The communicative constitution of adaptive capacity during Sweden's Västmanland wildfire

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Abstract

Purpose – The purpose of this paper is to explain how adaptive capacity is accomplished through communication processes and can contribute to enhancing disaster resilience. The authors adopt a structurational “four flows” explanation of communication processes.

Design/methodology/approach – The authors observed and analyzed discourse in meetings of a crisis communication network consisting of representatives of municipalities and public authorities involved in crisis communication management during the Västmanland wildfire in Sweden.

Findings – Adaptive capacity during the wildfire was principally accomplished through the structurational communication processes or “flows” of self-structuring, activity coordination, and institutional positioning. These flows intersected demonstrating how communication accomplishes the development of a responsive affiliation, organizes stabilizing structuring practices, and enables adaptive structuring practices.

Research limitations/implications – The main contribution of this study is a communicative explanation for adaptive capacity, which draws from a structurational model of constitutive communication, and lends further understanding to improvisation during disasters.

Practical implications – The authors discuss the findings in relation to improvisation, suggesting how the findings can inform future coordinated crisis communication for the public and news media. The recommendations address how practitioners might build a responsive affiliation, use minimal structures (e.g. communication practices), and maintain flexibility by introducing group reflexivity behaviors.

Originality/value – The authors provide new theoretical and empirical knowledge of the communicative constitution of adaptive capacity during a disaster.

Keywords Resilience, Adaptive capacity, Communicative constitution of organization, Four flows CCO

Paper type Research paper

Disaster response literature often explains a community's ability to recover from a catastrophe as a function of the community's resilience (Cutter *et al.*, 2008; Normandin and Therrien, 2016; Norris *et al.*, 2008). Notions of community resilience refer to bouncing back to a “normal” state (Wildavsky, 1988), and as a system's “ability to absorb change and disturbance and still maintain the same relationships between populations or state variables” (Holling, 1973, p. 14). Several scholars have noted that resilience is a useful metaphor when applied to ecological systems to describe how impacted ecosystems return to a previous state following a disturbance (Norris *et al.*, 2008). However, researchers who examine how social systems, such as communities, prepare for and respond to disaster have critiqued the resilience metaphor for being preoccupied with outcomes of events, or properties that characterize a response, and as such, the metaphor obscures the processes of adaptation occurring in the midst of an unfolding disaster (for a thorough critique see Norris *et al.*, 2008). Due to these critiques, several scholars prefer to discuss resilience as a function of adaptive capacity (Adger, 2000; Klein *et al.*, 2004; Norris *et al.*, 2008).

Adaptive capacity refers to a community's ability to identify, mobilize, and stabilize response resources throughout the duration of a disaster event (Paton, 2006). Key response

resources include objects, conditions, and characteristics that people value (Norris *et al.*, 2008). The resource of interest in this study is crisis information, which varies in the extent to which it is available, accessible, and trustworthy (Norris *et al.*, 2008). These essential processes of adaptive capacity all occur through communication, and are currently under-explored in the extant adaptive capacity literature. Moreover, the capacity of a resource, like crisis information, to remain adaptive across an incident depends on the extent to which it is robust, redundant, and easily accessible (Norris *et al.*, 2008). Thus, we ask the following guiding question: how is information compiled, organized and made available to the public throughout an unfolding event such that it is robust, redundant, and easily accessible?

To investigate the guiding question, this study considers how communication unfolds as a constitutive process that links actors and organizations, and facilitates both the adaptive production and distribution of informational messages. This study proceeds in three parts: first, we discuss and critique the role of communication as it is conceptualized in extant disaster resilience literature, which focuses on adaptive capacity. We discuss how communication is understood as the transmission of messages, such that research examines properties (rather than processes) associated with conveying, receiving, or retaining information. Second, we provide an alternative way to conceptualize communication: as a constitutive, adaptive process. To that end, we offer a structurational “four flows” explanation of communication (Giddens, 1984; McPhee and Zaug, 2009), theorizing that agency representatives’ talk constitutes an organized response that provides both structure and possibilities for adaptation. Third, we examine how an ad hoc facilitated network of crisis communication specialists representing geographically distant municipalities and authorities in Sweden communicated to coordinate a disaster response to help citizens take precautionary measures during the 2014 Västmanland wildfire, the largest fire in the country in 40 years.

