Towards a formalization of interorganizational trust networks for crisis management

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ABSTRACT

As the concept of trust has found its way into the crisis management literature, many questions remain to be addressed, among which that of its integration with information technology, and its relevance for improving collaboration in a crisis management environment.

We propose in this paper that a sub category of social networks, interpersonal trust networks between organisations, may have a significant influence on the management of a crisis by organizations, and that their formalization by technology can help manage such networks and prepare for potential crises.

Following a review of trust in the crisis management context, we link trust's organizing properties to crisis management case studies and present our rationale for formalizing trust networks in an information system. We consider the technological artifact produced before the crisis by formalizing interpersonal, interorganizational trust relationships will constitute an element for collective sensemaking by parties involved in the management of a crisis.

Keywords

Trust, crisis, formalization, networks, sensemaking.

INTRODUCTION

"The urgency of the job swept away ordinary responsibilities and the everyday dullness of family life, and it made nonsense of office paperwork and tedious professional routines. Traditional hierarchies broke down too. The problems that had to be solved were largely unprecedented. Action and invention were required on every level, often with no need or possibility of asking permission. As a result, within the vital new culture that grew up at the Trade Center site even the lowliest laborers and firemen were given power." (Langewiesche, 2002)

Writing on the recovery efforts after 9/11, William Langewiesche captured in this passage the essence of the disruption felt on the morning of September 11, 2001, the emerging ambiguity between the disappearance of an orderly - and constraining - environment and the discovery of a disturbing, transitory and open, new reality. To tackle a situation alternatively described as a collapse of sensemaking (Weick, 1993) and a surge of meaning (Roux-Dufort, 2007), this paper makes a case for considering that social mechanisms, such as trust, and technological artifacts that take them into account, can contribute to improvements in the challenge of crisis management (CM)

Responding to the call by ISCRAM 2010 organizers to consider "how our rapidly changing technologies may change the way that we respond to crises in our ever more interconnected world", this paper will focus on social connections between parties involved in a crisis. Precisely, we will address the importance of interpersonal trust between representatives of organizations, and less formal groups, responding to a crisis.

When the need for collaboration between organizations – "joint action by organizations on matters of strategic importance" (Astley, 1984) - is identified, the issue of trust generally follows: "Although research has identified many determinants of cooperation, virtually all scholars have agreed that one especially immediate antecedent is trust." (Smith, Carroll and Ashford, 1995) In CM, the need for collaboration of organizations was largely described, for instance for the coordination of efforts by Morris et al. (2007), Comfort (2007) and Granot (1997), for information sharing (Boin and Smith, 2006), and the quality of the relationships was considered to have an impact on the success of the intervention. (Mendonca and Wallace, 2007)

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As a recognized antecedent to cooperation, trust then appears relevant to CM, and while reaffirming this basis by references to several case studies, our intent in this paper will be to provide a theoretical justification for trust formalization in a technological artifact. The first part of this paper will present the concept of trust between organizations as found in the literature, and explain our focus on interpersonal trust. We will then present more precisely the argument for the importance of trust in CM and response. In a second part, we will present our rationale for the formalization of trust relationships between organizations likely to face a crisis to manage together.

TRUST: A MULTIDISCIPLINARY PUZZLE

Widely considered a complex concept, trust has been keeping busy numerous scholars of a number of fields, especially in the last 15 years. Economists, sociologists, psychologists and organizational scientists – among others (Arnott, 2007) - agree on the importance of trust in social interaction, although they do not agree on its definition (Rousseau, Sitkin, Burt and Camerer, 1998) As most economists consider that the rational prisoner of the dilemma does not trust[1] research also shows that a trusting behavior is widely observed in everyday life. In a highly cited paper, Hosmer (1995) offers an original answer to the trust puzzle by presenting a philosophical and ethical perspective, linking trust to a moral duty. The two schools of thoughts that have to date dominated the approach to trust in social sciences are the calculative, behavioral approach, and the psychological approach. Both approaches will be presented.

