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## SOCIAL MEDIA IN THE DISASTER CYCLE - USEFUL TOOLS OR MASS DISTRACTION?

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Social media presents new vehicles for interactive communication and user-generated content using an array of Web- and mobile-based tools. As a result, platforms such as Facebook and Twitter are widely used around the world for entertainment but there is growing interest in using them during and following natural or man-made disasters. Due to their ease of use and simplicity, social media platforms can provide efficient delivery of information that can give better situational awareness for emergency response.

Unfortunately, this great amount of information can sometimes be useless or even dangerous, since its reliability is often unclear and any uncertainties can result in chaos. Research is therefore needed on the technological, regulatory, and reliability aspects of social media use in emergency situations. This paper will present an overview of the use of social media during recent disaster events in an attempt to better understand the associated benefits and inherent risks. Challenges encountered when using social media in disaster response activities are then presented. Finally, technological, policy, and reliability improvements that may be necessary to further incorporate social media into the disaster management cycle will be addressed.

Keywords: Disaster management, natural or man-made disasters, social media, crowdsourcing

### INTRODUCTION

With an increasing number of households now connected to the Internet and with the proliferation of smart phones and mobile technology applications, a great number of online-users spend most of their time on social media websites. Social media has become an essential part of the lives of millions of people throughout the world and has changed the way humans interact and do business with each other. Although social media can be defined in several ways, one definition describes social media as a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content (Kaplan & Haenlein, 2010). Another description highlights that social media depends on mobile and Web-based technologies to create highly interactive platforms through which individuals and communities share, co-create, discuss, and modify user-generated content. As a result, social media introduces substantial and pervasive changes to communication between

organizations, communities, and individuals (Kietzmann & Hermkens, 2011).

The booming of social media platforms such as Facebook, Twitter, Instagram, Vine and LinkedIn has led to the creation of an entirely new industry composed of social entrepreneurs, “app” developers, social media managers and, of course, consumers. These tools have profoundly changed people’s habits in how they interact with friends, get their news, hunt for jobs and absorb advertisements.

Social media has also modified the way people spend their leisure time by offering widespread possibilities of virtual interaction and entertainment. In September 2012, Facebook exceeded one billion people (Protalinski, 2012) who use the website each month to stay in touch with existing contacts, build new friendships, share ideas and organize private events. People also increasingly rely on Facebook and other social media sources to learn about what is happening in the world, as traditional news outlets become less relevant. Over the past 10 years, print journalism is seeing a decline in terms of both audience and revenues, and the emergence of social media

newsrooms has further negatively impacted an industry already weakened by the advent of television and the Internet.

Besides the more common uses briefly described above, people have also embraced social media for more complex purposes such as communicating during a crisis. As social media has spread, disaster management organizations and the public has increasingly resorted to social networks to aid in rescue and relief efforts. The United Nations (UN) has also recognized the importance of social media in disaster management, and projects such as “Space-Based Information for Crowdsourcing Mapping” have become one of the core activities of the United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER, 2012). The benefits and risks of social media-derived data were also discussion topics at a recent UN-SPIDER international expert meeting on “Crowdsourcing Mapping for Disaster Risk Management and Emergency Response” organized by the UN Office for Outer Space Affairs (UNOOSA), the Secure World Foundation, and the Government of Austria (UNOOSA, 2012).

The aim of this paper is to provide more insight into the use of social media in disaster management and to help create more awareness of its increasingly important role. More specifically, it will provide an overview of the use of social media during recent disaster events in an attempt to better understand the associated benefits and inherent risks. Challenges encountered when using social media in disaster response activities are then presented. Finally, technological, policy, and reliability improvements that may be necessary to further incorporate social media into the disaster management cycle will be addressed.

