ORIGINAL PAPER

Social Media in Disaster Risk Reduction and Crisis Management

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Abstract This paper reviews the actual and potential use of social media in emergency, disaster and crisis situations. This is a field that has generated intense interest. It is characterised by a burgeoning but small and very recent literature. In the emergencies field, social media (blogs, messaging, sites such as Facebook, wikis and so on) are used in seven different ways: listening to public debate, monitoring situations, extending emergency response and management, crowd-sourcing and collaborative development, creating social cohesion, furthering causes (including charitable donation) and enhancing research. Appreciation of the positive side of social media is balanced by their potential for negative developments, such as disseminating rumours, undermining authority and promoting terrorist acts. This leads to an examination of the ethics of social media usage in crisis situations. Despite some clearly identifiable risks, for example regarding the violation of privacy, it appears that public consensus on ethics will tend to override unscrupulous attempts to subvert the media. Moreover, social media are a robust means of exposing corruption and malpractice. In synthesis, the widespread adoption and use of social media by members of the public throughout the world heralds a new age in which it is imperative that emergency managers adapt their working practices to the challenge and potential of this development. At the same time, they must heed the ethical warnings and ensure that social media are not abused or misused when crises and emergencies occur.

Keywords Social media · Disasters · Emergency management · Ethics · Twitter · Facebook

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Introduction and Definitions

At 09:02, local time, on 29th May 2012, a damaging earthquake struck Emilia-Romagna and Lombardy regions of northern Italy. This was the second major seismic event to affect the area in 10 days. It killed 17 people and caused extensive damage to 40 municipalities. Within 50 minutes a clear and relatively comprehensive picture of the earthquake and some of its most important impacts was available. It could be consulted via the Internet from almost anywhere in the world. The information presented was essentially accurate and the speed with which it became available was largely a result of the use of social media to communicate from the sites affected to places where data could be collected and presented to the public.

The term 'social media' embraces blogs, micro-blogs, social book-marking, social networking, forums, collaborative creation of documents (via wikis[1]) and the sharing of audio, photographic and video files (Balana 2012). It is characterised by interactive communication, in which message content is exchanged between individuals, audiences, organisations and sectors of the general public.

Social media usage is, to some extent, negatively correlated with age and positively with educational attainment. For example, people over the age of 55 tend to prefer conventional sources of news. The degree of adoption of social media varies from country to country but is generally dynamic in most environments and hence any summary statistics are liable to become outdated rapidly. Attempts to relate social media to personality factors have suggested that they are most attractive to people, of both sexes, who are relatively extrovert (Correa et al. 2010), but there is no indication of the extent to which any effort to develop profiles of users might be culturally conditioned. Information on gender differentiation is, at best, fragmentary (Armstrong and McAdams 2009).

In the United States, the Internet is the most important source of information for people under the age of 30. For other Americans, it is second only to television (Krimsky 2007). Elsewhere, the use of 'smart' phones and social media resources is increasing so rapidly that they are now a force to be reckoned with throughout the world. Social media dispense with "information gatekeepers", which include doctors giving on-line medical advice and journalists relating a news story. These figures are replaced by *apomediaries*, in which network filtering or group moderation are the only processes by which the spontaneous feed of information is regulated—a matter of *apomediation* or *disintermediation* (Eysenbach 2008).

This paper offers a review of the use of social media in disasters and major incidents. I consider both how citizens, emergency managers and first responders make use of social media in crisis and how researchers perceive and characterise the phenomenon. I examine seven ways in which social media are put to use for disaster response, recovery and risk reduction. As social media have both beneficial and potentially malign connotations, their advantages and drawbacks are discussed. Next, I consider the ethical implications of social media in disaster, including the

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[1] The term 'wiki' is defined by the OED as "A type of web page designed so that its content can be edited by anyone who accesses it, using a simplified markup language." It was apparently first used in 1995.

risks and dilemmas of unregulated communication and the degree of inclusiveness of new media. In order to end on a positive note, examples of successes with social media in disaster are briefly discussed. Finally, some conclusions are drawn, but these must necessarily be provisional, as the field is in the early stages of rapid evolution in relation to both technological development and social acceptance.