Economists (Williamson, 1993; 1985; 1981; Gambetta, 2000) generally refer to trust as a self interested, strategic behavior an agent will show after evaluating the probability of an expected action by another agent. Trust is a means by which an agent will pursue its self interest, in a game theoretical fashion, and is subject to opportunism. If in a one-sided version of the prisoner's dilemma, the outcome no trust/no trust will be obtained, repeated strategic interactions may lead to trusting behavior, as mechanisms such as reputation and third party coercion come into play. (Gibbons, 1997; Williamson, 2000)

Critics of the calculative approach to trust point that it does not allow to explain the ultimatum game – an experiment puzzling game theorists since responders demonstrate a costly sense of fairness (Kenning and Plassman, 2005) - or any degree of trust at the start of a new relationship, nor does it explain altruism and social cooperation (Cox, 2004: Rachlin, 2002) Sociologists also find such a view of trust lacking to explain for the influence of context upon the relationship (Granovetter, 1985), the importance for trust of social networks and institutional frameworks, in other words the difference between "horizontal trust" and "vertical trust" (Sztompka, 2006) Psychologists have also described the disposition to trust others in general, a trait that is shown by an individual and that can be measured (Rotter, 1967) In this paper we will rely on the definition of trust by Mayer, Davis and Schoorman (1995) as it is considered one of the most robust. (Lewicki, Tomlinson and Gillespie, 2006) It combines a dispositional dimension with the perception of the trustworthiness of the object of trust, and a perception of risk by the trustor; notably, the model describes a dynamic trust, integrating a feedback loop from the outcome. Trust is then defined as " the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party." (Mayer et al.,1995)

Levels of analysis

Interorganizational trust has been the focus of a fair amount of research in recent years, as authors have examined its role in as diverse situations as supplier-distributor relationships in the Dutch flower industry (Claro, Borin, Claro and Hagelaar, 2006), bank-small firms relationships (Saparito, Chen and Sapienza, 2004) and humanitarian relief coordination. (Stephenson and Schnitzer, 2006) It is largely agreed that trust has a positive impact on the interorganizational performance, communication and cooperation: "Overall, research on interorganizational trust has revealed a wide range of positive outcomes for interfirm relationships such as alliances and buyer-supplier relationships." (Zaheer and Harris, 2006) Also, interorganisational trust has an interpersonal dimension and a number of studies have measured interorganizational trust at the interpersonal level (Seppanen, Blomqvist and Sundqvist, 2007), which still represents a methodological challenge. (Zaheer and Harris, 2006) In our study, we will focus on the interpersonal dimension of the interorganizational trust.

Trust for CM: a relational infrastructure?

As early as 1988, Krackhardt and Stern had stressed the importance of trust, a dimension of a friendship, in the context of organizational crisis. Mishra (1996) examined the importance of trust in the organizational response to crisis, and Weick and Roberts (1993) mentioned its role in the "collective mind" of organizations to ensure reliable performance. However, in CM, it is quite recently that trust between organizations has really been addressed more thoroughly as authors

[1] Although we acknowledge its interest, we will not address here the question as to whether a rational agent is actually likely to end up in a prison, and if so, what are the implications for society.

recognized its importance for collaboration. Boin and Smith (2006) called for the formation of a response network, including public and private stakeholders, on a basis of trust, with the aim of increasing critical infrastructures resilience. Specifically addressing interorganisational trust, Getha-Taylor (2007) mentions that during the crisis caused by hurricane Katrina, one of the very first actions of Coast Guard Chief of Staff Admiral Thad Allen after he took charge of coordinating the crisis response was to make a list of people he trusted. Down the line of responsibility, emergency responders also rely on trust relationships, as "trust relationships are the hallmark of their operating style" (Cigler, 2007) The Incident Command System success was shown to depend on multi-agency pre-training that has allowed social relationships between responders to develop over time, which creates trust and shared mental models. (Franco, Beutler, Blau, Holman and Zumel, 2009) Kapucu (2007) points to trust to face uncertainty after an extreme disaster, and concludes that "building trust among public and non-profit organizations can best be done outside emergency situations." Uhr and Johansson (2008), modeling relationships networks, have offered useful evidence for the importance of trust in CM: "Qualitative information stemming from interviews, discussions, reviews of reports and participation in seminars, all of them pertaining to two emergencies that occurred in Sweden during 2004 and 2005 (one flood situation and one storm) indicate trust to have been important for how the emergency response systems involved were structured." More recently, Boin (2009) stated: "An effective response depends on such variables as previous interaction and trust between network parties." The networked nature of this relational structure described by CM practitioners and scholars, its critical importance to the management of crises and the ability of this social network to impact critical systems (Egan, 2007) calls for the study of the importance of the relational infrastructure in interorganisational CM: the remaining of this paper will focus on the relevance of formalizing its trust dimension.

TRUST FOR ORGANIZING AND SENSEMAKING IN CRISIS

In the following section, we will consider how the properties of trust as an organizing principle, and its formalization, specifically address the question of sensemaking for CM.

