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A strategy for communication between key agencies and members of the public during crisis situations

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Contents

Executive Summary

This report contributes to the CascEff project by providing information on how human behaviour can be influenced by the communication strategies adopted by emergency managers during crisis situations. Specifically, it sets out to build on D3.2 through an exploration of not only *how* key decisions by relevant stakeholders are communicated to members of the public, but also how citizens are likely to *respond to and act upon* these crisis messages. The reduction of uncertainty and prevention amongst disaster-affected populations remain important objectives throughout the stages of the incident for those emergency managers who are attempting to prevent disruption of other components of the socio-technical system.

It also provides an overview of the key themes in the crisis and risk communication literature, assesses the characteristics of effective crisis communication and how people respond to these messages, and presents the key findings from a critical thematic analysis of 41 semi-structured interviews conducted with key stakeholders between December 2014 and May 2015. In addition, three large-scale emergencies in Europe were analysed in order to identify key lessons for crisis communication during such incidents. These were:

1) The floods in South-West England (December 2013 - February 2014);
2) The thunderstorm that hit the Pukkelpop music festival in Belgium (18 August 2011); and
3) The rioting in the town of Haren, in the Netherlands (21 September 2012), after thousands of young people gathered for a local girl's birthday party advertised as 'Project X Haren'.

SPEAK Guidelines

The report proposes a set of guidelines for effective communication practices during each stage of a crisis situation. These guidelines, which we refer to as 'SPEAK' were:

1) **S**tudy the information-seeking behaviours of your audience before deciding upon which communication platforms to use during crisis situations;
2) **P**repare for the loss of critical infrastructure during such incidents by employing a communication mix that includes both traditional and digital media;
3) **E**ngage key stakeholders e.g. civil society organisations in order to ensure that the information shared with the general public is both accurate and consistent
4) **A**lways consider the ethical implications of using crowdsourced information obtained from social media sites; and
5) **K**nowledge gained from previous incidents should be used to inform future communication strategies.

These 'SPEAK' guidelines should inform communication at each key stage of a disaster or crisis situation (mitigation, preparedness, response and recovery). The integration of tactics traditionally associated with risk and crisis communication, assessment of citizen information needs and behaviours, and proposed mix of traditional and social media channels should help increase preparedness amongst populations living in disaster-prone area. This should help prevent the disruption to information relations and other elements of the socio-technical system associated with cascading effects.

Key recommendations included:

1) Emergency managers should assess the information needs and behaviours of the public at all stages of the disaster in order to maximise the impact of messages sent by their agencies. Desired behavioural changes (e.g. evacuation instructions) are most likely to occur if extensive information is shared about disaster preparedness at the early stages of the cycle.

2) Shared responsibility towards DRR should be extended into the field of crisis communication. Key agencies are likely to remain the most trusted sources of information during crisis situations. However, social media helps these organisations build situational awareness through the crowdsourcing of crisis information, as well as pushing information that offers advice and reassurance to those affected by such incidents. They can also help empower local communities and build resilience towards disasters.

3) A strategic communication mix of social media, traditional media and face-to-face meetings should ideally be employed at all stages of man-made or natural disasters. While it is misleading to suggest that there is a 'killer app' in terms of crisis communication, we would like to draw particular attention to the potential use of social media to correct rumours and disinformation, which have the potential to lead to cascading effects during these incidents.

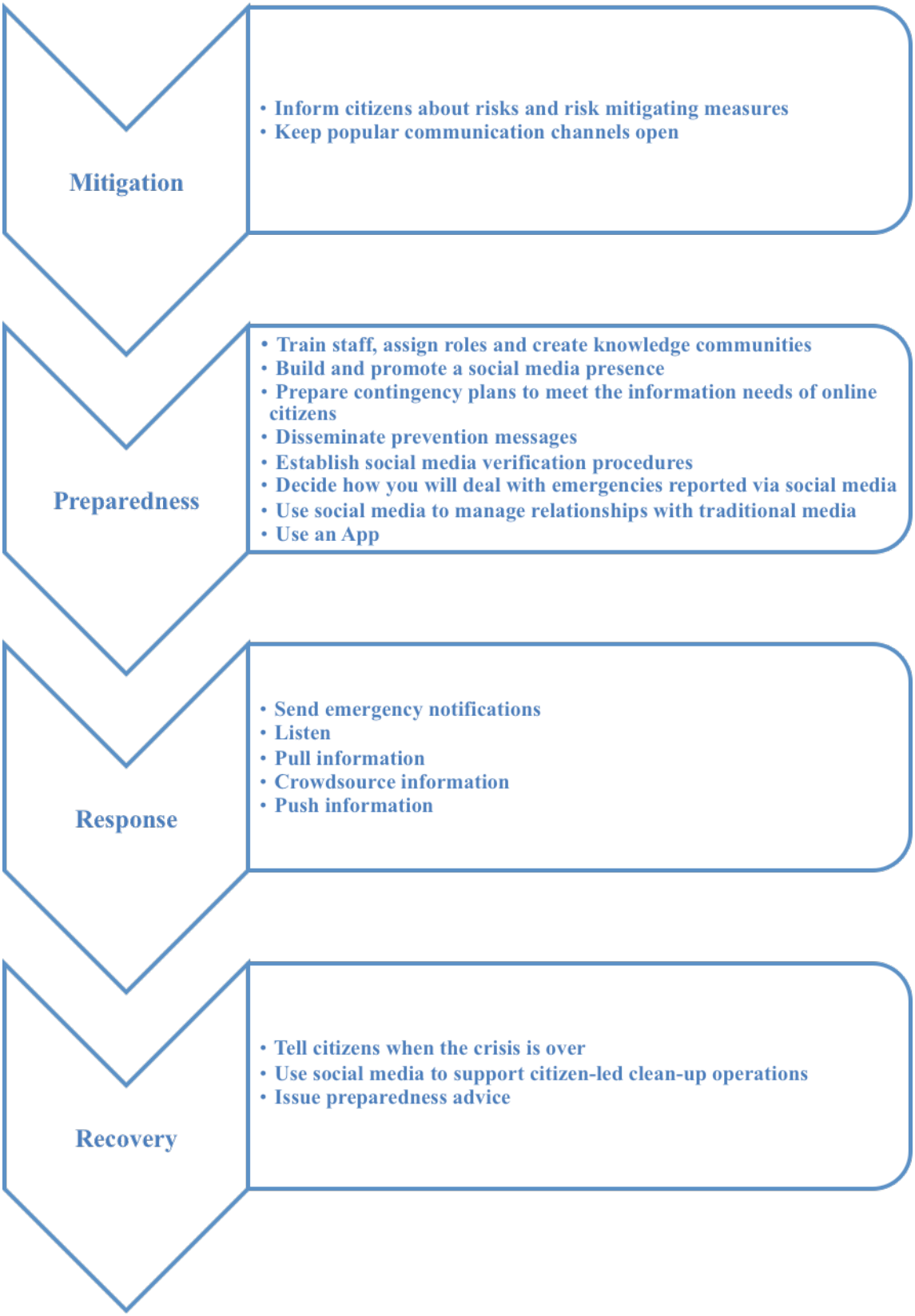
4) Radio, television, newspapers and telephone calls remain important channels for those unable or unwilling to access new media technologies. They are also seen as trusted sources of information during crisis situations. Also, in the immediate aftermath of man-made or natural disasters, when there may be bandwidth limitations, traditional channels such as electronic billboards and PA systems may be more effective ways to communicate with members of the public. Emergency management communicators should therefore target those communication platforms that are most commonly used by residents in disaster-affected areas in order to maximise the reach of their content. They should also focus on those communication channels that may be more resilient and effective in the immediate aftermath of a man-made or natural disaster.

5) Key agencies should collaborate with other emergency services and civil society organisations to ensure that these messages are clear, consistent and accurate. Such messages are much more likely to be acted upon by members of the public who live in disaster-prone areas.

6) Evaluation and reflection should be critical components of crisis communication practices at both the individual and organisational levels. Lessons learnt from previous incidents should help inform future communication plans for man-made and natural disasters.

Communication Strategy Flowchart

A communication flowchart (see below) was created to explore the communication tactics that are applicable during each of the four phases of a disaster (mitigation, preparedness, response and recovery).


Mitigation
• Inform citizens about risks and risk mitigating measures
• Keep popular communication channels open
Preparedness
• Train staff, assign roles and create knowledge communities
• Build and promote a social media presence
• Prepare contingency plans to meet the information needs of online citizens
• Disseminate prevention messages
• Establish social media verification procedures
• Decide how you will deal with emergencies reported via social media
• Use social media to manage relationships with traditional media
• Use an App
Response
• Send emergency notifications
• Listen
• Pull information
• Crowdsource information
• Push information
Recovery
• Tell citizens when the crisis is over
• Use social media to support citizen-led clean-up operations
• Issue preparedness advice

Limitations

There are two main limitations relating to the scope and objective of this report that should be acknowledged. First, a complete overview of every national framework for crisis and risk communication was considered neither feasible nor desirable in order to identify effective communication practices during incidents with cascading effects. The aim of this report was to identify broad themes and patterns in crisis and risk communication and to reflect upon their respective strengths and weaknesses. Second, the interpretation of this task in the DoW was that it would not be appropriate to promote a linear, technocratic approach towards communication during cascading disasters, nor one that should be implemented in every EU member state. Cascading disasters are by their very nature complex and unpredictable events that require flexible, people-centred decision-making and communication processes in order to prevent further disruption to other systems. Therefore, it was decided to focus instead on the identification of broad guidelines and tactics for effective communication that could be adopted by key stakeholders and applied to the context in which such incidents occurred.

Nomenclature

asynchronous channels	communication channels characterised by separation of message exchange by time and space e.g. e-mail[1]
digital media	any media that are encoded in a machine-readable format and can be created, viewed, distributed, modified and preserved on computers
incident evolution tool	An incident evolution tool (IET) is a methodology which relies on input from either specific, applied, models of physical effects or past experience to describe how the impact of an incident on a system may spread to dependent systems. The IET is an informative tool which can be used for improved crisis management by supplementing the knowledge and experience of crisis managers with additional information as to the likely progression of an incident from initiating event through multiple dependent systems[2]
situational awareness	the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning and the projection of their status in the near future[3]
social media	the collection of software that enables individuals and communities to gather, communicate, share and in some cases collaborate or play[4]
synchronous channels	communication channels which allow for message exchange in 'real time' e.g. telephone calls[5]
traditional media	media introduced before the advent of the internet that are for the purposes of mass communication e.g. billboards, magazines, newspapers, radio and television broadcasting[6]
user generated content	content created by social media users rather than journalists/editors[7]

[1] Verderber, K. S., Sellnow, D. D. & Verderber, R. F. (2015). *COMM* ^{3}. Stamford, CT: Cengage Learning.

[2] CascEff (2016) *Glossary and Definitions, Deliverable 1.6* .

[3] Endsley, M. R. (1998). A comparative analysis of SAGAT and SART for evaluations of situation awareness. In Proceedings of the Human Factors and Ergonomics Society 42nd Annual Meeting (pp. 82-86). Santa Monica, CA: The Human Factors and Ergonomics Society.

[4] boyd, d. (2009). 'Social media is here to stay... now what?' Available at: http://www.danah.org/papers/talks/MSRTechFest2009.html (accessed 24 September 2015).

[5] Verderber, K. S., Sellnow, D. D. & Verderber, R. F. (2015). *COMM* ^{3}. Stamford, CT: Cengage Learning.

[6] Lee, F. L.F., Leung, L., Qiu, J. L. & Chu, D. S. C. (2013). *Frontiers in new media research*. New York: Taylor & Francis.

[7] boyd, d. (2009). 'Social media is here to stay... now what?' Available at: http://www.danah.org/papers/talks/MSRTechFest2009.html (accessed 24 September 2015).

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We would like to thank all of our participants who agreed to be interviewed for this research.

1 Introduction

Disasters invariably involve some form of communication failure that contributes to the disruption of other essential services in the affected area. Hence the UN Sendai Framework for Disaster Risk Reduction (UNISDR) called for national governments to continue to develop "people-centred" disaster risk and emergency management mechanisms in order to make communities more resilient to such incidents.[8] This is particularly salient in the case of disasters with cascading effects. In CascEff, we have defined cascading effects as the *impacts* of an initiating event where:

1) System dependencies lead to impacts propagating to other systems;
2) The combined impacts of the propagated events are of greater consequences than the root impacts; and
3) Multiple stakeholders and/or responders are involved.

While this definition is elaborated in more detail elsewhere (see D1.1 and 1.3), it should be noted that the disruption of information relations has a particularly negative impact upon the ability of emergency managers to prevent cascading effects developing in the aftermath of disasters. The interruption of information flow between functionally interdependent actors has been identified as one of the most common triggers of cascading events during large-scale disasters, such as the 2011 Tōhoku earthquake and tsunami in Japan and the 2005 London bombings (known as 7/7) (Hagen et al., 2015). Coordination and information-sharing between emergency managers and key stakeholders in such incidents are often subject to delays, when telecommunication networks become congested in the wake of such an incident (Zaisa et al., 2015). This potential vulnerability in the socio-technical system is perhaps an inevitable consequence of the pervasiveness of communications infrastructures in contemporary societies and their increasingly important role in the management of other critical infrastructures (Zimmerman et al., 2009).

Information relations no longer solely refer to the linkages between the blue light organisations that respond to man made and natural disasters. The traditional top-down approach towards emergency management (known as 'command and control') has gradually been replaced by a multi-stakeholder approach towards emergency management that places greater emphasis on the exchange of information with members of the public. Previously considered unreliable conduits of crisis information, citizens now play an important role in the collection and sharing of data that helps build situational awareness for crisis responders. Nevertheless, this 'shared responsibility' does not mean that all citizen involvement in the information flows that surround 'cascading disasters' will help minimise the potential for further disruption of interdependent systems.[9] Rumours, misinformation and disinformation

[8] UNISDR (United Nations International Strategy for Disaster Reduction). 2015. *Sendai framework for disaster risk reduction 2015–2030*. http:// www. wcdrr. org/ uploads/ Sendai Framework for Disaster Risk Reduction 2015-2030. pdf. Accessed 1 Apr 2016

[9] This term is used alongside the 'toppling domino effect' to describe the impact of disasters with cascading effects. For more on this, see: Haavisto, I., Banommyong, B,, Kovacs, G.., and Spens , K.(2013). Supply Chain Coordination in Cascading Disasters. Paper presented at MLB Conference, 2013. Nagoya, Japan. September 9-26, 2013.

spread by citizens on social media have the potential to increase public anxiety about disasters, as was seen with the English riots in August 2011 (Procter et al., 2013). A related problem relates to the potential misinterpretation of official crisis messages by members of the public that leads to further unanticipated cascading effects. Therefore, it is imperative that all key stakeholders are aware of the importance of message consistency and accuracy in positively influencing the behaviour of citizens during large-scale emergencies.