The Research Literature

The research literature on social networking and social media in disasters and crises is still quite limited. Moreover, it focuses on the short-term aspects of emergency response and rapid recovery. It is understandable that there are as yet no studies of the longer term, both because social media are a relatively new phenomenon and because the research is also new. Although 'new media', such as the Internet, have received attention from academics for a decade or more, very little of the research on social networking predates 2007. However, there is a trend towards a rapid increase in the number of papers that have been published. In this context, the literature on 'social media' needs to be differentiated from that on the social aspects of mass media, which is a much wider field that embraces more conventional and long-standing forms of dissemination of information, such as radio and television (Quarantelli 1989).

Studies of social media in disasters have been conducted as part of a general tendency to examine the functioning of social interaction by means of the Internet and mobile devices (Krimsky 2007). Both sets of literature concentrate mainly on specific themes, which are:

- how social networks function and how they are used
- how to build and utilise algorithms either to enhance social networking or to monitor it
- the extent to which people use social networks, how they perceive them and what their communication preferences are
- the penetration of devices such as 'smart' mobile telephones and the extent to which these provide people with access to social media.

In addition, students of risk, crisis and disaster have studied:

- how social media are used in crises
- the views and opinions of emergency managers and journalists regarding social media and the extent to which the new media are integrated with more traditional means of communication
- how social media interact with the traditional sources of information.

There is a broad distinction between studies of the technical and social aspects of new media. The creation of new platforms and algorithms characterises the former (Cheong and Lee 2010; White and Plotnik 2010), while studies of the kinds of usage and messages sent relate to the latter (Hughes and Palen 2009; Lindsay 2011). The technical side includes by studies of the rate and modality of diffusion of messages (Song and Yan 2012).

While researchers work to develop software for the efficient dissemination of messages via social networks during crisis situations (e.g. Plotnick et al. 2009), Reuter et al. (2012) advocated a more systematic approach to the use of social networking software in crisis situations, starting with classification of uses and potentials.

Researchers are equivocal about the balance between the advantages and drawbacks of social media (see below), but they are united in identifying the uses to which the media can be put. Social media promote cross-platform accessibility and a constant flow of information. Situational updates can be complemented by geographical and locational data (Vieweg et al. 2010). Just-in-time information can be provided on how to cope with developing situations. Moreover, social media provide a framework for the work of journalists and for public discussion and debate.

Social Media in Disaster and Crisis

The following are some of the ways in which social media can be used in disaster risk reduction and crisis response.

1. *A listening function*. Social media are able to give a voice to people who do not normally have one. They also enable a remarkably democratic form of participation in public debate and facilitate the exchange of information and points of view. During an emergency, through their tendency to coalesce opinions (or stimulate monetary donations), social media are capable of revealing some aspects of the mental and emotional state of a nation. This may seem a rather exaggerated claim, but it should be noted that Quarantelli (1997) argued that the advent of modern information and communications technology involves changes that are as profound as those that occurred after the invention of printing. These changes do, or soon will, affect directly the majority of the population and the rest indirectly.

The listening function involves constantly or periodically sampling the varied output of social media. This enables currents of popular opinion and public preference to be gauged. It may also indicate how the public is behaving and reacting to events. Crawford (2009) classified online listening into three categories: background listening, reciprocal listening and delegated listening by corporations. Crawford defined background listening as mere tuning in, a minimal form of engagement. Reciprocal listening involves two-way exchange of messages, with mutual sensitivity to their content and implications; and delegated listening is a form of "arm's length engagement", in which messages are monitored and responded to, if at all, en masse. Hence, listening is a question of keeping track of opinions, giving advice or collecting information that is of interest to corporations. As Crawford (2009, p. 526) noted, "there has been a glorification of 'voice' as the prime form of participation online."

