Chapter 3

The use of social media in crisis communication

This chapter highlights how social media can support the changing landscape of crisis communication. It identifies the challenges that arise from the use of social media and ways of dealing with these challenges. A framework for monitoring the development of social media practices amongst countries for crisis communication is proposed. This includes a three-step process that spans passive to dynamic use of social media. This chapter provides governments with a self-assessment tool that will enable them to monitor and track progress in the effective use of social media by emergency services or crisis managers.

This chapter draws on Wendling, C., J. Radisch and S. Jacobzone (2013), working paper "The Use of Social Media in Risk and Crisis Communication", *OECD Working Papers on Public Governance*, No. 24, OECD Publishing, Paris, http://dx.doi.org/10.1787/5k3v01fskp9s-en.

For a comparative snapshot of social media use in and by OECD governments to deliver more open policy processes in other areas of public policies, the following paper provides an in-depth analysis: Mickoleit, A. (2014), "Social Media Use by Governments: A Policy Primer to Discuss Trends, Identify Policy Opportunities and Guide Decision Makers", *OECD Working Papers on Public Governance*, No. 26, OECD Publishing, Paris http://dx.doi.org/10.1787/5jxrcmghmk0s-en.

An updated analysis of the use of social media by government is also available here: http://oecdinsights.org/2015/08/21/reaching-maturity-in-government-use-of-social-media/.

Key Messages

1. Social media are revolutionising communication. They have great potential to support two-way crisis communication at a low cost and with high efficacy, and can maintain trust in government by developing a direct relationship with citizens at a time when expectations are high.
2. There are three main ways to use social media in crisis management: 1) bottom-up as a situation awareness tool; 2) top-down as a state communication tool; and 3) multi-ways as a platform for dynamic interaction.
3. The challenges of using social media in crisis communication include: the multiplicity of players, the amount of information generated, the question of open data, privacy and confidentiality, the question of liability, the expectation of the population, and the issue of security.
4. Governments should develop social media strategies to support their crisis communication strategies before, during, and after a crisis. Guidelines can encourage the use of social media by emergency managers and should address the implications of an increased use of social media (resources, reliability, information overload etc.).
5. Governments should foster citizen-led social media use and enable communities and individuals to self-initiate and volunteer in emergency efforts through the development of technological platform and tools
6. Governments should maintain traditional media in their crisis communication strategies to ensure the inclusion of all segments of the population.

Crisis communication strategies and policies underpin an organisation's overall risk management strategy. It is essential to identify effective risk communication strategies for informing both the public and professionals. As communication technology diversifies and proliferates, social media (Facebook, Twitter, etc.) are increasingly used to convey information during crises to send warnings, conduct situational awareness, and even to catalyse action and sustain dialogue and feedback loops among public authorities, volunteer groups, the business sector and citizens. Despite their usefulness, governments often view social media with some caution due to potential costs of trying to keep pace with growing citizen expectations. The reliability of social media content is sometimes questioned, although filtering tools have been developed that may be used to reduce time spent reading irrelevant messages and untrustworthy sources. Risk management policies should take into account these recent technological changes if policy makers are to keep pace with sociological changes among their end users.

This chapter offers a typology of social media uses to reflect a range of practices in countries and the strategic approaches that governments and other organisations could adopt to go beyond an ad hoc use of these tools and achieve better outcomes, especially for emergency services. The intention of this chapter therefore is to address the conditions under which risk and crisis communication strategies can be adapted to be successful in this new environment.

Risk and crisis communication strategies are evolving with the emergence of social media

Risk and crisis communication strategies began to develop in the 1960s-1970s with the contribution of research from cognitive and social psychology experts. This research concluded that people use cognitive shortcuts to process information and that perceptions could diverge greatly due to expectations, leading to overreactions, mistrust, etc. Risk and crisis communication was developed as a strategy to make people's behaviour more "rational" so that they could make informed decision.

In the 1990s, this unidirectional model of risk and crisis communication was criticised as leading to one-way communication from the expert to the lay public, which did not give enough place for dialogue and feedback. The idea emerged to create platforms for discussion where people could discuss and exchange opinions and information about risks. The focus was on consensus building and conflict resolution. It became key to gather multiple viewpoints. Collective models of decision-making were put in place, together with new participatory approaches for communication. Risk and crisis communication research became multidisciplinary: in addition to psychology, communication science, sociology, and political science also came to play. Organisations dealing with risks and crises were set up and employed social scientists in their communication departments to develop new ways to interact with the public.

The emergence of social media

Since the late 1990s, new social media have not only changed the perception of risks and crises, but also citizens' expectations towards emergency response officials, the private sector, volunteer organisations, etc. Platforms such as Twitter, Facebook and Ushahidi (an open crowdsourcing crisis information platform) have been widely used to communicate about risks and crisis situations (e.g. 2010 Haiti earthquake, 2011 Fukushima nuclear accident). This change is linked to the rapid development of the Web 2.0 and its applications. The United Nations (UN) says that Internet traffic is expected to

grow 25-30% between 2011 and 2015 in North America, Western Europe and Japan, and to reach or surpass 50% in Latin America, the Middle East and Africa (United Nations Global Pulse, 2012). However, the use of social media, such as Facebook and Twitter, is growing even more rapidly. In Senegal, for example, Facebook receives about 100 000 new users per month.

Technological innovation spurs social and institutional change (IRGC, 2012). Best practices are slowly emerging and driving broader changes, such as refining linguistic and other behavioural norms in the use of social media for risk and crisis communication. In many countries, public expectations and roles are changing in terms of the desire for increased transparency of information in the spirit of open government, and participation in information gathering, sharing and verification. Trust in established experts, public officials and numerous bloggers has changed: the public is no longer content to receive official recommendations and advice in a passive way. People are gradually shifting from a situation where the information was pushed on them and made available by authorities, to a situation where the information can also be pulled. For example, followers can register to Really Simple Syndication (RSS) feeds that gather the fragmented information they want and filter the data they access according to their own interests. Social media have also created new arenas of information exchange where dynamic and interactive flows of data are in the hands of millions of individuals who seek a more evidence-based participatory form of risk and crisis communication. New services exist to deal with online communication among official emergency responders. Advanced tools can help map crisis communications on the web in real time.

Social media can be used to enhance risk and crisis communication in several ways: 1) they are collaborative and participatory, online discussions can improve situation awareness; 2) they are decentralised, the information can circulate very quickly among actors, thanks to RSS feeds or tweets that are immediately available online to multiple organisations; 3) social media are popular and accessible, emergency services can extend their reach when sending information or warning; and 4) social media can provide data that are geographically or temporally traceable, digitally generated content allows for the monitoring of the geographical and time development of a crisis.

Different types of social media used in risk and crisis management

Five types of social media can be identified (see Table 3.1.). **Social networking** media, such as Facebook and Myspace, bring groups of people together because they share common interests. **Content sharing media**, such as YouTube and Flickr, allow anyone to upload content such as videos or pictures to be shared with everyone or with a restrictive community of users. **Collaborating knowledge sharing media**, such as Wikis and podcasts, enable participants to ask questions and wait for answers from different users. **Blogging social media** are used to share facts and values, emotions and expectations. Finally, **volunteer technology communities** (VTC), such as Ushahidi and Sahana, are social media platforms or modules created especially for risk and crisis communication.

Different types of social media can be complementary in risk and crisis management. Social networking media can help enhance co-ordination among volunteers and emergency services. Content sharing media can help conduct situational awareness by identifying images or videos of how a crisis is evolving in real time. Collaborative knowledge sharing media can help develop dialogues between different stakeholders in a risk or crisis management situation. Blogging or micro blogging tools, such as Twitter,

can be used to share facts in real time, but also to convey recommendations and warnings very rapidly. Social media platforms or modules like Ushahidi create a synthesis of various social media content to help emergency managers and volunteers become more efficient in their activities.

Table 3.1. The different types of social media used in risk and crisis management

Type of social media	Examples	Use for risk and crisis communication
Social networking	Facebook Myspace Friendster	Enhance co-ordination among volunteers and emergency services. Allow to share information inside a community. Provide swift update on emergency situation.
Content sharing	YouTube Flickr Vimeo	Enhance situational awareness in real time through exchange of pictures and videos. Allow emergency services to easily launch viral campaigns about risks. Help identify missing individuals, victims.
Collaborating knowledge sharing social media	Wikis Forums Message boards Podcasts	Enhance dialogue between victims and emergency services.
Blogging and microblogging	Blogger Wordpress Tumblr Twitter	Convey recommendations and warnings. Share facts. Twitter enables immediate information sharing with a wide reach and feedback possibilities.
Specialised crisis management platform managed by volunteer technology communities (VTCs)	-MAPPING COLLABORATION OpenStreetMap Crisis mappers Google map maker -ONLINE AND ONSITE CONTRIBUTION Ushahidi Crisis commons Sahana foundation Geeks without bounds -PUBLIC-PRIVATE-PEOPLE PARTNERSHIP Random Hacks of Kindness (with Google, Microsoft, Yahoo, NASA, World Bank)	Mapping of emergencies. Community Emergency response team facilitator.

