

Twitter turns ten: its use to date in disaster management

Neil Dufty, Molino Stewart Pty Ltd, examines the adoption of Twitter in times of disasters over the past ten years

ABSTRACT

This article explores current literature to identify the main uses of Twitter in emergency management over the past ten years in Australia and overseas. It finds several uses across the 'disaster cycle' including as a medium for identifying hazard risk, community engagement for disaster mitigation and preparedness, early warning communication, crowdsourcing to provide real-time information, emotional support, identifying needs and vulnerabilities of affected communities, and allocating resources during recovery. This paper concludes by examining some relatively untapped uses of Twitter in building disaster resilience including for social capital formation, capacity building, disaster virtual communities-of-practice, and social change.

Introduction

Twitter, a micro blogging form of social media, was founded by Jack Dorsey and associates in San Francisco in 2006. It was originally developed to be an urban lifestyle tool for friends to provide each other with updates of their whereabouts and activities. However, with its changed tagline from 'What are you doing?' to 'What's happening?' it has developed into a reporting and communication medium useful in many fields including emergency management.

Twitter use

We Are Social (2016) estimated in early 2016 that 31 per cent of the world's population were active social media users, with 10 per cent annual growth in users recorded. As shown in Figure 1, approximately 66 per cent of social media users accessed Facebook, while about 14 per cent (320 million) used Twitter. Twitter growth is slower than the average global growth rate for social media.

There is an uneven spread of the use of social media use across the world. For example, in North America

59 per cent of the population use social media, while only 11 per cent in Africa and South Asia (India, Pakistan, Sri Lanka and Bangladesh) use social media (*We Are Social* 2016). There are very low levels of Twitter use in some countries such as China that have their own language social networks, while other countries have usage rates above the global average, such as the United Kingdom (19 per cent), United States of America (19 per cent), Saudi Arabia (19 per cent), and Malaysia (18 per cent).

In Australia, 58 per cent of the population used social media in 2016 with 41 per cent using Facebook and 10 per cent (2.4 million) using Twitter (*We Are Social* 2016).

According to Sensis (2015), in Australia 'females and younger Australians (below 40 years) are the most prolific social networking users with much greater proportions in these cohorts using social media *per se* and more frequently than others'. However, more males than females use Twitter.

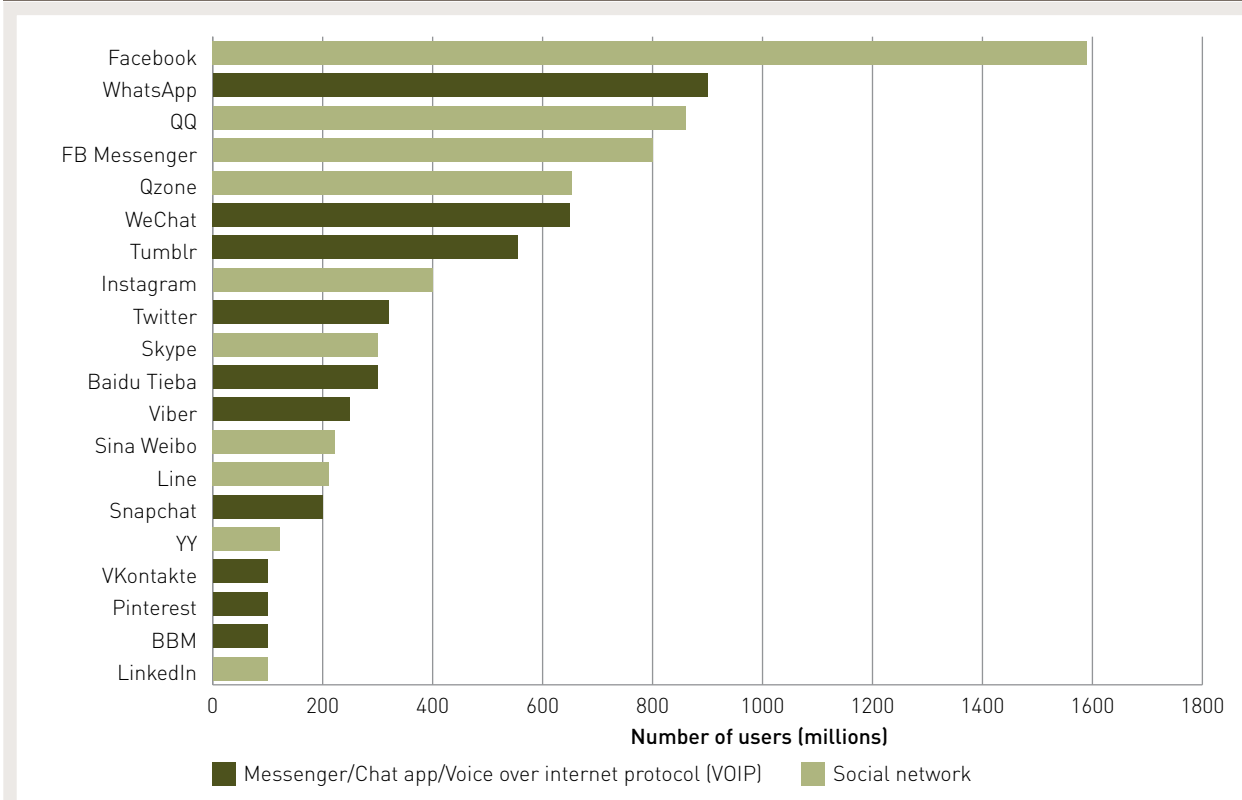
Approximately 32 per cent of Australians have never used social media, with 61 per cent of those over 65 years having never used social media (Sensis 2015).

