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COMMUNICATION BARRIERS IN CRISIS MANAGEMENT: A LITERATURE REVIEW

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COMMUNICATION BARRIERS IN CRISIS MANAGEMENT: A LITERATURE REVIEW

Research

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Abstract

Communication between and within crisis response organizations (i.e., fire and rescue services, medical assistance, government agencies, public organizations, police) and the public (i.e., victims, volunteers, people affected by the attacks) is essential for coping with natural or man-made crises such as Hurricane Katrina or the terror attacks of 9/11. Research, however, emphasizes that effective communication is difficult to establish because multiple communication-related barriers arise during crisis management that impede enhanced mitigation, preparedness, response, and recovery. Although research in crisis management and crisis communication gains more and more practical and scientific notice, it still lacks a comprehensive overview. Hence, we conducted a systematic literature review to examine how communication between and within crisis response organizations and the public takes place during the mitigation, preparedness, response, and recovery phases of a crisis. The results show that several technological, organizational, and social barriers hinder communication between all involved. The purpose of this review is to provide a foundation based on the current literature and suggest future research directions to advance knowledge on communication and barriers in communication between and within crisis response organizations and the public during crisis management.

Keywords: crisis communication, crisis management, barriers in communication, information and communication technology

1 Introduction

To cope with natural or man-made crises, it is crucial to distribute relevant information and expertise in a timely manner to all crisis response organizations (i.e., fire and rescue services, medical assistance, government agencies, public organizations, police) to save lives and minimize damage. Under such stressful and highly dynamic situations, effective communication can literally be a matter of life and death. For instance, during 9/11, responding organizations could not rely on contingency plans due to the scale and uniqueness of the attack. Multiple organizations were involved in the crisis response (Kapucu, 2006a; Comfort and Kapucu, 2006); the public (i.e., victims, volunteers, people affected by the attacks) reacted in unforeseeable ways (Comfort and Kapucu, 2006); and communications technology failed (Kapucu, 2006a; Comfort and Kapucu, 2006); information flowed too slowly and at insufficient levels of detail (DeBruijn, 2006). Moreover, coordination between the various responding organizations failed because they did not establish communication with other crisis responders before the event (De Bruijn, 2006; Comfort and Kapucu, 2006; Kapucu, 2006b). It has been established that communication between all crisis responders is a key factor that positively affects preparedness, mitigation, coordination, and cooperation; empowers communities; and limits harm (Van Gorp et al., 2015). Hence, barrier-free communication is crucial for successfully managing a crisis.

Given the catastrophic failures crisis responders have faced due to the many communication-related challenges, scholars have dedicated a considerable amount of attention on the role of communication in crisis management (Allen et al., 2014; Dawes et al., 2004; Kapucu, 2006a; Manoj and Baker, 2007; Netten and Van Someren, 2011). Reliable and effective communication during a crisis response is difficult to achieve because it must be established within and between organizations and with the public. Despite multiple advances in crisis communication and related technology (Ahmed, 2011; Amailef and Lu, 2011; Chen et al., 2008b; Currión et al., 2007; Fruhling, 2006), crisis communication is often experienced as ineffective (Allen et al., 2014; Bharosa et al., 2010; Day et al., 2009). In addition, to the best of our knowledge, research lacks a comprehensive overview about communication during crisis management and the barriers hindering communication. To address this issue, we conduct a systematic literature review to synthesize existing literature on crisis communication and communication barriers between and within crisis response organizations and the public. The review also suggests several avenues for future research.

The remainder of this paper is structured as follows. In the next section, we provide a theoretical background for crises, crisis management, crisis communication, crisis responders, and communication barriers. Based on this theoretical background, we develop a framework to combine the theoretical perspectives and guide the literature review, which we explain in section 3. In section 4, we present our findings in the light of our theoretical framework. In section 5, we discuss our results and present limitations, future research directions, and a conclusion.

2 Theoretical Background

In this section, we provide a theoretical background for crises and crisis management (including the four phases of crisis management), crisis communication, crisis responders, and barriers in crisis communication. Based on this theoretical background, in the subsequent section we develop and present a framework to guide our literature review and the development of a research agenda.

2.1 Definition of Crisis and Crisis Management

According to Staw et al. (1981), there is no generally accepted definition of *crisis*. Several terms for crisis, such as emergency, disaster, or catastrophe, have been used interchangeably, although sometimes with slight differences (Hiltz et al., 2011). We adopt the definition of Kreps (1984: p. 312), who defines crises as “events, observable in time and space, in which societies or their larger subunits (e.g., communities, regions) incur physical damages and losses and/or disruption of their routine functioning.” This review focuses in particular on natural and human-made crises, such as hurricanes or terror attacks (Eshghi and Larson, 2008).