Note: For a description of each social media, please refer to Annex 1.

Using communities like Ushahidi, volunteers have already responded to major disasters, such as earthquakes in Haiti and Chile and flooding in Pakistan. Volunteers created detailed maps, processed imagery, and geo-located posts made –with their geographical information attached - by the affected population to a broad number of social media channels. Some tools developed by these volunteers have already been deployed under the United Nations Disaster Assessment and Coordination (UNDAC); others provided support to the European Union (EU), the United States and across the globe, making their supercomputers and large storage arrays available for managing translation workflows, and serving large data sets.

Finally, Geotagging and Volunteered Graphic Information (VGI) can also play a role in crisis management. Geotagging is the process of adding location information to social media posts, videos, or photos. When the public uploads any of these media to the Internet they may have the ability to add a geotag to their post. Emergency managers, especially at the state or regional level, can obtain a picture of the destruction occurring in an area through these posts. Through the use of internal geographic information systems (GIS) or free online sources (such as Google Earth) these posts can be plotted on a map and will give a high angle view of what is occurring in the community. Many social networks, like Facebook, Twitter, and Flickr, are making their services compatible with geotagging, which can most easily be accomplished when updating social media through a smartphone.

Is there a need for increased use of social media in risk and crisis communication?

The uptake and deployment of social media in emergency services entails development, training and operations costs. The technical and social knowledge to work with social media may represent a steep learning curve for risk and crisis managers who are used to working with traditional media. Senior level management is often not among the primary community of social media users and may be less exposed to the social changes brought about by Facebook and Twitter than younger generations. However, they are exposed to politicians who often pick up on such changes quickly as a way of remaining connected to voters.

There is a tendency among experts and public officials to fear that too much reliance on social media could give rise to new public expectations that would be hard to meet by the authorities in charge. As a result, many organisations still consider that traditional media should be the primary channel to inform the public in risk and crisis communication and still operate by relying on daily news conferences and public briefings. They do not see the need for a constant update in real time and many do not monitor social media networks to conduct their situation awareness or to communicate with the public. Often they do not have the communication infrastructure to make appropriate use of social media in risk and crisis management.

Nevertheless, social media have the potential to bring beneficial changes in risk and crisis communication. Recent studies show that behavioural changes are more easily achieved through personalised communication (Thaler and Sunstein, 2008). Social media can be powerful tools for encouraging resilient behaviour in a community. Messages sent out can be adapted to different categories of the targeted population.

A recent study of the American Red Cross shows that expectations are changing (American Red Cross, 2011). Nearly half of respondents would sign up for Short Message Service (SMS), RSS or other electronic types of alerts that provide safety information; this percentage is growing year after year. One in seven general public respondents experienced an emergency or witnessed a newsworthy event and posted information or photos about that event to a social media site. Facebook is the most popular way to do so, followed by Twitter and Flickr. If unable to reach emergency services with traditional means, one in five of the general public would turn to online channels to request help. Nearly a fourth of the general public and a third of the online population would definitely use social media to let loved ones know they are safe. The public is demanding constant updates: it will accept that a situation evolves but will not tolerate being kept in the dark.

Recent studies show that seniors are also now using social media (Pew Research Center, 2015). This evolution means that the scope of population that can be targeted through social media becomes bigger by the day. New organisational structures exist that go beyond the traditional government centric approach towards a "whole of community" approach to risk and crisis management. According to a recent study conducted for the World Bank, the rise of the volunteer technology communities like Ushahidi has brought a new set of organisational designs to problems that have often become snagged in bureaucracy (See Box 3.1.). VTCs rely on flattened, decentralised structures with decision-making and conflict resolution mechanisms that were adapted from online communities like Wikipedia and open source software projects. As a result, they have moved far faster than larger players in nearly all circumstances - and perhaps faster than established protocols would allow.

New forms of risk and crisis communication are emerging as a result. Social media can be used in major catastrophic events and in steady state situations to enhance both risk and crisis communication. A study by the University of Copenhagen that analysed the motivation to use social media showed that the use of these technologies by emergency services is tied to individuals pushing their organisations to change (Latonero, M. and I. Shklovski, 2011). Part of the impetus to interact more with citizens directly derives from the dissatisfaction of organisations with traditional media. The officers interviewed felt they would be better served if they could interact directly online with the citizens rather than through the media. The study showed that the emergency services users of the social media during a crisis do not only listen to tweets, but also encourage reporting and reward them. To validate the information they read on social media, they try to interact with the persons to verify and ensure they can trust the facts. Their experience of the use of social media helps them know better which tweet to trust, and thus reinforces their motivation to continue using social media, even if they do not necessary receive further organisational support.

What worked well

Several examples illustrate what works well when using social media in crisis communication. The following boxes provide examples of such practices from OECD countries.

Box 3.1. The EU MASSCRISCOM research project in crisis communication

In most EU countries, risk and crisis communication mostly focuses on radio and television. Sirens are used to a considerable degree in some areas to warn the public directly. A major problem is to reach the public in innovative ways, while making it possible for people to provide information when catastrophic events occur. The Masscriscom project explains the added value of using new media such as RSS feed, YouTube, Twitter or Facebook. It gives the example of so called Crisis Communication Centre (CCC), which can rely on a multiplicity of risk, and crisis communication channels coupled with geographical information systems to be as precise as possible in the warning messages and situational awareness. The CCC is thought as a two-way communication cell where information can both be sent to the public and received from it. The CCC is also connected to the EU 112 emergency call number cell. To ensure interoperability and facilitate the distribution on all kinds of communication channels, the CCC relies on a standard format or template, the common alerting protocol. The CCC consists of three main components namely the operators, the monitoring and alarm function and the editorial office. The operators respond to the demand of the public on the different types of communication channels and transmit the information to the authorities.

Box 3.1. The EU MASSCRISCOM research project in crisis communication (continued)

The monitoring and alarm function detects and follows events. It has the capability to detect anomalies that may indicate that something has happened or is happening. The editorial office assists the authorities in elaborating and updating the basis for the FAQ for an event, preparing the information to the different groups and in different languages. It conducts quality assurance of the messages. The office is responsible for the communication on the web and for the traditional media contact. To sum up, the CCC serves as contact point for the public in order to reduce the burden on the 112 emergency call number. It provides the opportunity for supplying the public quickly with information. It also provides a channel for compiled and co-ordinated information from the authorities to the public.

Source: Webpage of the EU MASSCRISCOM project: www.masscriscom.eu/default.aspx

Box 3.2. Community Emergency Response Team (CERT) and the Sahana module

A series of storms flooded Chicago's south west side. The temperature was supposed to get very cold and a lot of households were without power. Chicago's police and fire departments on site were overwhelmed by the number of people needing assistance. The Chicago Office of Emergency Management and Communications (OEMC) was asked to find more volunteers, and the office looks to the Community Emergency Response Team (CERT), which uses the so called Sahana module. This social media platform dedicated to emergency situation offers the possibility to create an event to mobilise volunteers, both medically trained and not. The system sends out the deployment requests and processes the replies. Each volunteer willing to be deployed is automatically sent details on where to go and to whom to report. The general deployment volunteers report to the OEMC Incident Commander while the medical deployment is sent to the on-scene Medical Director.

Source: http://sahanafoundation.org/

Box 3.3. Ushahidi interactive mapping

The Ushahidi platform helped to crowd source information during Haiti's earthquake in January 2010. It aggregated data coming from different social media into an interactive mapping. When telephone lines are not working, people turned to the social media. The fact that they can see their input on the interactive mapping motivates them to continue to contribute. The Haiti Ushahidi map, backed up by a volunteer network that included Haitian-Americans translating text messages from Creole, was used by search and rescue teams to find survivors. It enhanced both the situational awareness and the crisis response provided on site. Since then, Ushahidi interactive mapping has been used to map the impact on communities of the BP oil spill and the consequences of Japan's earthquake and Tsunami in 2011.