2. *Monitoring a situation*. Whereas the listening function involves the passive collection of information, monitoring is conducted in order to improve reactions

to events and better to manage the general public by learning what people are thinking and doing. Current research (Bird et al. 2012) suggests that harmful and inaccurate rumours are not particularly enhanced by the use of social media. One reason for this is that, with mass participation, the false rumours that do begin to circulate are easily corrected by knowledgeable people. Hence, in the aftermath of the Japanese earthquake and tsunami of March 2011, there was little indication that the massive use of social media by the Japanese public led to the successful propagation of rumour and wildly incorrect information (Hjorth and Kim 2011). Moreover, Stirratt (2011) found that, in the Japan disaster, 49 % of Twitter messages were either positive or somewhat positive in their attitude to emergency preparedness and only 7 % were negative.

Floods in Queensland, Australia, led to extensive use of social media for public interaction and communication, but not for the mass propagation of false information. Bird et al. (2012, pp. 30–31) noted that: "While rumours were common at the height of the disaster, respondents reported that the moderators of the Facebook pages were prompt at confirming information and providing official sources when available." Hence, despite the presence of a major crisis—the floods—the use of social media did not lead to a situation of general anarchy that was out of control.

3. *Integration of social media into emergency planning and crisis management.* In a questionnaire survey (Barr 2011), it was found that 80 % of US general public and 69 % of online users felt that it would be beneficial for national emergency response organisers to monitor social networking sites regularly. However, in most places this has not happened. Agencies are afraid that social networks will produce inaccurate information of dubious provenance (Goolsby 2010). Moreover, the full integration of social networks into disaster management would require many of them to change their working practices, as, in the words of Palen et al. (2007), "command-and-control models do not easily adapt to the expanding data-generating and data-seeking activities by the public." Nonetheless, there is immense potential to make data dissemination a two-way process, in which information is both received from the public and fed to it (Crowe 2012; Jennex 2012a; Sykes and Travis 2012).

The assertion that command and control may be at odds with social media deserves further elaboration. I have argued elsewhere (Alexander 2008) that there is a continuum between command-based and collaborative models of emergency management. The command end of the spectrum tends to be authoritarian, and to divide competencies by level of command into strategic, tactical and operational. The collaborative end of the spectrum tends to divide competencies by theme, such as communication, logistics, and shelter. As there is no clear hierarchical structure in social media, they fit much better into a collaborative model than a command one. Present experience suggests (Yates and Paquette 2011) that issuing orders to the general public is likely to generate an adverse reaction on social media, whereas issuing requests for collaboration may elicit a more positive response, based on involvement rather than alienation. Moreover, the thematic organisation of

collaborative models of emergency management favour collective information sharing on tasks, topics and sectors.

Hughes and Palen (2012) observed that the strict bureaucratic nature of emergency management systems, such as the US NIMS, is at variance with the open system and free access character of the social media of which emergency managers are being exhorted to make use. However, the direct, person to person nature of social media is a boon to public information officers, as it helps them avoid the common pitfall of being misquoted by the official media. Moreover, citizens are widely recognised to be the real first responders after disaster (Helsloot and Ruitenberg 2004): they hold the key to the use of social media as an extension of emergency management. Rarely are emergency management organisations ready to utilise such developments. As Westbrook et al. (2012, p. 2) observed, "The community, volunteer organizations, and news organizations are currently embracing social media, but EM is slow to adopt and implement it on a full scale." There are demonstrable benefits from doing so. For example, Vihalemm et al. (2012) found that social media can help citizens receive, understand and cope emotionally with warning messages.

Yet there is an imperative to act: the public can now share information and disseminate critical news to the world and each other without going through government communication methods. This is revolutionizing the way in which people seek help and the way first responders and managers receive and exchange information. The very structure of communication and information sharing dynamics is changing for both for emergency managers and the public. As the Director of the US. Federal Emergency Management Agency, Craig Fugate, stated in a Senate Homeland Security Hearing in 2011, one of the social elements that is changing in the field of emergency management is the way the public can now be viewed "as a resource and not a liability." For example, social media can be used to deliver warnings to users. In the most sophisticated cases, these may involve local information in the form of maps and data, as well as instructions on what to do during an impending crisis.