The report is structured as follows: First, the contribution of this report to the CascEff project will be elaborated in order to contextualise its key recommendations. The methodological approach towards the development of the SPEAK guidelines will also be discussed in this section. The next chapter will present an overview of the academic research on crisis and risk communication, with a view to identifying the theoretical framework for the communication practices outlined in this report. Finally, the report will present the SPEAK guidelines for effective communication practices during disasters with cascading effects. The flowchart will situate these tactics within each of the four stages of the disaster cycle, namely mitigation (prevention of future emergencies and minimsing their effects), preparedness (preparing to deal with an emergency), response and recovery. This model of disaster and emergency management is chosen on the basis that it has been widely adopted by key agencies in the field, including FEMA in the US. However, the guidelines and tactics outlined in this communication strategy can be applied to other conceptualisations of the disaster cycle such as 'Planning, Preparation, Response, Recovery'. This report will explore what lessons can be learnt from communication practices deployed during three previous large-scale emergencies and apply these to cascading disasters.

1.1 Deliverable description and relationship to IET

The communication strategy presented here is the result of research activities carried out under Task 3.5, which is part of Work Package 3 (WP3) - 'First responder tactics, human activities, interaction and behavior' and which focuses on 'Communication with the public and coordination between agencies'.

This Deliverable (D3.3 - associated with Task 3.5), is described in the Description of Work (DoW) as:

> A strategy for communication between key agencies and members of the public during crisis situations including the use of social and traditional media channels in crisis scenarios: A flowchart describing the strategy for communication between key agencies and members of the public during crisis situations including the use of social and traditional media channels in crisis scenarios.

In line with these objectives, this report is primarily aimed at those agencies that participate in disaster management, ranging from 'blue light' organisations such as police and fire and rescue services to municipal authorities and public bodies such as the UK Environment Agency that deal with the public during these incidents. It can, however, also provide valuable insight for critical infrastructure providers who may be vulnerable to cascading effects from both man-

made and natural disasters. In this way, it is intended to supplement existing guidelines for effective communication during crisis situations, such as those developed by the COSMIC and iSAR+ projects (see Appendix 2 for more details).

This deliverable outlines a set of guidelines for effective communication between key agencies and members of the public during crisis situations. These inform the recommended communication practices for key stages of the disaster management cycle (mitigation, preparedness, response and recovery) in the flowchart at the end of the report.

This report contributes to the CascEff project by providing information on how human behaviour can be influenced by the communication strategies adopted by emergency managers during crisis situations. Specifically, it sets out to build on D3.2 through an exploration of not only *how* key decisions by relevant stakeholders are communicated to members of the public, but also how they are likely to *respond to and act* upon these crisis messages. The reduction of uncertainty and prevention amongst disaster-affected populations remain important objectives throughout the stages of the incident for those emergency managers who are attempting to prevent disruption of other components of the socio-technical system. Studies have also shown that the rapid dissemination of clear, unambiguous information can increase the quality of decision-making during crises (Veil et al., 2008). Therefore, the identification of effective communication tactics and when they should be deployed is a necessary corollary for improved incident management during cascading disasters. The results of this report will also help inform the development of the Incident Evolution Tool (IET) in two ways: First, the adoption of these guidelines will help identify potential vulnerabilities in the communication plans adopted by organisations that use the IET to support their decision-making. As discussed earlier, the breakdown in communication infrastructure is one of the most frequent triggers of cascading effects and this should be addressed by these organisations in their planning and preparation for such incidents. Second, the information on how members of the public act upon crisis messages should help these emergency managers develop a communication strategy that is scalable in a similar fashion to the intended uses of the IET. A flexible and fluid approach towards risk and crisis communication is needed in order for the collaborative model of decision-making outlined in D3.2 to positively influence the behaviour of disaster-affected populations throughout each stage of a disaster.

1.2 Methodology and Approach

The communication strategy and flowchart proposed in this report are based on information gathered from four primary sources, namely:

i) academic research into best practices in crisis and risk communication;
ii) the results of other EU funded projects in emergency management;
iii) the exploration of three case studies in which communication played a key role in the mitigation of cascading effects; and
iv) an analysis of 41 semi-structured interviews conducted with emergency managers and other key stakeholders.

i) **Review of Crisis Communication literature**

The first step was to conduct a literature review on the key principles that underpin both crisis and risk communication. Several academic databases (e.g. Google Scholar, Web of Science) were consulted in order to identify recently published research in these two key areas. Relevant journals in the fields of media and communication, emergency management studies, and information studies were also consulted in order to establish the theoretical framework for communication practices between key agencies and members of the public during disasters with cascading effects. While the role of the media in disaster management will be explored in more detail in D.3.4, this report will identify communication practices that reassure disaster affected populations and prevent further disruption to other functionalities of the socio-technical system mobilised during large scale incidents (see D.3.2 for more on this).

ii) Review of outputs from EU funded projects in related areas

There has been constant communication between members of the CascEff consortium and partners involved in other projects that focus on cascading effects, which helped identify sources for this communication strategy. The publications of projects such as COSMIC, DRIVER and FORTRESS were reviewed in order to establish the principles that underpin effective communication practices for emergency managers during large-scale emergencies, including those with cascading effects. The CORDIS directory was also consulted in order to identify any previous or ongoing EU funded research that addressed these issues. These will be referenced as appropriate throughout the report.

iii) Case studies in disaster management and communication

Cascading effects are particularly likely to occur during natural disasters and public order incidents, in which disruption to one interdependent system impacts upon the others (Ekman and Lange, 2015). In this way, cascading disasters and large-scale emergencies appear to share similar characteristics such as complexity, uncertainty and a time pressure for emergency managers to respond quickly (Bram et al., 2016). Three such incidents were explored in order to identify lessons that could be learnt about how to communicate effectively with members of the public during cascading disasters:

1) The floods in South-West England (December 2013 - February 2014);
2) The thunderstorm that hit the Pukkelpop music festival in Belgium (18 August 2011); and
3) The rioting in the town of Haren, in the Netherlands (21 September 2012), after thousands of young people gathered for a local girl's birthday party advertised as 'Project X Haren'.

Background on each of these incidents can be found at the end of this report (see Appendix 1), with examples of effective communication practice from each used to inform the SPEAK guidelines and flowchart that are proposed in this report.

iv) Interviews with emergency managers and key stakeholders

A critical thematic analysis of data gathered from 41 semi-structured interviews with key stakeholders was conducted between December 2014 and May 2015. Interviewees were selected on the basis of their experience in crisis communication and, in most cases, their direct involvement in the management of the three aforementioned crises. This ensured that

the proposed strategy was informed not only by theory and practice, but also that it drew on relevant expertise from Belgium, the Netherlands and the United Kingdom (UK). Ethical approval for conducting these interviews was obtained from the University of Leicester Research Ethics Committee prior to contact being made with these interviewees.

Four different semi-structured interview schedules were developed and used to investigate questions around crisis communication as well as traditional and social media use for communication with members of the public. These reflect the different types of individual who were approached: media representatives; App creators and hackathon participants; emergency services representatives and representatives of other organisations who were involved in the response; and experts. The schedule was used as a means to stimulate discussion and dialogue between interviewer and interviewee, and although a core group of questions was asked, new questions and discussions often emerged through the interviews. A core group of questions was repeated in all four interview schedules. Interviewees from our expert group were also asked to comment on some of the themes that had been emerging from interviews conducted around the three cases.

Interviews were conducted using telephone, Skype or in person at various location in Belgium, England and the Netherlands between the end of December 2014 and the beginning of May 2015. The method of thematic analysis devised by Braun and Clarke (2006) was used in this study in order to explore the themes that emerged from these interviews. Two coders read each interview transcript and compared fieldnotes in order to identify the communication practices that these interviewees believed had mitigated the cascading effects from these three incidents.

Limitations

There are two main limitations relating to the scope and objective of this report that should be acknowledged. First, a complete overview of every national framework for crisis and risk communication was considered neither feasible nor desirable in order to identify effective communication practices during incidents with cascading effects. The aim of this report was to identify broad themes and patterns in crisis and risk communication and to reflect upon their respective strengths and weaknesses. Second, the interpretation of this task in the DoW was that it would not be appropriate to promote a linear, technocratic approach towards communication during cascading disasters, nor one that should be implemented in every EU member state. Crisis communication scholars such as Coombs (2015) argue that step-by-step guides may be too constraining and recommend that general outlines be adopted that can be adapted to a variety of crisis situations. Therefore, we argue here that there is a need for communication strategies to be highly contextualised and constantly adjusted to reflect the information needs and behaviours of the public. Cascading disasters are by their very nature complex and unpredictable events that require flexible, people-centred decision-making and communication processes in order to prevent further disruption to other systems. Therefore, it was decided to focus instead on the identification of broad guidelines and tactics for effective communication that could be adopted by key stakeholders and applied to the context in which such incidents occurred.

2 Crisis Communication

The need to improve disaster-related communication has been an ever-present feature of Disaster Risk Reduction (DRR) initiatives over the past two decades.[10] Hence, the United Nations International Strategy for Disaster Reduction (UNISDR) identified "dialogue, coordination and information exchange" between various stakeholders as one of its strategic priorities in the Hyogo Framework, which set out a series of DRR objectives to be achieved between 2005 and 2015.[11] The Sendai Framework for Disaster Reduction, the most recent UNISDR publication, has continued to emphasise the importance of information sharing and communication between key stakeholders as a corollary to building resilience within disaster-affected populations.[12] Top-down approaches towards DRR have gradually been replaced in countries such as the UK by an emphasis on 'shared responsibility', whereby local communities are encouraged to play a more active role in preparing for and responding to disasters.[13] Crisis and risk communication practices have become an increasingly important component of such initiatives in disaster-prone advanced industrialised states in the world. For example, organisations such as the American Federal Emergency Management Agency (FEMA) have used their official YouTube channel to provide US citizens with information on a variety of topics, such as how to prepare a disaster kit and take appropriate action during an emergency (Dufty, 2011). Relevant to this project, EU initiatives such as the national crisis coordination centres have been created in order to promote information sharing between member states in these areas. However, different approaches towards crisis and risk communication are still persist within the EU, as demonstrated by the patchwork pattern of early warning systems in countries such as Sweden, Czech Republic and Spain (Nilsson et al., 2012). This is in stark contrast to the resilient communications framework adopted by the UK, which includes an online private network for civil protection practitioners and a variety of mechanisms for issuing public emergency alerts including the use of both traditional and social media.[14] Elsewhere, the cultural, linguistic and economic diversity within the EU has also been identified as posing particular challenges for risk communication aimed at preventing the spread of communicable diseases (Infanti et al., 2013). MacDonagh et al., (2016) argue that there remain many gaps in communication practices in EU member states, particularly in relation to the analysis of online information and how to benchmark and evaluate existing strategies.

Although the apparatus for crisis and risk communication within EU member states may be unlikely to change in the near future, the identification and sharing of best practices might help mitigate the effects of crisis situations upon elements of the socio-technical system. The congestion of telecommunication networks or the misinterpretations of crisis messages by members of the public are frequently identified as triggers of cascading effects during man-made and natural disasters (Hagen et al., 2015; Nowell and Steelman, 2015; Pescaroli and

[14] For more information on the UK Resilience communications framework, see: www,govt.uk/topic/public-safety-emergencies (accessed 1 April 2016)

[14] For more information on the UK Resilience communications framework, see: www,govt.uk/topic/public-safety-emergencies (accessed 1 April 2016)

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[14] For more information on the UK Resilience communications framework, see: www,govt.uk/topic/public-safety-emergencies (accessed 1 April 2016)

Alexander, 2014). In order to understand how to prevent such failures, one must first explore what constitutes effective communication on behalf of emergency managers during the various stages of the disaster cycle. In this section, the theoretical principles that underpin crisis communication will be examined in order to contextualise the guidelines and tactics elaborated in this report. It does so by providing an overview of key characteristics of crisis and risk communication, exploring how classic models such as the Crisis Emergency Risk Communications (CERC) and Situational Crisis Communication Theory (SCCT) can be applied to communication practices, and examining how members of the public respond to crises.

2.1 Origins of Crisis Communication

Crises (or disasters) are events that are usually unexpected, affect individuals or organisations, have the potential to inflict financial or reputational damage upon key stakeholders, and require urgent action to prevent their escalation (Coombs, 2015; Herman, 1963; Ulmer et al., 2007). Therefore, the purpose of crisis communication strategies should be to improve this situation and to 'limit and contain harm' to those individuals and organisations affected by the disaster (Seeger, 2006:234). It is perhaps no surprise therefore that it first emerged in the United States (US) as a sub-field of public relations (PR) practice in the early twentieth century. An overarching theme in the early crisis communication literature was that there was a need to provide "timely, accurate information and communicate strategically to minimise reputational damage" to individuals and organisations (Holladay, 2009:215). Probably one of the earliest examples of crisis communication followed an accident on the Pennsylvania railroad in 1906. Ivy Lee, credited as one of the founders of PR, convinced the railroad company to disclose information about the accident in what was widely considered to be the very first press release.[15] While the communication strategies of corporations to repair their reputations may not appear directly relevant to this report, incidents such as the BP oil spill in the Gulf of Mexico (April 2010) show how such organisations may seek to use the media to avoid responsibility for man-made disasters (de Wolf and Mejri, 2013). This also illustrates how crisis communication may have a variety of conflicting objectives; for example governments are likely to prioritise the restoration of public order while their citizens focus more on "being informed, protected and even reimbursed" (Seeger, 2006:34). The ways in which the media may both help and hinder these efforts will be explored in more detail in D3.4, but it should be noted that many crisis communication researchers recommend that emergency managers work in partnership with news media organisations as part of their response to a crisis (Ulmer et al., 2007). This has been a recurring theme in the crisis communication practice and research that emerged in the US in the early 1990s and more recently in Europe.