Source: http://www.ushahidi.com/

Box 3.4. The Australian Alert SA web portal: social media messages in an emergency in one place

The Alert SA website brings together social media messages from South Australia's emergency services via Twitter, Facebook and RSS in one place, so that all the users of the portal can have a comprehensive pictures of what is shared on social media. http://www.alert.sa.gov.au/ brings together the Facebook page of the police and of the firemen services, the Twitter page of the state emergency services, the RSS feed of the Bureau of meteorology, and so on. It also provides all the emergency contacts (phone numbers, bureau, etc.).

Source: Webpage Alert SA in use in Australia: www.alert.sa.gov.au/

Box 3.5. The X 24 international crisis exercises

The exercises X 24 (http://24.inrelief.org/) are virtual, open-invitation, humanitarian assistance and disaster relief (HADR) exercises with real-world functional components that are hosted every year by San Diego State University's "Immersive Visualization Center" (VizCenter). On 24-25 September 2010, the VizCenter hosted the first virtual HADR event called "Exercise X24". X24 involved over 12500 people from 79 nations and 90 US government, non-government organizations, and public/private partners in a collaborative environment using crowd sourcing, social media, and cloud computing applications. A second exercise, X24 Europe, was held from March 28-31, 2011. X24 Europe transcended formed a collaborative bridge between individuals, communities, and nations with over 49000 participants from 92 nations that included two ambassadors, a US major general, as well as representatives from US European Command (EUCOM), US Northern Command, US Transportation Command, Office of Navy Research, STAR-TIDES at the Center for Technology and National Security Policy from National Defense University, and many others. The focus area for the scenario was the Balkans region with a seismic event that generated a tsunami in the Adriatic Sea followed by aftershock damage inland. 78% of participants were from Croatia, Macedonia, and Bosnia and Herzegovina.

The emergency managers and military officers say the idea was to tap the potential of social media to create video and text channels of communication that offer more immediacy and flexibility than the standard command-and-control operation anchored in a government war room. This new model for emergency response relies on volunteer technical communities of software developers, social media monitors and field volunteers during the crisis management. According to an article published in *USA today* following this exercise, working online from locations around the globe they meet via video, audio and text on Skype, in what they call "virtual emergency operations centres" and carry out countless tasks critical to the rescue and response effort.

Source: Webpage on the X24 exercise: http://vizcenter.net/x24/more.html

What has not worked well

The utilisation of social media can generate issues in time of crisis that can diminish the efficiency of emergency preparedness and response operations. This is exemplified in the cases explored below.

Criticism on the blogosphere

The risk of not including those who feel concerned by a disaster is that they may turn to the blogosphere if they feel they have not been heard. This happened in November 2007 in the United States when the heavy fuel oil of the Cosco Busan container ship spilled into San Francisco bay. The California governor declared a state of emergency and state personnel, funding and equipment were made available to assess and clean the environmental damage. However, no clear guidelines existed on how to include the help volunteers wanted to provide on the spot, so volunteers turned to the blogosphere. The coast guards and other emergency services were so much involved in the crisis response that they did not monitor or counterbalance the communication of potential volunteers who, as they could not be involved, criticised their actions. This is a challenge for organisations as it is very hard to deal with image and reputation issues on the Internet while dealing with a crisis.

Information that comes from sources other than emergency services

A study by the University of Georgia showed that on 22 may 2011, during the Joplin tornado, a Facebook employee started to create a dedicated Facebook page from her iPhone called *Joplin tornado info* (Wiliam, William, Burton, 2012). It was launched less than two hours after the event and quickly received 44 000 followers. This meant that those searching for information on the situation were relying on her and other volunteers instead of on the direct official services of FEMA, who felt they could have done a better job. This example raises the question of the sources that should prevail for social media crisis communication: is it better to develop government led social media risk and crisis communication or to enhance citizen-led social media use during crises to develop resilient communities?

The overload of information

The large volume of tweets and Facebook pages as a result of Hurricane Irene in 2011 meant that it was very difficult to pull meaning out of the flow of information. As a result, FEMA identified a need for new tools to conduct situational awareness through social media.

Good practice examples of using social media in risk and crisis communication

This section illustrates the increasing potential for the use of new social media for risk and crisis communication through 12 examples of practice. When an organisation starts to use social media it is important to decide what goals are identified as a priority. Is the objective to be more visible? To enhance recovery management? To improve situational awareness? Depending on the goals, the audience, content and tools to be used will differ, as explored below.

Raising public awareness about risks and crises

The "Hurricane tip of the week" and e-cards from the US Center for Disease Control and Prevention

Since the 9/11 terrorist attacks in the United States, the Center for Disease Control and Prevention (CDC) has developed innovative strategies to raise awareness through social media of potential risks and crises. For example, the "Hurricane tip of the week" is

a CDC initiative that relies on social media to post a tip per week. The weekly tip, which has more than 1 600 Twitter followers and 34 000 email subscribers, is also available as a widget (a small programme that users can download onto their computers or embed in their social media profiles or blogs). Widgets have also been used for product recall, for example there were more than 15.5 million page views of the salmonella peanut product recall widget, which included a searchable database of recalled products. CDC has also used e-cards to encourage disaster preparedness. During national hurricane week, a dozen e-cards, including a mobile friendly version, were launched. More than 100 000 people opened these e-cards. CDC also makes public service announcements available as podcasts on the web.

The "get prepared" portal of Public Safety Canada

Public Safety Canada's "get prepared" portal is available online and has a mobile friendly site. The general public can stay connected and receive regular updates via Twitter, RSS feeds, email, among others. There is an emergency preparedness week every May that aims for people to understand the risks in their region. It is run in partnership with the Red Cross, the Salvation Army, the Canadian association of fire chiefs, among others. The idea is to work closely with provinces and territories, as well as with non-governmental organisations (NGOs). The tweets sent during emergency preparedness week are approved by Public Safety Canada and then retweeted by the partners.

Recommendations

It is important to use social media as an awareness raising strategy prior to crises so that people can become accustomed to referring to official sources on social media portals. Using social media to raise public risk and crisis awareness allows emergency services to increase their access to audiences of different types, such as younger audiences who rely less on traditional media. The use of social media to raise risk and crisis awareness also helps to reduce the dependence on traditional media channels and to develop new types of campaign that use more personalised tones and creative digital tools to enhance behavioural change. Using social media can also lead to viral dissemination through communities.

Surveillance, monitoring, situation awareness and early warning systems

Social media can help to understand more accurately what is happening during a crisis. Because of the broad flow of information, two options for monitoring information are currently used by organisations: technical and volunteer.

The technical option

The technical option relies on the technology of crowdsourcing. Computer programmes can be used to synthesise what type of content is shared and to provide meaning. Pilot projects exist in various universities to develop such tools. The Empowering the Public with Information in Crisis (EPIC) project tries to understand how to create situational awareness from Twitter during crises. Within EPIC the "Tweak the tweet" tool is looking at recent events and how to extract more useful information from Twitter in times of crises, especially if tweets can be geo-located. Similarly the Twitcident project from the Delft University of technology in the Netherlands filters

Twitter to obtain real time intelligence. The researchers introduced a web-based system for filtering, searching and analysing information about incidents or crises.

For US FEMA, geospatial data and mapping applications are central. One new FEMA application maps emergency declarations, earthquakes, models of building failures, status and location of relief facilities, and the progression of search operations. This application integrates with Microsoft's Bing search to provide a birds-eye view of maps. Disaster relief workers can send SMS updates that are integrated with the maps from the field. Similarly in Japan, in the aftermath of the March 2011 earthquake and tsunami, Georepublic Japan and OpenStreetMap Foundation Japan launched a crisis map that provided and visualised real-time information on news and official reports, as well as information provided by the crisis-affected community (via SMS/text and internet platforms) on evacuation centres, damages, and requests for help.

Google Flu Trends uses aggregated Google search data to estimate current flu activity around the world in near real-time. Emergency services can use automated data extraction and analysis methods. Different approaches already exist to extract and analyse data from Twitter. Many crisis mapping application techniques can visualise crisis developments in real time. Emergency services can also rely on content analysis tools, such as these provided by Google. In addition, emergency services can use network analysis to visualise who retweets what in order to monitor rumours.

The volunteer option

The second option is to rely on volunteers. For instance, 67 volunteers were trained to support media monitoring for the United Nations humanitarian response to the Libyan civil war in 2011. The US meteorological services also relies on people taking pictures or videos of tornadoes using Global Positioning System GPS locators and text messaging to provide real time situational awareness.

Recommendations

The combination of technological and volunteer options can lead to very innovative practices, such as volunteer technology communities. Learning about the different options available and following innovations taking place in the field of crisis situational awareness is important for getting the best meaning out of the overload of information and for having a clearer picture of how to respond to a crisis. According to a study of the ETH Zurich on crisis mapping, volunteer technology communities, mainly managed by non-state actors, can provide states with a low cost way of analysing the terrain in an emergency situation (Cavelty and Giroux, 2011). This phenomenon could develop because the mapping applications are increasingly known and because teams of volunteers can get organised across the globe to initiate and manage the maps when a crisis strikes.