A review by Lettieri et al. (2009) reveals that the literature on crisis management agrees on four time-oriented phases of crisis management: two pre-crisis phases, *mitigation* and *preparedness*; and two post-crisis phases, *response* and *recovery* (Lettieri et al., 2009; Petak, 1985). The aim of the mitigation phase is to prevent a crisis and mitigate the vulnerability of environmental and social systems. In the preparedness phase, also pre-crisis, the aim is to enable crisis managers and other potential crisis responders to respond effectively should a crisis actually happen (McLoughlin, 1985). In the post-crisis response phase, all responders react with the aim of preventing further loss and damage. The fourth crisis phase is recovery, in which the restoration and rehabilitation of the crisis environment takes place (McLoughlin, 1985). As Dorasamy et al. (2013) state, most research explores the post-crisis phases, especially the response phase.

2.2 Crisis Responders' Communication in Crisis Management

In the crisis context, communication is the process of creating a shared meaning among all involved. The specific aim of crisis communication is to address the crisis successfully. Communication serves relationship building, information collecting, coordination, information dissemination, and planning for

and managing a crisis (Sellnow and Seeger, 2013) and thus is important in all four crisis management phases. In pre-crisis phases, communication supports mitigation and preparation, and in post-crisis phases it enhances the response to and recovery from threats the crisis creates.

This literature review distinguishes between two groups of *crisis responders*: *crisis response organizations* includes all organizations involved, such as relief organizations, government agencies, medical assistance, fire and rescue services, and the police; and the *public*, comprising victims, volunteers, and other people affected by the event. We include the public and its role because increased access to and use of social media has resulted in the public taking an active part in crisis management (Ling et al., 2015).

Crisis communication takes place within and between response organizations as well as among the public, and the public also communicates with organizations during crisis management (Quarantelli, 1997; Quarantelli, 1988).

2.3 Barriers in Communication Flow and Framework

Researchers found that challenges managing a crisis are often related to *communication barriers* (Bharosa et al., 2010; Day et al., 2009; Hale et al., 2005). Manoj and Baker’s (2007) research on crisis communication defines three categories of communication barriers. *Technological barriers* correspond to problems based on the technology used for crisis management. *Social barriers* in communication arise because of the differences among individuals in the various crisis response organizations or the public involved during the crisis phases. *Organizational barriers* arise between and within organizations during crisis management.

In the Figure 1 framework, for crisis responders, arrows between boxes show communication between the two groups of responders identified above and circular arrows show communication within each group. The arrows shown with the management phases emphasize that the phases play out over time and that mitigation begins again after recovery.

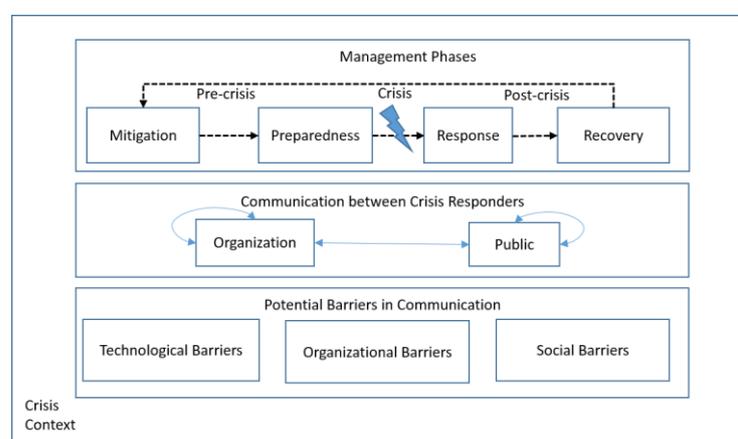


Figure 1. Framework for Communication during Crisis Management

3 Methodology

The aim of this study is to synthesize highly relevant literature on communication and communication barriers during crisis management by means of a systematic literature review (Schwarz et al., 2007). Our approach follows the recommendations of Okoli and Schabram (2010) as well as Webster and Watson (2002) as guides in structuring the review. We developed the analytical framework presented in the previous section based on an initial screening of seminal work on the topic. We use it to derive the following search terms:

Title, abstract, keywords: (cris*s OR disaster OR catastrophe OR emergenc*) AND (mitigation OR preparedness OR response OR recovery) AND (communication OR information)

