Enhancing Critical Infrastructure Resilience Through Information-Sharing: Recommendations for European Critical Infrastructure Operators

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Abstract. This paper explores how critical infrastructure (CI) resilience can be improved through effective crisis communication between CI operators and members of the public. Drawing on academic and practice-based research into crisis and risk communication, as well as the results of 31 interviews conducted with key stakeholders from across Europe, the AESOP guidelines are proposed for enhancing the communication and information-sharing strategies of CI operators. These emphasise the importance of integrating both traditional and digital media into a multi-channel communication strategy that facilitates dialogue between CI operators and key stakeholders including emergency management organisations and representatives of local communities. The information-seeking behaviours of citizens should be evaluated by these organisations in order to ensure that this messaging reaches key demographics in disaster-vulnerable areas. This paper concludes by examining how post-disaster learning should be incorporated into a flexible framework for crisis and risk communication that manages public expectations about the time needed to restore services in the aftermath of large-scale incidents.

Keywords: Social media · Information sharing
Critical infrastructure resilience

1 Introduction

Much of the research in the fields of disaster management and crisis communication has focused upon the practices of key emergency management organisations, such as police, fire and rescue services (see Coombs 2010 for example). In contrast, there has been very little empirical investigation of the communication and information-sharing practices adopted by critical infrastructure (CI) operators during each stage of an incident (mitigation, preparedness, response, recovery).

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This paper sets out to address this gap by exploring how CI resilience can be enhanced through the information-sharing practices of its operators. Building on the model of crisis communication proposed by Coombs (2015), it explores the ways in which CI operators might avail of the affordances of both traditional and social media in order to manage the expectations of disaster-affected populations about the timescale for the full restoration of services in the aftermath of a disaster. This paper concludes by proposing the AESOP guidelines for effective communication and information-sharing by CI operators during such incidents.

2 Crisis Communication and Disaster Resilience

2.1 Defining Crisis Communication

The importance of effective crisis communication has been acknowledged in key Disaster Risk Reduction (DRR) initiatives over the past two decades, including the United Nations International Strategy for Disaster Reduction (UNISDR) and The Sendai Framework for Disaster Reduction. Effective crisis communication is not just about what information is being shared; rather it is about using communication channels to enable dialogue with the public. Coombs (2015) argues that organisations responsible for crisis communication should *manage information* through the collection and dissemination of crisis-related information, while also *managing its meaning* through initiatives to influence how people perceive the crisis and related organisations.

2.2 Crisis and Emergency Risk Communication Model

The CERC model combines elements of crisis and risk communication in a framework that applies to each of the four phases of the disaster cycle. The model allows communicators to effectively "inform and persuade the public in the hope that they will plan for and respond appropriately to risks and threats." (Centers for Disease Control and Prevention 2014: 7). The model proposes that both local and national stakeholders should engage the public in information collection and dissemination, rather than relying on a small number of 'experts'. This move from 'top-down' to a 'shared responsibility' model of crisis communication was related to the increased volume of user-generated content (UGC) available on social media sites such as Facebook and Twitter. This UGC was said to provide emergency managers with unprecedented 'real-time' access to witnesses' information (Cassa et al. 2013). Furthermore, the ability to both push and pull information via social media was widely held to be increasing the reach of messaging designed to mitigate the impact of these incidents (Laituri and Kodrich 2008).

However, although the CERC model held out the possibility of a truly 'collaborative' crisis communication strategy, there remains little empirical evidence to show its influence on crisis communication practices outside the United States (MacDonagh et al. 2016). Furthermore, it could be argued that disasters such as Hurricane Katrina in the US in 2005 illustrated the need to extend the collaborative aspects of the model, especially in relation to the trust (or lack thereof) between minority communities and government during such incidents (Quinn 2008). There also remains a dearth of

research exploring how CERC might be implemented by CI operators in order to increase critical infrastructure resilience by managing the expectations of citizens about the level of service that will be available during disasters.

3 Methods

3.1 Interviews and Focus Groups

This study set out to add to the limited empirical data on how operators can build more resilient critical infrastructures through crisis communication and information sharing during crisis situations. Interviews, focus groups and consultations were conducted with 31 relevant stakeholders between November 2016 and January 2017, including CI operators, professional journalists and other emergency management personnel. These participants were based in several EU countries including France, Portugal, Norway and Sweden. The participants were recruited via call for participation notices issued to relevant professional networks via email. These countries were selected on the basis that they hosted the living labs used in the IMPROVER project. Two different interview schedules were developed and used to explore the perspectives of CI and emergency management professionals, and journalists in relation to how crisis information is currently communicated and how this might develop in the future. CI and emergency management professionals were asked about current communication strategies; whether digital media had been incorporated, how traditional and digital media were used together, what feedback is collected, and what audiences they hope to reach using different platforms. Interviews with journalists focussed on their experiences of social media in detecting and verifying incidents, and whether they had come across any ethical and legal challenges of using social media in relation to emergencies. Ethics approval was sought and obtained from the host institution prior to data being collected and it was agreed with all participants would be anonymised in subsequent publications. Themes that emerged from the data were identified and explored using the six phases of critical thematic analysis proposed by Braun and Clarke (2006). Two coders read each transcript and compared notes in order to identify the communication practices that these interviewees believed would help build critical infrastructure resilience.