Through exploring how communication is a constitutive process at the heart of adaptive capacity, this study makes several contributions: first, it contributes to disaster resilience literature a constitutive understanding of communication as a process, which illustrates how communication practices allow for adaptive organizing during an unfolding crisis. Thus, we will explain how communication is more than information exchange, and that communication processes are at the center of inter-organizational efforts to construct an organized response to the uncertain conditions found in an emerging and expanding crisis. Second, this study contributes an empirical case to the growing area of theorizing on constitutive explanations of organizing through communication. Third, through unpacking communication as a constitutive process by which actors co-produce a disaster response (rather than considering communication as transmission of information), this case study highlights key instances in which communication processes or “flows” have impactful constitutive consequences (e.g. in connecting agencies and representatives, developing structured ways to interact, dividing responsibilities), and provides specific advice for designing communication practices (e.g. conducting interagency meetings and simulation drills, engaging in reflexive communication to improve coordination), which might be useful for municipal governments, communities, and emergency response organizations.

Adaptive capacity and communication

Adaptive capacity addresses how communities adapt to resource needs across the lifespan of a disaster event (Paton, 2006). Resources include objects (e.g. tangible and virtual informational messages, supplies), conditions (e.g. infrastructure, organizational network connections), and characteristics (e.g. creativity, flexibility) that people value and which are necessary for facilitating a disaster response (Norris *et al.*, 2008). Thus, capacity refers to the extent to which a community is able to respond to changing conditions by ensuring that necessary resources remain available, or at least, quickly accessible. Generally speaking, the

notion of adaptive capacity captures the idea that resources have dynamic attributes; that is, a given resource such as crisis information might vary in the extent to which it is robust (i.e. obtained from a reliable source), redundant (i.e. backed up or substitutable), or quickly accessible throughout a disaster (Norris *et al.*, 2008). Accordingly, an adaptive response to a crisis is one that monitors and attends to the robustness, redundancy, and accessibility of a resource – in this case crisis information messages. For instance, robust crisis communication messages are obtained from sources that have access to factual, correct, or otherwise helpful response information, while redundant crisis communication messages might be repeated or come from multiple sources. Overall, research on adaptive capacity tends to examine the community level, and is typically quantitative. Outcomes of adaptive capacity vary across authors; Norris *et al.*'s (2008) model of adaptive capacity, for example, identifies psychological wellness, population wellness, and quality of life as markers that a community's disaster response was effective. The notion of adaptive capacity is applicable to large-scale disasters that influence entire communities and require coordination across multiple agencies. Such events might include slow- and fast-onset natural disasters, disease outbreaks, and possibly terror attacks.

Broadly speaking, adaptive capacity refers to a community's ability to respond flexibly to an ongoing crisis through managing necessary resources throughout the event. According to Paton (2006), a community's adaptive capacity depends on acquiring necessary resources to address a disaster, relying on various competencies to mobilize available resources, developing strategies for addressing hazards using available resources, and ensuring that response strategies maintain the availability of resources over time as circumstances change.

The four activities of adaptive capacity identified by Paton (2006) depend on both structure and flexibility. On the one hand, structures such as rules, policies, procedures, best practices, established linkages among organizations, and member hierarchies (among other examples) provide frameworks that can aid members in understanding where and how to identify resources, and coordinate them in an orderly manner. Toward that end, researchers have explained the structured side of disaster response by examining networked interagency responses (Adkins, 2010; Kapucu *et al.*, 2010), and have used network analysis to demonstrate community capacity building through identifying markers of successful partnerships during such crises (Kapucu *et al.*, 2010). On the other hand, given that structures can be constraining, other scholars have emphasized the improvisational aspects of disaster response. Improvisation "involves reworking precomposed material and designs in relation to unanticipated ideas conceived, shaped, and transformed under the special conditions of performance, thereby adding unique features to every creation" (Berliner, 1994, p. 241). Improvisation is not an entirely spontaneous process, rather, it involves using what is already available, namely, minimal structures, to adapt to unexpected events (Eisenberg, 1990). For example, Wachtendorf and Kendra (2006) found that, through ongoing sense-making and improvisation, an ad hoc flotilla of watercraft developed a responsive affiliation, which evacuated Lower Manhattan amid the 9/11 attacks. Through first developing a responsive affiliation (which provided a minimal structure), boat captains were then able to coordinate the evacuation amid unfolding circumstances.

