USE OF SOCIAL MEDIA DURING FLOOD EVENTS

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Abstract

Victoria experienced significant major floods between September 2010 and March 2011. Over this time it was evident that many community members were using social media to obtain information about the floods and to share this information with others. The Victoria State Emergency Service (VICSES) provided information to communities through social media and also developed a strategic intelligence capability to obtain intelligence from social media sources.

During the floods VICSES and the Office of the Emergency Services Commissioner (OESC) conducted a research project to obtain information about how people used social media during the flood event.

This paper will provide an overview of the research conducted and provide insight in to how social media can be best utilised and managed during flood events to communicate warnings and emergency information and to obtain intelligence from communities.

Introduction

Between 12 January and 10 February 2011, Victorian emergency management agencies responded to the most significant flood event on record in Victoria. Persistent low-pressure systems associated with extraordinary tropical moisture led to Victoria recording its wettest January on record by the halfway point of the month. Heavy rainfall was recorded across the state between 9 and 15 January, resulting in rainfall totals of 100-300mm across two-thirds of the state, and consequently major and moderate flooding spanning north, west and central Victoria.

Less than a month later, between 4 and 6 February, tropical moisture resulting from Tropical Cyclone Yassi interacted with a cold front, triggering extreme rainfall across the Melbourne Metropolitan area, the North Mallee district and much of Eastern Victoria. Daily rainfall totals between 100-200mm were widespread in the eastern and south-eastern suburbs of Melbourne, and were the equivalent of what most weather stations would usually observe in an entire summer season. These exceptionally high daily rainfall totals resulted in severe flash-flooding in numerous locations, with the south-eastern suburbs of Melbourne and the regional town of Mildura amongst the most severely affected.

During this period, the Victoria State Emergency Service (VICSES) responded to more than 17,500 requests for assistance, 320,000 individual Emergency Alert messages were issued and the VICSES Flood and Storm Information Line received over 16,800 calls. Communication of warnings and information to the community was paramount, and online and social media outlets were used extensively by media, emergency services, communities and other interested people. Understanding the way in which social media was used in the Victorian floods was an important starting point for the development of policy and approaches to the use of social media in future

emergencies, and as a result research was undertaken to inform social media strategies for all Victorian government agencies, including VICSES.

Objectives

Wide ranging objectives were established for the study, including:

- Documenting of social media mentions during the Victorian floods
- Analysing of comment by location and other characteristics
- Ascertaining the nature of comments
- Establishing flows of information
- Establishing the nature of sharing of warnings and other information
- Exploring the message database for useful insights
- Recommending approaches for future events

Methodology

For this study, data was captured for the period 10 January 2011 to 5 March 2011, from channels such as Twitter, open Facebook pages, open forums, open blogs and news sources.

Twitter is an online social networking and micro-blogging service that enable its users to send and read text-based posts of 140 characters, informally known as 'tweets'. Messages on Twitter may be tagged by including one or more hashtags: words or phrases prefixed with the # symbol. Users can then search for the hashtag within Twitter and all posts with the tagged word will appear in the search results. Notable hashtags during the 2011 Victorian floods were #vicfloods and #vicrains, while #qldfloods was predominantly used for the 2011 Queensland floods. Hashtags do not conform to specific rules, but are generally chosen by consensus within the Twitter community. Individual user accounts within Twitter are identified by a 'handle', which is the @ symbol followed by the name of the account (@victoria_ses, @QPSmedia). Unless a user has specifically set their account to be viewed only by their 'followers', all tweets are available for public view.

Facebook on the other hand is a more private social networking platform that allows users to post status updates, images, videos and links to their profile for viewing by their 'friends'. Most individual Facebook users have content on their Facebook profiles hidden from general public view, however many companies, organisations and groups have open Facebook pages that contain content that is exclusively for public view.