2.2. Crisis Response

Crisis communication research has tended thus far to focus on organisational responses to crises rather than on the pre or post-event period. Coombs (2015: 142) argues that there are two overarching strategies that should be employed by organisations responsible for crisis communication:

[15] For more on Ivy Lee's role in the development of crisis communication and PR, see here: http://www.nku.edu/~turney/prclass/readings/3eras2x.html (accessed 10 March 2016).

1) *Managing information* through the collection and dissemination of crisis-related information;
2) *Managing meaning* through initiatives to influence how people perceive the crisis and related organisations.

Pertinent to this project (see D3.2 for example), both involve the sharing of information with a view to positively influencing the behaviour of the public during crisis situations, many of which have the potential for cascading effects. Researchers such as Sturges (1994) and Barton (2001) identify three categories of crisis response strategy available to emergency managers in order to achieve this objective:

1) Instructing information that helps stakeholders e.g. citizens to take appropriate measures to protect themselves from physical or financial harm during a crisis;
2) Adjusting information e.g. expressions of sympathy that are designed to help these stakeholders cope with the psychological trauma associated with the crisis situation;
3) Internalising information that sets out to repair the reputation of the organisation(s) affected by the crisis.

Crisis communication scholars such as Coombs (2010) have promoted an evidence-based framework for the selection of crisis response strategies such as those listed above. Developed over ten years, Situational Crisis Communication Theory (SCCT) is based on the assumption that crises are always negative events which stakeholders can only make sense of through the attribution of responsibility for such incidents (see Figure 2.1). A two-step process is envisaged that involves an evaluation of the type of crisis followed by factors, such as the reputation of the organisation or whether there is a history of similar crises, that intensify attributions of the organisation's crisis responsibility (Coombs 2015: 144). Effective crisis response requires organisational rhetoric to be appropriate for the "level of reputational threat posed by the crisis" (Olsson, 2014: 115).

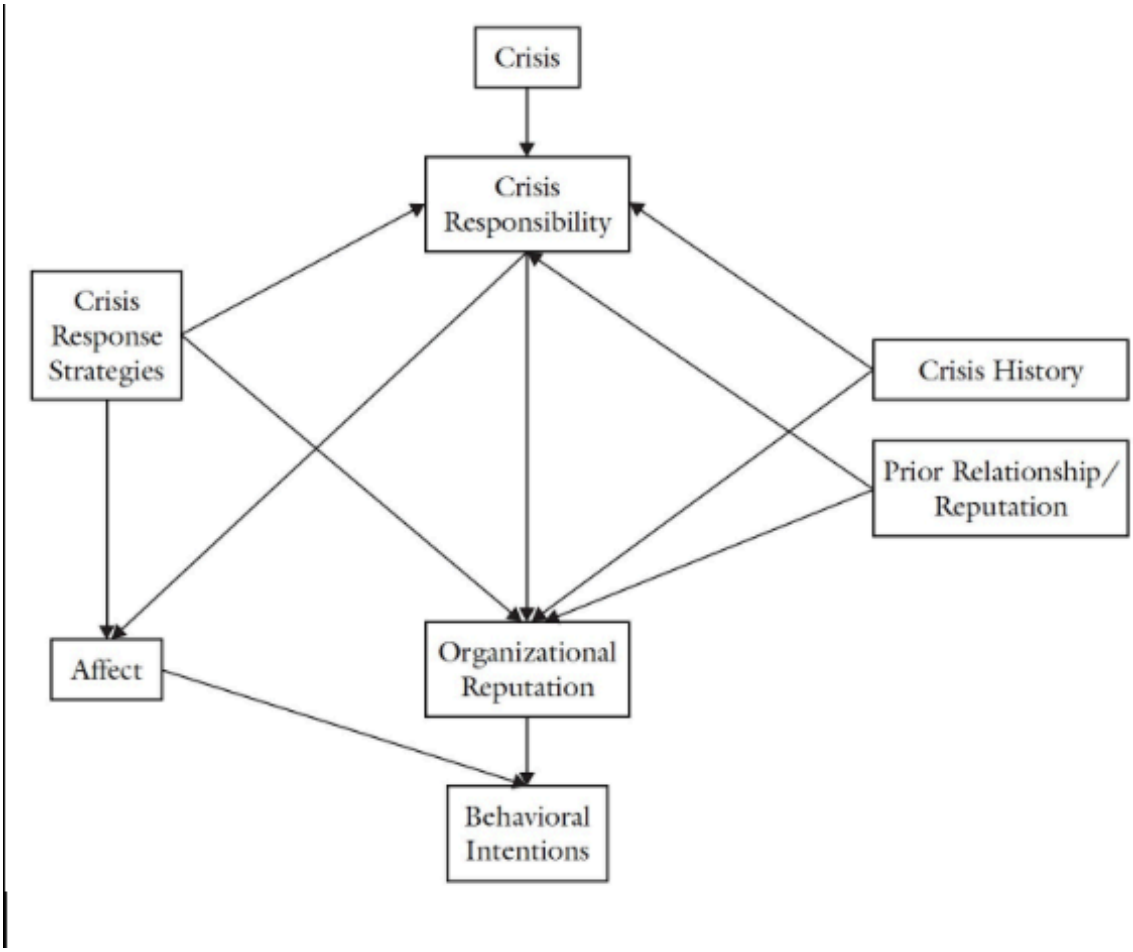


Figure 2.1 Crisis Situation model of Situational Crisis Communication Theory (SCCT) Source: http://www.palgrave-journals.com/crr/journal/v10/n3/fig_tab/1550049f1.html

Clearly SCCT may be better suited towards managing the reputational harm arising from organisational crises than preventing cascading effects during man-made or natural disasters. It also doesn't appear to fully account for the diversity of opinion that may exist within the population about who is responsible for a crisis (Benoit, 2014). Yet, the two-stage process of SCCT does appear to have some relevance to emergency managers, particularly in its recommendation that crisis response strategies should be based upon an assessment of the crisis type and the attribution of responsibility for the management such incidents.

2.3 Crisis and Emergency Risk Communication (CERC) model

Since the late 1980s, crisis communication researchers have argued that crisis communication practices should be more fully integrated into the field of emergency management. Like organisational crises, the focus in this research has often been on crisis response rather than how communication practices might be deployed in order to minimise harm at other stages in the disaster cycle (see MacDonagh et al., 2016 for an overview). Indeed, initiatives to educate and inform citizens about future disaster mitigation have frequently been categorised as 'risk communication' rather than crisis communication (Seeger, 2006; Steelman and McCaffrey, 2013). Reynolds and Seeger (2005) identified a number of distinctive characteristics of the

former, such as the fact that its messages were prepared in advance in comparison to the situation-driven and responsive nature of the latter. The debate over when crisis communication begins and ends has been further complicated by the addition of a third category, 'disaster communication'. This concept has been proposed by Coombs (2010) to define the post-event coordination of key stakeholders in the 'relief and restoration' phase. However, recent research has tended to characterise crisis communication as a hybrid of these distinctive modes of communication; a continuous process that sits within the emergency management structure through each stage of a disaster from mitigation to recovery. One manifestation of this hybrid approach has been the Crisis and Emergency Risk (CERC) model, which was originally proposed for public health professionals and promoted through organisations such as the US Centre for Disease Control and Prevention.[16] CERC brings together both risk and crisis communication in a framework that addresses the importance of communication between stakeholders through every developmental stage of a crisis (Reynolds and Seeger, 2005). It recommends a rigorous evaluation of crisis messages and the development of local partnerships in order to increase disaster preparedness amongst the public (see Figure 2.2). These principles can be applied to improve crisis and risk communication practices during a range of man-made and natural disasters including terrorist attacks and earthquakes.[17]

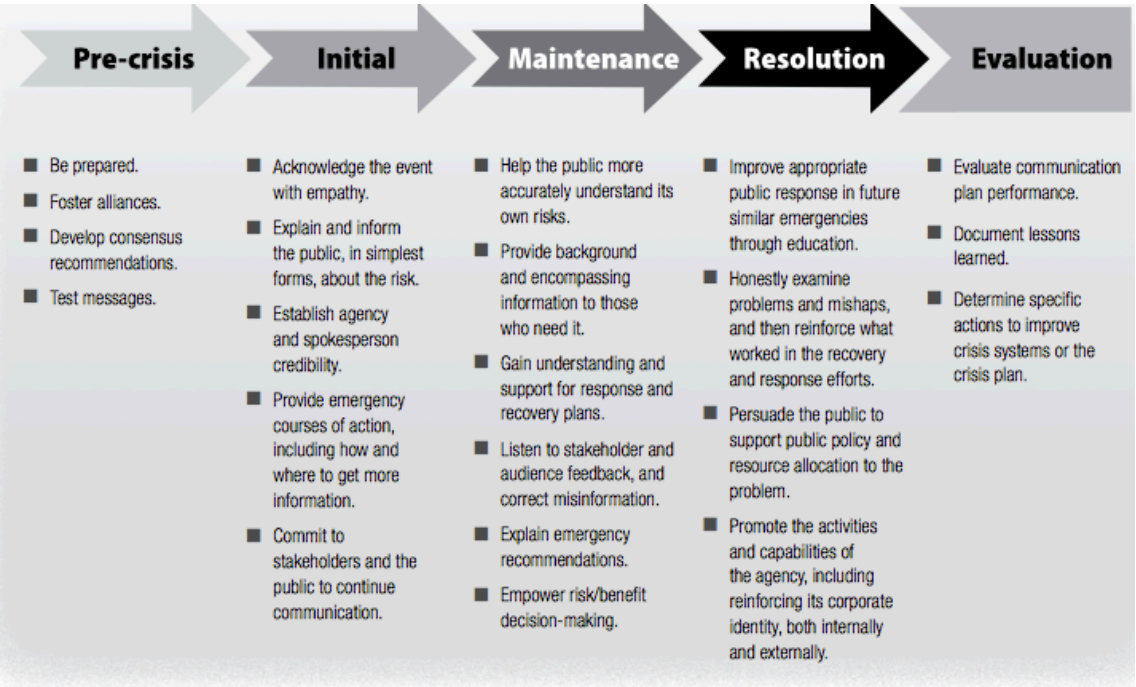


Figure 2.2 Crisis and Emergency Risk Communication (CERC) Cycle Source: US CDC (2014) http://www.nku.edu/~turney/prclass/readings/3eras2x.html

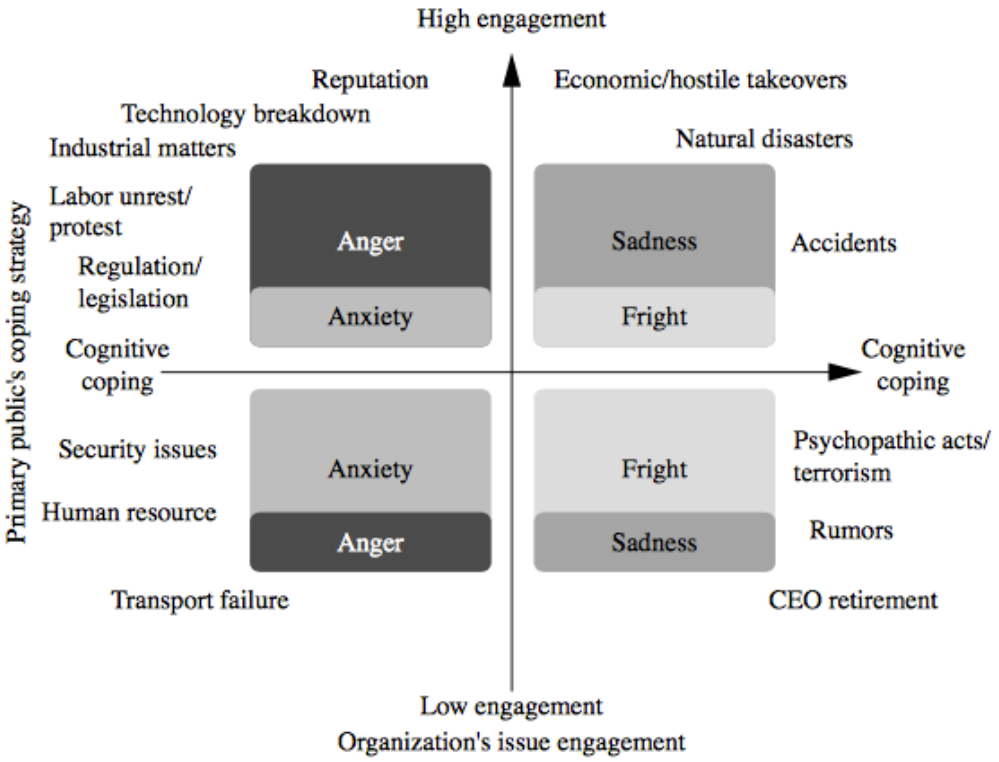
[16] Further information on The US CDC application of CERC can be found on its website: http://emergency.cdc.gov/cerc/ (accessed 1 April 2016).

[17] These scenarios are discussed by the US CDC in the CERC manual. This can be accessed here: http://www.bt.cdc.gov/cerc/resources/pdf/cerc_2014edition.pdf (1 April 2016).

CERC has been used to train Public Information Officers (PIOs) and tested on a number of crises during the past decade, such as the 2009 influenza pandemic (Infanti et al., 2013). However, scholars such as Quinn (2008) have proposed that the model needs to be expanded to incorporate different stakeholders, as illustrated by the lack of trust between minority communities and government during Hurricane Katrina in 2006. Furthermore, there appears to be little evidence thus far to show how CERC has informed current crisis communication practices within Europe (MacDonagh et al., 2016). Nevertheless, CERC does appear to contain at least two valuable insights for emergency managers who respond to man-made and natural disasters. First, it promotes a move away from a top-down, expert-led risk and crisis communication strategy towards a dialogic approach that involves partnership with local stakeholders, including members of the public. Second, it emphasises how important it is for these stakeholders to communicate before, during and after the crisis situation in order to mitigate its effects. Moreover, the control structure that treated the public as passive participants during crisis situations appears to be no longer fit for purpose in the era of social media and big data. The sharing of responsibility for information flows during crisis situations will be discussed in more detail later in this report.