Organizing properties of trust

An antecedent to cooperation, trust's influence on the organization of the emerging CM network deserves to be investigated. As Boin (2009) describes that "In fact, the crisis response in modern society is best characterized in terms of a network comprising a wide variety of response organizations that usually do not work together during "normal" times", we believe understanding trust a crucial issue for CM research.

McEvily, Perrone and Zaheer (2003) propose to connect the psychological and sociological microfoundations of trust with the macro-bases of organizing. They describe trust as an organizing principle, or as "a heuristic for how actors interpret and represent information and how they select appropriate behaviors and routines for coordinating actions." Specifically, they present the details of trust's structuring properties towards the network of actors situated in a social space, and its properties for mobilizing the resources of the actors. In terms of structuring properties, they draw attention to the fact that "trust shapes the relatively stable and enduring interaction patterns in and between organizations", while from a mobilizing perspective " trust motivates actors to contribute, combine, and coordinate resources toward collective endeavors." (McEvily et al.,2003) Seven features characterize trust as an organizing principle and this section will review each of them in the light of CM preparation/literature.

TRANSFERABILITY AND DENSITY: trust influences the density of the network of actors – as the network of actors involved in emergency management described by Choi and Brower (2006) - through the process of transferability, by which two unrelated agent can establish trust faster when they both trust in a common third party. This phenomenon was described by Mesquita (2007), who describes the role of "trust facilitators." In an effort to create an internet based community of trust for CM, Odell (2008) also acknowledges the need for a trust champion.

GENERATIVE CAPACITY AND MULTIPLEXITY: multiplexity, or the number of ties within a relationship, reveals its richness. Trust's generative capacity allow for the development of the relationship along new dimensions on the basis of an initial dimension of trust. I can trust you first with information, and in light of the success of my initial trust, later decide to trust you with lending you some equipment. Simo and Bies (2007) describes that, after hurricanes Katrina and Rita, "In central Texas, several funders and nonprofit executives noted how organizations with preexisting relationships were able to build on such relationships, particularly when they were built out of respect, trust, and some degree of familiarity."

DELAYED RECIPROCITY AND STABILITY: the risk taken by a party of a relationship who first fulfills its obligation in an exchange implies its trust in the delayed compensation by the other party. Partner organizations or individuals who trust each other will not demand immediate compensation for their contribution in the CM effort, bringing stability to the CM preparation and process. Such a need was described by Tierney and Trainor: "It is thus very common in disasters for network actors to be unfamiliar with one another's roles and capabilities and uncertain about the nature of their relationships with one another, especially during the initial phases of the response. The numerous planning and strategy meetings that take place during disasters are needed in order to facilitate the negotiations that must take place among

network actors as they attempt to manage emergence." (Tierney and Trainor, 2004) The resulting stability requires to build trust relationships before the crisis happens, as they will benefit from an accumulated serie of reciprocal exchanges. In the words of Getha Taylor (2007) drawing lessons from Katrina, "The importance of investing in relationship building cannot be overstated". Cigler (2007) also points at "problematic trust relationships" between organizations as a cause for slow and inadequate disaster response during Katrina, and notes that "during a crisis response, responders can build trust, facilitating norms of reciprocity and enhancing coordination".

ROLE SPECIALIZATION AND NONREDUNDANCY: specialized roles in a network make possible for instance the delegation of power, and reduced redundancy. Trust in the elements of the network is necessary to allocate such role specialization – an obvious example being the allocation of responsibilities among the signatories of the National Response Plan (Morris, Morris and Jones, 2007) – that imply partner organizations and their members trust each other to fulfill their tasks. Another example is given by Palm and Ramsell (2007) at a municipal level, with actors trusting each other to share information in order to avoid redundancy of tasks.

DISCLOSING, SCREENING, AND KNOWLEDGE SHARING: the importance of trusting sources of information is stressed by Alavosius, Houmanfar, and Rodriquez (2005) who analyse the US National Commission on Terrorist Attacks report on 9/11, and illustrates how screening can impede knowledge sharing. Also, efficient knowledge sharing during a crisis is dependant on trust between organizations, as trust promotes disclosing of information. For Chua (2007), who analysed 400 documents to understand the delays observed in responding to hurricane Katrina, "Besides having a proper authority structure, the importance of building a sense of trust and cooperation cannot be overlooked. Without solidarity among the agencies, knowledge transfer will be impeded by turf protection and infighting."