Taking into account the interdisciplinary nature of the topic, we conducted the keyword-based search in five information systems (IS) and social sciences literature databases: AIS Electronic Library, EBSCO Business Source Complete, ACM Digital Library, Science Direct, and IEEE Xplore Digital Library. The search yielded 11,719 articles. After removing the duplicates (n=2,292), we applied the following exclusion criteria. First, we screened the title, keywords, and abstracts of all papers and excluded those that did not relate to the topic or were written in a language other than English (n=7,769). For example, we excluded articles that investigate crises that do not fall under the definition of Kreps (1984) (e.g., organizational image crises (Coombs, 2015), financial crises (Eastburn and Boland, 2015)). Second, following the recommendations of Kitchenham and Charters (2007), we defined quality guidelines and excluded literature not complying with those guidelines (n=1,582). The quality guidelines were based on the *journal quality list (JQL)*, which ranks more than 900 journals based on 18 different rankings (Harzing, 2015). In this review, we included only high-quality literature published in outlets ranked as A*, A or B in the JQL. In addition, we included the proceedings of the five primary IS conferences (i.e., Americans Conference on Information Systems, European Conference on Information Systems, Hawaii International Conference on Systems Science, International Conference on Information Systems, Pacific Asia Conference on Information Systems) to account for the emerging nature of the research topic and IS focus of this article. These conferences are not ranked by the JQL. However, all five conferences are well respected in the IS community and have high standards of quality. The selection criteria have two major implications. One, we assume that major contributions are published in leading journals and conferences. This assumption is often made in literature reviews (Webster and Watson, 2002) and relaxed by conducting (1) a comprehensive forward and backward search on the included articles and (2) making justified exceptions for highly influential papers on the research topic identified in the process. Very few of those exceptions (n=7) were made if and only if all authors agreed on the inclusion of the paper in question.

The final sample included 76 studies. In an in-depth review of each of the remaining papers, we extracted all available information on communication barriers, crisis management phases, and the crisis responders. Those notes are the basis for the following review. Table 1 shows the number of articles found that corresponded to the sections of the framework. Please note that a single paper may contribute to more than one category.

Communication Barriers		Communication between Crisis Responders		Management Phases	
Technological	48	Intra-Org.	10	Mitigation	8
Organizational	55	Inter-Org.	55	Preparedness	31
Social	49	Org.-Public	35	Response	69
		Public	13	Recovery	14

Table 1. Number of articles found for each section of the framework

4 Review Results

We present the results of the subsections of the framework in this section as follows. We first present the findings regarding technological, organizational, and social communication barriers. For each type of communication barrier, we provide a table summarizing the core findings of our literature review. We then present the findings on the management phases (i.e., mitigation, preparedness, response, recovery).

4.1 Technological Barriers

Technology is vital during crisis response and recovery, because it is often the only way to overcome geographic distances and enables communication with people in the crisis area and those responding to and managing the crisis. The first technological barrier is *infrastructure failure*. For instance, communications technology became vulnerable and failed during Hurricane Katrina because the infrastructure was damaged by water and/or wind—sometimes exacerbated by previous mismanagement. Attempts to get the communications system back online were hampered by conflicts over resources among crisis responders and the system's failure itself, which made communication difficult or impossible (Garnett and Kouzmin, 2007). During 9/11, communication networks failed; networks thought to be redundant were actually running on the same damaged infrastructure (Dawes et al., 2004).

Second, crisis responder's *non-acceptance of technology* is a serious issue in crisis response and recovery that this can lead to a bottleneck of information dissemination in post-crisis phases (Lee et al., 2011; Ada et al., 2010). Aedo et al. (2010), using the well-known *technology acceptance model* designed to explain the use and acceptance of a new technology in organizations (Hu et al., 1999), pointed out that it is still difficult to get multiple organizations to accept and adopt the same technology. Crisis responders not accustomed to a new technology intended for crisis response communication may not use it, opting instead to stick to more familiar technology they already use (Lee et al., 2011; Manoj and Baker, 2007; Van de Walle and Turoff, 2007). Additionally, many systems were developed to address crisis problems without adapting usability specifically to the user group of responders (Carver and Turoff, 2007). This is consistent with the argument of Day et al. (2009), who claim that crisis responders collect data on paper and not for electronic processing because they do not see the value of the technology. Hence, *non-acceptance of technology* can hinder communication on an intra- and inter-organizational level, resulting in inefficient use of the technology (if it is used at all) and causing time delays.

The third technological barrier is the *use of different technology*. Crisis management systems are often developed to address crisis management functions within one organization and therefore have no interoperability among multiple organizations. These standalone systems, addressing only a part or parts of the crisis and usable by some but not all responders, limit the ability to exploit fully the efficiencies of crisis management as a whole (Dilmaghani and Rao, 2009). In addition, responders often to a crisis situation bring various technical resources, such as diverse data or information formats, that have never before been applied together. These differences can also lead to interoperability problems and hinder communication (Day et al., 2009).

Social media usage by crisis responders can cause the fourth technological barrier. The literature identifies many opportunities for social media in crisis management to serve as a means for collecting and integrating public information, but also notes some problems. Oh et al. (2013) argue that social media services have high potential as rumor mills because of source ambiguity. Rumors, particularly during the response phase, can be dangerous by supplying communication lines with incorrect information (Oh et al., 2013) that can interfere with the decision making of crisis responders (Oh et al., 2015). In addition, Chatfield et al. (2014) claim that the integration and verification of information generated in online forums is still a major challenge. Another key challenge with social media for crisis responders is to aggregate information and determine its reliability (Zhou et al., 2013). Further, organizations might miss the potential of social media by preferring traditional communication channels (Kaewkitipong et al., 2012).