Communication and information comprises one category of adaptive capacity (Norris *et al.*, 2008). Other adaptive capacities include economic development, social capital, and community competencies (Bihari and Ryan, 2012; Norris *et al.*, 2008). Scholars are quick to acknowledge that "good communication is essential for community resilience or capacity" (Norris *et al.*, 2008, p. 140). However, within adaptive capacity literature, very little is known about what "good communication" looks like. When communication is examined, it often is treated as the transmission of information, a conceptualization that limits its explanatory power because it does not help us see what

communication does, builds or accomplishes. For instance, the aforementioned research examining the structural properties of community networks has paid little attention to the communicative processes that enact the networks, particularly the flexibility needed under changing circumstances (Kapucu and Hu, 2014; Nohrstedt, 2016). Similarly, improvisational studies have examined interdependent actions, but not the communication by which actions were coordinated (Wachtendorf and Kendra, 2006).

Extant disaster resilience literature clusters communication and information together as a necessary resource for crisis response (Norris *et al.*, 2008). From this informational view, messages, infrastructure, and narratives each – by virtue of being robust, redundant, and easily accessible – play a role in the capacity of a community to adapt both during a crisis, and as it recovers. First, the capacity to transmit messages effectively depends on the viability of communications infrastructure, as well as its redundancy in case of damage. Second, the capacity of the public to remain safe depends on residents receiving and heeding information from trusted, credible sources. Finally, communication, in the form of narratives, conveys meaning about a disaster event for community members who experienced it. These narratives play an important role in a community's capacity to learn from a disaster and prepare for the next one.

Conceptualizing “communication” as the transmission of information or lessons from an event results in focusing on specific characteristics of communication – particularly, the amount and adequacy of information conveyed through various channels (Putnam and Boys, 2006). When researchers limit understandings of communication to the amount or adequacy of informational messages exchanged, they miss the opportunity to examine how communication processes accomplish much more, particularly, how communication actively connects agencies, and structures the interactions that build the crisis response and contribute to adaptive capacity. The next section presents communication as a constitutive process that links actors and organizations, and facilitates both the adaptive production and distribution of informational messages.

The communicative constitution of adaptive capacity

Large-scale disaster responses often involve some kind of facilitated ad hoc network of responders. For example, in the Swedish context, the Swedish Contingencies Agency (MSB) facilitates networks of responders drawn from various municipalities, county administrations and public authorities. Similarly, in the US context, disaster response is facilitated by the federal emergency management agency, by filling an organizational hierarchy (the incident command system, ICS) with an ad hoc assembly of qualified people from around the country (Bigley and Roberts, 2001). Both of these examples of facilitated networks rely in part on loose structures that connect key personnel (e.g. the ICS hierarchy, or the MSB networks), while also relying on ongoing communication practices to enact a disaster response. Therefore, we might expect that the organization facilitating the network would employ generic organizational practices to, for example, coordinate action, structure operations and interactions, and respond to the needs of public constituents. Therefore, this study calls for a theoretical perspective that explains how a loosely pre-defined structure becomes enacted and modified through the communication practices of its assembled members.

There are several emerging schools of thought that explain the communicative constitution of organization (CCO), or, the communicative processes by which the phenomenon of organizing occurs (see Brummans *et al.*, 2014; McPhee *et al.*, 2014 for reviews). This study draws from a structurational account of CCO, referred to as the four flows model (McPhee and Zaug, 2009). The model emerged as most appropriate for this study of an ad hoc facilitated network due to its focus on ways that common types of organizational structuring practices, or “flows,” are maintained, altered, enacted, or

discontinued through communication between and among interactants. A structurational account of organizational communication focuses on communication as the central constitutive process that produces an organized, adaptive or resilient response, specifically one that monitors and attends to the robustness, redundancy, and accessibility of crisis information messages. In doing so, this study provides an explanation for how an adaptive crisis response comes forth from the uncertain and emergent conditions of an unfolding disaster. In particular, focusing on communication processes that bring agencies together and coordinate actions allows us to see that “communication” is not just an exchange of information, but rather the central mechanism by which a complex and large-scale crisis response becomes possible through ongoing interaction. It is this constitutive view of communication that sets this study apart from, and ultimately contributes to, the adaptive capacity literature, which tends to adopt an “informational” view of communication. In particular, we draw from a four flows model to explain how a facilitated, ad hoc network of crisis communications specialists enact communication practices that compile, organize, and make crisis informational messages available to the public.