Improving preparedness through social media

Examples from the health field

During the 2009 influenza pandemic, tweets and SMS were used to indicate where vaccination against H1N1 influenza was available. Social media were used to encourage the population to vaccinate and to indicate where the nearest place was to do so. In Kenya, which has a population of 33 million, there are 11.3 million mobile phone subscribers but only 264 000 landline and 3 million Internet users. An opt-in system for

blood donors enables people to receive text messages or email reminders stating when they are eligible to donate again, but also sends messages calling for donors of specific blood types during shortages or crises. This reflects the potential for M-Government (Mobile Government) in developing and emerging economies (OECD, 2011).

The World Health Organisation (WHO) uses social media in its Strategic Health Operations Centres (SHOC), which operate 24-7. Thanks to TweetDeck, they conduct searches by selected keywords on Twitter. WHO now has two full-time social media staff and receives nearly 6 000 new followers on Twitter per week, and about the same number on Facebook per month. These numbers are growing, which helps WHO to both monitor health crises and provide good advice to followers. During the Fukushima events, WHO observed via TweetDeck that some people were telling their friends to drink wound cleaners, which contain iodine, because they thought this would help their body be prepared for nuclear radiation. Via Twitter and Facebook, the WHO social media team warned people not to do this as it could be harmful. The same day, WHO noticed people rushing to take iodine pills and tweeted: "Consult your doctor before taking iodine pills. Do not self-medicate!"

Social media use for natural disasters

Social media can also be used to raise awareness of the risks related to the geographical area where the follower is located and provide recommendations if needed (e.g. what to do in case of major storms or earthquakes). They differ from other channels of communication because the style of communication can be more informal and conversational, which can have an impact on audiences that are not receptive to very official information messages.

Recommendations

Social media can improve preparedness through diversifying the type of approach an emergency service can take. It can be a way to go beyond the command and control position towards more varied tones and styles of information exchange, according to a recent study conducted by Booz Allen Hamilton with the American Public Health Association (Tinker and Fouse, 2009)). The fact that communication can be more individual can have a greater impact on behavioural changes. Social media can also be used to prevent false medical advice from circulating, to clarify rumours and to disseminate tips on crisis preparedness.

Providing information and warning

Provision of information and instruction

Social media, like blogs, can be used to provide advice by posting information such as emergency phone numbers, location of hospitals requiring blood donations and evacuation routes. In its disaster recovery scenario, FEMA can ask retailers which of their stores are closed, then overlay that information on a map to provide food aid to areas where it is needed. During the earthquake in Indonesia in April 2012, a tweet from the US Geo service 15 to 20 minutes after the earthquake said that a tsunami was not likely, which was crucial information for the public and emergency services. This shows that real time communication via social media can change the way crises are managed and experienced by the population.

Real time alert and warning

Social media represent one more channel for emergency services to send alerts and warnings during natural disasters, such as storms or tornadoes. The use of the Twitter sign-off "Please RT" (retweet) and the target of influential online individuals enable an increase in the diffusion of warning messages. Many emergencies require an early warning that reaches many people as quickly as possible. Twitter and Facebook can help because most of users will receive the notification instantly and spread it in their network. During the Iceland volcano eruption, people turned to Facebook and Twitter to know if they could fly and to get information on alternative travel plans in real time. Travellers asked for accommodation and it was offered by others.

Recommendations

Experienced users of social media for emergency warning recommend sticking to facts and being as objective as possible. There is a need to focus not only on communicating to the affected persons but also on understanding that even the unaffected can be worried and in need of information. These unaffected persons can be included in the communication strategy to enhance resilience in the long run, to improve their knowledge of crises, and to enable their mobilisation. Preparation is also important, and many services use pre-messaging where tweets or email alerts are ready and validated to be adapted to the circumstances at the last minute and used very quickly. Crisis communication is increasingly integrated into crisis management as crisis communicators and managers are working hand in hand. This creates a dynamic context where it is important to use the opportunities for information to flow both ways. For instance, travellers during the volcano eruption in Iceland were helping each other find alternative travel plans or accommodation.

Improving crisis response through mobilising volunteers

Social media can be used to mobilise volunteers both during and after a crisis:

Mobilising volunteers

Social media can be used to indicate willingness to help in the event of an emergency. Indicating in the "status" of a social media such as Facebook availability and skills for both professionals and volunteers could be a way for public authorities to know in real time who to mobilise in a given area of disaster.

Social media can also help to direct and target volunteer efforts. During the Deepwater horizon oil spill in the Gulf of Mexico, pictures of birds covered in oil were sent via text message to a volunteer organisation called the Louisiana Bucket Brigade, who then contributed to mapping the most affected areas where efforts should be concentrated. During the earthquake in Christchurch, New Zealand, a large group of volunteers, gathered via a Facebook campaign organised by students called "supporting Christchurch earthquake 22-02-2011", worked closely with the civil defence units.

Mobilising online volunteers far from the crisis epicentre

Online volunteers can be used to relay information provided by emergency services and can also be mobilised to improve situation awareness. The Red Cross trained 150 public affairs volunteers on how to use social media. These volunteers can now upload content onto a website and Red Cross personnel screen. Red Cross platforms include a

wordpress blog, a Facebook page, and an online disaster newsroom that includes shelter locations, numbers of meals served, and other information the media may want to use. The Red Cross Twitter account has 10 000 followers. Tweets cover topics such as shelter, preparedness information and on the ground situational awareness. They can be retweeted by volunteers.

Recommendations

Social media can change risk and crisis communication through empowering and connecting large numbers of volunteers. Governments can no longer focus their risk and crisis communication solely on how much to share and how to package information. Instead, they face a large number of citizens, volunteers and professionals who can exchange critical information between themselves and respond both locally or through remote action. Government officers need to take into account this major change in their risk and communication strategy, and become a steering force for this powerful source of help, information and energy.

Identifying survivors and victims

Identify as "safe and sound" to inform loved ones

Social media can provide a way of checking that family and friends are safe. Applications like safeandwell.org from the American Red Cross allow people to register if they are safe in an area of disaster. Concerned family and friends can search the list of those who have registered themselves as "safe and well" by clicking on the "search registrants" button. The results of a successful search will display a loved one's first name, last name and a brief message. In Japan, during the 2011 earthquake and tsunami, people turned to Google person finder and 320 000 posts were made in one week. People also published photos of the lists of people in evacuation centres on the image web platform of image *Picasa*.

Report as a victim and request assistance

Social media, combined with the use of mobile phones, can help to precisely report an accident and to send requests for assistance. In Korea, 25 000 reports from citizens via an application were processed by public authorities. Korea emergency services and police now promote two-way information sharing by using geographic information systems combined with new technologies.

Recommendations

The use of the social media to identify survivors and victims has proved successful. However, the use of social media to request assistance remains limited to a few examples, such as in Korea. The question is to identify if social media can help avoid crowded emergency phone lines or if there are too many risks of false online declarations to rely on them to request and send assistance. Another issue lies with providing the names of victims. During attacks on campus in the United States, the government had asked for no communication of names online. However, these names were available on Wikipedia.

Managing reputational effects

Using social media for risk and crisis communication can help to counter inaccurate press coverage or to counterbalance rumours.

Counterbalancing damaging rumours

If an organisation is not present in the social media arena, someone else may speak for it and damage its reputation. This can be dangerous if the organisation is not present to counterbalance the information provided. This situation was experienced by Nestlé in the case of an anti-Kit Kat campaign where Greenpeace used social media to accuse the group of using palm oil for its chocolate bars. The company now monitors and uses social media to prevent the reoccurrence of situations that can damage the brand.

Communicating about the organisation's actions

The general public is not always aware of the effort given by emergency organisations. Using social media to communicate about what an organisation is doing can help change the public's perception of the actions taken to respond to an emergency.

Recommendations

It is important to be open to complaints and critics and to respond to them in an appropriate manner. It is important to invest in social media presence to avoid letting bad situations get out of control, which can happen quickly. Social media should be used not only to communicate but also to listen.

Providing incentives to collect funding and support

Encouraging donations

Social media can be used to solicit donations when major catastrophes occur. People can indicate on their Facebook page that they have contributed to funding an NGO for crisis response and hence encourage their friends, families and networks to do the same. The Red Cross is using social media to encourage collective action towards more funding during emergencies.