For this study, data was extracted using commercial social media monitoring providers Buzz Numbers and Rowfeeder.com, and was collected on the basis of the specific search terms "victoria", "vic" or "floods". As far as possible, comments relating to the Queensland floods and floods in other parts of the world were excluded, however a total in excess of 320,000 comments about floods was collated.

As a relatively new field of research, analysis of social media comment is essentially based on text analysis techniques including key word counts. However, validating the relevance, content, nature and purpose of comments requires extensive analysis and cleaning of data sets. Through a combination of commercial software and human reading, the dataset of 320,000 comments was cleaned to ensure only commentary relating the Victorian floods was included. Comments on floods that included river or

location names, or the words victoria, flood or vicfloods were retained in the data set, and all other comments were discarded. The cleaning process reduced the data set from in excess of 320,000 comments to 12,405 highly relevant comments.

Limitations

Due to the nature of social media monitoring, comments that may have related to the Victorian floods might not have been included in the analysis for a number of reasons. Firstly, comments that may have related to the floods but did not contain the key search terms (vic, victoria or floods) were removed from the data set. Vieweg (2010) describes this data loss as "markedness", where "certain landmarks or items become taken-for-granted and expected when referred to in more general terms". An example of this would be that any comments that described 'the river' or 'the water' without specifically using the word 'flood' would not have been included in the dataset.

It is also likely that a very significant number of Facebook comments were not included in the dataset due to the privacy controls on individual Facebook pages. Facebook posts were only able to be collected from open, public facebook pages, which were more likely to be group or organisation pages rather than individual Facebook accounts.

Findings

Volume and Nature of Commentary

The majority of content collated was generated by Twitter, followed by news sources, blogs, Facebook and forums. As discussed above, not all Facebook comments are public, so the full extent of Facebook commentary is likely to be significantly higher than this study indicates.

Figure 1.0 shows that Twitter comment is event sensitive, and rises and falls quickly at various points during the event, while blogs and news are more persistent sources of commentary. The high level of commentary by news sources highlights the significant use of social media by established traditional media outlets, including emergency broadcasters, for both large-scale community wide and smaller-scale events.
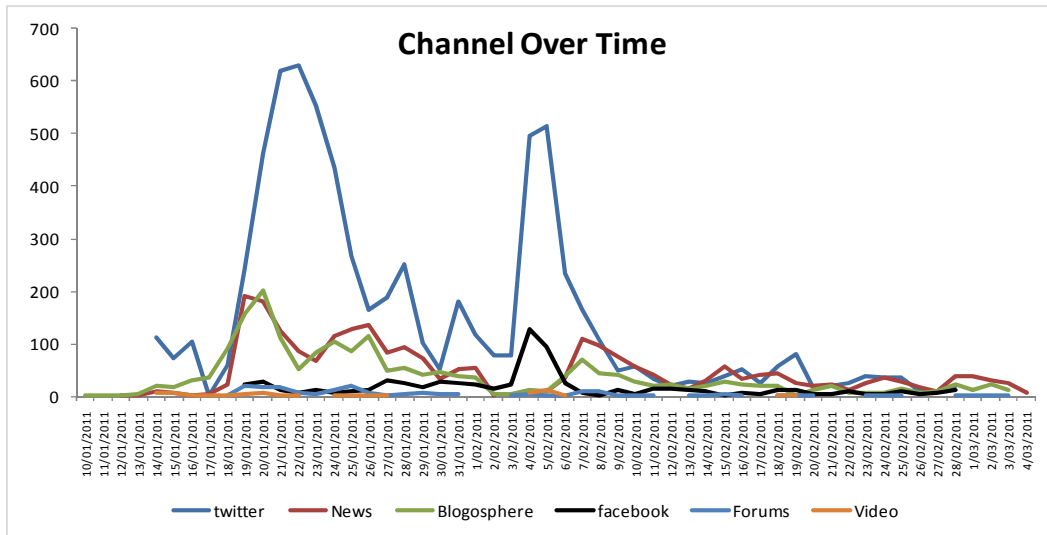
Figure 1.0 Social media channels over time

The nature of social media commentary relating to the 2011 Victorian floods was generally helpful and positive. The kind of ironic or cynical comment evident in many other topics in social media was not evident in commentary relating to the floods. Similarly, the social media comments relating to the floods were rarely random or meaningless, and were generally highly informational and valuable in their content.