2.4. Integrated Crisis Mapping (ICM) Model

The most recent development in the crisis communication literature has seen the focus switch to how people experience disasters, as well as how they respond to crisis information. Previous assumptions that citizens were passive recipients of information have largely been discredited through research in the field of media and communications (see the work on framing theory by Entman (1993) for more an overview). In the same vein, emergency managers need to be aware that emotions might influence the response of citizens to their risk and crisis communications. The classic model of how people respond to crisis information tended to characterise this as a linear process; warning messages would be personalised, verified and, if credible, lead people to take some form of protection action (see Mileti and Sorensen, 1990 for an overview). Yet, the negative emotions associated with different crisis types play a crucial role in determining the behavioural tendencies of people affected by disasters, The Integrated Crisis Mapping (ICM) model identified the four most common negative emotions experienced by members of the public during crisis situations (anger, anxiety, fright and sadness) with a view to informing crisis communication strategies (see Figure 2.3).



Source: Jin *et al*. (2007)

Figure 2.3 Integrated Crisis Mapping (ICM) Model

The rationale for ICM was that emergency managers would be able to select appropriate communication strategies (and provide the correct type of information) to members of the public if they were aware of these affective reactions to different disaster types (MacDonagh et al., 2016). However, like SCCT and CERC, there appears to be very little evidence thus far to suggest that this model is directly informing crisis communication practices in relation to man-made and natural disasters.

2.5 Characteristics of Effective Crisis Communication

Best Practices

Much of the empirical research to date has tended to identify best practices in crisis communication through an exploration of practitioner perspectives. For example, a study of 26 World Health Organisation (WHO) officers, the majority of whom had disaster experience, suggested that communications capacity be built during the pre-incident phase in order to aid more effective crisis communication. Proposals included the maintenance of databases of trusted local information sources and the drafting of public service announcements that addressed Frequently Asked Questions (Medford-Davis and Kapur, 2014). Seeger (2006:238) arguably provides the most comprehensive list of (10) best practices in crisis communication. Specific recommendations relating to interactions with the news media will be discussed in D3.4, but there are several practices that are particularly pertinent to this report. Many of these are congruent with the literature reviewed above, such as the need to build partnerships with the public, understand the audience and their information-seeking behaviours, conduct rigorous risk assessments in the pre-event stage, and to incorporate communication into the decision-making processes. However, there are also four best practices in relation to the content of crisis messages. These are summarised below:

1) *Honesty, candour and openness*: withholding information may contribute to panic and public agencies should be open about risks in order to encourage the public to share responsibility for their management;

2) Communicate with *compassion, concern and empathy*: these characteristics will enhance the perceived credibility of the message and the sender;

3) Accept *uncertainty and ambiguity*: acknowledging the fluidity and uncertainty of the situation will help build trust with the public;

4) Messages of *self-sufficiency*: giving people advice on how to minimise harm will help them feel more in control during uncertain situations.

The overlap between risk and crisis communication is perhaps best reflected by the fact that many of these recommendations could be applied to communication in either the pre or post-incident phase. A synthesis of over 100 risk communication guidance documents from agencies based in Australia, Canada, UK and the US also emphasised the importance of openness and honesty between all relevant stakeholders throughout each stage of a public health crisis (Jardine et al., 2003). The only additional best practice identified in this area was that there should be an acknowledgement of the “diverse levels of risk tolerance” amongst the general public (Steelman et al., 2013: 686). Overall, the overarching theme of these best practices appears to be that the timely provision of accurate, contextual information is the most effective form of communication during a crisis or disaster.

2.6 Public Responses to Crisis Communication

The adoption of these best practices in crisis communication might feasibly prevent the type of public panic that triggers further cascading effects during disasters. Yet, effective crisis communication is presumably also assessed on the basis of whether members of the public

take the desired preventative action to minimise harm to themselves, and their families and friends. There are two main caveats that should be noted in relation to crisis message acceptance. First, source credibility, previous experience of disasters, and trust in the content determine whether members of the public are likely to act upon such messages (Veil et al., 2011; Mersham, 2010). This intuitively might lead one to conclude that warning messages received from blue light organisations are the most likely to be acted upon. Conversely, Mileti (2000) argues that it is only when information is received from a combination of public officials, experts, and blue light organisations that it is likely to be both believed and acted upon. If a warning message is received from a trusted family member or friend then it is also more likely to be believed and acted upon compared to other sources (Gregg et al., 2007). While it is discussed in more detail later in this report, it is also worth noting that people may turn to a variety of media channels in order to obtain crisis information. Word of mouth and traditional news media continue to be viewed as primary sources of information for people affected by flood disasters in Australia (Ryan, 2013). Social media plays an important role in the later stages of such incidents, not only through the provision of information to disaster-affected populations but also as an outlet for expressions of support and solidarity (Fisher et al., 2011; Schultz et al., 2011; Spence et al., 2015). Therefore, a multi-channel approach towards crisis communication will likely be required in order for crisis messages to reach target audiences.

Second, there is no guarantee that people will take protective action even if they are made aware of the disaster risk. Japan has been widely credited as having one of the most sophisticated early warning and disaster preparedness systems for natural disasters in the world. Yet, a study in the wake of the 2011 earthquake and tsunami found that household preparedness has remained relatively poor, particularly amongst single people who had recently moved to larger cities (Tomio et al., 2014). Similar trends have emerges from studies conducted in other countries with extensive risk communication strategies designed to enhance disaster preparedness. For example, the review into lessons learnt from the 2007 floods in the UK found that many of the local residents in affected areas were still unaware of which organisation they should contact to get information on the recovery operation (Pitt, 2008). In sum, it would appear highly unlikely that efforts to promote preparedness within disaster-affected communities will positively influence the behaviour of all residents. Emergency managers should adopt multi-channel risk communication strategies in order to maximise the impact of these messages and to aid disaster mitigation in these areas. Some media channels may be more appropriate than others depending upon the circumstances. For example, the use of sirens to issue tsunami warnings in rural areas might be considered best practice due to the ease with which they can be both heard and understood (Gregg et al., 2007). However, research indicates that behavioural change of citizens during disasters will only be achieved if they are informed of these procedures prior to such incidents (Goolsby, 2010). It is perhaps too early to tell whether models such as ICM, with their focus upon emotional responses to different crisis types, will help emergency managers devise communication strategies that achieve this objective.

3 Guidelines for effective communication between key agencies and members of the public during crisis situations

Five key guidelines for effective communication between blue light organisations and members of the public during crisis situations were identified through the above literature review, the results from a study of 41 semi-structured interviews with key stakeholders, and lessons learnt from the three case studies (Project X Haren, the Pukkelpop festival disaster, and the Floods in South-West England). These guidelines, which we refer to here as 'SPEAK' are:

1) **S**tudy the information-seeking behaviours of your audience before deciding upon which communication platforms to use during crisis situations;
2) **P**repare for the loss of critical infrastructure during such incidents by employing a communication mix that includes both traditional and digital media;
3) **E**ngage key stakeholders e.g. civil society organisations in order to ensure that the information shared with the general public is both accurate and consistent;
4) **A**lways consider the ethical implications of using crowdsourced information obtained from social media sites; and
5) **K**nowledge gained from previous incidents should be used to inform future communication strategies.

Emergency managers should implement these 'SPEAK' guidelines at each key stage of a disaster (from mitigation to recovery) in order to prevent the disruption of information relations that has the potential to lead to cascading effects (Powell and Rayner, 1952).

3.1 Study the information-seeking behaviours of your audience before deciding upon which communication platforms to use during crisis situations

People tend to search for information about disasters when they perceive that these events are likely to directly threaten their own lives or property (Westerman and Spence 2013). Such information 'needs' intuitively relate to how the course of the disaster will affect citizens (otherwise known as situational awareness), but also occur when individuals try to reach out to family and friends in order to check whether they are safe from harm (Thelwall and Stewart, 2007). Individuals may also search for information on which organisations are responsible for delivering disaster recovery missions in affected areas (van Leuven, 2009). Previous research, which draws heavily on the uses and gratification theory of Blumler and Katz (1974), suggests that individuals turn to those media platforms that are perceived to satisfy their information 'needs' during crises (Austin et al., 2012).

Social media sites such as Facebook and Twitter not only make it easier for citizens to follow breaking news in real-time, but also help bring together those communities that have experienced trauma due to a man-made or natural disaster (Murthy, 2012). Heavy social media users, such as those aged between 16 and 24 years old, are likely to perceive that these sites are more credible than traditional media as they provide crisis information that is not available elsewhere (Sutton et al., 2008). The frequency of updates available on social media may also provide advantages for emergency management communicators who wish to share

accurate, real-time information with members of the public. The amplification and serial transmission of crisis messages can be encouraged through the 'retweet' function on the microblogging site Twitter. There has also been some evidence to suggest that citizens use these sites to search for information to corroborate warning messages before deciding how to act upon them (Sutton et al., 2014).

That is not to say that social media should automatically be viewed as the most effective mode of communication adopted by key stakeholders during the various stages of a disaster. As well as the persistence of the gap between those who are able to benefit from the internet and those who are not (also known as the digital divide), there remains some skepticism amongst users about the accuracy and trustworthiness of information posted online. Several studies have suggested that the general public continue to perceive traditional media such as newspapers to be more credible and trustworthy than online sources (Stephens et al, 2013).

While acknowledging the integral role of social media in 'spreading' crisis information, the social media mediated crisis communication (SMCC) model proposed by Yan Jin and colleagues acknowledges that traditional media, as well as offline social interactions, remain important components of crisis communication (Jin et al., 2011). A more nuanced interpretation of this research suggests that while people are most likely to seek out familiar social networks in the aftermath of a disaster, the means by which they access these may ultimately depend on what media is available to them. Empirical data gathered from disasters such as Hurricane Sandy, which caused extensive damage in the New York and New Jersey regions after it made landfall on the eastern seaboard of the US in October 2012, suggested that new assemblages of what could be dubbed 'old and new media practices' were adopted by people in order to seek emotional support during these events. Residents in areas affected by Sandy used every method possible in order to obtain information, receiving news from peer networks, radio, television and social media sites such as Twitter (Burger et al., 2013). This suggests that emergency management may require the use of multiple asynchronous *and* synchronous channels in order to communicate effectively with citizens in affected areas.

We advocate a more strategic approach than this 'all-channel' model for those blue light organisations that directly communicate with the public during crisis situations. A pre-requisite for this communication strategy is the collection and analysis of data relating to the information-seeking behaviours of citizens. Specifically, this should include:

- An overview of the communication infrastructure that is available to residents of areas that are deemed to be vulnerable to man-made or natural disasters; and
- A detailed analysis of the types of media these residents use on a daily basis, with a specific focus on what platforms they would use to obtain situational awareness during disasters.

In terms of the former, there would appear to be a clear rationale for European emergency management communicators to use online media during crisis situations. The most recently available data (January 2015) shows that 81 percent of the population in Western Europe have access to the internet, compared to 58 percent in Eastern Europe and 42 percent of the world's population.[18] Social media consumption has also grown exponentially over the past

[18] Kemp, S. (2015). *Digital, social and mobile worldwide in 2015.*Available at: http://wearesocial.net/blog/2015/01/digital-social-mobile-worldwide-2015/ (accessed 1 September 2015).

decade, with an estimated 300 million active social media users across Europe at the start of 2014.[19]

Yet, the persistence of the digital divide militates against the adoption of crisis communication strategies that rely solely on digital media technologies. Recent studies have shown that only 40 percent of Europeans can be characterised as active social media users,[20] with 22.4 percent reporting that they do not use the internet at all.[21] Although the gap between rural and national internet penetration rates in European Union (EU) member states has decreased between 2010 and 2014 (from 12 to 8 percent[22]), there are still some geographical areas that have little to no internet connectivity. Such broadband 'blackspots' have implications for police and fire and rescue services situated in rural areas within the UK. For example, the Llanberis Mountain Service reported that the slow and unreliable internet connection in Snowdonia, North Wales (with speeds said to be below 1Mb/s) hindered their efforts to use digital media tools to locate injured mountaineers.[23] The most recent iteration of the UK digital communications infrastructure strategy has pledged to address these issues by rolling out superfast broadband to 95 percent of UK premises, as well as 4G mobile communications to 98 percent of population, by the end of 2017.[24] Nevertheless, emergency management communicators need to be aware of the communications infrastructure available to members of the public before deciding upon which platforms to use during crisis situations.

It is also important to study the media channels that are most frequently accessed by residents of areas likely to be affected by man-made and natural disasters. Clearly, it may be prudent for emergency management communicators to use 'tried and trusted' traditional media such as newspapers, radio, television, electronic billboards, text-to-speech phone calls, stewards and PA systems[25] to disseminate information to the general public. However, a more strategic approach may be required which takes into account the sites that are used by members of the public during crisis situations. For the foreseeable future this is likely to revolve around the three most popular social media sites worldwide, namely Facebook, Twitter and YouTube.[26] Facebook, for example, has consistently come up as the most popular social media site in the UK[27], Belgium[28] and the Netherlands.[29] That is not to say that sites should be used for the

[20] Kemp, S. (2015). *Digital, social and mobile worldwide in 2015*. Available at: http://wearesocial.net/blog/2015/01/digital-social-mobile-worldwide-2015/ (accessed 1 September 2015).

[21] International Telecommunications Union. (2015). *ICT Facts and Figures: The World in 2015.* Available at: http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf (accessed 7 September 2015).

[22] European Commission (2015). *Digital Agenda Scorecard 2015.* Available at: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=9929 (accessed 6 September 2015).

[23] Reisdorf, B. & Oostveen, A. (2015). A promised 'right' to fast internet rings hollow for millions stuck with 20th-century speeds. *The Conversation*, Science & Technology section, (accessed 10 September 2015).

[24] Department for Culture Media and Sport (2015). *The Digital Communications Infrastructure Strategy*. Available at: https://www.gov.uk/government/publications/the-digital-communications-infrastructure-strategy (accessed 10 September 2015).

[25] PA systems stands for public address systems - systems for electronic sound amplification and distribution comprised of a microphone, amplifier and loudspeakers and used to address large publics.

[26] Chaffey, D. (2015). Global social media research summary 2015. *Smart Insights*. Available at: http://www.smartinsights.com/social-media-marketing/social-media-strategy/new-global-social-media-research/ (accessed 6 September 2015).