4. *Crowd-sourcing and collaborative development.* In most disasters, the first responders *are* the public. Moreover, social capital is involved in the form of the mobilisation of skills, leadership, networks, support systems, and so on (Dufty 2012). This involves the concept that social networks and interaction between people increase productivity and lend added value to outcomes. The social networks benefit from the particular skills of their members. One aspect of the formation of social capital through social media is crowd-sourcing. For example, Ushahidi is the name of a crowd-sourced crisis mapping platform (www.ushahidi.com—Gao et al. 2011a). Sahana, and its derivatives Eden, Vesuvius and Mayon, are open source disaster management systems. These initiatives rely on spontaneous contributions to make them work. This endows them with positive feedback, in that the more they are used, the more popular they become and the more they encourage users to contribute to them. Ushahidi and Sahana are examples of the use of social media to create and disseminate methods and good practices, and to form social capital. They are open-source,

free-access platforms that can be used and modified by anyone. In this respect, they are particularly useful for places where disaster management and response are poorly developed and resources are scarce.

In crowd-sourcing, it is suggested that 1 % of the crowd will create content, 10 % will validate it and 89 % will use it (Goolsby 2010). However, this is sufficient to maintain a constant flux of information and a high level of consultation of the sites built upon crowd-sourcing. The drawbacks are that crowd-sourcing lacks a common mechanism to facilitate coordination between organisations, it lacks security features, and it does not necessarily provide the information that is most needed or most accurate (Hammon and Hippner 2012). Nevertheless, crisis mapping is particularly suited to crowd-sourcing through the use of social networks, in that reports can be received from many users, and compiled into the resultant maps, which can be widely disseminated. Maps can depict survivors' temporary settlement camps, resource distribution sources, accessible roads, impacted areas, and so on. In the words of one researcher (Goolsby 2009), crowd-sourcing creates a sort of "open intranet" in relation to the Internet, or in other words a community of users.

5. *Creating social cohesion and promoting therapeutic initiatives.* Social media can be used to make people feel part of particular initiatives. They can foster a sense of identification with local or on-line communities. Researchers (e.g. Taylor et al. 2012, p. 25) have noted that people caught up in disaster reported feeling more supported and more optimistic about the future when social media were extensively involved. Moreover, social media can be used to enhance voluntarism by increasing the profile and connectedness of voluntary organisations. In this way, they can have a positive impact on the esprit de corps of the members.

An American Red Cross survey of social media usage was carried out in 2010 (Blanchard et al. 2010). It indicated that 24 % of the US population and 31 % of the online population would use the media to tell family and friends they are safe. This reflects both the utility of social media and a well-founded lack of confidence in means of communication such as direct telephone calls, which are subject to network saturation.

6. *The furtherance of causes.* Social media such as Twitter can be used to launch an appeal for donations. With respect to the 2010 Haiti earthquake disaster, Lobb et al. (2012) found that television had a much greater impact in this respect, but nevertheless a Twitter appeal did elicit a considerable response from public donors. Gao et al. (2011b) found that In 48 hours the American Red Cross received $8 million in donations merely from text messages. Lobb et al. (2012) observed a rapid rise in donations straight after the disaster, when news coverage was maintained at a high level, and then a gradual, persistent decline as coverage dwindled and disappeared.

7. *Research.* The understanding of social reactions to stress, risk and disaster can be enhanced by the use of social media. This represents a challenge to researchers, who are struggling to create what one of them has called a "digital ethnography" (Murthy 2011a). Some authors (e.g. Castillo et al. 2011) have

chronicled the move towards automatic credibility analysis. Others have compared activity on social media sites with the timeline of events in the field (Chung 2011).

The Negative Side of Social Media

Reported above are seven ways in which social media are useful and through which they show promise for development in the fields of disaster response and resiliency. However, they do have a darker side (Chung 2011; CSS-ETH 2013). Rumour propagation is not to be ruled out, nor is the dissemination of false or misleading information, whether this is done inadvertently or deliberately. Anyone who doubts the power of Internet-based information to disseminate false information should type the words "earthquake prediction" into a search engine. The resulting sites are a mixture of those that purvey dispassionate scientific information and those that are based on highly debatable, perhaps utterly unscientific, premises and methodologies. Yet the sites run by charlatans often have the same visual impact, and thus superficial legitimacy, as the authoritative scientific sites (Flanagin and Metzger 2007). Worse still, potentially social media can be used to orchestrate crime, depending on the strength or weakness of any function that arises, probably quite spontaneously, to "self-police" their output (Goolsby 2010).

