on a story. (R8)

Respondent R1 was a witness to the event when it happened but was not using social media at the time. While phone lines and other communications were not working, people were able to use social media. Thousands of Twitter posts were generated.

> At the time of this fire I was living in Herriman City, and I recall the communication problems that everyone was having when trying to locate family members and get updates on the fire. The cell phone towers were bogged down, and I knew people had resorted to using social media to communicate, but when I search for this fire on Twitter I was not expecting to see what I found. I was shocked to see how many concerned community members, news stations, local businesses, federal agencies, and other organizations were posting about the fire. All I had to do to find the information was type the words Herriman Fire into the Twitter Search and scroll to the date of the fire, and I found thousands of posts. I have never been an advocate for social media, but I am definitely starting to see its many benefits. (R1)

A local Utah story got national attention when an 18-month-old baby was rescued after 14 hours in a car turned upside down in a river. Her mother died in the crash. While the hashtag #babylily was used during the event, it existed before and still is used for other stories:

> It was more difficult to find posts that originated from the initial release of the story. I search for "Toddler in car accident" and found some posts pertaining to this story. It was not until today's posts that I noticed a hashtag had finally been produced, #babylily, and the majority of posts that relate to the incident now use it, which makes following the story easier. I did not copy down every Tweet I found, since there were many that all said the same thing. There was also a lot of conflicting information about how long Baby Lily was in the water, how old she is, and what time the car crashed. I think there will also be more "public reaction" to this story in the next few days. This is still a relatively new story on twitter, since it happened last weekend, a lot of people are still hearing about it (and subsequently tweeting about it) for the first time. There is also still a lot unknown, such as what caused the car accident, and who has legal custody of Baby Lily, that the public wishes to know. (R10)

Here are a sampling of tweets from R9 who also reported on #babylily. In this event all tweets from the public were re-tweets of news media stories:

- I searched #babylily in reference to an 18 month old girl that survived the night in her car seat that was suspended in the car her mother had been driving that rolled over into a ditch. The most recent results appeared at the top so I scrolled down to the bottom. The first tweet was submitted by @tracysnowder. [R10]
- March 9th, 2015. @tracysnowder (public) Baby found alive inside car in Spanish Fork river now in stable condition http://ksl.to/wYP1RE
- March 11, 2015 - @World_News_N1 (Media coverage & Other information) Watch: Mystery Surrounds 18-Month-Old **Lily**'s Miraculous Survival: **Toddler** survives being trapped for 14 hours... http://abcn.ws/1KUVOvr
- March13, 2015 @KSLcom (Media coverage) Exclusive: Body-cam footage shows rescue of 'Baby Lily' after crash **#BabyLily** #LilyRescue http://ksl.to/ZLvkvo

## CONCLUSION

The use of social media has changed the way the public is informed about disasters and how to recover from them. While the traditional media continue to play a key role, social media have given citizens a means to inform and protect each other as well as to alter public policy and the official approach to dealing with emergencies. The Haiti earthquake was a watershed moment that changed how social media are used in disasters. While social media were independently evolving in the years leading up to 2010, the use of social media in the Haiti disaster made public officials aware of their potential in disaster response. Since then, social media have played an important part in informing and keeping the public safe at both the local and national levels.

This study proposed that student-produced case studies based on Twitter feeds can help emergency managers and public officials in making decisions about disaster response. The following conclusions are drawn from analysis of the data generated from the student case studies of Twitter posts and may be valuable considerations for public officials and policy makers:

- This study showed that by searching #hashtags enough information can be generated from Twitter to build a chronology of disaster events. The complete story can be available on Twitter, although as pointed out by R10, the story may be fragmented as it emerges, and information may be lacking and inaccurate. Questions may be left unanswered. This confirms Sutton's claims (as cited in Maron, 2013) that "all the fast-paced information available via social media does pose inherent risks when navigating emergency situations."
- Most influencers (i.e., @BBCBreaking) appear to be established media. Influencers set trends and provide information that other users may use or re-tweet. Even as people

obviously still watch television and listen to the radio during a disaster or emergency event, they also rely upon the media for information to tweet.

- Many Twitter messages that students identified as originating from the public were re-tweets or linked to the media stories.
- While the media rely on public officials for information and comments for their stories, the public official presence on Twitter appears to be much less than that of the general public. Still, the study seems to confirm that emergency agencies can determine what people are saying by tracking hashtags.
- In situations with numerous victims (like earthquakes, hurricanes, or wildfires) public tweets provided information to the media and to public officials. These tweets had the potential to provide information that other members of the public, the media, and public officials could use for decision-making. Eyewitnesses do become "first line reporters" of what is happening.
- Twitter may serve as "a platform for information interaction" as public observations and official comments are picked up by the media and then are re-tweeted or placed on Facebook for a broader social media audience.

The following are questions left unanswered by this study that require further study:

- How can emergency managers use Twitter to follow a disaster situation?
- How does Twitter trending help in disaster decision-making?
- How can emergency managers identify disaster hashtags? And trends in uses of Twitter during disasters?
- What disasters become major trending topics on Twitter?
- How are hashtags established for disasters? Why do some flourish while others decline in use or die?
- What are major disaster trends on Twitter? Who are major disaster influencers on Twitter?
- What kind of disaster Twitter information is retweeted?

While this study is limited by the number of cases and Twitter posts in each case study, it does provide valuable insights into the use of Twitter as a social medium in disasters and other emergencies. Twitter has become a powerful tool for the traditional media and the public in information gathering and information sharing. Similarly, government officials and emergency agencies can use Twitter as a source to provide disaster awareness, decision-making information, and public feedback.

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