[27] Ofcom (2014). *Adults' media use and attitudes report*. Available at: http://stakeholders.ofcom.org.uk/market-data-research/other/research-publications/adults/adults-media-lit-14/ (accessed 11 September 2015).

dissemination of crisis information based solely upon their popularity. Rather, our interviewees extolled the virtues of using those social media sites that were most likely to facilitate public engagement with such content. Facebook was the preferred site in Belgium, whereas Twitter was perceived as the most effective tool for engaging the general public in both the Netherlands and the UK. Local variations in these trends were noted by several of the participants. For example, both Facebook and Twitter were used interchangeably by local police departments in Belgium, with no obvious explanation given for why one site was more effective than another in the context of crisis situations.

While it is beyond the scope of this report to fully explain these observations, we propose that key agencies should explore the information-seeking behaviours of their respective audiences before deciding upon which media channels should be used in the context of crisis situations. Such data will help emergency management communicators to develop a more strategic and efficient communication strategy to be deployed during such incidents. This should ideally be an annual activity in order to allow for changes in the communications infrastructure and the emergence of new media platforms that are popular amongst the target population.

Recommendations:

- Collect and analyse data on the local, regional and national communications infrastructure;
- Identify the communication channels your target audience are able to access;
- Identify the traditional and social media platforms that your target audience uses on a regular basis;
- Review the available communications infrastructure and the information-seeking behaviours of your audience on an annual basis in order to inform future communication strategies.

3.2 Prepare for the loss of critical infrastructure during such incidents by employing a communication mix that includes both traditional and digital media

A related concern for emergency management communicators is how to ensure that their communication strategies during crisis situations are not disrupted by 'single points of failure' within the communications infrastructure in disaster-affected areas. The review discussed above should help identify vulnerabilities in the communications infrastructure, as well as provide valuable insight into the media channels used by citizens in areas likely to be affected by man-made or natural disasters. However, the consensus amongst our interviewees was that some form of network failure was inevitable and that such issues were best addressed through the use of a communication mix that involved both traditional and digital media.

Power outages and network failures may make it difficult for citizens to access crisis information via both traditional and social media platforms. The loss of electricity might make

[28] BVLG (2015). *Belgian Social Media Monitor - augustus 2015*. Available at: http://bvlg.blogspot.be/2015/08/belgian-social-media-monitor-augustus.html (accessed 24 September 2015).

[29] telecompaper (2015). Facebook still most popular, but other social media growing. Available at: http://www.telecompaper.com/news/facebook-still-most-popular-but-other-social-media-growing--1065848 (accessed 10 September 2015).

it difficult for citizens to access television news coverage of disasters. Mobile wireless communication networks and wifi connections may fail when too many users within the same geographical area attempt to log on to internet services using their smart phones. 'Patchy' internet connectivity was said to have impeded the emergency services who responded to both the Pukkelpop disaster and the Project X Haren riots. People might also experience difficulties with their own communication devices during such incidents. Our Belgian interviewees provided anecdotal evidence of how the heavy rain during the Pukkelpop disaster had damaged the smart phones of many of the festival-goers, thus denying them a form of access to their social networks after the storm that hit the festival site. Battery life might similarly be viewed as a potential point of failure that might prevent citizens from accessing crisis information.

The lack of technical infrastructure required in face-to-face communication, public meetings and the use of loudspeakers, might suggest that these more traditional communication channels are the most reliable way of ensuring that members of the public receive crisis-related information during power outages. These findings are corroborated by research on evacuation communication during man-made and natural disasters (see D3.2). Yet doubts persist in relation to the efficacy of using these modes of communication during disasters that affect large populations, especially in rural areas. Our interviewees identified radio as a particularly effective and resilient communication channel that can reach large populations even in those circumstances where power supplies are disrupted. This finding was congruent with previous research into crisis communication during disasters. During Hurricane Sandy, for example, some New Jersey residents reported that they had used portable radios to obtain information about the course of events due to the disruption of power supply and communication networks in the region (Burger et al., 2013).

Nevertheless, our interviewees emphasised the importance of using multiple traditional and digital media platforms (such as Apps, cell broadcast, e-mail bulletins, newspapers, opt-in text to speech calls like NL-Alert and Be-Alert, radio, SMS, social media and television), in order to reach as many people as possible during man-made or natural disasters. We propose that this communication mix should include not only media that are readily available and disaster-resilient, but also that are the most likely to be used by local residents to search for crisis information.

Recommendations:

- Study the vulnerabilities of communications infrastructure in areas likely to be affected by man-made and natural disasters;
- Identify those communication channels that are likely to be particularly resilient during disasters e.g. radio;
- Use a combination of both social and traditional media in order to reach as many local residents as possible;
- Low-tech communication channels e.g. loudspeakers should still have an important role to play in the communication mix.

3.3 Engage key stakeholders in order to ensure that information shared with the general public is consistent

Cooperation between emergency management communicators and key stakeholders, such as local politicians, critical infrastructure providers and civil society organisations, is essential in

order to ensure the serial transmission of accurate information during crisis situations (Sutton et al., 2014). Previous studies have also shown how the repetition of the same information through multiple channels during emergencies can help communicate situational urgency to target audiences, thus making it more likely that they will take appropriate action to protect themselves and their families (Stephens et al., 2013). This can help mitigate the cascading effects of a disaster by putting less stress on essential services that are under pressure, such as healthcare and transportation. Conversely, the lack of message consistency from key stakeholders may contribute to the cascading effects of natural disasters and public order incidents. In the case of the Project X Haren riots, conflicting messages from the Mayor of Haren and other authorities about an alternative party being organised in the town were implicated as a direct contributor to the riots. Furthermore, lack of message consistency could have more drastic effects. For example, during disasters communication networks can become unusable due to high traffic (e.g. during the Pukkelpop disaster). A lack of consistent message could result in the public using a range of communication networks at a much higher volume in order to determine correct information. If this resulted in communication network outages then the effect on disaster relief and support services, such as healthcare, could be significant, and have further cascading effects.

A pre-requisite for inter-agency cooperation is for each key stakeholder to understand their respective responsibilities during emergencies. European states typically call upon the same emergency services to deal with these incidents, namely police, fire and rescue services, and emergency medical services (EMS). However, there are often national variations in terms of whose responsibility it is to lead the response to these incidents and to decide what information should be shared with the general public. In Belgium, the Netherlands and the UK, for example, we can see that there are some differences in terms of the organisation of emergency management.

Civil protection services in Belgium are organised at the federal level and fall under the jurisdiction of the Minister of Home Affairs and the Directorate General for Civil Security, with the scale of the incident determining who is responsible for coordinating crisis management in Belgium (see D3.2 for more on how these incidents are managed). The municipal and provincial authorities assemble in a Communal or Provincial Crisis Centre to coordinate the crisis management between the different multi-disciplinary agencies. Emergency response is coordinated at the federal level via the Home Affairs Crisis Centre if the provincial authorities are deemed to have insufficient resources to cope with the incident, it affects two or more of the ten Belgian provinces, or it concerns a nuclear or aviation incident. The Federal Centre brings together three bodies to deal with such incidents, namely the assessment, management and information cells. The management and information cells of the Federal Centre, decides upon what information should be disseminated to the population at the various stages of the incident.

A similar mix of both federal and municipal authorities is responsible for emergency management in the Netherlands. The latter are also expected to respond to emergencies at the local level, with the King's Commissioner for each province taking ownership of emergency management when local authorities are unable to cope with the scale of the incident (see D3.2). Like in the Belgian system of crisis management, the Dutch Directorate General for Public Order and Safety and the Ministry of the Interior has overall responsibility for disaster preparedness and for the deployment of blue light organisations such as the fire brigades and Emergency Medical Services during national emergencies. Each respective Ministry creates a

central command for incidents that fall under their jurisdiction, with the National Crisis Centre (NCC) functioning as a national coordination hub when disasters affect multiple policy areas.[30] The NCC is also responsible for providing information to those in disaster-affected areas via a range of media including brochures, news media and the crisis communication cells of relevant government ministries.

Finally, the UK Civil Contingencies Act (2004) requires Category 1 responders, such as local authorities, emergency services, the National Health Service (NHS), the UK Environment Agency and Category 2 organisations, such as the transport and utility companies, to work together to provide information and advice to the public about emergencies.[31] Both participate in Local Resilience Forums, bodies that were created to foster multi-agency cooperation for civil protection purposes in each police area within England and Wales. This sharing of responsibility between key stakeholders is also evident during major national emergencies where the Cabinet Office Briefing Rooms (COBR) are used to coordinate the recovery effort (see D3.2). Local Strategic Coordinating Groups and Local Tactical Coordination Groups play a key role in the operational response that is coordinated by the Civil Contingencies Committee, the UK cabinet committee chaired by the Home Secretary and supported by the Civil Contingencies Secretariat (CCS), to deal with man-made and natural disasters. It should be noted that the CCS has no such responsibility for civil emergency planning in Northern Ireland and Scotland, as this is a devolved matter that is administered at regional level by their respective government departments.

These disaster management structures illustrate the key role played by both local and national political actors in crisis management in Belgium, the Netherlands and the UK. Inter-agency cooperation at the local level is also important in order to ensure that real-time accurate information is shared between first responders and members of the public. For example, during the Pukkelpop festival disaster the municipal authorities were heavily criticised for their failure to provide real-time crisis information during the incident.[32] A study of Twitter activity during the disaster revealed that there had been no tweets from official accounts as events unfolded.[33] The organisers of two Belgian music festivals confirmed that they organised regular face-to-face meetings with key stakeholders such as the police or the local authorities' Safety Cell in order to discuss the communication strategies that would be deployed during their respective events. They had also piloted modes of communication, such as the use of mobile telecommunication devices e.g. 'walkie-talkies', in order to ensure that information could be relayed from any part of the festival site in the case of any disruption to the communications infrastructure. These meetings were also viewed as being important in building working relationships and trust between the various agencies that would be involved in these festivals. Hence it had been agreed that the official social media accounts of both festivals would

[30] Kuipers, S. & Boin, A. (2014). *Crisis and Disaster Management in the Netherlands 2014*. Available at: http://www.preventionweb.net/files/Netherlands-country-report-2014.pdf (accessed 10 September 2015).

[31] Cabinet Office (2004). Civil Contingencies Act. Available at: http://www.legislation.gov.uk/ukpga/2004/36/pdfs/ukpgacs_20040036_en.pdf (accessed 10 September 2015).

[32] Mertens, P. (2012). How thunderstorms at Pukkelpop 2011 stimulated Belgium's use of social media for disaster response. Available at: http://repository.disaster20.eu/sites/default/files/Peter%20Mertens%202012%2011%2005_How%20Pukkelpop%20stimulated%20SMEM_D2.0%20Birmingham.pdf (accessed 1 September 2015).

[33] Terpstra, T., de Vries, A., Stronkman,R. & Paradies, G. L. (2012). Towards a realtime Twitter analysis during crises for operational crisis management. *Proceedings of the 9th International ISCRAM Conference*, Vancouver, Canada.

retweet messages from the police and other 'blue light' organisations in the case of an incident.

Key stakeholders such as festival organisers, and 'blue light' organisations should also cultivate good relations with the news media in order to facilitate effective communication with citizens during crisis situations. Our interviewees confirmed that local BBC radio stations had played a vital role in providing critical information on the availability of medical supplies e.g. prescription drugs in the wake of the floods seen in South-West England between December 2013 and February 2014. A dedicated response team from the County Council was permitted to use the facilities at a BBC station, enabling them to provide assistance to callers from areas affected by the floods. There was also evidence to suggest that speculative and sensationalist media coverage of these incidents had the potential to increase the likelihood of violence and civil unrest. For example, local and national journalists in the Netherlands suggested that some popular entertainment programmes had encouraged thousands of young people to attend the Sweet Sixteen birthday party in Haren on 21 September 2012, which culminated in anti-social behaviour and disorder that later became known as the Project X Haren riots. While it is beyond the scope of this report to fully explore the role of the media during crisis situations, it was clear that greater cooperation between emergency management communicators and professional journalists might help address some of the deficiencies in media reporting of our three case studies.

Like Disaster Risk Reduction, responsibility for communication during crisis situations should be partially shared with civil society organisations in disaster-affected areas. Citizens can assist emergency management communicators in three specific ways, namely 1) the crowdsourcing and verification of crisis information; 2) the provision of emotional and material support to those affected by major incidents; and 3) participating in digital volunteer groups that bolster disaster response missions.

Incidents such as Hurricane Sandy have shown how key agencies can leverage the 'power of collective intelligence' via social media - members of the public shared critical information via sites such as Twitter and played a key role in correcting misinformation and dispelling rumours that had the potential to hinder efforts to restore order to affected areas.[34] Citizens can use social media to share eyewitness perspectives that help build situational awareness for those actors involved in emergency response, producing a form of 'socially produced accuracy' that reduces the possibility of cascading effects occurring in the aftermath of these incidents (Vieweg et al., 2008). Hashtags can function as 'fire spaces'[35] in which data generated by residents in affected areas can be transformed into information that helps first responders allocate resources towards those communities that are most in need of assistance (Potts, 2014). Emergency managers can use information-gathering platforms such as Coosto, Ushahidi and Twitcident to help them sift through the large volume of data available on these sites at each stage of the incident.

[34] Purohit, H., Castillo, C., Diaz, F., Sheth, A. & Meier, P. (2014). Emergency–relief coordination on social media: Automatically matching resource requests and offers. *First Monday*, *19*(1), DOI: http://dx.doi.org/10.5210/fm.v19i1.4848.

[35] 'Fire spaces' refers to environments where connections among actors remain relatively stable while they add information to the network or modify it as content becomes highly mobile and sometimes unpredictable (see Law, J. & Mol, A. (2001). Situating technoscience: An inquiry into spatialities. *Society and Space*, *19*, 609-621.)

Social media can also be utilised by citizens to provide emotional and material support to citizens living in disaster-affected areas. During the floods in South-West England, for example, our interviewees confirmed that Council requests for assistance on sites such as Twitter had resulted in hundreds of volunteers helping deliver sandbags to private residences that were threatened by the floods in the region. Indeed, citizen-led social media campaigns such as #forageaid[36] and Flooding on the Levels Action Group (FLAG)[37] emerged during this period, providing financial support for affected communities and calling for the dredging of the rivers to avoid future floods.