IDENTIFYING AND COMMITTING: There seem to be a interactive relationship between trust and identification with one another. For instance, swift trust (Meyerson, Weick and Kramer, 1996), developed within ad hoc teams, has been shown to depend on a common social context, affiliation (Adams, Waldherr, Sartori and Thomson, 2007) and similarity is also an antecedent of trust at the organizational level (Donada and Nogatchewsky, 2007)

The common objective that federates the efforts of parties involved in the CM process can be argued to provide such a context, as it creates a sense of belonging and similarity of interests, or community between parties involved. The network literature recognizes similarity as an antecedent to network formation, as "Similarity is thought to ease communication, increase the predictability of behavior, and foster trust and reciprocity." (Brass, Galaskiewicz, Greve and Tsai, 2004)

SUSPENDING JUDGMENT AND SAFEGUARDING: Trust, as it implies to accept a certain degree of vulnerability, liberates resources that otherwise would have been spent of safeguarding. Crisis situations are not a favoured context to prepare and sign contracts, although joint action is ubiquitous. "Interviews with those involved in the response who consider their efforts a success reveal that the trust and rapport that developed from preexisting personal relationships helped unify those involved toward achieving a shared goal." (Getha Taylor, 2007)

Sensemaking properties of formalization

The interorganizational nature of any far reaching crisisis is a double problem of understanding and common action for crisis managers. On the one hand, managers of organizations and community leaders involved in a crisis are facing a situation where the objective dimensions (physical, institutional and social) require sensemaking by its subjective actors, as defined by Thomas, Sussman and Henderson (1993) as "the interaction between information retrieval, the attribution of meaning and action." On the other hand, these individuals are driven by the occurrence of the crisis to coordinate their work: the interpersonal dimension of interorganizational trust (Smith et al., 1995) is therefore strategic to the collective performance of CM.

Formalization, as a process and a product of social interaction, functions as "a facilitator of sensemaking in interorganizational relationships," revealing its reciprocal relationship with sensemaking. (Vlaar, Bosch and Volberda, 2006) Illustrating for instance the importance of organisations' interaction, Helsloot (2005) cites the discussion of plans and scenarios by parties involved, and their cooperation at different levels of government: during the Bonfire simulation exercise in the Netherlands "every organization involved indicated that the preparation for Bonfire was at least as important as the exercise itself."

After a presentation of the organizing properties of trust, we argue in the following section that the development of new technologies for social networking opens new ways of preparing for crises situations, for organizations and their representatives. In the words of Karl Weick, such new capacity will enrich their understanding of the situation to prepare, by allowing them to see the relevance of considering a relational infrastructure for crisis management. "When people develop the capacity to act on something, then they can afford to see it. More generally, when people expand their repertoire, they improve their alertness. And when they see more, they are in a better position to spot weak signals which suggest that an issue is turning into problem which might well turn into a crisis if it is not contained." (Weick, 2006)

The following section details four mechanisms (Vlaar et al., 2006) by which formalization allows sensemaking and a better collaboration between organizations, and therefore should be carried out in preparation of crises. We will review each of these mechanisms to present a rationale for formalizing trust networks for CM in an information system (Table 1)

***FOCUSING PARTICIPANTS' ATTENTION*:** Formalization allows participants in interorganizational relationships to focus their attention, which affects their ability to make sense of their partners, of their relationships and the situation they (will) face together. Consequences of this common focus on interorganisational trust relationships will include the identification in the response network of the individuals and organizations jointly considered reliable for the CM process. Also, organizations and their representatives will be able to recognize the need to enrich their relationships and exchanges with partnering CM practicioners. As the temporary asymetry of input by organizations and individuals as part of CM process will be freely acknowledged, it will facilitate the allocation of responsibilities for the CM process. Also, information quality being crucial to CM process, jointly identifying which information to share will create a sense of belonging, likeness, and community, and help recognize the need to accept a certain degree of vulnerability for the sake of a clearly defined common goal. Developing network level standard operating procedures, a basic learning tool for a CM network requires formalization: "the increasing formalization of the network made SOPs the critical method by which lessons were stored and disseminated."(Moynihan, 2008)

PROVOKING ARTICULATION, DELIBERATION AND REFLECTION: After identification in the CM network of crucial individuals and organizations, partners will be able to explore possible extension of the CM network. New ways to enrich their trust relationship can be discussed at that point, for instance formal of less formal meetings dedicated to CM improvement. The accepted risk and vulnerability required by the CM process will be shared so that detailed roles and responsibilities can be attributed, for each potential CM scenario, according to participant's capacities; new ways to improve relevant information sharing between CM practitioners are made possible.