One of the key social media behaviours evidenced was message spreading, which comprised 43 per cent of the total dataset. Message spreaders included re-tweets, shares and distribution of comments relating to relief, donations, news, warnings and general emergency information. Message spreading relating to relief and donations was most prevalent, followed closely by the spreading of news items. Message spreading relating to warnings was comparatively low at only 7.5 per cent of the total dataset, which is likely to be due to a lack of official agency use of social media for warnings. It is worth noting that VICSES now has the capability to automatically post all warnings directly to the organisation's Facebook and Twitter pages, which is likely to increase the instance of warning related message spreading in future events.

Community Self-Organisation & Response

One of key findings of this research is that social media comment during the 2011 Victorian floods was not necessarily informed by official information releases. As figure 2.0 illustrates, during January social media commentary was slow to pick-up on the Victorian floods, whereas during the February flash flooding event, social media commentary was ahead of official agency information releases.
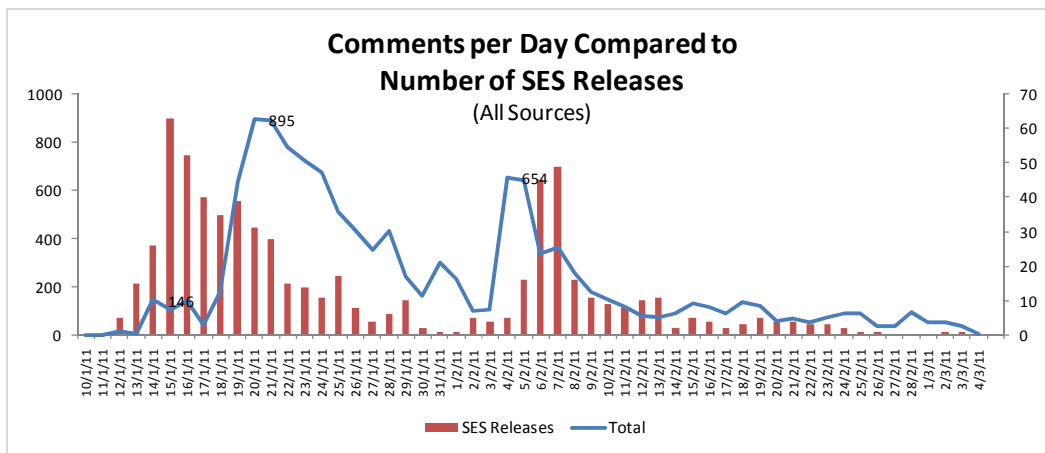
Figure 2.0 Social media comments per day compared to official releases

A similar situation was evidenced through Twitter hashtag usage across both the January and February flood events. In the early stages of the flood event there was widespread use of two hashtags - #vicfloods and #vicrains. Throughout the course of January and February, general social media users began to focus on the #vicfloods identifier rather than #vicrains. Official sources however continued to use #vicrains, leading to a fragmentation of the discussion. This example demonstrates the importance of official sources understanding the way in which general users are talking about an event, and responding accordingly.

During the floods, community members also established social media websites of their own accord to share information without involvement from emergency services. Some of these pages had several thousand 'fans' and high levels of engagement during the floods. This type of imitative is a key characteristic of the social media community, and highlights that social media discourse will happen during emergency situations regardless of whether official sources are involved in the dialogue. Such phenomena also points to a substantial level of sophistication in self-organisation within the social media community, even at the peak of emergency situations (Bruns, 2011)

Regional versus Metropolitan Social Media Usage

Social media commentary relating to the floods increased when heavy rain and flooding reached the urban environment in early February, which is likely to be due to larger population and possibly a higher level of engagement with social media. However, the data also showed a higher than expected level of involvement in social media in regional areas.