Unique characteristics of Twitter for emergency management

A large proportion of the research into the use of social media in emergency management has focused on Twitter, even though the global uptake of Facebook is substantially higher, and despite Facebook being used more extensively in disasters to date (Irons *et al.* 2014). This is largely because Twitter has some unique characteristics that are, at this stage, more useful to disaster management and research.

Twitter is a microblogging communication technology that allows users to distribute short messages (tweets) on the World Wide Web or through smartphone apps. Over the years, various additional features have been included in the backend and the interface e.g. facilities for picture upload and display, automatic shortening of URLs to save characters in tweets. Through an API (Application Programming Interface), third-party applications which offer additional functionalities can be connected to the service.

Figure 1: Global use of social media platforms in 2016.



Source: We Are Social 2016.

Twitter provides those involved in emergency events with some features not shared by other forms of social media such as Facebook. The basic concept guiding the use of Twitter is the idea of ‘following’. Becoming a follower of a user is similar to subscribing to their updates that are added to those from other sources being followed. With Facebook and other social network sites, social relationships are required to be reciprocal. However, with Twitter this is not necessarily the case. The resultant social networking relationships can thus provide an insight into human behaviour, connections and sentiment before, during and after a disaster.

As opposed to Facebook posts, tweets are generally publically available and therefore provide succinct real-time information from a range of sources to all as a story unfolds. This can be likened to receiving a spool of news headlines on a particular topic including an unfolding emergency event. The use of hashtags, consisting of the ‘#’ symbol followed by a word or phrase enables the news spool to be categorised to allow people to focus on a particular event (e.g. #QLDfloods) or theme (e.g. #bushfires). Twitter’s ‘trending topic’ functionality promotes a shared use of certain hashtags for current events or contribution to ongoing conversations.

Bruns and Burgess (2011) indicate that ‘Due to the specific communicative affordances of the Twitter platform, it lends itself especially well to the dissemination of breaking news from a range of sources, essentially in real time, to a wide network of

users who can rapidly form an *ad hoc* public around the event or issue when news with a high degree of perceived global interest breaks on Twitter, it travels around the world with unprecedented speed.’ (Bruns & Burgess 2014, pp. 374-375).

Twitter also allows for further sharing of information and networking through the use of replies and retweets. In both cases, communicative references to other Twitter users are not only made visible, but navigable as well. This benefits those experiencing the event, those wanting to know more about it, and those wanting to help including emergency and humanitarian agencies.