Citizens also used Twitter in Belgium to provide support to those who had fled the Pukkelpop festival disaster. One Twitter user (tweeter) began to connect festival-goers with the residents of the nearby town Hasselt via the #hasselthelpt hashtag. The hashtag mobilised Hasselt residents to offer them food, shelter and transportation (de Vries et al., 2014).[38] This initiative spread to other nearby towns, with their offers for help promoted via eponymous hashtags like #antwerpenhelpt, #brusselhelpt and #genthelpt. Many also offered festival-goers the opportunity to use their internet connection to inform their families and friends that they were safe. Twitter hashtags like #ppok[39] and Facebook pages such as the Pukkelpop Safehouse page were used to connect these individuals with their loved ones, who had been unable to make contact with one another due to the pressure placed upon mobile telephone networks in the wake of the incident.[40] The offering of food, shelter and especially transportation could help mitigate the cascading effects of the disaster when offered to individuals affected by the disaster and organisations helping with disaster relief. By offering food, shelter and transportation to individuals affected by the storm, individuals were provided with a safe environment; lessening the risk of harm which could put extra pressure on blue light services. Access to transportation could also mitigate the effect of the disaster by dispersing the population.

If these offers of help could also be extended to organisations helping with disaster relief the cascading effects of a disaster could be reduced. Disruptions to transportation can affect access to healthcare and the supply of food and water (Haraguchi and Kim, 2015). If the effect of the disaster on transportation could be reduced then the cascading effects on healthcare and food would also be mitigated.

Clearly, this empowerment of local communities to participate in disaster response has implications for the communication strategies of first responders and those key agencies involved in emergency response. It might increase the resilience of these communities to future disasters and encourage local citizens to fully participate in Disaster Risk Reduction alongside formal emergency management institutions. Yet, social media users typically disengage from these online groups once they have had their questions about the incident

[36] ITV (2015). Scheme which fed Somerset's flooded farm animals wants to become fully-fledged rapid-response charity. Available at: http://www.itv.com/news/west/2015-01-13/scheme-which-fed-somersets-flooded-farm-animals-wants-to-become-fully-fledged-rapid-response-charity/ (accessed 1 September 2015).

[37] http://www.flagsomerset.org.uk/Media.aspx

[38] de Vries, P., Galetzka, M. & Gutteling, J. (2014). Persuasion in the wild: Communication, technology, and event safety. *Persuasive Technology*, *8462*, 80-91.

[39] van Peteghem, D. & Caudron, J. (2012). Hoe het Pukkelpop-drama de echte kracht toont van sociale media, Available at: http://www.frankwatching.com/archive/2011/08/19/hoe-het-pukkelpop-drama-de-echte-kracht-toont-van-sociale-media/ (accessed 2 September 2015).

[40] https://www.facebook.com/pages/Pukkelpop-Safehouse-niet-Officieel/182836471784870

answered (Potts, 2014). While citizen-led initiatives such as those outlined above add value to crisis communication, 'blue light' organisations look likely to retain their status as the most influential sources of information during such incidents for the foreseeable future.

During large-scale man-made or natural disasters, it may also be appropriate for key agencies to mobilise digital volunteers[41] to assist with the analysis of social media data. Several models for digital volunteer organisations exist including Virtual Operations Support Teams (VOST), the Standby Task Force (SBTF) and the Digital Humanitarian Network (DHNetwork) (Meier, 2014). In contrast to other organisations, VOST teams work by request and report directly to the organisation that requested their assistance. VOST teams function as a type of intermediary between citizens who use social media during crises and emergency management teams. While VOST teams have been very active in France and Spain over the past few years, they have often been considered ill-suited for the small-scale incidents that are typical within the EU and on a relatively regular basis. However, the model has been adapted in Belgium, where volunteer teams have been set up which consist of professionals rather than citizens and can be called upon to help in smaller incidents as well. The SBTF (a global network of volunteers trained and ready to collaborate online in the immediate aftermath of a natural disaster[42]) and the DHNetwork (a consortium of volunteer and technical communities[43]) are more international. Consequently, some digital volunteer organisations may be more suitable to certain types of man-made and natural disasters than others (see Appendix 2 for further information on these digital volunteer organisations).

Recommendations:

- Be aware of the emergency management structure in your respective region;
- Build good relationships with professional journalists and other key stakeholders in order to ensure message consistency;
- Use social media to crowdsource crisis information and to empower local communities to share responsibility for its dissemination to the general public;
- Consider the use of digital volunteers to analyse social media data during large-scale incidents.

3.4 Always consider the ethical implications of using crowdsourced information obtained from social media

Key roles in emergency management such as that of the Public Information Officer (PIO) have become increasingly oriented towards the monitoring and evaluation of the user-generated content (UGC) discussed in the previous section (Hughes and Palen, 2012).

In particular, the crowdsourcing of crisis information via social media raises a number of ethical issues for PIOs in relation to the gathering, storage and sharing of UGC. Key agencies may, for example, ask members of the public to share their images of man-made or natural disasters via a dedicated hashtag on Twitter. Such information can help build situational awareness and contribute to response and recovery efforts. However, such requests may also

[41] By digital volunteers we refer primarily to volunteers who leverage new technologies to organise and assist in emergency response.

[42] http://blog.standbytaskforce.com/

[43] http://digitalhumanitarians.com/about

inadvertently jeopardise the physical safety of citizens, as they put themselves at risk to capture this footage. Our research revealed that so-called 'storm watchers' were engaging in such hazardous activity in order to capture footage of the floods in the South-West of England. There was also video footage recorded by an eyewitness showing the collapse of the Chateau tent at the Pukkelpop festival that resulted in five fatalities.[44] In light of these incidents, we argue that emergency management communicators should be cognisant of the risk posed to citizens within disaster-affected areas when making requests for information via social media. It might even be appropriate in some circumstances for them to refrain from making such requests during extreme weather events such as thunderstorms that are likely to attract 'storm watchers'.

The second ethical dilemma relates to the potential harm that might arise from the use of UGC created during such incidents. While the Terms of Service (ToC) of platforms such as Twitter may make it clear to users that they should have no expectation of privacy in relation to their tweets, those that express anguish and distress during disasters may be re-traumatised if such content is recirculated by key agencies such as the police and fire and rescue services. It is also highly doubtful whether the verbatim reproduction of these comments is necessary in order to illustrate the key themes that emerged from social media discussions about such incidents (Reilly, 2014; Reilly and Trevisan, 2015). While our interviewees tended to be aware of such ethical dilemmas, concerns continued to be raised about the ethical stances taken by key stakeholders during such incidents. For example, the news agency Belga was forced to apologise for publishing inaccurate and unverified information, obtained from social media, relating to the number of fatalities during the Pukkelpop disaster (Joye, 2013).

We propose that such ethical dilemmas should be addressed through key agencies familiarising themselves not only with existing national and supranational regulations on data protection and online privacy, but also with current academic writing on the ethics of social media research. In addition, these organisations should consider how best to inform members of the public about the potential breach of their privacy that might arise from their contributions to online groups that emerge during man-made or natural disasters.

Recommendations:

- Anonymise, aggregate and validate data supplied by members of the public before sharing;
- Remind members of the public that they need to ensure their safety when recording incidents;
- Consider what data you need from members of the pubic and whether the potential benefits from having it outweigh the potential costs involved in collecting it;
- Only collect as much data as is needed for operational reasons e.g. to establish situational awareness;
- Ensure that your use and storage of social media data complies with the relevant national regulations on data protection and EU privacy laws;
- Inform members of the public about how the crowdsourced data will be used (and stored).

[44] CBC (2011). Storm death toll at Belgium music fest rises to 5, Available at: http://www.cbc.ca/news/world/storm-death-toll-at-belgium-music-fest-rises-to-5-1.1109602 (accessed 2 September 2015).

3.5 Knowledge gained from previous incidents should be used to inform future communication strategies

Our interviewees indicated that communication strategies for future incidents would be informed by lessons learnt from these three case studies. For example, the UK Environment Agency has begun to use 'hyper-local' Facebook pages to facilitate dialogue with local community groups such as FLAG about the dredging operations they had implemented to prevent future flooding in Somerset. There was also some evidence to suggest that these key stakeholders had contingency plans for the loss of critical communication infrastructure. One of the Belgian festival organisers confirmed that they had strategically deployed large screens across the festival site in recent years in order to communicate with festival-goers who were unable to access wifi networks and mobile phone networks. These illustrate how emergency managers in Belgium, the Netherlands and the UK are constantly searching for ways to maximise the visibility of public safety messages in order to prevent cascading effects from any future major incidents.

We propose that a systematic review should focus on what elements of the communication strategy did and did not work during major incidents. It should include not only communication flows between the emergency services and the public, but also those between key agencies during such incidents. Each stakeholder should also consider the criteria by which they evaluate the success (or not) of communication strategies that could be deployed during such events. Clearly social media metrics might provide an insight into the reach of emergency messages issued on sites such as Twitter, as well as the role of citizens in the crowdsourcing and verification of crisis information. Such data should be triangulated alongside other metrics such as the number of telephone calls received by the emergency services and the traditional news media outlets used by citizens to obtain information on the incident. The scorecard provided by the EU FP7 Project CrisComScore can also be used to evaluate the crisis communication plans of these stakeholders. [45]

A holistic approach towards crisis communication strategies might emerge from an official inquiry into the events under review. However, we propose that a shared responsibility approach towards communication during crisis situations is more likely to emerge through the organisation of workshops that bring together citizens and the emergency services to identify best practice. Hackathons, such as the one organised in the aftermath of the Project X Haren riots, might provide a suitable forum for engaging all relevant stakeholders in learning lessons from previous incidents. Nevertheless, it remains important that key lessons are identified and recommendations are implemented in order to address any obvious weaknesses in communication strategies deployed during such incidents.

Recommendations:

- All stakeholders should practice reflection (what went wrong and what went well);
- Assess communication flows during incidents from multiple perspectives (e.g. from emergency services and members of the public);
- Consider what metrics (e.g. social media data) should be used to evaluate the reach of official emergency messages;

[45] This scorecard allows participants to audit their disaster preparedness and communication plans. See here for more information: http://cordis.europa.eu/result/rcn/45886_en.html (accessed 1 April 2016).

- Consider organising a hackathon or an official enquiry to identify key lessons from incidents.

4 Communication strategy flowchart

Below we present our flowchart for communication between key agencies and members of the public during disasters with cascading effects. At each stage, emergency managers should pay attention to two aspects of language. First, there is the use of terminology in crisis communication. While this may be necessary in communication between agencies, it should not be assumed that all subscribe to the same definitions of key terms. Terminology databases, such as Firebrary, should therefore be consulted in order to avoid any misunderstandings between these organisations. The use of complex jargon should also be avoided in any communication with the general public. Second, there is the language that should be used in crisis communication. In countries such as Belgium, there may be a legal requirement for blue light organisations to communicate with the public in several languages that are commonly spoken in the region. Therefore, emergency management communicators should familiarise themselves with the language proficiency of their target audiences and tailor their communication strategies accordingly. This communication strategy is informed by the 'SPEAK' guidelines and emergency management communicators should adhere to both during man-made and natural disasters.

Emergency management is typically divided into four phases: mitigation; preparedness; response; and recovery[46]. Following this convention, we draw on our three case studies to explore the communication tactics that are applicable during each of these four phases.

4.1 Mitigation[47]

Inform citizens about risks and risk mitigating measures: There may be specific known risks that exist in a local area that members of the public should be informed about. The UK Environmental Agency, for example, publishes a mitigation measures manual for dealing with flood risks and in the aftermath of the 2013/2014 floods in South-West England, and kept members of the public informed about progress with river dredging.

Keep popular communication channels open: Citizens tend to use hashtags and 'fire spaces' in order to address information needs during crises and disasters. These communication channels also provide opportunities for key agencies to share advice and information on disaster-preparedness. As discussed earlier, the UK Environmental Agency has received very positive feedback from local residents for its use of a hyperlocal Facebook page to provide information on the dredging of rivers in the areas around the Somerset Levels and Moors. Key agencies should endeavour to use online and offline spaces in a similar fashion, engaging local communities at every stage of the disaster cycle.

[46] Baird, M. E. (2010). The 'phases' of emergency management, Available at: http://www.vanderbilt.edu/vector/research/emmgtphases.pdf (accessed 29 September 2015).

[47] Under 'mitigation', defined as 'the action taken to eliminate or reduce the loss of life and property damage related to an event or crisis, particularly those that cannot be prevented' (see e.g. Emergency management program, Cornell University, https://emergency.cornell.edu/cuemp/#prevention) we consider two tactics related to a recurring, 'non-preventable' event - flooding.

Build partnerships with key stakeholders including local communities: The development of local partnerships will help foster trust between key agencies and members of the public. This will help build preparedness in disaster-prone areas with the public more likely to accept and action upon warning messages. Citizens may also help create situational awareness through the provision of eyewitness accounts on social media providing media.

Test warning systems: Early warning systems in Japan and the US tend to rely upon some form of system testing in order to maximise their impact upon target populations during crisis situations. This should be a priority for any key agency that responds to such incidents in order to prevent information failures associated with incidents such as the Fukushima nuclear accident in 2011 (Thatcher et al., 2015).

4.2 Preparedness

Train staff, assign roles and create knowledge communities: Agencies should consider what roles key staff will play during crisis situations, with a specific emphasis on who has responsibility for the authorisation of messages to the public. Members of the communication team should also receive guidance on how to present information to the target audience via adequate multiple media channels in a clear and consistent fashion. This might be achieved through the creation of special interest groups (or 'knowledge communities') within the sector that allow individuals to share best practice in this area. There should also be contingency planning for large-scale incidents, which might place a huge strain on the resources of these teams as they try to answer each citizen query promptly.

Build and promote a social media presence: Social media can help build trust between citizens and the emergency services, particularly when social media sites are regularly updated and members of the public receive courteous and punctual responses to their online comments. In turn, these users are likely to come back to these sites to satisfy their information needs during crisis situations. The promotion of official social media accounts is vitally important in order to encourage members of the public to use these sites during crisis situations. There are a number of ways to do this ranging from the strategic use of pre-existing hashtags on Twitter to the use of Facebook and YouTube advertisements to target certain audiences.

Prepare contingency plans to meet the information needs of online citizens: There will be an inevitable increase in demand for information from members of the public during a crisis situation. Key agencies should prepare a contingency plan for how they will deal with this increased demand for information. Key tasks include: 1) assessing servers' abilities to respond to requests during episodes of increased traffic, ensuring that proper infrastructure is in place and web hosting sufficiently scaled; and 2) setting up a 'dark' website that can be made available to the public should the official website of an organisation crash due to an increase in the number of people who are trying to access it. This 'dark' website can be a version of the official site that is intentionally 'pared down' (e.g. stripped of non-essential images).