The recognition of common vulnerabilities and interests by parties involved in the CM process will help them manage actively the perception of threat, through the intentional interpersonal actions individuals can use to build trust (Williams, 2007)

INSTIGATING AND MAINTAINING INTERACTION: "As network actors develop relationships and interdependencies with one another through repeated interactions, trust increases, as does knowledge of the strategic calculus of other members." (Moynihan, 2008) Repeated interaction will allow for the update of CM network and adaptation to new CM scenario, and with trust increasing, for the development of a sense of belonging and community. The enrichment of relationships and CM capabilities by experienced reciprocity and trust will test and improve the allocation of responsibilities for the CM process, the value of information shared, leading to improved CM information sharing processes. Experience of respectful interaction, integrity of partner, and reciprocity develop interorganisational trust and strengthen partnership for CM success.

REDUCING JUDGMENT ERRORS AND INDIVIDUAL BIASES, AND DIMINISHING INCOMPLETENESS AND INCONSISTENCY OF COGNITIVE REPRESENTATIONS: The sharing of views between identified trusting partners will improve quality, robustness of CM plans and networks, as help discard irrelevant cues regarding CM network relationships. Trusting partners will be able to balance requirements for reciprocity in the CM process. They will focus on information relevant to the CM process, increasing their ability for realistic allocation of tasks in the CM process and keeping partnering expectations realistic, with a sense of balance and longer term perspective.

Network theory applied to emergency management stresses the need to confront interpretations for policy development, as "Legitimacy emanates from the interplay between legal interpretations, common understanding, and trust within a network." (Palm and Ramsell, 2007)

Expected crisis management (CM) benefits of formalizing networks of interorganizational trust relationships in an information system		**Trust (McEvily et al., 2003)**						
		Structuring: By structuring we mean the development, maintenance, and modification of a system of relative positions and links among actors situated in a social space.				Mobilizing: the process of converting resources into finalized activities performed by interdependent actors. Material and nonmaterial resources,(e.g. time, effort, attention, and knowledge), are decentralized and unevenly distributed among actors. Mobil		
		Transferability and Density.	Generative Capacity and Multiplexity.	Delayed Reciprocity and Stability.	Role Specialization and Nonredundancy.	Disclosing, Screening, and Knowledge Sharing.	Identifying and Committing.	Suspending Judgment and Safeguarding.
Formalizing (Vlaar et al., 2006)	Focusing participants' attention: Formalization helps participants in interorganizational relationships to focus their attention, thereby affecting their ability to make sense of their partners, the relationships in which they are engaged and the collabor	Identify individuals, organizations reliable for the CM process - Integrate to network	Recognize the need to enrich relationships and exchanges between CM practicioners	Recognize the temporary asymetry of input as part of CM process	Allocate responsabilities for CM process	Position information quality as crucial to CM process	Create a sense of belonging, likeness, and community	Recognize the need to accept vulnerability for the common goal/CM process
	Provoking articulation, deliberation and reflection:Formalization helps participants in interorganizational relationships to articulate, deliberate and reflect upon issues, thereby affecting their ability to make sense of their partners, the relationships	Explore possible extension of network for CM	Explore ways to enrich the relationship for CM improvement	Explore the accepted risk/vulnerability required by CM process	Detail roles and responsabilities for each potential CM scenario	Explore ways to improve relevant information sharing between CM practicioners	Recognize the common vulnerabilities and interests adressed by CM process	Manage the perception of threat
	Instigating and maintaining interaction:Formalization instigates and maintains interaction among participants in interorganizational relationships, and thereby affects their ability to make sense of their partners, the relationships in which they are enga	Update CM network, adapt network to new CM scenarii	Experience the enrichment of relationship and CM capabilities	Experience reciprocity and increase trust in CM process partners	Test and improve allocation of responsabilities for CM process	Experience, test value of information, improve CM information sharing processes	Develop sense of belonging and community through interactions, artefacts	Experience respectful interaction, integrity of partner, develop partnership for CM success
	Reducing judgment errors and individual biases, and diminishing incompleteness and inconsistency of cognitive representations held by participants in interorganizational relationships (affecting their ability to make sense of their partners, their relatio	Improve quality, robustness of CM plans and networks	Discard irrelevant cues regarding CM network relationships	Balance requirements for reciprocity in CM process	Increase ability for realistic allocation of tasks in CM process	Focus on information relevant to CM process	Keep partnering expectations realistic	Keep a sense of balance, longer term perspective