Twitter has proven more resilient than Facebook to government blockage in some parts of the world as shown in the 2011 uprising in Egypt (Kavanaugh *et al.* 2012).

According to Schmidt (2014, p. 6), Twitter differs from other online applications in that there is no ‘shared location’ where users and their contributions become visible (as in a blog posting or Facebook status update with subsequent comments).

Uses of Twitter across the disaster management cycle

Social media platforms, including Twitter, have been used and analysed for use in disasters particularly since the 2010 Haiti earthquake. Several researchers

such as Bruns and Burgess (2014, p. 374) and Athanasia and Stavros (2015) provide extensive lists of Twitter use during and after these disasters.

Other researchers have attempted to summarise the uses of social media for emergency management based on this research. Alexander (2014) identified seven ways in which social media can be used in disaster risk reduction and crisis response:

1. A listening function - social media enables managers to listen to those affected by the event.
2. Monitoring a situation - monitoring social media traffic helps reactions to events and to better help affected people by learning what they are thinking and doing.
3. Integration of social media into emergency planning and crisis management – social media are used with traditional media e.g. to issue warnings.
4. Crowdsourcing and collaborative development - information provided from social media by those affected can be very valuable to disaster managers e.g. through crisis mapping.
5. Creating social cohesion and promoting therapeutic initiatives - social media can help people feel part of certain initiatives and promote volunteerism.
6. The promotion of causes - social media can be used to launch fundraising appeals for disasters.
7. Research - the understanding of social reactions to stress, risk and disaster can be enhanced by the use of social media.

Kaminska and Rutten (2014) identified the main uses of social media across the four pillars of the disaster management cycle being prevention and mitigation, preparedness, response, and recovery. They found three main areas where social media platforms and applications have been used successfully or show promise:

- public information
- situational awareness
- community empowerment and engagement.

Table 1 was constructed using the findings of these summative analyses of social media use and an extensive search of white and grey literature relating to the specific use of Twitter in emergency management and research. Table 1 provides an overview of the main uses of Twitter across the four pillars of the disaster management cycle. 'Warning' has been added as pillar between 'Preparedness' and 'Response' due to the large amount of Twitter usage identified for this aspect of disaster management.

As shown in Table 1, much of the documented use of Twitter in emergency management has occurred for warning, response and recovery. The main use of Twitter in mitigation and preparedness has been for public education and engagement even though, according to Dufty (2015, p. 16), 'It appears that social media is "underutilised" in countrywide disaster risk reduction public awareness strategies and a greater understanding of its potential and benefits is required'.

Of the main uses identified in Table 1, the most researched Twitter activities are: as an additional means of emergency communication (e.g. Simon *et al.* 2014), crisis mapping and big data analytics (e.g. Meier 2015), sentiment analysis (e.g. Ahmed & Bath 2015), and crowdsourcing or 'citizen science' (e.g. Tapia, LaLone & Kim 2014).

Concerns with Twitter use

The unique characteristics of Twitter provide opportunities for emergency management but also for misuse. Potential misuse needs to be understood and managed by emergency managers. Numerous studies have illustrated the negative use of Twitter in this field. For example, Gupta, Lamba and Kumaraguru (2013) found a large amount of fake content (29 per cent of tweets) and over 6000 malicious accounts relating to the main hashtags used in the 2013 Boston Marathon bombing. Weimann (2014) observed that 'Twitter has recently emerged as terrorists' favourite Internet service, even more popular than self-designed websites or Facebook, to disseminate propaganda and enable internal communication'. Gupta *et al.* (2013) identified 10,350 unique tweets containing fake images that were circulated on Twitter during *Hurricane Sandy*. However, 86 per cent of tweets spreading the fake images were retweets, hence few were original tweets.

Although Twitter can be used to misinform, several studies have shown considerable use of trustworthy sources. For example, Thomson *et al.* (2012) found that for the hashtag #fukushima used in the Fukushima nuclear disaster close to 70 per cent of synthesis-derivative tweets (tweets containing some form of third-party information) were based on highly-credible sources.