Disseminate prevention messages: A mix of communication channels should be used to inform members of the public about disaster-preparedness and the support services available to them should an incident occur in their particular area. This should include information about the different ways in which they can communicate with blue light organisations and

other key agencies during such incidents. It may also be prudent to raise awareness about how disinformation and rumours might hinder the emergency response. The aim of these messages should be to reassure the public that adequate measures are in place should a man-made or natural disaster occur in their local area. Emergency services should also consider how best to disseminate these prevention messages to the general public. Automated messaging via platforms such as Hootsuite may be a viable alternative to having staff send messages manually via various media platforms. However, this should not be used during a crisis when members of the public seek reassurances from the police and fire and rescue services that their requests for help are being dealt with.

Establish social media verification procedures: As per the false rumours about fatalities during the Project X Haren riots, unverified information on social media can contribute to the cascading effects from public order incidents. Hence organisations need to verify crowdsourced information from social media before it can be used to build situational awareness. Verification and factchecking can be achieved, for example, through the cross-referencing of information obtained from sites such as Twitter with the observations of emergency services personnel and other members of the public who are attending the incident. Work is also currently being done to develop a methodology to identify disinformation and rumours on Twitter based upon the characteristics of tweets like language use, source use and history of posting behaviour.[48] However, for the foreseeable future, verification is likely to remain an activity that involves other social media users and the emergency services working together to check the veracity of information circulating online in the immediate aftermath of disasters.

Decide how you will deal with emergencies reported via social media: The floods in South-West England led to the emergency services receiving many requests for help from citizens via social media. For example, one member of the public who was unable to contact these services via telephone tweeted the local fire brigade to ask for assistance with moving medical gas. While all relevant agencies frequently remind the public to call rather than 'tweet' for help in the case of medical emergencies, it is still likely that such requests will continue to be made during future crisis situations. This presents emergency services personnel with a dilemma as to how to check the veracity of these reports. It may be prudent in some circumstances for tweeters to be reminded that they will need to provide further information via telephone in order for the emergency services to come to their assistance. Alternatively, citizens might be encouraged to use a specific hashtag in order to capture the attention of the emergency services. What is clear is that key agencies should agree the procedure for dealing with requests for assistance via social media in advance of these crisis situations.

Use social media to manage relationships with traditional media: The cultivation of good working relationships with professional journalists can help key agencies in their efforts to provide accurate information to citizens during crisis situations. News media organisations can help amplify messages sent by emergency services on social media through the retweeting of such content and also sharing it on traditional platforms such as radio, television and newspapers. As discussed earlier in relation to the floods in South-West England, this can help mobilise volunteers to assist with tasks such as providing sandbags to homeowners trying to protect their properties from flooding.

[48] http://www.pheme.eu/

Use an App: During crises, members of the public turn to familiar media channels in order to satisfy their information needs. However, Apps may have great potential for issuing public safety messages to members of the public during incidents such as the Pukkelpop disaster and the floods in South-West England. Both of these incidents led to the creation of dedicated Apps, such as 'I am OK' to assure family and friends of festival-goers that they were safe from harm. Apps use less bandwidth than other mobile phone functions such as SMS text messaging, which is an advantage in crisis situations where mobile phone networks may fail due to increased traffic. In the UK, for example, Apps have already been developed to enable citizens to report hate crimes and other incidents directly to the police (Dorset Police, 2014). Therefore, emergency managers should explore possible synergies with App developers in order to further develop tools that could be deployed during major incidents. They should also work with the local news media and civil society organisations in order to promote these tools to the general public.

4.3 Response

Send emergency notifications: Emergency notifications can be sent to members of the public during crisis situations. For example, a citizen can sign up to receive Twitter Alerts from official accounts direct to their smart phones. These notifications are delivered via SMS or a push notification if using Twitter for iPhone or Android. The UK Environment Agency, for example, sends live flood alerts via Facebook and Twitter Alerts. There have also been Cell Broadcast trials in several European states. These Broadcasts allow messages to be delivered to citizens within a specific geographic location, even when load spikes lead to the failure of communication networks.

Listen: Social media provide opportunities for key agencies to listen to what citizens are saying about the incident. PIOs and other members of their communication team can respond directly to those social media users who express dissatisfaction with the emergency response. Listening on social media can also help emergency managers anticipate and mitigate cascading effects. However, the representativeness (or lack thereof) of social media users suggests that PIOs should verify these findings using other data sources before making any recommendations to emergency managers.

Pull information: Information can also be pulled from social media in order to build situational awareness in crisis situations. Keyword searches and the monitoring of hashtags can arguably provide as much insight into the evolution of an incident as messages received by the emergency services via their official social media accounts. It can also help identify civil society organisations that might be able to help mitigate cascading effects from public order incidents such as Project X Haren. Although this form of data capture has been traditionally associated with the police, European fire and rescue services have also begun to engage in social media data collection and analysis. For example, Belgian fire and rescue services are now able to access UGC, such as photographs, videos and tweets, en route to an incident courtesy of a digital tool. However, it is still essential that information pulled from social media is contextualised with reference to information received via other media channels.

Crowdsource information: Pulling information from social media can improve situational awareness, but information can also be purposefully crowdsourced from members of the public. The authorities can use a dedicated hashtag to encourage citizens to share specific types of images and eyewitness perspectives on relevant incidents. They can also ask members

of the public to help them verify information received from other members of the public via social media or other communication channels.

Push information: Listening can also help inform what information should be pushed by emergency managers via various media channels. 'Push' information can quell rumours and disinformation and address the diverse information needs of citizens during crisis situations. Emergency management communicators should provide regular updates in order to prevent cascading effects occurring from citizens speculating about crisis situations. Even if no further information is available, it is advisable that key agencies explain why, rather than allow a communication vacuum to develop. The fluidity and uncertainty of a crisis situation should be acknowledged in a dialogic form of communication that directly engages members of the public. Push information should be verified and cross-referenced with updates provided by other agencies in order to ensure message consistency. This will avoid a repeat of the events leading to the Project X Haren riot, during which conflicting messages from the Mayor of Haren and other authorities about an alternative party being organised in the town was said to have directly contributed to the violence. Social media should be deployed in order to push information during a crisis situation. Professional journalists should be invited to amplify these messages through sharing this content with their respective online social networks too. Although tweets are restricted to 140 characters, hyperlinks should be provided to websites that contain further information about the recovery efforts. It is important that information provided on an official website is clearly presented, easily understood, and directly addresses some of the issues identified through listening to citizens talking about these incidents online.

4.4 Recovery

Tell citizens when the crisis is over: Crises, such as the floods in South-West England, often have a devastating economic impact upon the affected areas. To mitigate the impact of the decline in tourism in the region in 2014, Cornwall Council launched an 'open for business' campaign via various communication channels (own website, traditional and social media, the Visit Cornwall website, tourism and travel magazines among others). Such campaigns are important not only in reviving tourism, but also in encouraging investment in disaster-affected areas.

Use social media to support citizen-led clean-up operations: Members of the public can also use social media to organise recovery operations. For example, citizens began to repair the damage caused by the riots in Haren under the Project Clean X initiative. Key agencies should try to promote these initiatives through retweeting messages of support, as well as building relationships with participating civil society organisations

Issue preparedness advice: Key lessons from the incident should be recorded by emergency managers and used to inform future plans for emergency response. They should also consider issuing preparedness advice to local residents, who are likely to be receptive to such content given recent events. However, it is important not to overload citizens with information during a period in which they may still be traumatised by the incident. It may be more appropriate to consult civil society organisations in order to establish what preparedness information should be disseminated at this stage.

The above communication tactics can be summarised in the communication strategy flowchart presented below.

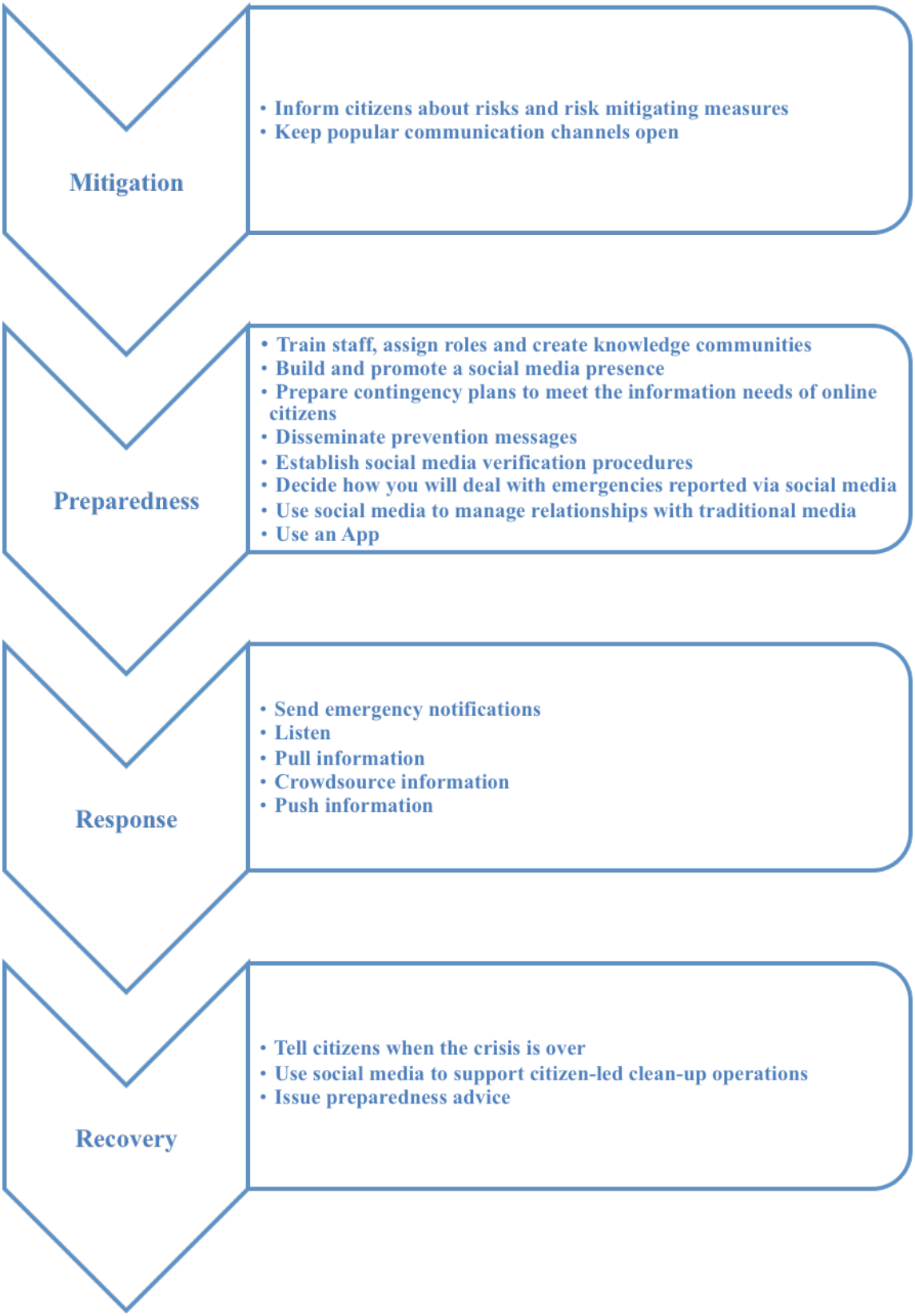


Figure 4.1: Communication strategy flowchart

5 Conclusion

This report has presented an overview of best practices in crisis and risk communication in order to develop guidelines for effective communication between key agencies and members of the public during cascading disasters. Lessons learnt from three case studies (Project X Haren, Pukkelpop and the UK Floods) were also incorporated into the SPEAK guidelines for communication during crisis situations. These were:

1) **S**tudy the information-seeking behaviours of your audience before deciding upon which communication platforms to use during crisis situations;
2) **P**repare for the loss of critical infrastructure during such incidents by employing a communication mix that includes both traditional and digital media;
3) **E**ngage key stakeholders e.g. civil society organisations in order to ensure that the information shared with the general public is both accurate and consistent
4) **A**lways consider the ethical implications of using crowdsourced information obtained from social media sites; and
5) **K**nowledge gained from previous incidents should be used to inform future communication strategies.

Key findings also included:

1) Emergency managers should assess the information needs and behaviours of the public at all stages of the disaster in order to maximise the impact of messages sent by their agencies. Desired behavioural changes (e.g. evacuation instructions) are most likely to occur if extensive information is shared about disaster preparedness at the early stages of the cycle.

2) Shared responsibility towards DRR should be extended into the field of crisis communication. Key agencies are likely to remain the most trusted sources of information during crisis situations. However, social media helps these organisations build situational awareness through the crowdsourcing of crisis information, as well as pushing information that offers advice and reassurance to those affected by such incidents. They can also help empower local communities and build resilience towards disasters.

3) A strategic communication mix of social media, traditional media and face-to-face meetings should ideally be employed at all stages of man-made or natural disasters. While it is misleading to suggest that there is a 'killer app' in terms of crisis communication, we would like to draw particular attention to the potential use of social media to correct rumours and disinformation, which have the potential to lead to cascading effects during these incidents.

4) Radio, television, newspapers and telephone calls remain important channels for those unable or unwilling to access new media technologies. They are also seen as trusted sources of information during crisis situations. Also, in the immediate aftermath of man-made or natural disasters, when there may be bandwidth limitations, traditional channels such as electronic billboards and PA systems may be more effective ways to communicate with members of the public. Emergency management communicators should therefore target those communication platforms that are most commonly used by residents in disaster-affected areas in order to maximise the reach of their content. They should also focus on those communication channels that may be more resilient and effective in the immediate aftermath of a man-made or natural disaster.

5) Key agencies should collaborate with other emergency services and civil society organisations to ensure that these messages are clear, consistent and accurate. Such messages are much more likely to be acted upon by members of the public who live in disaster-prone areas.

6) Evaluation and reflection should be critical components of crisis communication practices at both the individual and organisational levels. Lessons learnt from previous incidents should help inform future communication plans for man-made and natural disasters.