### **THE ROLE OF SOCIAL MEDIA IN DISASTER MANAGEMENT**

At present, many existing smart phones and hand-held devices contain features such as GPS receivers, accelerometers, cameras, microphones and Bluetooth capability. An increasing number of applications utilize one or more of these features for social networking, education, and transportation and produce a large volume of data (Adam, Shafiq, & Staffin, 2012). Most interestingly, social media and the devices that facilitate their use

are now increasingly finding their place during disaster events.

#### **Haiti earthquake**

On January 12, 2010, a magnitude 7 earthquake struck the south-east of Port-au-Prince Haiti, causing widespread destruction in the city and the surrounding countryside. Several aftershocks followed (some exceeding magnitude 5), causing more destruction and hampering rescue efforts. More than 230,000 people died, and some of Haiti’s most populous areas suffered mass destruction. A shocked world responded quickly by forming response teams and launching large and well-equipped search and rescue missions (Williamson & Antoniou, 2012).

The disaster response system employed by relief personnel in Haiti concentrated on enabling information sharing among teams of responders from the international community. Although surely welcomed by those affected by the disaster, this traditional system lacked the ability to aggregate and prioritize data that came from an increased number of sources, making it difficult to benefit from valuable information coming from non-official external volunteers in other countries and the local Haitian community. It was in this context that the online Ushahidi system was used for the first time on a large scale disaster situation. Translated from Swahili as “witness” or “testimony”, Ushahidi provides an interactive-mapping platform connected to a live multimedia inbox and was initially developed to provide evidence of violence in Kenya after the uncertain presidential elections of 2008 (Forbes, 2013). Following the earthquake in Haiti, Ushahidi provided a way to obtain, consolidate, and share critical information from Haitians. The Ushahidi inbox received a large volume of text messages, tweets, photographs, video, and Web-based reports. Those reports were then manually organised on its platform and with this information a live crisis map was created which showed the areas that required immediate assistance. Information delivered via these maps included where buildings had collapsed and where medical supplies had to be delivered (Forbes, 2013).

#### **Great East Japan earthquake and tsunami**

In Japan, Facebook has reached more than 17 million users and the number is increasing (Appleby, 2013). It is no surprise then that following the Great East Japan earthquake and

tsunami of 2011, social media became a primary source of communication as other more traditional media was not available. Japanese citizens used many types of social media networks including Facebook, Twitter, and Mixi (a popular Japanese social media site) to send warnings, request help, and inform others that they were safe. Within an hour of the earthquake, more than 1,200 tweets per minute were being sent from Tokyo (Horwath, 2011). Twitter reported that the day of the earthquake 177 million tweets were recorded, setting a new record (Dunn, 2011). Even the office of the Prime Minister created a Facebook page with English translations of official press briefings and updates, in order to keep the international community informed (Appleby, 2013). Furthermore, following the nuclear plant blast in Fukushima, there was a considerable increase in the use of Ustream, a website that provides a platform for lifecasting and live video streaming of many diverse channels (Appleby, 2013).

### Hurricane Sandy

Hurricane Sandy was the deadliest and most destructive hurricane of the 2012 Atlantic hurricane season, as well as the second-costliest hurricane in United States history (Blake, Kimberlain, Berg, Cangialosi, & Beven II, 2013). Throughout this ordeal, the authorities used social media to connect with the public and response managers, provide information, and continue the dialogue with the community in order to get information about their needs (Cohen, 2013). As a result, the validity of social media during a disaster event became further recognized.

### Calgary floods

Calgary, one of Western Canada's largest cities, experienced major flooding in late June 2013 and parts of the city had to be evacuated as the rivers spilled over their banks and flooded communities. The evacuation affected 5,000 people and is the largest evacuation order in the history of the city.

Social media such as Twitter, Flickr, Facebook, blogs and websites were broadly used by citizens and the authorities, for a good coverage of the flood (Montgomery, 2013). Twitter was the most used platform from the first day of the evacuations, and it helped to collect information so that the authorities could provide assistance exactly where it was needed (Schwartz, 2013). The City of Calgary itself created a Twitter feed with hashtag #yycflood (Figure 1) with which people could get and

spread information, suggest solutions, provide help, and report problematic situations to the authorities. Videos and photos provided by citizens on this and other platforms helped show the extent of the disaster (Darcy, 2013).