Facilitating the supply of support

During an emergency, people who want to help by providing blankets or a safe place to stay for victims of a disaster often do not know where to turn. By indicating precisely on social media what type of contribution could be needed, emergency services can avoid flows of unnecessary materials and develop synergies in the communities.

Recommendations

It is important to be specific about what precisely is needed during a crisis and to be aware that fundraising tweets account for a minor percentage of messages during the crisis phase. According to a study conducted by Queensland University of Technology and the University of New South Wales in Australia during the 2011 South East Queensland Floods, fundraising tweets are more efficient in the post crisis phase when people turn to recovery (Bruns, 2012). It is also important to take into account that there may be a gap between the expressed intention and the ultimate decision to donate.

Learning from crises

Social media can be used after a crisis to facilitate the lessons learnt processes and as useful material for risk and crisis researchers.

Facilitating the lessons learnt processes

Social media provide content associated with a date of post, which can help emergency managers keep a very detailed report of what happened hour by hour. Tweets and photographs linked to maps and a time line can help build a comprehensive story of what happened and identify the main vulnerabilities.

Developing skills and knowledge on risks and crises

The content of social media during a crisis can be rich material for social scientists to analyse in order to have a better knowledge of risks and crises. In the United Kingdom, emergency and health services work with behavioural scientists and communication specialists to conduct audience research and track feedback during risk and crisis communication campaigns, such as the 2009 influenza pandemic.

Recommendations

Some websites can help keep records and archives of tweets, or create a timeline that shows a visual mapping of the crisis enfolding and ending. Many applications for mapping or placing tweets on timelines are available for free, which can be an incentive for a greater number of researchers to use these materials. Social scientists could be mobilised in multidisciplinary expert groups to learn from past crises and develop new ways of engaging with the public through tailored risk and crisis communication.

Improving partnerships and co-operation

International co-operation and public-private partnerships in the field of social media in risk and crisis communication are identified as a way forward.

The ICT4Peace Crisis Information Management Advisory Group initiative

Innovative initiatives are taking place, such as the pioneering ICT4Peace initiative based in Geneva and operated through a partnership called the Crisis Information Management Advisory Group (CIMAG). This partnership includes the United Nations Department for Peacekeeping Operation, the United Nations Department of Political affairs, the United Nations Office for Coordination of Humanitarian Affairs (OCHA), the World Food Programme, the United Nations Development Programme, the United Nations Children's Fund (UNICEF) and the United Nations Refugees Agency (UNHACR) The partners work together towards enhancing crisis portals such as OCHA's OneResponse, and also work on bringing together practitioners, developers and policy-makers to develop crisis mapping and address emerging needs in crisis communication.

Build partnerships to enhance the use of digital media

The study of the United Kingdom's response to the 2009 influenza pandemic stresses that health departments should seek to further explore the use of social media, using independent partners such as the Science Media Centre (Hine, 2010). The study underlines that the development of such a partnership will help to engage the wider independent scientific community and the media.

The UN Global pulse initiative

A UN white paper, published in May 2012, states that the purpose of the UN Global pulse is to detect "digital smoke signals", protect the vulnerable and strengthen resilience

to global shocks. It uses real times analytics to turn imperfect, unstructured, and complex information available on the web into actionable information for officials in charge (United Nations Global Pulse, 2012). The programme brings together expertise from UN agencies, governments, academia, and the private sector to research, develop, test and share tools and approaches. This co-operation will lead to the development of free and open source software tools to help governments and organisations make evidence based decisions with limited resources.

Recommendations

Partnerships for using social media in the area of emergency management and communication exist, but they come with difficulties. Not all players have the same interests or the same background. Some are from the humanitarian sector, others are technologists who can build new platforms for imagery and mapping, etc. Traditional players of emergency management teams and new players coming from social media need to make sure they are have a similar outlook, speak the same language, and can learn from each other. Technologists have a tendency to focus their energy on crisis communication, while emergency services need better risk communication in the long run. The question of the financing and sustainability of the co-operation is crucial. Most of the current volunteer technology communities rely on small resources and the public sector may or may not have the means to contribute to greater investment in risk and crisis communication in the future. Public authorities could collaborate with Twitter and Facebook to facilitate a quicker response if the account of an official emergency service gets highjacked.

Building trust

Ensuring an organisation is trusted online

The use of social media could improve transparency and trust in public authorities. Government authorities, and more broadly experts, are no longer easily trusted in crisis situations after cases of misinformation. They are under pressure to respond within tighter time frames as soon as an event occurs. With reliable and updated public safety and emergency notification via Twitter or RSS feeds they could work on enhancing the level of transparency. Developing a community of followers for the communication of hard facts and timely information on disasters could help public authorities benefit from and adapt to the breaking news effect, capitalising trust over time.

Knowing which online sources to trust

It is important to know which types of Facebook pages, tweets or blogs can be trusted or not. Lessons must be learnt from each crisis to identify those that can and can't be relied upon

Recommendations

Studies show that the more citizens can engage with their government online, the more they develop trust (Mickoleit, 2014). Public authorities in charge need to be aware of this when deciding how to engage with their citizens.

Enhancing recovery management

Social media can be used to enhance recovery management in two ways: through the sending of information on reconstruction and recovery, and through the provision of stress management.

Sending information on reconstruction and recovery

In post crisis phases, social media can be used to send information about recovery and reconstruction. Social media can be used to communicate the recovery of infrastructure (bridges, routes, water supply) and to identify areas that are in most need of recovery. Site clearance can also be co-ordinated.

Planning stress management

Social media can help to identify where stress management is most needed in the recovery phase and to offer tools for managing stress through interactive platforms. Research conducted after Hurricane Katrina shows that interactive information is preferred to static: those who were affected turned to interactive social media forums to share their thoughts and feelings rather than static traditional media. The sense of belonging to and sharing emotions with an online community can help in the post crisis phase.

Recommendations

Social media can play a role after a crisis to enhance recovery and reconstruction. Communication plans must be structured according to the phase of the crisis. As it is difficult to "turn off" social media, ensuring continuity in the use of social media over the risk management cycle is crucial.

Challenges of using social media

The challenges in the use of social media in risk and crisis communication must be taken into account when developing social media strategies. Social media use in risk and crisis communication is complex and must be handled with care. Financial issues, legal issues, political issues and security issues are at stake when deciding to develop the use of Facebook or Twitter in the case of emergencies. For each challenge, solutions and remedial strategies are presented below.

Multiple players and communication channels

The first challenge that emergency officers face is the multiplicity of players and communication channels that exist during a crisis situation. These can be national, regional or local players; officials or volunteers; and they can use traditional media or social media. This can blur the picture and provoke an information overload.

There are three approaches to managing social media information: subsidiarity, multichannel and centralised. Some countries have opted for a subsidiarity principle, where the level of government closest to the community concerned is responsible for communication. Others use a multi-channel approach so that people can rely on different sources of information, some more factual some more subjective. Other countries favour a centralised use of social media to eliminate multiple communication strategies from multiple departments. The challenge is for an organisation to decide how best to deal with

the broad range of players and channels that could potentially be part of their risk and communication strategies. They must see which approach best suits their organisational and national culture and the choice must be clearly stated.

It is important to have guidelines and a comprehensive strategy for risk and crisis management that gives precise rules and recommendations on how to engage with social media. On a day-to-day basis it is possible to have an online and social media division in the risk and crisis communication department. This unit plans the social media strategy on a weekly basis with all the relevant services.

There could also be social media roundups with a daily or weekly presentation of situation awareness through crowdsourcing of social media content. It is important during inter-services meetings to validate pre-messaging strategies for crises. The experience of Eurocontrol during the volcanic ash cloud over European airspace shows the importance of an integrated approach: Eurocontrol had established its Twitter account few months before the crisis, this account became the most active crisis communication tool utilised by passengers blocked in airports throughout Europe. The member of staff responsible for monitoring and using social media had to integrate this information into briefings with the crisis manager and with staff who handled traditional media. The use of social media needs structure the services in charge of its use must be aware of what information is delivered and what tone is preferred for different social media platforms, etc.

Transparency and reliability

The content of social media does not follow a process of validation to indicate its truthfulness. Therefore, there is a risk of propagating rumours and misinformation. Retweeting can make a rumour spread very quickly and get out of control. This could lead to panic in a population that would not be justified by facts, but only spread through misinformation. As traditional media often quotes online interaction it can relay false social media information without the reader/watcher noticing.