The central theoretical mechanism driving structurational processes is the duality of structure (Giddens, 1984; McPhee *et al.*, 2014). Duality of structure refers to the interplay between overarching structure and individual agency. Structures are the rules members follow, and they act as resources upon which members base their actions (Giddens, 1984). Individual agency refers specifically to human agency, particularly human actors’ capacity to be self-reflexive and make intentional choices. The duality of structure captures the interplay between structure and agency such that structures might inform action, but members’ actions might reinforce, alter, or disregard a given structure thereby creating a new one. Communication scholars have appropriated aspects of structuration to explain how communicative action accounts for emergence, stability, and change in structuring organizational processes. A structurational explanation of organizational communication consists of four “flows” of communication (McPhee and Zaug, 2009; Browning *et al.*, 2009; McPhee and Iverson, 2009). Each flow is a type of communication pattern that organizes action in specific ways. Flows become evident when observing communicative interaction episodes across time.

Flows address types of communication that comprise how organizing efforts unfold. According to McPhee and Zaug (2009), membership negotiation refers to the connection between an actor and the organizing effort, particularly the actor’s role and personal investment in the effort, and his or her inclusion, identification, or assimilation with others who are involved. Reflexive self-structuring refers to communication processes such as devising and following rules and policies that provide a template for interaction among those who are organizing. Reflexive self-structuring aims to distinguish an organizing effort as a purposeful whole. Self-structuring messages are not directly about tasks, but rather communication regarding connections among people, norms, and roles; these messages serve a structuring function and provide a skeleton for connection. Activity coordination addresses the purpose for organizing – what the group came together to do, and how they plan to do it. This flow refers to communication episodes that involve dividing task-related labor, and determining the scope and authority for roles that enact tasks. Institutional positioning captures the relationships between the organizing effort and external audiences, such as stakeholders or constituents (McPhee and Zaug, 2009, p. 41). An ad hoc network of responders organizing during a disaster operates as a short-term organization, and the organizing effort can appropriate aspects of network participants’ home organizations (e.g. meeting structures, roles, communication technology, etc.), but also create new ones specifically designed for the network.

A structurational model of constitutive communication provides an explanation for adaptive capacity that simultaneously accounts for both the enduring nature of

organizational structures and the fluidity of ongoing organizing activities. The recursive relationship between organizational structure and human agency – the duality of structure – is the theoretical mechanism that explains organizational stability and change both within flows and where flows intersect. In particular, the structuration model locates the constitution of organization at the intersection of two or more communicative flows that draw on rules and resources from past interactions (i.e. structure), while at the same time drawing from, changing, or disregarding organizational structures in the present moment (i.e. as humans exercise agency). Each flow of communication entails episodes of interaction that generate social structures, but no single flow is sufficient to constitute organization. Instead, flows intersect such that the social structure generated through one communicative flow has the potential to set the conditions for communication in another flow. As McPhee and Zaig (2009) state, “In each flow, a sort of social structure is generated through interaction; and by allowing for one flow to control or condition another, the model allows for specifically organizational power” (p. 33). Moments of interaction in which flows intersect provide analytical markers for identifying instances in which ongoing talk accomplishes the flexibility, stability, or change of an organizing effort.

The few studies adopting the four flows framework have illustrated intersecting flows, nested relationships within and among flows, and the practical application of flows. For example, Browning *et al.* (2009) showed how self-structuring and activity coordination intersected in the Air Force as aircraft technicians devised entrepreneurial maintenance solutions in an otherwise rigid bureaucracy. Specifically, aircraft technicians followed a rather vague policy document that provided general guidance; the lack of detail in the document forced technicians to draw from local resources to fulfill the directive in innovative ways. Moreover, the policy’s lack of detail empowered technicians – who were in the best vantage point to identify and improve maintenance needs – to improvise workable solutions. Another study using the four flows framework showed how the activity coordination flow was comprised of knowledge production and sharing processes (Hansen and Canary, 2015). Demonstrating the practical application, particularly the break-down, of the flows, Bean and Buikema (2015) examined how dysfunction within the flows contributed to the decline and loss of control in al-Qa’ida.