Figure 1: Tweets during Calgary floods (Strapagiel, 2013)

### RISKS AND BENEFITS FROM THE USE OF SOCIAL MEDIA

Of those Americans affected by natural disasters from 1980 to 2010, 76% used social media to contact friends and family; 37% used social media to help find shelter and supplies; and 24% used social media to let loved ones know that they are safe, while 18% retrieved information through Facebook (University of San Francisco, 2013). Although the cited timeframe covers a period of time before the popular use of the Internet and social media, the numbers above still show the expansion of social media use amongst the public. Public officials and the mainstream media are also adopting social media during disasters as a vital tool for communication (GroupTweet Blog, 2012). It is therefore important when talking about social media and disasters to distinguish between providing information and receiving information, and between private users and organizations as the different types of disasters require different approaches in each case when using social media tools. Furthermore, the experience from the use of social media thus far has shown both positive and negative results.

#### Positive results

A good example of how authorities can disseminate information using social media comes from the 2013 floods in Calgary. A few days after the evacuation, city officials wanted

to gather volunteers in order to brief them for the upcoming neighborhood re-entry support, and the request to gather at McMahon Stadium was spread immediately through multiple social media sites. As a result, although the city was originally seeking approximately 600 volunteers, nearly 7000 people arrived to offer their help (Montgomery, 2013). During the floods themselves, Calgarians used social media to help find answers about their family, friends, and properties (Montgomery, 2013).

Another good example is New York Governor Cuomo's Twitter account activity during Hurricane Sandy. The Governor's Twitter account was sending about 400 messages a day, updating citizens about the situation, providing photos and information about the power situation, storm, and damages. This resulted in the Governor's Twitter account going from 20,000 followers before Sandy to reach more than 55,000 after the storm (Stelter & Preston, 2012).

In Japan, in Kahoku Shimpo in Sendai, one of the main newspapers was not able to print, thus they decided to use Twitter in order to keep the citizens informed. Similarly, several public bodies used Twitter to keep the people informed (Appleby, 2013).

### **Negative results**

As the successful examples described above clearly show, using social media as disaster warning and response tools can be very powerful and effective, allowing public authorities and civil protection officers to reach out in real-time to a vast part of the population. However, in order to fully reap the benefit of this new kind of communication and concretely save human lives, social network users need to guarantee the accuracy and credibility of these early-warnings, to avoid causing unwarranted panic.

This happened recently in Italy, in the aftermath of the 4.8-magnitude earthquake that hit Tuscany on 25 January 2013. The small municipality of Castelnuovo Garfagnana, in the center of the area affected by the seismic activity, announced via its official Twitter account, the night of 31 January (at 10:20pm) that new quakes may be expected in the coming hours and suggested citizens to leave their houses (Esclusivista, 2013). As a result, almost 6000 citizens still dealing with the stress of the recent earthquake poured immediately out onto the streets and spent the night outside, sleeping in their cars or in

temporary shelters. "Unfortunately", the early warning launched by the municipality via Twitter proved to be a false alarm, launched by the authority responsible for civil protection on the side of caution - too much caution in this case that caused unnecessary mass confusion (Oggi, 2013).

During Hurricane Sandy, social media were primary sources of information for many people. The authorities realized its importance and decided to verify the information and attempted to prevent the spread of misinformation brought about by several false alarms. In one for instance, a fake photo of the New York Stock Exchange under three feet of water started to be distributed along with false tweets and other intentionally misleading reports and images (Figure 2). The New York City Fire Department posted messages on Twitter and other social media sites to correct such misinformation (Cohen, 2013).