There were two limitations that should be acknowledged. First, a complete overview of every national resilience and crisis communication framework was not feasible. Rather, the aim of this study was to identify broad themes and patterns in crisis and risk communication and to reflect upon their respective strengths and weaknesses. Second, the data presented below is based upon a self-selected sample and could not be considered representative of these professional groups in these countries. Therefore, it was decided to focus instead on the identification of broad guidelines and tactics for effective communication that could be adopted by CI operators and applied to the context in which such incidents occurred.

4 AESOP Guidelines for Effective Communication Between CI Operators and Members of the Public During Crises

4.1 Analyse the Information-Seeking Behaviours of Local Populations Before Deciding Which Media Channels to Use During Disasters

As discussed earlier, understanding information-seeking behaviour is a pre-requisite for creating effective crisis communication strategies. A dearth of information during and after a disaster can create a vacuum in which rumours and disinformation emerge that have the potential to inflame tensions within affected communities. Our study suggested that some CI operators were still likely to prioritise action over communication with the public, the latter usually being facilitated via the traditional media. Therefore, we propose that operators should analyse the target-population's information-seeking behaviour prior to deciding which channels are used to share crisis information; incorporating traditional and digital media within their communication strategies in order to maximise the reach of these messages.

4.2 Engage Key Stakeholders in Order to Ensure Message Consistency Across Traditional and Social Media Platforms

The use of social media to share UGC during disasters can create challenges as rumours and misinformation spread on sites such as Facebook and Twitter can contribute to the strain placed on critical infrastructures during disasters while simultaneously creating unrealistic expectations about the amount of time required for full restoration of these services. Collaboration between CI operators, emergency management organisations, and news media organisations is essential in order to ensure that a consistent message is delivered to citizens from the sources they trust the most (Sutton et al. 2014). However, our interviewees identified the need to adhere to internal control structures and the absence of pre-existing relationships with such stakeholders as obstacles towards this level of cooperation. In order to rectify this, CI operators should cultivate positive working relationships with their counterparts in the news media, other emergency management organisations and other CI organisations. They should also ensure that consistent messages are shared via their own traditional and digital media channels (Stephens et al. 2013).

4.3 Social Media Should be Used to Provide Real-Time Updates to Citizens About Ongoing Efforts to Restore Services

CI operators should be aware that the exponential growth in social media use worldwide has increased public expectation about the availability of real-time crisis information. Social media use can also increase community resilience by encouraging engagement and a sense of community on a local and national level (Cheng et al. 2013). Our study suggested that although some operators used these sites on a regular basis, many did not appear to have a social media strategy to be deployed during crises. Several interviewees noted that their organisations lacked expertise in this area and

failed to provide sufficient support to those in the communication team responsible for updating their social media accounts. Therefore, it is not only essential that CI operators use these sites to provide real-time updates to citizens about efforts to restore key services, but also that they integrate social media into their crisis communication strategies.

4.4 Observe and Adhere to Context-Specific Regulatory Frameworks for Emergency Management and Resilience

Efforts to increase CI resilience through information-sharing should always be complaint with their respective national and international regulatory frameworks (Melkunaite et al. 2016). For example, UK CI operators should adhere to the principles of JESIP (Joint Emergency Services Interoperability Practices), which aims to improve crisis response by encouraging communication, collaboration and interoperability between relevant stakeholders.

Whilst encouraging collaboration in crisis response, the European Programme for Critical Infrastructure protection[1] (EPCIP) notes organisations are only legally permitted to share information with personnel of an appropriate level of security who have been vetted by their respective EU state. Such frameworks should always underpin the communication and information-sharing practices of operators before, during and after disasters.

4.5 Post-disaster Learning Should be Employed in Order to Enhance and Develop Future Communication Strategies

Communication strategies need to be constantly reviewed and updated in light of the changing media landscape and the evolving consumption patterns of citizens. Hence, post-disaster learning is essential for CI operators to innovate and adapt their current practices to the changing requirements of their target audiences. Our analysis showed that many organisations already have regular reviews in place. Most organisations sought feedback on their practices, even though in some cases it tended to consist of complaints rather than actionable requests. Such initiatives are essential in order to create communication strategies that manage the expectations of citizens in relation to the services provided by CI operators.

5 Conclusion

The AESOP guidelines presented in this paper should inform the communication practices of CI operators at each stage of a crisis (mitigation, preparedness, response, recovery). The proposed tactics build on existing best practices in the field of crisis communication, aiming to establish the most effective channel(s) to be deployed during such incidents. With particular focus on how both traditional media and social media

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can help build resilience, this paper has explained how the frequency, clarity and consistency of crisis communication messaging can help build more resilient critical infrastructures. CI operators should work with other key stakeholders to ensure that the information shared with members of the public is both accurate and consistent. Finally, this study suggested that it was imperative for operators to constantly review and update their communication strategies in order to adapt to the changing media environment and the evolving information-seeking behaviours of their target audience.

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