Table 2 summarizes the findings on these four technological barriers.

Technological Barriers	Sources
<p><i>Infrastructure failure</i> disrupts the communication between physically separated crisis responders and occurs due to:</p> <ul style="list-style-type: none"> • radio and cell phone blackouts; • loss and failure of communications systems—sometimes exacerbated by previous mismanagement; • the absence of backup communications networks; • disruption of infrastructure support. 	<p>Chen et al., 2008a; Chen et al., 2010; Dawes et al., 2004; Goel et al., 2004; Ipe et al., 2010; Junglas and Ives, 2007; Kouzmin and Garnett, 2007; McEntire, 2002; Pan et al., 2012; Perry, 2007; Scholl and Patin, 2012; Scholl et al., 2012.</p>
<p><i>Non-acceptance of technology</i> is a potential communication barrier because crisis responders at different locations:</p> <ul style="list-style-type: none"> • resist using a given communication system during crisis response; • resist adopting a communication system at the organizational level; • use inadequate means of communication, such as paper; • do not use the system because its design is unwieldy. 	<p>Aedo et al., 2010; Carver and Turoff, 2007; Day et al., 2009; Gomez and Turoff, 2007; Lee et al., 2011; Manoj and Baker, 2007; Reddy et al., 2009.</p>
<p>The <i>use of different technology</i> leads to communication problems due to:</p> <ul style="list-style-type: none"> • a lack of interoperability; • inconsistent information formats or data standards that hinder information exchange between organizations. 	<p>Chen et al., 2008b; Curriion et al., 2007; Day et al., 2009; Dilmaghani and Rao, 2008; Garnett and Kouzmin, 2007; Gomez and Turoff, 2007; Reddy et al., 2009.</p>
<p>Communication barriers between organizations and the public resulting from the use of <i>social media</i> occur due to:</p> <ul style="list-style-type: none"> • rumors in social media that interfere with the decision making of crisis responders • problems of integration and verification of information and information overload • inadequate information quality; • organizations not exploiting the potential of communication with social media, preferring instead one-way communication. 	<p>Chatfield et al., 2014; Gonzalez and Bharosa, 2009; Kaewkitipong et al., 2012; Oh et al., 2015; Zhou et al., 2013.</p>

Table 2. Technological Barriers

Technological barriers not addressed and eliminated during the pre-crisis phases can hinder communication between all crisis responders during response and recovery.

4.2 Organizational Barriers

Organizational barriers to communication occur between and within crisis response organizations during the post-crisis phases if organizations do not collaborate before the crisis occurs. The first barrier arises from *organizational differences*. In crisis response, organizations with differing organizational cultures—each with its own norms and rules and different expectations about informal and formal conversations—must work together. Organization-specific rules and norms bind organizations, and the focus on their own tasks in crisis response can hinder the communication process between responders from different organizations. A lack of understanding of these different norms and rules can lead to misunderstandings between the organizations involved in the crisis management process (Allen et al., 2014). Hence, strong norms and rules between organizations hinder communication and complicate the creation of a common perspective on the crisis. Rietjens et al. (2009) investigated crisis communication between NGOs and the military and found that their different skills, personalities, working methods, norms, terminology, and preferred means of communication created barriers to interorganizational communication. The unfamiliarity between the different organizations, as well as the absence of understanding of knowledge, capabilities, and professionalism of the other party, all impede communication. This is in line with the results of Bharosa et al. (2010), who found that a lack of awareness about or lack of

interest in the other organization limits information sharing. In addition, the multiple organizations involved have different information privacy requirements, which can limit data exchange between each organization (Dilmaghani and Rao, 2009).

Organizational structures are another communication barrier found in the crisis management literature. Professionals from different organizations are shaped by their positions and tasks in those organization. Some response organizations have a top-down, hierarchical command-and-control structure like that of the military (Manoj and Baker, 2007), with highly bureaucratic structures and detailed rules, policies, procedures, and instructions (Bigley and Roberts, 2001). Roles in such organizations are specialized and based on standardization, routines, and regular training. Other organizations have more informal structures or structures based on equality. Some response organizations are more disciplined than others (Bharosa et al., 2010). This is not a problem in the pre-crisis phase, but these differences between organizations can lead to collaboration and coordination problems when an unpredicted crisis strikes. Moreover, bureaucratic structures can hamper the response due to the size and uniqueness of the crisis, especially if that response must deviate from conventional crisis plans or protocols (Turoff et al., 2004b).