The studies presented so far that draw from the four flows framework show how one flow of communication sets the conditions for communication within another flow. According to McPhee and Zaig (2009), it is at these intersections that it is possible to see how ongoing, everyday talk enacts both flexibility and existing structures; the present study adds to this body of work by showing the organizational potential of intersecting flows. Connecting the four flows model to adaptive capacity raises the question: how is crisis information compiled, organized and made available to the public throughout an unfolding event such that it is robust, redundant, and easily accessible? To better understand how the adaptive capacity of crisis information messages is managed through communication practices, we ask the following research questions:

- RQ1. What explanatory power can communicative “flows” have for understanding how adaptive capacity emerges for a network of organizations who coordinate to manage information about an incident?
- RQ2. What specific enabling practices do we find at the places where pairs of the communicative “flows” intersect?

The Västmanland wildfire

The 2014 Västmanland fire was the largest wildfire in Sweden in 40 years. Crisis communication representatives from numerous agencies and municipalities forming an ad

hoc network coordinated information for the public in response; agencies included Västmanland County Administrative Board, and the national Swedish Civil Contingencies Agency (MSB), among many others (see Table I). MSB has been developing a network model of crisis operation since the Bird Flu pandemic in 2006. MSB crisis networks periodically conduct practice simulations to prepare for unexpected events. MSB typically activates a pre-established network of crisis communication representatives from various agencies, municipalities, county councils, organizations, and authorities during crises concerning, for example, pandemics, CBRN events, or natural disasters. However, while such networks are common during certain events, there was no pre-established network for the Västmanland fire due to its suddenness and unexpected magnitude. As such, this particular fire response was unique because the network of crisis communication representatives was largely ad hoc. When the wildfire grew out of control, the County Administrative Board requested that MSB facilitate a network to coordinate crisis communication. Upon this request, MSB established a network of representatives from 24 organizations (e.g. municipalities, local and national authorities) over the course of the wildfire.

MSB established and maintained the crisis communication network through a series of ten telephone meetings, which followed a structured agenda led by a coordinator from MSB. The meetings followed a consistent structure involving roll call, reports from each representative regarding public information needs, crisis communication efforts already under way, and proposals for further communications activities needed. This agenda and network model was developed during previous events (e.g. H1N5 “Swine Flu” pandemic in 2009). The meetings established a common understanding of the fire situation, the public’s informational needs, and each network member’s communicative activities. The meetings also allowed network members to coordinate crisis communication messages

Organizations present	Meeting									
	1	2	3	4	5	6	7	8	9	10
Vastmanland County Board	x	x	x	x	x	x	x	x	x	x
113 13	x	x	x	x	x	x	x	x	x	x
SOS Alarm	x	x	x	x	x	x	x	x	x	x
MSB	x	x	x	x	x	x	x	x	x	x
Krisinformation.se	x	x	x	x	x	x	x	x	x	x
1177 Health Care Guide		x	x	x	x	x	x	x	x	x
Swedish Transport Administration	x	x	x	x		x	x	x	x	
Dalarna County Board		x		x	x	x	x	x	x	x
Swedish Board of Agriculture		x	x	x	x	x	x	x	x	
Swedish Forest Agency		x	x			x	x	x	x	x
National Board of Health and Welfare		x	x			x	x	x		
Swedish National Food Agency			x		x	x	x	x	x	
Public Health Agency of Sweden		x	x	x		x				
County Health Administration Vastmanland	x									
SVA, National Veterinary Institute	x	x								
Municipalities' representative	x					x				
Insurance Sweden							x	x	x	x
Insurance Agency							x	x	x	x
National Board of Housing, Building and Planning							x	x	x	
Consumer's Insurance Bureau							x		x	
LRF, Federation of Swedish Farmers							x			
Swedish Tax Agency							x	x		
Swedish Environmental Protection Agency								x	x	

Note: An x denotes that the organization listed was present in the meeting

Table I.
Organizational
representation across
the ten meetings

through using the web interface called MyPages – a central online database for questions and answers. Network members wrote, verified, and deleted evolving questions and answers about the wildfire, which were then published on the public national crisis website (i.e. Krisinformation.se). Local and regional responders provided links to the Q&A page from their own organizational webpages, while the Q&A page reciprocally embedded links to those same regional authorities. The emergency hotline 113 13 relied on the Q&A information to answer questions from the public, and media outlets relied on it for their reporting on the fire.