Social media information from official channels should be clearly labelled as such. In March 2011, researchers from Kobe City University of Foreign Studies surveyed Twitter users and tracked updates from earthquake victims in Tohoku, Japan. This survey shows that in order to increase the validity of tweets during an emergency, management officials could announce them with an official "hashtag" (topics labelled with the "#" symbol) via multiple social media platforms (Acar and Muraki, 2011). Establishing official accounts that can be retweeted increase the validity and reliability of using Twitter as a tool during a disaster event. The official tweets should be clearly labelled. In Japan during the 2011 earthquake and tsunami, each official service had an icon to indicate from which official sources the tweets were coming. In addition, it is crucial to educate people to the use and risks of social media. Communication campaigns, school programmes, and other initiatives could be developed to explain the risks of misinformation and rumours.

Mobile wireless devices (e.g. smartphones) are often equipped with advanced sensor technology, GPS, accelerometer and a digital compass. They offer the potential for remote sensing and information fusion in an emergency. Sensor measurements could ensure information integrity and avoid misinformation being spread too easily. Combining sensor measurements with the information shared online via social media could be a way to limit misinformation.

Regulation is another way of approaching the problem of misinformation. In Mexico in 2012, Twitter has more than 4 million users, 98% of citizens have a Facebook profile

and 30 million people are able to access the Internet. As these figures keep on increasing a bill has been passed called the Veracruz Law. This law prohibits citizens from spreading false rumours and information that may trigger panic. The difficulty lies in the definition of the false rumours. A risk is to use these types of legislation or regulation to censor social media.

To avoid panic it is possible to rely on the geographical precision of the communication tool used. In certain cases, social media offers the possibility to see the localisation of the account holder. In these cases, to avoid the unwanted movement of people who may block escape routes or cause unnecessary panic, it is possible to target only the persons positioned in a limited geographical area, instead of addressing everyone as with mass traditional media.

Reputation damage

The Japanese authorities used social media during the 2011 earthquake and tsunamis. On 13 March 2011 they started a Twitter page in Japanese, and on 16 March 2011 a Twitter page in English. On 23 March 2011 they started to use Facebook, and the number of followers increased rapidly. However the Facebook and Twitter pages were also used to attack Japan's image, even about unrelated topics such as anti-government messages protesting against the killing of whales, as well as against the use of nuclear power plants. This practice is known as trolling.

It is important to understand that social media cannot be controlled. Social media allow for responding to criticism and attacks as quickly as possible, and the respectful correction of inaccurate information can stop the spreading of rumours.

Keeping in touch

The elderly, the disabled and people who do not speak the local language may not be able to access the data provided by social media. A solution is to use various types of warnings and alerts. In Japan during the 2011 earthquake and tsunami, emergency responders used both tweets and traditional public display and wallpapers at the same time. The important aspect is to be consistent in the communication strategy throughout different channels. By multiplying the types of channels, it is possible to increase the probability that crucial information will be received by the targeted public. A technical solution is to use different social media in aggregated ways through websites such as Hootsuite and Tweetdeck. A user can type content into one webpage and it will be sent through multiple social media channels. This solution can help save precious time in an emergency situation. Prior to Facebook and Twitter, public communication officers had to organise press conferences and press releases during a crisis situation. Now they can also use social media, which the press can access directly.

Avoiding information overload

During a crisis, the number of information exchanges through social media can be so high that it becomes impossible to have a clear picture of what is happening. Bloggers or Facebook users can also publish false information or their perception of reality might be biased during a crisis, which makes it difficult for the emergency manager to get the right picture of the situation. The overload of true and false information can even go as far as blocking the whole telecommunication system and raising the question of the allocation of the bandwidth, like in Japan during the 2011 earthquake and tsunami.

A solution is trending or data mining. Starting with the right question and following the right data with the right metrics, a clearer picture can emerge from the intense flow of information exchange. Using services such as Trendistics or Google analytics, it is possible to see if there are trends in what people are exchanging. However, caution must be exercised to avoid inaccurately interpreting social media data. For instance, emergency services must take into account the sampling selection bias as social media users are not always representative groups of the larger population affected by a disaster. An "Information and Communication Technologies for Development" blogger from the University of London expressed his doubts on the use of Ushahidi during the Haiti earthquake. Ushahidi staff found correlation between the building damage and the SMS streams, however, after controlling for the presence of any buildings (damaged or undamaged), the text message stream had a weak negative correlation with the presence of damaged buildings. This example shows that caution and learning from past experiences are crucial when using crowdsourcing and data mining based on new media.

To avoid jamming the system with too many exchanges of information, public authorities can ban the use of certain media during a major emergency. For example, in Japan during the earthquake and tsunami the government decided to give priority to exchanges of emails in some affected areas.

Promoting open data while protecting privacy and confidentiality

Maintaining open data is important for social media to be able to crowdsource data easily. Although most social media do not have the in-house capacity to develop specific products for emergency managers, the platform is kept open and adaptable so that third-party developers can build customised tools to carry out crisis situational awareness. However, a risk could arise from this openness as the level of confidentiality of data provided by users on their social media pages could be endangered. It is not clear whether bloggers or Facebook and Twitter users consent to the analysis of their data. According to a study of the ICT4Peace Foundation on the potential and challenges of open data for crisis informatics management, there is still a long way to go before all actors are convinced of the benefits of openness (Stauffacher et al., 2012).

Overcoming the challenges of open data requires working on several fronts. Legal experts can be mobilised to address confidentiality issues. For instance, there is a need to make a distinction between the monitoring of one personal page and of a large number of pages. In the Netherlands, the law authorised the analysis of a flow of data coming from social media platforms, but banned the monitoring of individual social media use. Legal experts can also be mobilised to deal with proprietary technologies. A clear line must be found to protect commercial interests and to save lives. Law, policies and guidelines should be developed to ensure the use of social media in a crisis situation does not become out of control; but without regulations and laws restraining too strongly the innovative processes taking place.

Who is liable for what?

Risk managers have expressed fears that people could believe they should receive assistance if they have indicated via a social media platform that they are in need of help. There is a risk that emergency services could be held liable if they don't answer to an online request. Going one step further, could they be liable for providing incorrect or unclear information?

The Web 2.0 and use of social media in risk and crisis management may require adapting laws and public policies. More importantly, the emergency services and authorities in charge must have a clear process of internal validation of what can and cannot be put on social media. However, this process must not to include too many layers of validation, as this would hinder the provision of a swift social media response.

Managing public expectations

The use of social media in emergency management can create new expectations in the population at a time when human and material resources may be scarce. For instance, according to the social media emergency management camp organised in 2011 (Wardell and San Su, 2011), the use of 24/7 social media by the Los Angeles Fire Department (LAFD) means that three LAFD officers are committed to providing support over a 24-hour period through engaging in information dissemination and discussion across their Twitter profiles: @LAFD and @LAFDtalk. On a steady state basis, the officers use the tools to monitor user-provided information and look for emergency reports and opportunities to clarify information for citizens with questions or concerns. Not all emergency services can dedicate as much time and resources to the use of social media.

It does not require a large resource commitment to begin using social media within an emergency organisation; creating a Facebook page or a Twitter account is not very time consuming. The questions are how far to go and what is the objective. Once these are decided, it is important to make clear what the organisation can and cannot do with social media.

During emergencies, social media can play an important back-up role in disseminating warning and response information if traditional services are overwhelmed by demand. For example, during the 2011 floods in Queensland, Australia, Facebook was used to share warning information when official emergency services websites failed to cope with the heavy traffic. The use of social media can also be a way of avoiding an overload of information coming from phone calls. In the case of the volcano eruption in Iceland, the use of Facebook and Twitter helped with the shortage of resources to deal with phone calls and incoming emails.

Addressing security issues and avoiding potential misuse

With social media, one message intended for a target audience can be read by others who may not share the same culture or intention. This situation can create misunderstandings and, as it is not possible to know who is reading the information, offer opportunities for terrorists or criminals to use catastrophes to their own advantages and plan deadly attacks. Social media do not guarantee security in the authentication, which leads to questions concerning the potential dangers of an overly transparent exchange of information during a disaster.

There is a need to clearly define, at a high level, what information can and what should not be made available online. Rules can be discussed in advance, for instance, a decision could be made not to communicate names of victims or give information that could be used to endanger parts of the population.

Impact of social media

There is limited evidence on the impact of social media in crisis communication and management. People have diverse reasons for using social media during an emergency

situation: helping victims, being anxious, trying to find out if it is possible to return to the affected area, supporting emergency services, mourning, exploiting the situation, or being curious. These are all very different incentives for using social media and they lead to different strategies for the officials in charge.