Possible future uses in disaster resilience

Several researchers have identified ways in which Twitter can be more effectively used in the future for emergency management and resilience. Bruns (2012) sees the potential of Twitter as a crisis-detector network. He notes that 'The great, demonstrable strength of Twitter, after all, is that it is more than a mere broadcast medium – it enables everyday users to report from their own perspective, to provide updates on the local situation'.

'What would be much more valuable would be an approach which could enable a frictionless crowd-sourcing process - the automatic detection, aggregation, and evaluation of tweets that may point to a genuine emergency, in a way which can pick up the weak signals (rising water levels, the smell of smoke, the sensation of a tremor) before they are recognised as a genuine crisis. Used this way, Twitter would become a fine-tuned human seismograph, except for more than earthquakes alone'. (Bruns 2012, p.17)

Reuter, Heger and Pipek (2013) examined ways in which the capacity of emergency volunteering—both real and

Table 1: Main uses of Twitter in emergency management identified in research.

Use	Mitigation	Preparedness	Warning	Response	Recovery
Situational awareness			✓	✓	✓
Psycho-social support			✓	✓	✓
Threat detection			✓		
Crowdsourcing		✓	✓	✓	✓
Communication	✓	✓	✓	✓	✓
Public education and engagement	✓	✓	✓	✓	✓
Crisis mapping				✓	✓
Disaster reconnaissance				✓	✓
Sentiment analysis			✓	✓	✓
Post-disaster evaluation	✓				
Big data analytics	✓	✓	✓	✓	✓
Navigating to safety			✓	✓	
Crisis social media volunteering		✓	✓	✓	✓
Risk assessment	✓				
Fundraising					✓
Conduct search and rescue				✓	
Coordinate emergency resources			✓	✓	✓
Damage assessment					✓
Social network analysis				✓	✓

virtual—could be further developed using Twitter. They identified challenges for ‘real’ emergency volunteer groups that may be at least partially met with the help of social media and how the enlisting of virtual crisis volunteers could embolden those volunteers in the field.

Because of its public access and functionality to categorise information via hashtags, Twitter lends itself well to developing virtual communities-of-practice to help disaster-related learning. It has the potential to help learning for community disaster resilience. Zhang and colleagues (2015) explored the development of virtual communities-of-practice after *Hurricane Sandy* and noted the resulting more participatory nature of community learning, although there was ‘marginal evidence of capacity building across all components of the organizational learning cycle’. An example of a Twitter virtual community-of-practice used by emergency managers interested in social media is accessed via the #smem hashtag.

Due to its unique social networking relationships, Twitter has the potential to build ‘social capital’ – a proven factor in community disaster resilience (Aldrich 2012). Hofer and Aubert (2013) found that ‘the non-reciprocal friendship model of Twitter [i.e. the distinction between following and being followed] results in different effects on perceived social capital

(both bridging and bonding) than do classical social networking sites such as Facebook.

Twitter has also shown its capability for social change during and after events. Many observers of the uprisings in Iran in 2009 and the Arab states in 2011 heralded the use of social media. Some went so far as to declare the Iranian protests a ‘Twitter Revolution’. Analysis of Twitter posts from demonstrations in Egypt showed that individuals actively tweeting from Egypt demonstrated characteristics of opinion leaders (Kavanaugh *et al.* 2012).

Conclusion

Twitter is ten. Although it does not have the same global uptake as Facebook, its unique characteristics have enabled it to become more valuable than other social media to disaster management and research.

Based on research, the main uses of Twitter in emergency management are as an additional means of communication, for crisis mapping for response, for understanding the sentiment of those affected, and in sharing real-time information between the community and emergency managers.



As it moves into its next decade, Twitter could also be used in disaster management in the following ways:

- as a crisis-detector
- to build capacity of real and online volunteers
- to help disaster resilience learning through VCoP
- to build social capital for disasters
- to make positive social change following disasters.

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