Figure 3.0 illustrates that differences were evident between how social media was used in urban and regional environments, with regional users more likely to use social media for message spreading, and urban users more likely to be spectators or people commenting on their own involvement in the flooding. Commentary in urban areas was more personal, and there was a considerably higher volume of comments in a short period of time.

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Type of Comment by Flood Area

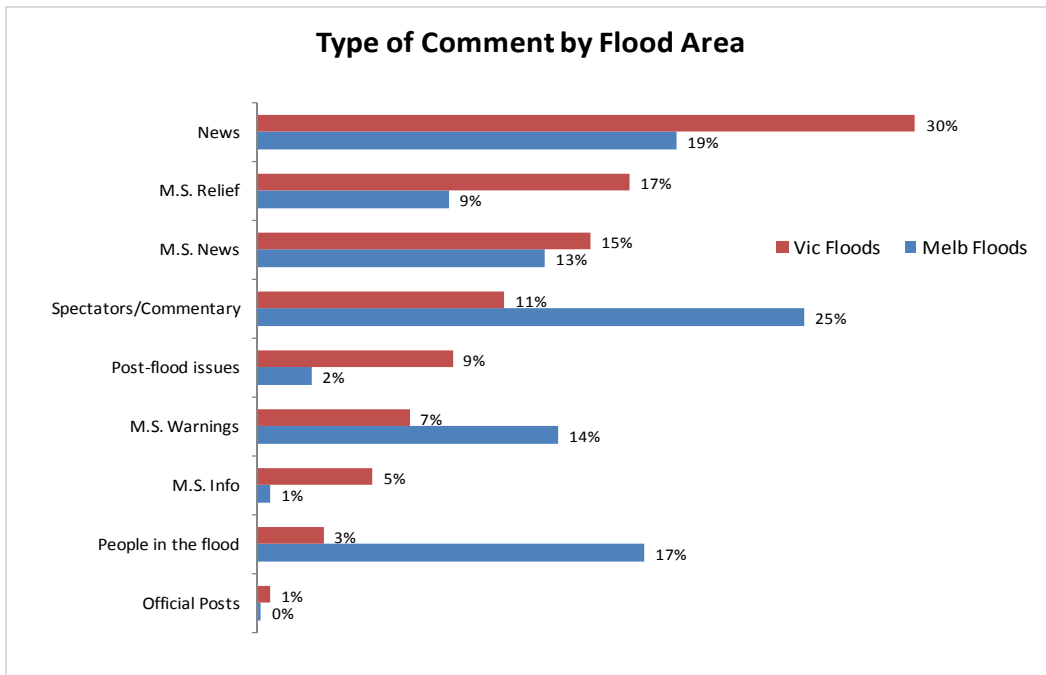| Type	Vic Floods	Melb Floods
News	30%	19%
M.S. Relief	17%	9%
M.S. News	15%	13%
Spectators/Commentary	11%	25%
Post-flood issues	9%	2%
M.S. Warnings	7%	14%
M.S. Info	5%	1%
People in the flood	3%	17%
Official Posts	1%	0%

Figure 3.0 Type of comment breakdown by geographic area

Where specific locations were mentioned, areas with larger populations unsurprisingly attracted more comment. Melbourne attracted the greatest number of comments, however Swan Hill and Kerang were also mentioned frequently, which is likely to be due to the longer duration of the flooding in these areas.