Implications for IET

This report highlights the importance of communication in the decision-making processes that will be supported by the IET. The disruption of information relations is a common trigger of cascading effects in other elements of the socio-technical system. Therefore, it is vitally important that emergency managers develop multi-channel communication strategies that are likely to engage all relevant stakeholders, including members of the public, throughout the evolution of crisis situations. A flexible and fluid approach towards risk and crisis communication is needed in order for the collaborative model of decision-making (outlined in D3.2) to positively influence the behaviour of disaster-affected populations during each stage of a disaster. While much of the crisis communication research to date has focused on communication strategies employed during crisis response, this report has argued that effective risk communication practices can not only help build preparedness, but also reduce pressure on essential services during the later stages of an incident. This has implications for emergency managers who wish to prevent the disruption of information and organisational relations, which are so often the trigger of cascading effects in other parts of the socio-technical system. The rapid sharing of clear, accurate information between all relevant stakeholders (including the public) at each stage of the disaster should also help improve the quality of decisions that are made using the IET. The push and pull of information via social media sites such as Facebook and Twitter has the potential to build situational awareness that improves decision-making during such incidents. The adoption of these communication guidelines should help emergency managers engage in scalable, people centred decision-making during cascading disasters. Those agencies that use the IET should be aware of how people respond to and act upon crisis information during all stages of an incident, and tailor their communication strategies accordingly.

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Appendices

Appendix 1: Background on case studies

Floods in South-West England, December 2013-January 2014.

Record rainfall throughout December 2013 and January 2014 saw tidal surges and floods in many coastal areas of the UK. South-West England bore the brunt of these storms, with large sections of the Somerset Levels left under water by 11 January. The train line at Dawlish would collapse on 5 February[49], effectively cutting off Devon and Cornwall from the rest of the UK railway network. The full scale of the economic impact of the floods would be revealed months later. The UK Environment Agency estimated that £135 million worth of damage had been caused to flood defences, with the Association of British Insurers stating that there were 17,500 flood-related claims[50] (worth an estimated £1.1 billion) between 23 December 2013 and 28 February 2014. Once the floods had subsided, Cornwall Council launched a campaign via various media types to communicate that the area is open for business and in this way to help mitigate the economic impact of the floods on the local tourism industry (Andrew, 2014).

Social media was one of many communication platforms used by the Environment Agency (EA) to provide weather forecasts and flood warnings to those living in affected areas. Social media was also used during the floods as a way to send emergency notifications. In the Cornwall area, the authorities received a request for help from a member of the public who needed help moving medical gas, but who was unable to reach the authorities via other channels. Citizen-led social media campaigns such as #forageaid[51] and Flooding on the Levels Action Group (FLAG)[52] emerged, which provided support for affected communities and called for the dredging of the rivers to avoid future floods.

Local radio and television stations would also play a key role in providing information on where local residents could obtain sandbags to defend their own homes from the rising floodwater, as well as travel updates detailing which areas to avoid. BBC Radio Gloucestershire invited teams from the County Council to sit in the newsroom and whenever a call came in from a member of the public in distress, these calls were immediately directed to the County Council team, speeding up the response.

Project X Haren, The Netherlands September 2012.

Project X was an event in Haren, the Netherlands which started out as a Facebook invitation to a Sweet Sixteen birthday party and ended up as a gathering of thousands of people causing

[49] Channel4 (2014) UK storms: Dawlish sea wall collapses under railway line, http://www.channel4.com/news/storm-flood-uk-weather-south-west-power-wind

[50] Insurance Times (2014) ABI: UK flooding and storms to cost insurers £1.1bn, http://m.insurancetimes.co.uk/abi-uk-flooding-and-storms-to-cost-insurers-11bn/1407490.article

[51] ITV (2015) Scheme which fed Somerset's flooded farm animals wants to become fully-fledged rapid-response charity, http://www.itv.com/news/west/2015-01-13/scheme-which-fed-somersets-flooded-farm-animals-wants-to-become-fully-fledged-rapid-response-charity/

[52] Stop the flooding. Dredge the rivers! http://www.flagsomerset.org.uk/Media.aspx

riots on 21st September 2012[53]. On 6th September Merthe - a girl from Haren - sent her friends a public birthday invitation via Facebook. One of her friends' friends misused the invitation, sending it to 500 people alone. In two days, 16,000 people were invited, at which point Merthe deleted the event. Jesse Hobson from Christchurch, New Zealand and 'Ibe der Fuhrer' from Berlin, Germany started organising a birthday party for the same date and time. The Twitter hashtag #ProjectXHaren began appearing online around 16th September, referencing the Project X movie[54] in which young people organise a party that spirals out of control. On 19th September a teaser trailer[55] for the Project X Haren party was uploaded on YouTube and an invitation-only Facebook group for the event was set up. The Facebook group was moderated and posts like 'we should not do this' were being deleted. A flyer for the event was also shared on lifestyle blog Melf[56]. Some popular television talk shows and entertainment radio programmes were also covering the event and encouraging young people to go.

Worried about the amount of interest that the event was attracting, the municipality of Haren and the local police discussed the option of organising an alternative party, but abandoned the idea over concerns that the people behind Project X Haren may feel encouraged to start similar events across the Netherlands. The municipality started communicating that there will be no party. One of the communications officers, however, mentioned the alternative party in a media interview two days before the scheduled event.

On 21st September, the weather was good, it was a Friday and students could use their free travel cards to get to Haren. As people were gathering it became evident that Merthe's house was heavily protected by police and there was no alternative party. People were standing in the streets and drinking alcohol, as there was not enough police in the streets to enforce the alcohol ban. Around 8:30 pm the riots broke out. Riot police were deployed just after 9.30 pm when there already were attacks on cars and property in the area. Rumours were also circulating about a girl who had been killed in the riots. The authorities were ill prepared to respond to such communication. The riots lasted for a few hours and there were injured people.

On the following day, members of the public started a Facebook page to organise a clean-up of Haren[57]. A member of the public who had collected about 500,000 tweets and scraped messages from the Facebook group initiated a hackathon to try and make sense of what had happened[58]. Mainstream newspapers also launched an effort to reconstruct the events to understand what went wrong[59]. An official Project X Haren Research Committee was set up with the task of event reconstruction[60]. The authorities were criticised for the inconsistency of their messages and their failure to convert information from social media into intelligence.

[53] Know Your Meme, Project X Haren, http://knowyourmeme.com/memes/events/project-x-haren

[54] Project X movie, http://projectxmovie.warnerbros.com/dvd/site/

[55] Project X Haren TRAILER / TEASER - Merthe weusthuis https://www.youtube.com/watch?feature=player_embedded&v=KRFES3xhfPI

[56] Project X Haren, https://melf.nl/uitgaan/11433/project-x-haren

[57] Project Clean-X Haren, https://www.facebook.com/ProjectCleanXHaren?ref=ts

[58] Schäfer, M. T. (2012) Analysing 500.000 Tweets: ProjectX Haren hackathon, http://www.newmediastudies.nl/magazine/analysing-500000-tweets-projectx-haren-hackathon

[59] Project X, http://detegels.nl/2012/project-x/

[60] Hoofdrapport twee werelden, http://www.utwente.nl/download/haren/

They did, however, use social media to crowdsource video footage from the night to identify rioters.

Pukkelpop Festival Disaster, Belgium, August 2011.

Pukkelpop is among the top 20 international open air music festivals based on attendance per day[61]. On August 18th 2011 at 6:15 pm a thunderstorm hit the Pukkelpop festival area in Kiewit, Belgium[62]. The thunderstorm was later classified as a supercell - a type of thunderstorm characterised by sudden onset and capability to produce severe weather conditions combining high winds, large hail and strong tornadoes. Within a few minutes the festival ground was flooded and trees were blown down. Festival goers took shelter in tents, but due to the high winds one of the festival tents - the Chateau tent - collapsed causing many casualties including five deaths[63]. Video footage recorded by festival goers on mobile phones would quickly emerge showing the full extent of the devastation caused by the thunderstorm[64].

Festival goers were also tweeting reports about collapsed scaffolds and trees and flooding of the festival grounds due to heavy rainfall[65]. At 6:52 pm the first rumours about deaths emerged on Twitter. These tweets were not widely shared and many of the shares expressed doubts about their truthfulness or requested more, official information[66]. While these rumours were still unconfirmed by official sources, two established mainstream newspapers reported information about the death toll on their websites. Other news outlets, including the national news agency Belga followed citing the yet unverified information. The two newspapers later issued corrections and published a letter of apology (Joye, 2013)**.** The number of tweets about deaths only peaked after mainstream media outlets published their first reports (Terpstra et al., 2012).

Communication by the authorities was kept at a minimum, partially to avoid creating further panic. The local government and authorities were, however, later on criticised for their failure to use social media to provide real-time crisis information during the incident[67].

One Twitter user took the initiative to connect festival goers with the residents of the nearby town Hasselt via the #hasselthelpt hashtag. This hashtag mobilised Hasselt residents to offer festival goers food and shelter, transport, Internet connection. Some of the Hasselt residents who offered help via #hasselthelpt were first time Twitter users with no history of use of

[61] Botelho-Nevers, E. & Gautret, P. (2013) Outbreaks associated to large open air festivals, including music festivals, 1980 to 2012. Euro Surveill, 18(11), 1-9.

[62] Terpstra, T., Stronkman, R., de Vries, A. & Paradies, G. I. (2012) Towards a realtime Twitter analysis during crises for operational crisis management, Proceedings of the 9th International ISCRAM Conference, Vancouver, Canada.

[63] CBC (2011) Storm death toll at Belgium music fest rises to 5, http://www.cbc.ca/news/world/storm-death-toll-at-belgium-music-fest-rises-to-5-1.1109602

[64] Hosdez, S. (2011) Pukkelpop - Horrible footage compilation, https://www.youtube.com/watch?v=YSF6g-LtpUU

[65] Terpstra, T., Stronkman, R., de Vries, A. & Paradies, G. I. (2012) Towards a realtime Twitter analysis during crises for operational crisis management, Proceedings of the 9th International ISCRAM Conference, Vancouver, Canada.

[66] Terpstra, T., Stronkman, R., de Vries, A. & Paradies, G. I. (2012) Towards a realtime Twitter analysis during crises for operational crisis management, Proceedings of the 9th International ISCRAM Conference, Vancouver, Canada.

[67] Mertens, P. (2012) How thunderstorms at Pukkelpop 2011 stimulated Belgium's use of social media for disaster response, http://repository.disaster20.eu/sites/default/files/Peter%20Mertens%202012%2011%2005_How%20Pukkelpop%20stimulated%20SMEM_D2.0%20Birmingham.pdf

Twitter prior to the events[68]. The #hasselthelpt initiative stimulated other nearby towns to follow with offers for help resulting in additional hashtags like #antwerpenhelpt, #brusselhelpt and #genthelpt.

Because additional mobile cellular towers or Cells on Wheels were not used, mobile connections - phoning and texting - were impossible during and after the thunderstorm[69]. As residents of neighbouring cities opened their homes to festival goers to use the Internet, social media emerged as a reliable way to say 'I am OK'. On Twitter, hashtags like #ppok were used by festival goers to assure family members they were safe[70]. On Facebook, users created the Pukkelpop Safehouse page where festival goers, friends and family were able to check in and find each other[71].

Before the start of the next year's festival season, a Pukkelpop festival goer who was affected by the 2011 thunderstorm and experienced the difficulties of getting in touch with friends and family created the I'm Fine App[72]. The idea behind it was to make it easy for anyone to populate the App with a number of contacts that they want to inform - through email or Facebook - about their well-being. Shortly after, a similar App was launched by Belgacom[73].

[68] de Vries, P., Galetzka, M. & Gutteling, J. (2014) Persuasion in the wild: Communication, technology, and event safety. Persuasive Technology, pp 80-91.

[69] Laurent, C. R. (2012) Augmented Disaster Driven Apomediation, http://www.medicine20congress.com/ocs/index.php/med/med2012/paper/view/1071

[70] van Peteghem, D. & Caudron, J. (2012) http://www.frankwatching.com/archive/2011/08/19/hoe-het-pukkelpop-drama-de-echte-kracht-toont-van-sociale-media/

[71] Pukkelpop Safehouse, https://www.facebook.com/pages/Pukkelpop-Safehouse-niet-Officieel/182836471784870

[72] I'm Fine App, http://www.imfineapp.com/

[73] GoodBytes, http://www.goodbytes.be/blog/article/how-belgacom-probably-created-the-i-am-ok-app

Appendix 2: Additional resources

This is a list of core additional resources, which can lead you to further materials.

Social media for crisis communication:

- Guidelines for the use of new media in crisis situations http://www.cosmic-project.eu/sites/default/files/Deliverables_D6.1.2_and_D6.2.2_Final_Guidelines_April_2015.pdf (COSMIC)
- Online and Mobile Communications for Crisis Response and Search and Rescue http://isar.i112.eu/downloads/files/D2271-iSARGuidelinesRoadmap.pdf (iSAR+)

Social media analysis tools:

- Comparative Review of Social Media Analysis Tools for Preparedness http://trilateralresearch.com/wp-content/uploads/2015/08/GDPC_SMAT_Short-Report-for-GDPC_Final.pdf

Verification:

- Verification Handbook http://verificationhandbook.com/

Hashtags:

- Hashtag standards for emergencies https://docs.unocha.org/sites/dms/Documents/TB%20012_Hashtag%20Standards.pdf

Ethics:

- Research using Social Media; Users' Views http://www.natcen.ac.uk/media/282288/p0639-research-using-social-media-report-final-190214.pdf

Digital volunteers:

- VOST: http://sotechem.syr.edu/wp-content/uploads/2015/07/PAGES_EM_SocialMedia_7.13.pdf
- SBTF: http://blog.standbytaskforce.com/
- DHNetwork: http://digitalhumanitarians.com/about

On Twitter, follow:

- #smem - SMEM is an abbreviation for 'social media in emergency management'. SMEM is an informal network of first responders, academics and others who aim to document and share social media best practices.
- #smemchat - a hashtag for SMEM chats on Twitter which occur every Friday at 12:30pm Eastern Time. Past #smemchat conversations can be viewed at www.SM4EM.org
- #crisiscomms - for general discussions about crisis communication
- #comderisque - equivalent of #crisiscomms in French
- #Krisenkommunikation - equivalent of #crisiscomms in German
- #VOST - VOST is an abbreviation for 'Virtual Operations Support Team'. Follow for conversations on social media for emergency management, digital volunteers and other related best practice, news and advice.

- #MSGU and #MSGUchat - equivalents of #smem and #smemchat in French.
- #RSGE - equivalent of #smem in Spanish.