Castillo et al. (2011, p. 675) observed that "immediately after the 2010 earthquake in Chile, when information from official sources was scarce, several rumours posted and re-posted on Twitter contributed to increase the sense of chaos and insecurity in the local population." This contradicts the rumour-quelling propensity of social media recorded in Tokyo after the 2011 earthquake (Bird et al. 2012). Castillo et al. (2011) also found that people had more faith in traditional media, and headlines on Twitter were regarded as less credible. Twitter was seen as a tool for political and commercial propaganda. Moreover, these authors found that outbursts of public sentiment correlated with unreliability in Twitter messages. They attributed some of the drawbacks of Twitter to the disconnection between on-line messages and the reality on the ground, which the message writers had difficulty in assessing properly.

One event in mid-2013 illustrates the negative effect that social media can have during a major incident. In the night of 4 May 2013 a freight train derailed at Wetteren near the Belgian city of Ghent, releasing acrylonitrile gas in an explosion and toxic cloud. Concentrations of the gas reached 600 parts per million, which is 6–8 times the lethal dose. One person died and 93 were injured by the fumes. As the area that was affected is densely urbanised, many aspects of this major incident were shared on social media. However, according to the commander of the Ghent Fire Brigade (GFB), Mr Christian van de Voorde [personal communication], much of the information being put about by the general public was wildly inaccurate. Unfortunately, the situation on the ground remained unstable for more than a week and, during this time, GFB was not able to gather accurate information with which to counteract rumours and exaggerations. In this respect, the impact of social media

on the public image of the incident was decidedly negative because it remained distorted, inaccurate and alarmist. When a situation is simpler and more easily interpretable, one may be able to rely on self-policing of social media by users who are concerned to get the facts right, but when the true facts are, on the instant, unobtainable or in dispute, that cannot be the case.

A further example is that of the massive surge in social media activity in the aftermath of Hurricane Sandy, which impacted the Atlantic coast of the United States at the end of October 2012. There is no doubt that social media did provide the opportunity for greatly enhanced exchange of information between the authorities and the public and between members of the public, but not without substantial costs (CSS-ETH 2013, p. 4). Photoshop-style image manipulation was widely used by people who shared photographs of the storm. Exaggerated and false news items, for example, about which places in New York City were flooded, were shared and reposted by so many social media users that they were picked up by mainstream media and thus began to assume the status of true stories until they could be discounted by field checking.

Murthy (2011b, p. 11) noted that the very people who are most in need of support may be those who have least access to and understanding of the technology that they would need in order to participate in the social media revolution. But apart from the basic digital divide between the 'haves' and 'have nots', researchers have noted the persistence of demarcations on the basis of race and class among users of the technology and services.

Perhaps the greatest challenge in using social media is the sheer volume of information involved. One researcher (Goolsby 2009, p. 3) commented that "finding useful 'tweets' during a major event… is a little like panning for gold in a raging river."

According to Cheong and Lee (2011), "Twitter has been identified as both a potential facilitator and also a powerful deterrent to terrorism." Hence, there is currently considerable ambiguity about whether social media exert a benign or a malign influence on public safety and security. For example, although China is known for its attempts to repress free usage of the Internet, there is an alternative story. Denis-Remis et al. (2013) described how patriotic Chinese used social media to orchestrate disruption of the activities of a French hypermarket company in China because of anger at French Government policies towards Tibet. Once it had started, the researchers saw the reaction as something that was impossible to stop, an indication of the strength of positive feedback in the effects of messaging (Denis-Remis et al. 2013, p. 53). This underlines the positive feedback inherent in social media usage in a crisis, a phenomenon that can generate unstoppable, uncontrollable developments with little regard to whether posterity will consider them positive or negative.