It is difficult to precisely evaluate the costs and benefits of using social media in risk and crisis communication. Metrics such as Google analytics can be used to assess how many followers exist for a given social media, but they do not provide information on the extent to which people's practices are affected by their use of social media pages in times of crisis. It is also very difficult to know how much of the information conveyed by social media is reliable, and how much it could enhance effectiveness or create additional difficulties. According to a study conducted by Booz Allen Hamilton and the American Public Health Association (Tinker and Fouse, 2009), most emergency services use a combination of metrics, online comments and surveys to evaluate their use of social media in times of crisis. However, as the crowdsourced use of social media is rather recent, it is difficult to have enough data available to evaluate the impact of social media in risk and crisis management.

Crisis information systems and analytics aim to bridge the gaps across social sciences to analyse the non-routine use of social media (i.e. use in times of crisis) and how it can differ from regular use. Further surveys and research are necessary to obtain a fuller assessment.

Developing strategies for the dynamic use of social media

Social media are a knowledge-gathering tool to ascertain public sentiment or disseminate a message to the public in times of crisis. They also allow for a dialogue with the public, and for the public to interact with services about an event without the intermediation of public authorities. Searching for a dynamic use of social media requires multistep strategies. Large discrepancies exist between different emergency services and different countries, etc. This section presents an analysis of how countries and organisations can go beyond an ad hoc approach to social media towards a more strategic and empowered approach. This should help emergency services to review their current social media use and develop more comprehensive and flexible communication strategies.

Bottom up: Situation awareness tool to identify "digital smoke signals"

When the use of social media is coupled with the possession of smartphones, everyone can send information from the site of an accident or catastrophe. From the emergency services' perspective, receiving this real time information (pictures, videos etc.) can help them to react accordingly. The measurement of trends on Twitter or other social media, carried out electronically or with the help of volunteers, can help conduct situational awareness in real time. Early detection of digital anomalies in how the population suddenly tweet can enable faster responses in times of crisis if they are interpreted correctly and timely as "digital smoke signals". The social media manager can provide daily social media updates on ongoing crises or risks, or conduct a weekly analysis of trends. Table 3.2. provides a self-assessment checklist for organisations on the use of social media to conduct bottom-up situation awareness.

Table 3.2. Checklist for situational awareness use of social media

	Yes	No
Do you have a list of blogs, Facebook pages, and Twitter accounts of people who follow risks and crisis and who could help you gather information from the communities? Do you follow specific hashtags?		
Does your organisation regularly monitor social media for situational awareness? (Every hour? Day? Week?)		
Do you use metrics to monitor the number of visits on emergency services web pages and social media pages in order to identify a trend towards one particular focus of a given risk or crisis?		
Do you build methodology or tools to monitor the flow of information exchanged via social media on the Internet?		
Do you encourage citizens to report during crisis using a social media (Twitter, blog)?		
Do you train your staff to use of social media as a situational awareness tool?		
Does your organisation have the necessary human skills to use social media to conduct situational awareness?		
Do you integrate social media in emergency exercises?		
Do you use crisis mapping based on crowdsourced social media data?		
Do you have a partnership agreement with a volunteer technology community in case of a major emergency?		

There are technical challenges in accessing and analysing data streams to conduct situational awareness. Ensuring the interoperability of systems can be challenging when monitoring various social media platforms and tools. What could appear as an anomaly in the flow of information and be interpreted as a digital smoke signal, can in fact be a false alarm due to sample bias or misinterpretation of the data. Nevertheless, innovative initiatives such as the creation of virtual platforms combining different social media analytical tools, are under way that could change the way emergency services conduct situational awareness in the near future (Smith, 2011). The technological innovations could be complementary to traditional tools of situational awareness.

In a February 2012 presentation on the topic of "Real-Time Awareness", Craig Fugate, Administrator of FEMA, explained what it means for his agency to become a "sophisticated user of information". In 2011, during a series of devastating tornadoes in the American mid-west, FEMA monitored Twitter and noticed an unusual number of different geographical locations being mentioned for tornado damage. Mr Fugate proposed immediately dispatching relief supplies to the long list of locations, but his team thought that they did not yet have an accurate estimate of the damage level to send assistance. His challenge was to get staff to understand that the priority should be one of changing outcomes, meaning that even if half of the supplies dispatched were never used and sent back later, unless trucks were sent immediately there would be no chance of reaching communities in need if they were suffering tornado damage already.

Mr Fugate explains: "If you're waiting to react to the aftermath of an event until you have a formal assessment, you're going to lose 12 to 24 hours…Perhaps we shouldn't be waiting for that. Perhaps we should make the assumption that if something bad happens, it's bad. Speed in response is the most perishable commodity you have…We looked at social media as the public telling us enough information to suggest this was worse than we thought and to make decisions to spend [taxpayer] money to get moving without waiting for formal request, without waiting for assessments, without waiting to know how bad because we needed to change that outcome." Fugate also stressed that using social

media to conduct situational awareness is not a precise science and the response is not going to be precise either. "Disasters are like horseshoes, hand grenades and thermal nuclear devices; you just need to be close— preferably more than less."

Top down: Using social media to communicate with the population

Social media allow for warnings to be sent to a broad group of people while at the same time precisely targeting individual information sending, according to the type of target groups identified by the communication managers. Table 3.3. shows the most common steps in top down use of social media.

Table 3.3. Checklist for top down communication use of social media

Checklist questions	Yes	No
Does your organisation have guidelines on the use of social media for the communication team? For the employees?		
Does your organisation have an RSS system on its webpage for people to follow it?		
Does your organisation have a Twitter account?		
Does your organisation have a Facebook page?		
Does your organisation have a blog?		
Does your organisation have hidden web/Twitter/Facebook pages that are prepared to be launched in case of crises?		
Does the head of your organisation have a Twitter account? A Facebook page? A blog?		
Does your organisation use social media to redirect people to its official website?		
Does your organisation use a variety of formats (pictures, videos, etc.) to communicate on social media?		
Does your organisation regularly update its posts?		
Does your organisation regularly archive its social media messages?		
Does your organisation have a team dedicated to social media communication?		
Does your organisation outsource its social media communication?		
Does your organisation have a fast track clearance approval process in place for social media strategy in times of crisis?		
Does your organisation have a list of your followers on the web and their profiles? Are you trying to build a subscriber base to extend your outreach via social media? Do you know who the key influencers are?		
Do you publicise your social media presence in press releases and place links towards your social media pages on your website?		
Do you have a strategy so that your social media network can grow? What are your objectives in terms of growth in scope (increase the age/ethnicity/gender/geographical range of Facebook fans, Twitter followers, etc.)?		
Has your organisation tried to use social media to raise risk awareness by sending tips of the week, what to do in case of an emergency on Twitter, or planned a viral campaign on YouTube?		
Does your organisation monitor, in real time, the evolution of its social media communication and its audience profile?		
Does your organisation alter its communication according to the different social media formats (Facebook, Twitter, etc.)?		
Does your organisation have co-ordination mechanisms with other emergency or government services to ensure that consistent information is widely spread?		
Does your organisation share content from other services on its pages?		

Caution must be exercised when using social media to communicate on risk and crisis. First, it is crucial to ensure the security of sensitive information; and second, a

validation process of information accuracy must be followed and if false information is posted by mistake a very swift correction must be put in place. Most government agencies using social media have clear guidelines on how to communicate. When their social media communication is not mature and well developed, they only provide basic information, such as weather warnings or real time information about an ongoing emergency.

Using social media for two-way communication and as a platform for dynamic interaction

Social media can be used as dynamic interaction platforms that are mobilised for two-way communication during a crisis situation. Crises lead to an urgent need for the public to receive information, but they also give rise to a strong wish to supply information to the authorities in charge. Using social media offers the possibility of including two-way communication options and of reacting to the demands of the public. Using two-way communication tools means that it is possible to know whether or not the message has reached and been understood by the recipient.

Table 3.4. Checklist for two-way use of social media

Checklist questions	Yes	No
Can your organisation receive and react to public input via social media?		
Does your organisation update regularly the question and answer page of your website?		
Do you have a forum where you can exchange in real time with the population in case of emergency?		
Do you initiate online conversation and exchange with your audience through social media?		
Do you encourage feedback through your social media communication?		
Does your organisation participate in other people/organisation's social media to encourage exchanges? Does your organisation join in relevant online conversations?		
Can people use social media to identify as a survivor?		
Can people use social media to request assistance?		
Do you use GIS as a dialogue tool to enhance the mapping of a disaster?		
Do you implement online interactive risk awareness campaigns (interactive games, etc.)		
Do you integrate the different social media platforms you use with each other?		
Do you have partnerships for sharing methods of two-way communication (with private sectors, etc.)?		