**Figure 2: False rumour tweeted during Hurricane Sandy (Gross, 2012)**

During the earthquake in Japan, local officials and non-governmental organizations (NGOs) noticed that the content of the tweets and Facebook messages which were requesting help were regularly not relevant. This was happening because many messages included unverified information from other people and were simply being re-tweeted (Appleby, 2013). The people who communicate wrong information are either people who have good intentions and believe they are passing relevant information or people who have bad intentions. This misinformation could lead to mass panic or hysteria, pointless evacuations that create confusion, overuse of telecommunications services, and anti-social behavior (Deacon, 2013). Such unsuccessful cases of social media (mis)uses in disaster management should induce disaster response managers to debate how to best regulate this kind of communication.

## **CHALLENGES OF SOCIAL MEDIA USE IN EMERGENCY SITUATIONS**

It is now clear that social media is here to stay but there are challenges that should be taken into consideration in disaster situations. These challenges can broadly be divided into technological and infrastructure, regulatory and reliability perspectives.

### **Technological and infrastructure**

Social media use is inextricably linked to technology. Users of social media access the various platforms and services through their computers, smart phones, and other mobile devices. These days smart phones contain GPS (GLOBAL POSITIONING SYSTEM) receivers and applications, which provide the exact location of the person who uses the phone. In a disaster, the information of the exact location of victims who need aid is vital, however not all users provide that data. Thus far, less than 5% of users have provided location information with their tweets due to privacy concerns and lack of awareness (Abbasiy, Kumary, Liu, & Andrade, 2012).

Moreover, we should not underestimate the part of the population, which does not know how to use social media prior to disasters and this means that they will not be able to use social media at all when the disaster happens. Research following the 2011 earthquake in Japan showed that there is important forward work to be done to help the elderly and others in the population who may not regularly use computers and social media so as not to marginalize them during disaster recovery efforts (Appleby, 2013).

Another challenge to the use of social media in disaster management is the resiliency of a region's power and communications infrastructures. Disasters often result in the loss of electric power and the ability to communicate by phone (landline or mobile) or via the Internet. This results in difficulties in reaching family and friends and posting information on the Web and via social media. The problem is exacerbated when access to infrastructure is limited even before the disaster occurs. In cases where individuals have no previous access to Internet and technology because of their low-socio economic situation, it automatically means that there is a part of the society that will have to struggle without access to information in real-

time during a crisis (Fraustino, Liu, & Jin, 2012).

### **Regulatory and reliability**

The use of social media in disaster management is still in its early stages, and as a result there is still some uneasiness on how to use it, both on the side of the authorities and amongst the public. It follows as well that there are very few, if any, laws or policies in place to direct the handling of information and social media strategies in a crisis situation. In the case of the 2007 Southern California fires, local citizens depended on the information they shared amongst themselves in order to decide their course of action since the authorities had not been prepared to handle the large amount of data and communications exchange simultaneously occurring over several media (Palen, et al., 2010). This can be interpreted as evidence of a lack of clear regulations and planning on the part of the authorities on how to deal with social media communications in a disaster scenario.

In a broader sense, the increased use of social media in disaster management raises questions with regards to privacy, liability, and security, along with all the associated legal considerations, which may help to explain the relatively slow development of appropriate regulatory frameworks (Sicker, Blumensaadt, Grunwald, Palen, & Anderson, 2010). Social media users may or may not understand the fine-print details of privacy and data sharing policies of the platforms they use, and it is perhaps still unclear how crisis response organizations can use the data shared on these platforms. With regards to liability, important debates arise on whether a person in the public or within a disaster management team uses or withholds information that could cause or prevent damage or loss of life (Sicker, Blumensaadt, Grunwald, Palen, & Anderson, 2010). It becomes rather difficult to understand who is liable if someone unintentionally uses or disseminates information that turns out to be incorrect; in the case of someone that intentionally spreads misinformation, as noted earlier in the case of the false rumours regarding the New York Stock Exchange during Hurricane Sandy, some may argue that legal action should be taken against the person spreading the false news. The design of social media platforms are at the heart of the security discussion, since the quality and reliability of the data being shared depend on the robustness of the platforms themselves and the networks they operate on.