Further, *network-related communication* barriers can hamper communication; these arise when the boundaries between organizations have not been sufficiently spanned before a crisis erupts. Some crises, because of their size and dynamics, require a considerably greater degree of coordination between organizations than is typical. Underdeveloped relationships are problematic when a crisis breaks out (Kapucu, 2006a; McEntire, 2002) because the organizations may not know the proper points of contact or may not have a leading organization coordinating and overseeing the information flow (Pan et al., 2012). It may even be demanding to work with unknown and sometimes even rival organizations.

A lack of trust between organizations can hinder communication during crisis response (Garnett and Kouzmin, 2007; Kapucu, 2006a). Day et al. (2009) reported problems in information sharing with source identification and inaccessibility. Hence, crisis responders did not know where to find the required information and responsibilities and remained inactive. Day et al. (2009) also identified an unwillingness to share information with other organizations as a hindrance to communication. The reason for this could be, for example, regulatory issues, organizational policies, or a lack of trust.

Another barrier concerns *location and resource issues*. Gomez and Turoff (2007) claim that missing or insufficient training with communications systems can hamper communication in response efforts, because responders do not learn how to use a system efficiently. Also, competition for limited resources among response organizations can be an obstacle to communication. For instance, Perry (2007) emphasized that competing humanitarian agencies had poor and inadequate interorganizational coordination. Moreover, it is often not clear before a crisis which data are relevant for other responders, because there are no objective selection criteria.

Table 3 summarizes the organizational barriers found in the literature.

Organizational Barriers	Sources
<p><i>Organizational differences</i> impede communication because:</p> <ul style="list-style-type: none"> • employees of different organizations are a product of different cultures, rules, and norms and are bound by organizational policies and bureaucracies; • organizations use different terms or languages; • organizations have different organizational structures, which can bind employees to their normal communication channels and bypass other relevant crisis responders; • response organizations have different goals and interests; • there is an imbalance in information interdependency between organizations; • there are different information privacy requirements in organizations; 	<p>Allen et al., 2014; Bajpai et al., 2010; Bharosa et al., 2010; Bigley and Roberts, 2001; Bui et al., 2000; Chen et al., 2008a; Dawes et al., 2004; Dilmaghani and Rao, 2008; Dilmaghani and Rao, 2009; Garnett and Kouzmin, 2007; Hale et al., 2005; Kapucu et al., 2010; Li et al., 2014; Manoj and Baker, 2007; McEntire, 2002; Pan et al., 2005; Pan</p>

<ul style="list-style-type: none"> • employees are a product of their own roles within organizations, and have different skills, motivations, and personalities; • organizations rely on formal plans that may not apply to some specific crisis response situations. 	et al., 2012; Perry, 2007; Reddy et al., 2009; Rietjens et al., 2009; Sujanto et al., 2008; Turoff et al., 2004b; Valecha et al., 2012.
<p><i>Insufficiently developed networks of organizations</i> hinder communications due to:</p> <ul style="list-style-type: none"> • a lack of trust between organizations; • insufficient information sharing; • a lack of initial communication between the responders; • an unwillingness to transfer data between organizations; • responders not having proper points of contact; • the absence of a central organization overseeing and coordinating the information sharing. 	De Bruijn, 2006; Granatt, 2004; Day et al., 2009 Dilmaghani and Rao, 2008; Kapucu, 2006a; Kapucu, 2006b; Kapucu et al., 2009; Kapucu et al., 2010; McEntire, 2002; Pan et al., 2012; Perry, 2007.
<p><i>Location and resource issues</i> can hamper communication between organizations due to:</p> <ul style="list-style-type: none"> • inadequate data sources in the crisis area; • limited resources to connect all crisis responders; • insufficient training in the use of communications systems. 	Day et al., 2009; Gomez and Turoff, 2007; Gonzalez, 2008; Hale et al., 2005; Perry, 2007.

Table 3. Organizational Barriers

4.3 Social Barriers

Social barriers can hinder communication among all involved due to differences between individuals. *Diversity* can become a social barrier among crisis responders when many people are involved in crisis management and must work together to achieve successful crisis management. Individuals who must harmonize their work may have different nationalities, ethnicities, cultures, political views, religions, or ideologies (Bui et al., 2000). A lack of trust (Manoj and Baker, 2007) or language barriers can impede communication among multiple crisis responders (McEntire, 2002).

If communication does *not meet the requirements of the situation*, it may also create a barrier. For instance, the design of a message can hinder communication because the message may not be received exactly as the sender intended (Hale et al., 2005). The interpretation of the message by the receiver is often incomplete, results in conflicting interpretations, or is hindered due to missing information quality during the crisis response (Hale et al., 2005). Also, the prevalence of different resources and reports with incorrect or insufficient information complicates communication among crisis responders (Dawes et al., 2004; Day et al., 2009; Gonzalez, 2009). Moreover, Hale et al. (2005) point to filtering as another problem for communication among crisis responders. Crisis managers face a dynamic, context-rich, and intense situation of limited resources and time pressure and must make decisions quickly. Filtering is important for retrieving relevant data needed to make choices in a crisis situation; filtering the wrong information can impede decision making.