Table 1: a rationale for formalizing trust networks for CM

Elements of methodology

In order to assess the influence of formalization on interorganizational trust, and crisis management capabilities through sensemaking, we propose the following evaluation research, "an attempt to assess the worth or value of some innovation, intervention, service or approach." (Robson, 1993) Our research will occur during the preparation phase of crisis management, consisting of "actions taken when a disaster is anticipated or impending in order to ensure a rapid and more effective response." (Rantanen, Soini, Jaakkola, Leppniemi, Saari and Sillberg, 2009)

Our conceptual model is presented below (Figure 1).

Although our study's focus is on the effects of formalization, we acknowledge the meaningfulness of arrows in opposite directions; not being a longitudinal pre/post crisis study, this will not investigate the effect of sensemaking and crisis on trust and formalization.

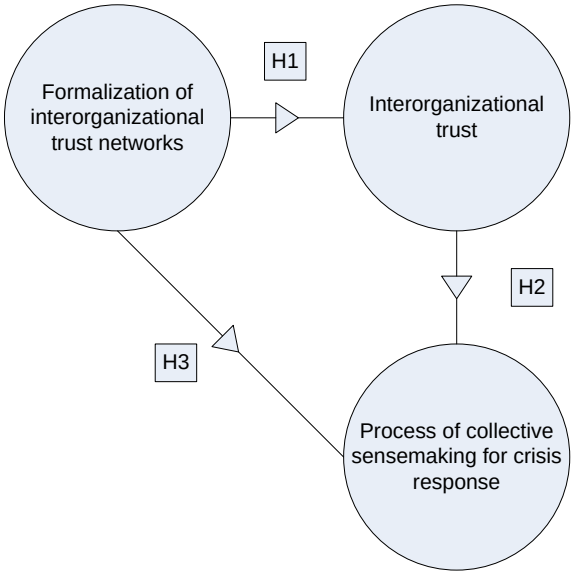

Figure 1: our conceptual model

Our hypotheses:

H1: The formalization of interorganizational trust networks has an impact on interorganizational trust.

H2: The level of interorganizational trust has an impact on the process of sensemaking for CM.

H3: The formalization of interorganizational trust networks has an impact on the process of sensemaking for CM.

Testing our hypotheses:

A mixed methodology will be used to be able to assess the usefulness of a system formalizing interpersonal trust relationships between organizations involved in the management of a crisis. The information collected will allow for the measure of interorganizational trust before and after formalization of the network, and for the assessment of the impact of the process and product of formalization on crisis management capabilities, through collective sensemaking.

Methods:

1. Identify a relevant context for research: relevant contexts for our study include critical infrastructures and municipalities as they typically mobilize networks of responders belonging to different organizations when struck by a crisis. (Palm and Ramsell, 2007; Boin and Smith, 2006; Tierney and Trainor, 2003)
2. Rely on local government CM agencies to identify a first set of organization to include in our study, and gain access to organizations. A snowballing approach will be used to complete the response network until saturation is reached. (Uhr and Johansson, 2007)

3. Carry out semi structured interview with managers before formalization: we will seek to identify pre-existing elements of sensemaking for CM (Muhren and Van de Walle, 2009), and assess the level of interpersonal trust between organizations.
4. Administer questionnaire on trust before formalization: we will measure the level of trust between representatives of organizations described by each responder as likely to be involved in the CM effort.
5. Carry out semi structured interview after formalization: we will seek to identify elements of sensemaking for CM, and assess the level of interpersonal trust between organizations.
6. Administer questionnaire on trust after formalization: we will measure the level of trust between representatives of organizations described by each responder as likely to be involved in the CM effort.

CONCLUSION

As crises tend to get worse, we believe with Boin (2009) that "the capacity to deal with some of these adverse events is growing". We have described in this paper the reasons why, as an antecedent to collaboration at the organizational and personal levels, trust is central to the activity of crisis response. We believe that modeling interpersonal trust relationships between organizations before crises can be an effective way to improve the overall response of parties involved in the management of a wide reaching crisis. As "we must develop new mechanisms for coordination in crisis management " (Waugh, 2003), we wish to contribute to the renewing of the approach to crisis management by the formalization of social networks, for a faster coordinated response to adverse events, and a better resilience of our society.

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