The tables above provide guidance on a selection of the most common existing communication strategies that rely on social media. Each emergency service can then explore the available options to see how to adapt their communication strategies. The technical systems available are changing very quickly, which means that a permanent scanning of new technologies must be done to keep aware of the last available solution. Social media strategies must be updated on a regular basis as the social media landscape is continually changing.

How to draft social media guidelines for risk and crisis communication

Several countries (e.g. United Kingdom, Australia, New Zealand), regions (e.g. Catalonia), cities (e.g. Seattle, New York) and agencies (e.g. US environmental protection agency) have already developed social media guidelines, but only a few, for example the American Red Cross and FEMA, have specific documents for the use of social media in risk and crisis communication. These guidelines exist in various forms: high level guidance exists for managers and decision makers to decide if their organisation should use social media or not; codes of conduct explain to the employees how to use social media, what the risks are and how to prevent them; and social media training can be offered to public sector employees and managers. Failure and success cases of social media use should be studied to learn from existing practices.

Major issues to be included in social media guidelines and training are highlighted in Table 3.5.

Table 3.5. How to draft social media guidelines

A social media glossary	Explain the wording used in social media and the technical terms related to social media platforms (e.g. crowdsourcing, data-mining, etc.)
A rule for private and public use of social media	Provide fundamental norms about how to communicate at work, but also in the private sphere about work.
A social media philosophy/strategy	Explain the objectives of the organisation when using social media to communicate. The goals are clearly stated (listen to public expectations, communicate about what the organisation does, enhance the reputation of the organisation, build a community, inspire volunteers, etc.). In addition it explains the resources available for social media communication and the main steps to follow to reach the desired outcome.
A social media tactics	Explain how different social media will be used (Twitter, Facebook, etc.), how the content will be developed and validated, how often the social media pages will be updated, what type of links or retweet practices your organisation will have with partnering organisations, what type of content is to be solicited from followers, etc.
A "what to do in case of…"	Explain what to do in case of problems such as spams, negative comments, provision of false information by mistake and jamming.

Key recommendations for social media use in risk and crisis communication

The use of social media in risk and crisis communication remains in its infancy. Tools are emerging to aggregate more and more data so that meaning can be drawn from the flow of information exchange via the Web 2.0 during a crisis. Technological innovations allow for risk and crisis relevant information to be crowdsourced from social media streams, which can be very valuable for emergency services and authorities in charge.

An increasing number of emergency officers and volunteer organisations use online activity to enhance the resilience of their communities during a disaster. Social media has enabled informal partnerships that enhance dialogue capacity among various stakeholders, although there are major challenges with this approach.

Emergency services must clearly tell their audience what they can expect to receive through social media in terms of risk and crisis communication. To make the best use of social media in risk and crisis communication, the following actions should be considered:

Governments should develop public policies to support the development of social media use in risk and crisis communication. These should include policies to sustain and implement open data strategies, to regulate the spreading of dangerous rumours, to assess the impact of social media, and to enable systematic national infrastructure to have the long-term storage capacity to incrementally learn from past crises.

Governments should foster citizen-led social media use through volunteer technology communities. Social media have been used spontaneously by citizens to enhance resilience and solidarity in affected communities. There is therefore an opportunity to accompany the current citizen-led initiatives to enhance collective intelligence in disasters and make sure that information provided is as reliable as possible. Different tools can be used, including: publishing rules and guidelines on the use of social media during a crisis and producing leaflets and education materials. Developing government-led social media strategies for use during a crisis requires introducing codes of practice at government level and training officials in charge.

Governments should develop social media strategies to support crisis communication strategies before, during, and after a crisis. Before a crisis, the capacity to filter social media for monitoring and situation awareness, grasping trends and early warning signals should be considered. Developing social media strategies requires organising crisis communication staff, establishing clear validation procedures, pre-messaging, and preventing crises by performing risk awareness social media campaigns. Organisations should position themselves as trusted sources and identify other trusted sources. In crisis phase, organisations need to provide real time objective facts so that the public are not kept the dark or forced to use other non-reliable sources. IT volunteers can be mobilised via online technology communities to improve crisis mapping and situational awareness. Rumours and misinformation must be mitigated as quickly as possible to avoid negative retweets and help set priorities for which audiences to target, depending on available resources. In post crisis phase, social media can be used to communicate about recovery and reconstruction, improve stress management and contribute to lessons learned.

Governments should consider the implications of a greater use of social media in terms of working practices and changes in organisational culture and organisational structure, etc. The use of social media can alter a user's perception of barriers that exist between persons, functions and organisations; and impart a false sense of access that raises expectations. This needs to be taken into account when deciding how to use social media in risk and crisis communication. Practices need to meet expectations that are reasonable for the organisation to handle. Change management may be needed to develop the use of social media.

Governments should draft guidelines for the use of social media in risk and crisis communication by public agencies. Given the large number of stakeholders that can be involved in crisis management, guidelines can be an efficient way to harmonise practices across government agencies, share lessons from good practice, and foster the development of social media strategies in each organisation.

Governments should maintain traditional media in their crisis communication strategy. Traditional media, such as sirens, wallpapers, radio and television, should be maintained and their interaction with social media considered.

Annex 1

While the list below is not comprehensive, it provides an overview of the social media platforms most used for risk and crisis communication.

Social media type	Short description
Facebook	A social utility that connects people with friends and others who work, study or live around them. People use it to keep in touch with friends and colleagues. There were 901 million monthly active users reported at the end of March 2012.
Myspace	An online community that allows users to connect, interact and exchange information with those who have the same interests. It is often used to discover new artists and watch videos online. Myspace had over 262 million users in 2012.
Friendster	A social gaming site launched in 2002. The service allows users to communicate with each other, share online content, etc. The site, at its peak, reached tens of millions of registered users; however, it has since declined in popularity.
YouTube	A user generated site that allows people to share videos and view and comment on the uploaded videos of others.
Flickr	A user generated site that allows people to share pictures and view pictures of others.
Vimeo	A user generated site that allows people to share videos and view and comment on the uploaded videos of others.
Wikis	A website that everyone can update to share and manage content with others.
Forums and Message boards	Online internet sites where people can hold a conversation through posting and responding to messages.
Chats	Online internet applications to hold conversations through real time instant text messages.
Podcasts	Web based audio and video content made available to download to a personal audio or video player.
Blogs on Blogger, WordPress, Tumblr	IA personal website that is updated frequently. It contains regular entries of commentary, pictures, and other materials.
Microblogs on Twitter	With 140 million users, Twitter is a platform for people who register to post and receive short messages to a network of followers. Top five countries in terms of Twitter accounts are the United States, Brazil, Japan, the United Kingdom and Indonesia (according to a study conducted by Semiocast in 2012)
-MAPPING COLLABORATION Crisis mappers OpenStreetMap Google map maker	Crisis mapping collaborative social media exist under various forms. Crisis Mappers leverage mobile and web-based applications, participatory maps and crowd sourced event data, aerial and satellite imagery, geospatial platforms, advanced visualisation, live simulation, and computational and statistical models to power effective early warning for rapid response to complex humanitarian emergencies. OpenStreetMap provides free geographical data and mapping. Google map makers can be used to access and improve maps according to various needs.
-ONLINE AND ONSITE CRISIS CONTRIBUTION SOCIAL MEDIA Ushahidi Crisis commons Sahana foundation tools Geeks without bounds	Ushahidi is an open crowdsourcing crisis information platform that is easily deployable to meet local needs. Crisis commons is an international network of professionals that aggregate during crisis camps and work collaboratively online to enhance crisis management. Sahana foundation software is dedicated to saving lives by providing information management solutions that often rely on social media. Geeks without bounds are developing applications to enhance the provision of humanitarian aid in disasters.
-PUBLIC-PRIVATE-PEOPLE PARTNERSHIP FOR SOCIAL MEDIA CRISIS COMMUNCATION Random Hacks of Kindness (RHoK) (with Google, Microsoft, Yahoo, NASA, World Bank)	RHoK organises and hosts biannual two-day events where volunteer technology experts develop software solutions for risk and crisis management. They are developing new social media products for the risk and crisis communication of the future.

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Webpage Alert SA in use in Australia: www.alert.sa.gov.au/

Webpage of Public Safety Canada: www.publicsafety.gc.ca/index-eng.aspx

Webpage of US FEMA: www.fema.gov/

Webpage of the US Red Cross Safe and well: https://safeandwell.communityos.org/cms/index.php

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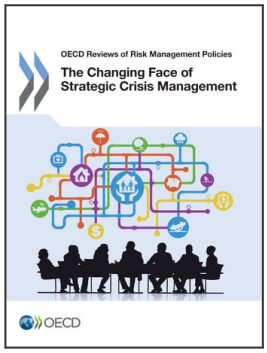

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