Finally, when reviewing the potential drawbacks of social media, one should also note the physical weaknesses. Writing about social media usage during a major interruption of electricity supply to the southern Californian city of San Diego, Jennex (2012b) noted that: "Ultimately the Great Southwest Blackout can be considered a massive, unplanned, backup battery test." Neither the users nor the providers of sites and cellular communication to reach them were ready in any way

for such an exigency. Tellingly, Jennex (2012b, pp. 4–5) concluded that "while the functionality of social media is useful, the maturity of social media availability is not sufficient to warrant including social media as operational crisis response systems." In other words, the potential is there, but much needs to be done in order to realise it. This will require preparedness on both the technical and the social fronts, from both suppliers and users of services.

One interesting question that deserves to be considered is whether the advantages and disadvantages of social media with respect to disaster mitigation and response are significantly different to those of traditional media. If one considers the case of earthquake prediction, there is little indication that television, radio and newspapers have behaved rationally, responsibly and within the bounds of scientific fact (see, for example, Dearing and Kazmierczak 1993). Would social media have closed or increased the gap between reporting and reality? It is too early to tell. However, the idea of a message that "goes viral" and is thus picked up by millions of users, is worrying. For example, the 30-min documentary film *Kony 2012*, about Joseph Rao Kony, the Ugandan founder of the Lord's Resistance Army (LRA) was viewed almost 100 million times on YouTube, through which it reached more than half of young adult Americans. Most of the people who saw it know no more about Kony and the LRA than they found out in the film. However, it has been widely criticised as being significantly inaccurate and misleading (Cavanagh 2012). This could easily happen in disasters, and, in so doing, potentially widen the audience beyond those who would have gained information from the traditional media. On the other hand, the worldwide misinterpretation of the trial of seven officials after the Italian L'Aquila earthquake of 2009 shows that the conventional media are just as capable as social media of picking up a misleading story and vigorously propagating it (Alexander in press b).

In synthesis, besides problems such as waning battery power, the use of social media brings forth issues of trust and privacy. As Johnson et al. (2011) observed, trust is asymmetric, personalised, dependent on context and potentially short-lived. Moreover, privacy is an increasing concern that is shared by many users of social media.

Ethics of Social Media Usage in Disaster

Students of social media have been quick to take note of potential ethical dilemmas. The first to investigate this aspect were legal and medical researchers. For example, the associations that represent medical personnel in the United States have counselled against uninhibited use of social networking, as it can lead to conflicts of interest, for example, when a doctor uses social media to befriend a patient. Decamp (2013) noted that problems such as this are a legal minefield, and one that lawyers have increasingly come to monitor in search of opportunities to litigate. Emergency managers normally have to walk a tightrope between actions that may be deemed excessive and any failure to respond adequately that could be considered negligence (Alexander in press a). As McKee (2013, p. 3) observed, "The changing nature of technology, as well as the relatively recent use of social media for research, means

that ethical considerations will have to be reviewed regularly." The same will be true of protection against unwarranted official intrusions into personal privacy (Nissenbaum 2004).

According to Nissenbaum (2004), privacy is subject to a set of norms about what can be divulged and how that can happen, but the norms vary from one social context to another. This is the theory of 'contextual integrity'. Violation of the norms amounts to a loss of privacy. Grodzinsky and Tavani (2010) noted that norms established or respected by one participant, for example the author of a personal blog, can easily be violated by the republication of material in a different context, for example, a public blog.

As noted above, risks are associated with a largely unregulated Internet-based system of public mass communication. In summary, the use of social media for nefarious or malignant purposes could potentially include attempts to persecute people or damage their reputations (Boggs and Edwards 2010), attempts to spread malicious rumour, efforts to foment violent protest, and attempts to organise terrorist activities. Lesser degrees of harm could involve invasion of privacy and unauthorised dissemination of personal information. Moreover, any system of disaster response or risk reduction that depends on social media for access to its services risks excluding those people who lack access to the requisite means. No amount of self-congratulation about the high levels of penetration of 'smart' mobile telephony can obscure the fact that there are citizens who for reasons of poverty, disability or choice do not possess the instruments in question and do not know how to use them. Moreover, it is clear that the wealthier, younger, fitter and more aware a person is, the more he or she is likely to be fully aware of the services available via social media and its potential under different circumstances. "Computer illiteracy" is a form of disadvantage in a world that has become dependent on digital communication for many services. It is only partially compensated for by the fact that, by relaying information by word of mouth, other people will be able to help a disadvantaged individual cope. However, total equality cannot be a sine qua non of social media, as there will always be some level of social exclusion to hinder their development.