Key Social Media Behaviours

One of the key social media behaviours evidenced through this study is that there is a strong willingness in the social media community to assist both official emergency management agencies and the wider community. This willingness was evidenced in two behaviours – message spreading and situational awareness. Social media users were active in spreading official messages to further disseminate warnings and information. This willingness to spread official messages through individual personal networks has the potential to lead to a substantial increase the in the reach of official communications. The second behaviour evidenced was the willingness of social media users to feed relevant situational information back to emergency management agencies. The VICSES Facebook page received a number of direct posts from social media users with detailed information about road closures, local conditions and in some cases, images and videos of local flood consequences.

Content analysis of the dataset also suggests that different social media channels are used in quite distinct ways, and for distinct types of content. Twitter was most often used for spreading news, information and warnings, while blogs were used primarily for news stories and longer commentary. Facebook was most strongly used for commentary by people who were directly involved in the floods. Similarly, YouTube was primarily used for posting eye-witness accounts of flood situations. Understanding of these key social media behaviours will be an important factor in the future effective use of social media in flood and other emergency events.

Three Principles for Effectively Using Social Media for Flood Events

1. Don't wait for an emergency to get involved in social media

One of the key principles of effective social media use in emergency situations is recognition that social media communication is founded on relationships, and these are best developed prior to the incident occurring. The traditional dichotomy of community information vs. agency information has no place in social media communications. If emergency management agencies are able to develop and maintain engaged and responsive two-way communication with the social media community in 'peace' time, the sense of common aims and intentions within the community will continue into emergency situations.

A significant factor in the effective use of social media during the 2011 Queensland floods was the responsive engagement that occurred between official social media sources such as @QPSmedia and everyday users. Because official sources chose to engage in two-way communication with social media communities rather than using the medium simply to push out information, the users provided official sources with the social capital required to shape the parameters of community discussion (Bruns, 2011).

Similarly, social media commentary during the 2011 Victorian floods lacked the negative and cynical content that can characterise general social media discourse, and was instead significantly focussed on positive and helpful commentary. The ability of emergency agencies to leverage this sense of community and willingness to help will be the defining factor in the success of social media as an emergency communications tool. The defining characteristics of community as an interactive population of individuals in a common location can be applied as readily to social media communities as traditional communities. Just as members of a physical local community will protect and inform one another during emergency situations, the social media community seems to respond in the same manner.

For this reason, official social media strategy and engagement is required across the range of preparedness, planning, response and recovery activities. The strong message-spreading activity evidenced in social media during emergencies can also be drawn on for preparedness and planning initiatives. Ensuring all preparedness materials are available digitally to enable distribution and sharing through social media channels is a simple but highly effective engagement strategy. Similarly, this study has shown that recovery issues are present in social media commentary from very early in the emergency, highlighting an opportunity for recovery engagement strategies to utilise social media as a communications tool. Flexibility and adaptability however should still be regarded as the fundamental factor in successful social media engagement at all points during the emergency management process. As Bruns (2011) notes, the crucial importance lies in "engaging with citizens through whatever channels are available, accessible and effective – regardless of whatever communicative preferences may have existed in government organisations before the event" (p8).

2. Use social media as an intelligence tool

One of the most significant potential benefits of using social media for emergency events is that it increases considerably the amount of situational information that is available to emergency management and response agencies. Recent studies such as Vieweg (2010) have argued that wide-scale social media communication often involves

self-organising behaviour that produces accurate situational information, often in advance of official communications. Commentary through social media channels moves rapidly, and often contains information that is ahead of both official agency intelligence channels and traditional news media.

As demonstrated through the research presented above, at various points during the 2011 Victorian floods, social media commentary was ahead of official sources in situational awareness and information. The significant amount of information being exchanged through social media channels highlighted the lack of official agency engagement with what is likely to have been relevant situational information. A similar situation occurred in the 2011 Queensland floods, where social media in effect operated as an unofficial, distributed early warning system, particularly through the capture and dissemination of first-hand footage and images (Bruns, 2011).