Furthermore, assessments must be made of the risks associated with the anonymity provided by some social media platforms; whereas a strong policy of anonymity may offer users the privacy they desire, it may also allow those with malicious intentions to operate with complete secrecy, thereby making it difficult to trace and pursue them (Sicker, Blumensaadt, Grunwald, Palen, & Anderson, 2010).

Emergency managers must react quickly based on the most current information of a situation and past experiences in similar circumstances. Large volumes of data coming from social media can be very useful but their use is often hampered by concerns over the reliability of the data and its trustworthiness.

The anonymity offered by some social media platforms can also cause concerns over the reliability of the data being shared; social media users who protect their tweets and adopt conservative privacy settings on Facebook, for example, may end up limiting the information that emergency managers get from the data and thus impact the reliability of the data since they cannot validate the information (Heaton, 2013). To help with ensuring the reliability of data, it has been proposed to provide meta-information along with the data that would give details about the data's source, a rating of the authoritativeness of the source, whether or not the data is in line with other official sources of data, its timeliness, and other features of the information's life (Sicker, Blumensaadt, Grunwald, Palen, & Anderson, 2010). Laws and public policy will therefore have to consider the impact of anonymity on data reliability and perhaps make meta-information a requirement to ensure the pedigree of data being shared.

#### **MIND THE GAP - IMPROVEMENTS TO FURTHER INCORPORATE SOCIAL MEDIA INTO THE DISASTER MANAGEMENT CYCLE**

A perfect model of how to use social media during a disaster does not exist. However, improvements to help further integrate social media use into disaster management processes can be made in the technological, policy and reliability spheres.

##### **Technological improvements**

As it has been discussed before the use of social media produce a large volume of data. In order to reduce the amount of data which

has to be processed during a disaster event and avoid the spread of misinformation, legislation should perhaps be enacted. Moreover, the social media platform providers should implement more effective filters that would spot the most relevant data that would be needed for critical decision making.

Another option to help ensure the quality of social media information (and therefore its reliability), is to implement a system where many users may provide information but a limited and trusted number of individuals monitor what is posted and can remove what is deemed inaccurate, malicious, or inappropriate. In the case of the Twitter platform, GroupTweet is a related feature that provides this functionality. A specific number of staff members setup and monitor a GroupTweet account and allow contributors to post tweets without having the password and associated administrator privileges. This results in the dissemination of approved and trustworthy information to a larger number of people by enabling colleagues and staff to help tweet. GroupTweet's strength lies in the fact that the reliability of the information has been taken into consideration, and administrators have the option to manually approve or deny each message. Also, while Twitter only allows connecting a Twitter account to a single phone, GroupTweet can update all the contributors by sending a text message (GroupTweet Blog, 2012). This can be especially useful if users in a disaster area do not have access to Twitter but can still send and receive text messages.

Finally, in some cases, where the coding and integration of thousands of tweets had to be done manually, an automated process would have greatly sped up the completion of tasks (Vieweg, Hughes, Starbird, & Palen, 2010). More research and improvement of the automation process is therefore warranted (UNOOSA, 2012).

##### **Policy improvements**

At the recent "Crowdsource Mapping for Disaster Risk Management and Emergency Response" conference (UNOOSA, 2012), participants came up with several noteworthy policy improvements.

It was identified a need for international organizations, governments, NGOs, and local authorities to become more active in using social media as a supplemental medium of communication without neglecting traditional media. In this way, it is hoped that a well-coordinated use of mixed media sources that

include social media will limit confusing the public when it is confronted with an almost unlimited amount of information in a time-critical disaster situation. This would require sensitizing the public on the possibilities of social media in disseminating important information during a crisis and helping citizens know where to look for the right information when they need it.