Information-related problems also are a type of social barrier. Day et al. (2009) report that organizations tend to place a low priority on ensuring reliable flows of high quality information. This may leave decision makers with missing and incomplete data (McEntire, 2002; Day et al., 2009), insufficient information quality (Horan and Schooley, 2007), a lack of information (McEntire, 2002), or too much information (De Bruijn, 2006). Further, crisis situations require decision makers to rely on different information sources. The failure to coordinate the exchange and integration of information is a typical problem in crisis situations (Dawes et al., 2004; De Bruijn, 2006) that can lead to inconsistencies across different information sources (Day et al., 2009), which can be exacerbated by incomplete and conflicting interpretations of data (Hale et al., 2005). Such information-related problems can diminish the level of confidence organizations and decision makers have in their data.

Table 4 summarizes the social barriers found in the literature review.

Social Barriers	Sources
<p><i>Diversity</i> between responders can hinder communication because of:</p> <ul style="list-style-type: none"> • language barriers; • religious, ideological, political, ethnic, cultural, and/or nationality differences, any of which can complicate cooperation; • lack of trust between unfamiliar crisis responders. 	<p>Bui et al., 2000; Granatt, 2004; Manoj and Baker, 2007; McEntire, 2002; Perry, 2007.</p>
<p>Communication does <i>not meet the requirements of the situation</i> due to inadequate:</p> <ul style="list-style-type: none"> • filtering of messages by the receiver; • message design; • message interpretation by the receiver; • decision making, which is related to cognitive overload due to the highly dynamic situation of crisis response. 	<p>Bharosa et al., 2010; De Bruijn, 2006; Hale et al., 2005.</p>
<p><i>Information-related problems</i> can hinder decision makers due to:</p> <ul style="list-style-type: none"> • information overload • insufficient information; • a lack of information quality; • incorrect data coordination and integration; • low information priority; • unreliability and low level of confidence in data; • inconsistent data from different sources; • incomplete or conflicting interpretations of data. 	<p>Bharosa and Janssen, 2010; Bui and Subba, 2009; Chen et al., 2008a; Clarver and Turoff, 2007; Dawes et al., 2004; Day et al., 2009; De Bruijn, 2006; Gonzalez and Bharosa, 2009; Horan and Schooley, 2007; Manoj and Baker, 2007; McEntire, 2002; Perry, 2007; Reddy et al., 2009; Valecha et al., 2012.</p>

Table 4. Social Barriers

For communication among all crisis responders to be effective, they must be aware of these barriers that—if not eliminated in preparation for a crisis may hinder communication mainly during crisis response and recovery.

4.4 Mitigation Phase

In the mitigation phase, communication between and within organizations primarily concerns dissemination of information about crisis risks; establishing rules and agreed-on plans; and making decisions about land-use policies, funding sources, infrastructure, minimizing the degree of risk in crisis prevention, and the risks for social and environmental systems (Guion et al., 2007). Moreover, organizations share information with the public about possible threats affecting people (Zahran et al., 2010). Gow (2007) introduces a framework for communication policy research pertaining to crisis mitigation.

4.5 Preparedness Phase

In the preparedness phase, organizations must establish functionalities for effective post-crisis management, and must therefore be aware of communication barriers that may hinder these efforts. Hence, in the preparedness phase response organizations focus on reducing negative effects of the crisis. This includes training to improve the skills, decision-making processes, and knowledge of crisis responders (Raman et al., 2006; Yao et al., 2005); interorganizational coordination (Gonzalez, 2008); communication skills (Mendonça, 2007; Yoon et al., 2008); and guidelines to improve information management (Bharosa and Janssen, 2010). Decisions must be made about the technological infrastructure and tools used within and between organizations (Aedo et al., 2010), and regarding the actions that will be taken

in the post-crisis phases (Turoff et al., 2004a). In addition, it is important that responders communicate to keep in touch, plan together for a crisis, and develop trust between organizations (Allen et al., 2014; Bharosa et al., 2010; Kapucu, 2006a). Moreover, building relationships between all crisis responders through training and timely communication among organizations about plans and actions is critical for good collaboration during a crisis response (Kapucu, 2006a). Kaewkitipong et al. (2012) point to the importance of warnings, as in how the Thai government used social media to inform other organizations and the public with weather updates about flooding and its impact.