If these problems become serious, critics will begin to argue that the democratic function of social media is a mere illusion. Instead, we see the media as a means of propagating and sustaining direct democracy, and of fostering participatory governance in disaster risk reduction. In this respect, it should be borne in mind that there is a difference between disseminating information and giving people executive power on the basis of what is disseminated. Nevertheless, even the mere propagation of information is empowering, to a certain extent.

The risk of concerted abuse of social media begs the question of whether they should be more regulated, and if so, how could that be achieved? Regulation would require an assessment of the potential seriousness of the problem, estimation of whether measures to control social media are feasible, and a decision on whether the measures are necessary and would help abate the problem.

Social media and the Internet constitute a truly open system, and one that has no centre. As Brafman and Beckstrom (2006) noted in their book *The Starfish and the Spider*, when such a system is under attack it tends to mutate into something that is

even less centralised and even harder to control. Thus, attempts in the People's Republic of China and the Islamic Republic of Iran to dictate what people can access on the Internet are only partially successful: they slow down rather than stop the dissemination of information. In the main, the question of how one polices a leaderless organisation is largely unsolvable. Individuals can be tracked down and arrested, sites can be taken down, services can be blocked or wound up, but others will replace them.

The converse view is that social media are a good means of circumventing corruption, mendacity, unwarranted control and excessive monitoring of people's activities. Moreover, we can view social media as a source of charity, solidarity and hope. While we should beware of treating such a system as a nirvana of democracy, while there is a good consensus among users about what is right and good, and what is acceptable, self-policing will be active. Bad posts and unethical messages will be censured by the users. In this respect, we can return to Charles Fritz's (1961) conception of disasters as the home of the "therapeutic community"—cf. Alan Barton's "altruistic community" (Barton 1970) and Taylor's "utopian feelings" (Taylor et al. 1970). In the immediate aftermath of a sudden-impact disaster, there tends to be a greater consensus in the community on what is right, good and ethical to think, say and do. Differences are put aside for the duration of the emergency, as the community faces a large external threat, for example the destruction caused by an earthquake, hurricane or flood. This is the period in which social media come into their own as a source of communication and support. Hence, they can be said to benefit from and reinforce the "therapeutic community", in a form of social symbiosis.

One other aspect of the ethics of social media usage deserves to be examined here. I have written elsewhere (Alexander in press b) of the "death of discretion" in modern culture. In fact, wireless communication is part of a broad trend towards the gradual abandonment of personal discretion and increasing tendency to share intimate details. For example, people grieve in public far more than they did in the early days of mass media. Social media facilitate mass participation in this process. Those who go against the grain and pose grossly offensive messages in relation to people's grief at losses are likely to be pursued vigorously by the authorities, as the level of outcry forces action to be taken. Social media can thus produce a very robust consensus, but not an absolute one.

There is an ethical question about the misrepresentation of disaster, whether this is deliberate, inadvertent or a combination of the two (Singer and Endreny 1994). The first "modern disaster" was probably the famine and starvation that occurred in the Biafran war of secession from Nigeria in 1967–1970. This was the first occasion on which film footage of death and suffering in an African famine were shared with the Western public in near real-time. However, the famine was not the result of natural disaster or inability to produce food, as the television viewers believed, but was a tactic of war, the result of blockades and military incompetency (Mayer 1969). Decades later, the Live Aid concerts and ensuing donation bonanzas propagated the misconception that Ethiopians were incapable of responding to catastrophic drought, when in reality they were the victims of forced migration, which was practically sustained by the donation spree (Müller 2013). Theoretically,

social media are able to correct the imbalances of perception, because realistic reports are likely to arrive from the field. However, much depends on who takes note of the reports and how they are mediated by social perception. For research, this is largely uncharted territory.