With regards to minimizing or preventing altogether the deliberate malicious use of social media, it has been argued that perhaps special legislation for telecommunications should be introduced whereby all social media accounts are identified and linked to the real identities of people (Deacon, 2013). This would be in the same spirit as the Anti Money Laundering-Counter Terrorism Legislation in the world of finances, which requires customers to verify their identity (Deacon, 2013). In this perhaps controversial strategy, it is theorized that social media users will better understand the power of social media when used appropriately to warn of imminent dangers and conditions during disaster response and furthermore how malicious activity will be investigated by authorities and appropriate penalties will be handed out (Deacon, 2013).

### **Reliability improvements**

The improvement of the validation system of social media information has been determined to be a pressing need to be addressed in the immediate future. This is in line with the proposed meta-information notion discussed earlier, and would include the establishment of a feedback system where a “rate the person/source” feature would be implemented (UNOOSA, 2012). This would help both crisis response coordinators and affected citizens know the degree at which they can rely on the information being disseminated.

To further address the problem of both unintentional and deliberate spreading of inaccurate data, the verification of rumours must continue to be carried out. A successful example that can be followed is the Rumour Control page launched by the American Federal Emergency Management Agency (FEMA) during Hurricane Sandy (FEMA, 2012). Alongside essential information on locating shelters, food supplies, and health services, FEMA posted popular rumours in an attempt to help affected citizens differentiate between true and false information (Cohen, 2013).

## **CONCLUSION**

This paper aimed to provide more insight into the use of social media in disaster management and to help create more awareness of its increasingly important role. To accomplish this, several examples of social media use in disaster response scenarios were presented from the Haiti earthquake of 2010, the Japan earthquake and tsunami of 2011, Hurricane Sandy in 2012, and the 2013 Calgary flooding events.

The benefits of using social media for disaster response organizations include the ability to continuously update the public with important information when habitual media channels are unavailable, getting crowdsourced information from citizens, organizing volunteer efforts, and generally staying connected with the population. For the affected public, social media provide a quick way to let others know their status, to get in touch with their friends and family, to stay informed about the crisis, and where to get help from either the authorities and/or other citizens. Alongside these positive aspects there are risks that both the authorities and the public receive false information, which can be the result of data being propagated by both well-intended and malicious sources. As a result, there is a risk of creating mass confusion and chaos, and of wasting time, effort, and resources in an already critical situation.

Several challenges encountered when using social media in disaster response activities were highlighted. On the technological and infrastructure front, the fact that an important segment of the population may not be familiar with or have access to computers, mobile devices, and social media must be taken into account. Education in the preparedness phase of the disaster management cycle must be carried out, while access to social media after a disaster must be facilitated. The infrastructure upon which social media platforms operate must be made robust, and social media must be a part of a diversified communications strategy following a disaster event. Challenges also exist due to the lack of regulations on how social media should be used by the authorities during crises. Issues of privacy, liability, and security must be addressed with the appropriate legislation. Finally, and perhaps most importantly, the reliability of data being circulated must be addressed. It is rather problematic if neither the authorities nor the

public can fully trust the information that they obtain from social media channels.

Improvements to address the various challenges include better classification methods to filter data and extract the most relevant and secure information, as well as further automation to more efficiently process the large amounts of data generated by social media. It is also recommended that international organizations, governments, NGOs, and local authorities incorporate social media in their disaster management strategies and to educate the public on how to use and interpret information from secure sources. Although most likely to be controversial, legislation could also be introduced to link citizens' identities to otherwise anonymous social media accounts in an effort to fight the spread of misinformation and hold people accountable. Furthermore, the implementation of meta-information to help ensure that data come from credible sources, rumour verification by the authorities, and the use of monitored collaborative data reporting platforms are all recommended to help improve the contributions of social media to disaster management practices.

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