Researchers increasingly emphasize information exchanges between organizations and the public through social media. For example, Chatfield and Brajawidagda (2013) show that Twitter is a viable complementary warning system because of its communication speed and reach; Tyshchuk et al. (2012) also recommend Twitter as an early warning system. Websites inform the public, reduce uncertainty, provide explanations about how to react, and identify resources for assistance in advance. Van Gorp et al. (2015) show that crisis response organizations use social media to provide advice directly for crisis preparation, point to other resources with crisis advice, and offer news about the crisis to the community. Guidelines for appropriate behavior or a collaboratively developed knowledge base with active discussion spaces are also themes of preparedness (Palen et al., 2007). Ahmed (2011) points out that organizations also must conduct seminars and workshops to educate the public and disseminate plans for crisis response.

Public warnings during crisis preparation are a subject of communication research. Granatt (2004) shows that early-warning partnerships support community crisis preparedness. Examples in the United Kingdom show that these partnerships facilitate trust and security. Gomez and Turoff (2007) emphasize the recommendations of the U.S. Federal Emergency Management Agency (FEMA) for individual preparedness. To establish the preparedness of local responders, Gomez and Turoff propose training and practice for effective communication with mobile information technologies. Further, continuous device use and fostering plain-language use should facilitate technology and communication for the crisis response phase.

4.6 Response Phase

The response phase includes communication within and between many organizations in a highly dynamic environment. Communication is key to quick and efficient coordination in this phase. As described above, several studies provide evidence suggesting that poor communication during interorganizational crisis response has a negative effect on collective decision making, collaboration, and coordination (e.g., Allen et al., 2014; Bui et al., 2000; Chen et al., 2008a; Dawes et al., 2004; Ives and Junglas, 2006). Communication in crisis response includes adapting to the situation as quickly as possible, assessing the appropriateness of formal plans, and gathering and processing information for crisis professionals' decision making. Communications systems are essential to enable information exchanges between crisis responders at different locations (Leidner et al., 2009); therefore, disrupted communications systems or infrastructure must be restored quickly. Hence, crisis managers must know about available backup systems and how they can be deployed.

Social media have changed how crisis information is created and distributed (Tim et al., 2013; Yates and Paquette, 2011). As recent research shows, social media are increasingly being utilized for communication between the public and organizations, for several reasons. For example, Chatfield et al. (2014) studied how the U.S. government engaged citizens with the help of social media during Hurricane Sandy. Carter et al. (2014) analyzed government social media strategies to inform the public in response to weather-related crises. Increasingly, social media are also an information source for crisis response organizations. The pervasiveness of smartphones give people the opportunity to take photos or videos and upload them to the Web immediately. Survivors in an affected area can report what they are seeing or hearing. Social media provide information in real time (Zhou et al., 2013). Crisis responders are

increasingly monitoring comments from the public. The large amount of user-generated content, including tweets, blog posts, and forum messages, can be used to detect an impending crisis or to get details about the scope of an unfolding crisis (Ahmed, 2011; Meesters and Van de Walle, 2014; Van Gorp et al., 2015).

Another function of communication between organizations and the public is for moral and emotional support (Ahmed, 2011). People can express their thanks to crisis responders or give moral support to crisis victims.

Information technologies such as smartphones and social network sites allow the public to take an active part in crisis response (Ada et al., 2010; Ahmed, 2011; Chen and Sakomoto, 2014). Using social media and mapping software on the Web enables citizens to publish and consume their own crisis-related information. Recent research from Ling et al. (2015) shows that social media can facilitate communication between the concerned public, which may not have network access like that of professional agencies. Thus, social media provide a channel for people to inform each other, participate, and not have to rely on or wait for information from the government. In addition, information platforms such as Ushahidi, an open-source project that allows users to crowdsource crisis information they can then send out via mobile phones, enables citizens to upload information on site and play an active role in crisis management (Hyman, 2014).

4.7 Recovery Phase

Cumbie and Sankar (2012) emphasize the importance of information sharing between organizations during crisis recovery to coordinate activities and address tasks such as coordination, short- and long-term shelter, rebuilding, as well as dissemination of information about accessing aid. Communication about available assistance takes place during recovery. Organizations must coordinate and collaborate to provide shelter, rebuild infrastructure, and distribute resources (Guion, 2007) and to maintain relationships with other organizations (Doerfel et al., 2010). Kaewkitipong et al. (2012) state that governments use social media to publicize information about successful recovery activities, collect lessons learned that can help an organization better prepare for another crisis, and facilitate coordination and collaboration between organizations. Further, organizations use social media to build relationships with the public and share information and coordination of volunteer activities. The public uses forums and blogs during the response to disseminate information. For example, Torrey et al. (2007) show that the public used online networks of volunteers to facilitate the distribution of donated goods to hurricane survivors. Further, the public used social media to share moral support and organize as well as promote recovery activities (Kaewkitipong et al., 2012; Palen et al., 2007).

Managing a crisis requires planning, flexible decision making, inter-organizational coordination, training, and technology, and the phases are strongly interdependent. Moreover, as recent research shows, the role of the public has evolved and is increasingly important for crisis management. As these sections have shown, communication among all crisis responders in the different phases of a crisis serves to ensure that these various tasks can be completed.