By developing effective methods for leveraging this information and feeding it back through the emergency management structure, information gained through social media sources has the potential to be the catalyst for a change in the traditional information flow structures within emergency management. The potential spread of misinformation is something that cannot be ignored by agencies, but the corresponding potential for valuable situational information also must not be overlooked. As Sutton (2008) notes:

> "…people will use any information from any number of sources to satisfy their needs and inform their activities in the face of disaster. These activities of information gathering, verification and distribution – which are extended and expanded in our increasingly networked society – require not only more research, but also simultaneous consideration by the institutions of emergency management for integrating their real – and helpful – aspects of public response into emergency management polices and procedures".

It should be noted that during both the Queensland and Victorian floods, official institutional sources such as @QPSmedia and @abcnews featured heavily in re-tweets and information sharing, illustrating that official sources still cut through as a primary information source (Bruns, 2011). Effective use of social media intelligence lies in emergency management agencies developing a successful 'pull-push' system of situational information, whereby information is pulled in from social media channels, verified, then pushed back through the channels as official information.

In the absence of an automated or computerised solution to the challenge of verifying and validating information sourced form the community through social media, the filtering and verification process must be managed manually through the traditional emergency management framework. However, considerable work is being undertaken in this area (Hughes, 2009, Vieweg, 2010) to develop automated systems that assist in the qualitative verification of computer-mediated communication.

3. Develop Structured Social Media Monitoring

While structured social media monitoring is still in its infancy, a number of commercial applications such as Buzz Numbers, Rowfeeder.com and Trackur can provide detailed monitoring of social media commentary. Where initial monitoring focused on the statistical properties of social media use, research is fast evolving to include more in-depth evaluations of message content and the nature of interactions (Vieweg, 2010). It is worth noting however that detailed social media content analysis is still significantly reliant on structured social research analysis, which remains time-consuming and costly. While questions such as "how many comments were made about the Victorian

floods?" can be automated, questions such as "what was the nature of the comment about the Victorian floods?" require human reading and detailed content analysis.

There are two key aspects to the monitoring of social media communication during emergencies – the immediate monitoring that occurs in real time, and the data collection that should occur for detailed review. These two activities have different purposes, but both are equally important in increasing ongoing understanding of the role of social media in emergency management.

A key challenge for both aspects of social media monitoring is understanding both the rapidity and fluidity of social media commentary. As discussed above, establishing hashtags early is vital, but the flexibility to adapt to changes and developments in hashtag usage is perhaps even more important. In a similar way, establishing keywords and understanding the language of the commentary quickly, as well as remaining responsive to its fluidity is very important. As Vieweg (2010) argues, Twitter in particular requires rapid mobilisation of monitoring tools due to short-lived access to tweets. Quick decisions will often need to be made in the early stages of an emergency event about what information to monitor and collect, often before the scope and the shape of the event are fully understood.

Each emergency event is likely to be unique, and as such, the language and content that develops in the social media community will be similarly unique. While some key search terms and hashtags may be anticipated, just as many will evolve as the event, and the commentary, progresses. The key action for emergency management agencies should be in establishing key search terms and hashtags in advance, which can then be adjusted as the commentary around the event evolves.

Conclusion

An important lesson from this research is that social media is beginning to play an integral role in the way that people both gather and communicate information during emergency situations. As with all methods of communication during emergency events, social media is just one channel that should be used as part of an overall communications platform encompassing multiple tools. Social media cannot, and arguably should not, replace or supersede traditional approaches to emergency management communications, but if leveraged strategically, it can be an effective means of strengthening and augmenting current systems. Social media commentary will exist during emergencies regardless of agency involvement, and both the Victorian and Queensland floods have demonstrated the benefits of official sources being involved in the conversation. By starting to integrate social media into traditional emergency management structures and strategies, and through the development of effective metrics to monitor social media commentary, emergency agencies have the potential to significantly increase their ability to manage emergencies across the range of preparation, planning, response and recovery activities.

Acknowledgements

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