One is prompted to ask whether there are any solutions to the ethical problems that at least potentially, and in some cases demonstrably, beset social media usage in disasters. In more general terms, high-profile cases of electronic media-based "stalking" and persecution, propagation of racism, endangerment of minors, threats of violence and incitements to criminal activity have prompted the authorities of various countries to discuss or adopt measures to take the offenders off line, track them down and, where appropriate, prosecute them. With respect to deliberate misuse of information in disasters, rarely have there been punitive measures with regard to the traditional media, let alone social media. However, the trial of the "L'Aquila seven" (Alexander in press b) is a landmark case in which the misuse of information given to the public was at the heart of the legal case. In that the prosecution successfully demonstrated that the results of this were fatal for some tens of recipients, the way has been opened for legal action on information that is harmful through negligence or design.

Some Recent Successes in the Use of Social Media in Disasters

Despite the potential for negative uses of social media, there have already been some success stories in their employment for disaster response and risk reduction. Social networks have been used instantly and spontaneously to report health issues, such as cholera in Haiti and dengue in Thailand and Indonesia (Resch et al. 2011). In Japan after the March 2011 earthquake and tsunami, social media facilitated public alerts, helped locate missing people and enabled mapping of different aspects of the emergency (Hjorth and Kim 2011). Flash-flooding in January 2011 in Queensland and Victoria, Australia, led to a six-fold increase in public accession to emergency service Facebook sites, representing a huge increase in interest and support (Bird et al. 2012). Researchers have developed an on-line monitoring tool to detect sharp increases ('bursts') in the frequency of key words that appear on Twitter (Cheong and Lee 2010). Furthermore, rumours and misuses of Twitter are being monitored by researchers at the University of Indiana, via a website called Truthy (truthy.indiana.edu). Lastly, the proliferation of crisis camps and their aggregations, crisis commons, has started to promote the more systematic organisation of social media for emergency response, on occasion using wikis (Blanchard et al. 2010).

Conclusion

The current situation regarding social media in disasters and risk reduction has been summarised very well by Sutton et al. (2008, p. 7):

> Our data suggest that social media support the influence of the existing public-side information production and distribution. As a consequence of the growing

utility of social media and the ubiquity of peer-to-peer communications, we believe that a change in disaster management models will come about in spite of any failure to formally recognize these widely distributed and often strikingly well-organized information activities. However, we argue that simply letting these inevitable changes take place would nevertheless result in needless delay, conflict and missteps. Instead, we call for efforts by public officials to actively consider how to align with peer-to-peer information exchange and to develop new conceptualizations of the information production and dissemination functions for disaster response.

In other words, the incorporation of social media into pre-existing emergency management systems is inevitable, owing to the sheer weight of public usage of such facilities. Moreover, as social networks can be two-way means of communication, they can mix popular and official information. In this optimistic view, the citizenry is viewed as a powerful, self-organising and collectively intelligent force (Gao et al. 2011b).

Lastly, it is notable that, after only a very few years of research, there are still many aspects of social media usage in crisis that are not adequately understood. One of these is the influence of gender on perception, attitudes and behaviour regarding usage of the new media (Armstrong and McAdams 2009). If social media are to be optimised as a means of communication during emergencies, such aspects will have to be understood thoroughly.

In synthesis, social media offer immense potential for interaction with the public and monitoring of the public's concerns. They have greatly increased the scope, volume and speed of information exchange. This has not occurred without risks, mostly associated with the propagation of false or inaccurate information, and the potential consequences if this takes place. However, mass participation tends to rectify some of the inadequacies associated with the free and unregulated flow of information. The future will probably see a rationalisation of the use of social media and new methodologies for judging the public mood and the utility of information supplied by the public. This will be a challenge that emergency planners and managers must necessarily face.

One final point concerns the role of social media in the long periods dominated either by protracted recovery from major disasters or by mitigation (disaster risk reduction). Patient attempts will need to be made to incorporate social media into these processes and during them the technological, cultural and social realities will inevitably change. There is a strong need for institutions such as civil protection services and emergency warning systems to be adapt to the changing reality of social media, and also to ensure that they have robust plans to tackle any ethical dilemmas that social media usage may produce in the future.

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