5 Discussion, Implications for Future Research, and Limitations

This literature review reveals that many papers focus on communication and communication barriers between organizations, while research that addresses intra-organizational communication during a crisis response is uncommon. Further research could explore the barriers to the communication of a crisis response organization in a crisis context. Promising insights and a new perspective on crisis management could also lie in research into organizational crises, such as an information security breach for a large customer base, that were excluded from this review.

Moreover, we found very few papers that followed the mitigation definition introduced in this paper and that also broached the issue of communication; research on pre-crisis phases, for the most part, addresses communication in the preparedness phase. This could be because mitigation—which is about prevention work, such as erecting dams to limit flooding—depends strongly on political and economic decisions about costs and benefits (Bakir, 2004). Nevertheless, risk estimation is important for preventing future loss, and it is in the mitigation phase that long-term risk reduction measures are established. Future research on communication could provide a more integrated view on all four management phases and develop the conceptual framework with all crisis responders considered.

Traditional crisis management systems are used to assist police, fire, medical assistance, and rescue services (Amailef and Lu, 2013), but in recent years research has examined social media as a tool for including information from the public in crisis management as well. This review shows that organizations are increasingly aware of the potential for the public to provide information that can support collective problem solving. Survivors in an affected area can support responders with on-site information about what they are seeing or hearing. Ada et al. (2010) argue that social network sites are a promising form of communication media to support crisis response. But research still lacks explanations for the behavioral intention to use social media during and in the aftermath of a crisis. Future research could explore how emotions or behavioral tendencies lead to public use of social media during a crisis.

Our results also emphasize that several barriers, which occur mainly due to deficient preparation for a crisis, hamper crisis response and recovery. The negative effects of these barriers are mainly experienced in post-crisis phases. Technological barriers such as *non-acceptance of technology* are typically found in the preparedness phase, and if not overcome have a negative impact on the response and recovery phases. Moreover, social barriers often arise during crisis response, when many individuals must communicate and coordinate action in a highly dynamic and confusing situation with incomplete or poor-quality information. To address these problems, future research could examine behavior models in combination with the design of communications systems.

Beyond technological and social barriers, a major source of problems in crisis response lies in the communication between response organizations. Organizations that want to improve their crisis management must change their behavior with respect to relationships with other organizations and build a common understanding of the situation and of the contribution of other organizations in crisis response. Further, there is still no integrated approach in the research aimed at understanding how organizations can learn from past crises. Future research on crisis communication should help us understand how knowledge from past crisis management and failures can be integrated successfully into organizations, with consideration given to all phases of crisis management.

Our research also has some limitations. The quality-based selection criteria we chose typically lead to the exclusion of journals and conferences that lack clearly defined quality standards or that represent small and expert communities. Such communities are often not listed in established journal and conference rankings, which makes it difficult to assess their quality standards. Future research could include such domain-specific journals and conferences (e.g., *International Journal of Information Systems for Crisis Response and Management*) for further insights on the topic. Also, we excluded studies that did not make a clear statement about the crisis responders involved in communication (e.g., papers focused on technological developments in crisis communication). These choices were made so we could focus on papers that explicitly contribute to the research question. It is important to note that some papers may have been missed that might have been relevant for this review.

6 Conclusion

Research shows that the impact and the frequency of crises are rising (Eshghi and Larson, 2008). Crisis communication will be more effective if crisis managers consider crisis management with both foresight and hindsight and consider all four phases of crisis management—mitigation, preparedness, response and recovery—as well as integral communication tasks. Identifying barriers to avoid problems in the future is vital for crisis management. This research provides an overview of the technological, organizational, and social barriers that must be overcome in crisis management. With a comprehensive understanding of the management phases and communication barriers, crisis managers can improve the timeliness and quality of communication and decision making in crisis management and further develop their crisis management skills. The framework in figure 1 can serve as a basis for further research that examines communication and its barriers during crisis management.

A complex crisis situation, by its very nature, brings with it communication challenges for all the crisis responders involved in managing the situation. This demands that crisis responders do what they can in advance to prepare to overcome communication barriers and aid coordination efforts when a crisis strikes. Crisis response organizations can prepare for these communication challenges by building a network among all response organizations, building their understanding of different organizational cultures, being aware of the sociological diversity among crisis responders, and keeping abreast of technology developments to be ready to handle even the worst-case scenarios.

Crisis management is an ongoing process. Every day, response organizations take action to prepare and mitigate crises or watch out for the next crisis. Communication is necessary to enable collaboration and coordination between multiple crisis responders in crisis situations; communication is how people share information, goals, directions, and emotions. Our hope is that the framework provided in this review and the overview of the barriers presented here can help improve communication in crisis management for the benefit of all.

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