Methodology

To study how communication contributed to adaptive capacity during the wildfire, the second author, with MSB's and participants' permission, observed all ten of the network's telephone meetings during a two-week period of intensive fire fighting (between August 6 and August 22, 2014). Participating organizations are listed in Table I. The meetings were recorded, transcribed, and translated from Swedish to English, yielding 233 pages of single-spaced text. The second author also obtained memos written by MSB's coordinators after the meetings, and gained access to iterations of the Q&A page as it changed with the fire's progression. The recorded meetings comprised our data set for this study, while the memos and Q&A pages were background information.

Data analysis

Four flows theorizing informed our methodological decisions for applying the model in analyzing the data. Our analytical focus when using the four flows approach was relatively inclusive and thematic. Each flow directed analytical attention to categories, or themes, of talk and messages. In the first step of our analysis, we conducted a general reading of the meeting transcripts and coded each meeting for emerging content. This process highlighted the progression of events across the ten meetings and served as an inductive, open coding process. Second, we deductively coded (Hennink *et al.*, 2011) the transcripts for evidence of the structurational flows, as defined by McPhee and Zaug (2009), and provide data excerpts for each in Table II. Deductive coding refers to noting concepts or themes one might expect given previous research or theorizing (Hennink *et al.*, 2011). To identify membership negotiation, we examined the data for talk about one's connection with, and inclusion in, the crisis response network. To identify reflexive self-structuring, we coded for talk in which the network members developed or reinforced their rules and procedures for how to interact with each other during the meetings, and instances in which they enacted those procedures/structures. To identify activity coordination, we coded for talk in which network members described resource needs (e.g. the public's information needs, maps, phone numbers, etc.), and how they planned to work together to establish and develop the common question and answer database. To identify institutional positioning, we noted all network participants' communication during meetings that positioned the network in relation to external audiences, and tracked it across the meetings and incident. During the coding process, we compared coded transcripts and reflected on the consistency of the emerging code labels (Hennink *et al.*, 2011). When we encountered coding discrepancies, we talked through differences until we reached an agreement on how to code the given passage. Finally, we selected quotes illustrating the findings.

Findings

The notion of adaptive capacity generally refers to ways that crisis response activities identify, acquire, and manage resources over the duration of a crisis event; this study focused on how informational resources (see Table III) were managed. The research

Flow	Operational definition	Sample quote
Membership negotiation	Communication integrating people as members to the network	[MSB]: this is the start of a joint work around questions and answers and a common management of questions over phone, we will tell you later about how to work in the tool that MSB supports with called My Pages, but can I ask a short question, I call on you if anybody is inside My Pages and if you know how to use the tool, I start with County Administrative Board, do you have access to My Pages? [County administrative Board]: Yes, I have access but I never used it [MSB]: Good, then I know that you have access, eh, [name] representative of the municipalities [Representative of municipalities]: I have access, I have been inside and added questions, I think I get it [MSB]: good. Eh County Health Administration Vastmanland, I just want to ask you if you have access to the tool My Pages where we jointly add questions and answers [CHAV]: I have access to the tool yes, but not been inside yet [...] [MSB]: we almost know each other, but it is great if you say who you are before you answer, so we know who thinks this is a great idea, eh I understood that [name] thinks this is great, County Administrative Board: what did you say? [...] [CHAV]: these contact details, who are we supposed to send them to?
Reflexive self-structuring	Communication structuring how network members will interact with each other	[MSB]: together we generate as many general questions and answers we can, consolidate answers and questions already generated and then continuously add and update, and if such work is done together by all involved that have a role [in crisis management] then you have a joint question database that all can fetch from, it will not be different versions of cut and paste, so all actors that want can get these questions and answers to their own web page or use in their own communication, and eh then the risk is extremely lower that messages diverge, and I think it is terribly important that all information is confirmed and true, when there are perhaps rumors or different versions, and eh we have a possibility to do this together through a crisis communication network, through short check-ins and by working in the same tool. This should also relieve authorities that experience a large pressure over their phones, if we give 113 13 as much support as possible so they can answer questions, then municipalities and others can manage the local problems
Activity coordination	Communication contextualizing and delegating coercion (and transforming structural resources)	[MSB]: to start, before we work on questions and answers, eh I want to get a short check in of the situation concerning communication with the public, and you can report shortly what is happening [...] [Dalarna County Board]: yes, [name] here from Dalarna County Board, eh we mostly disseminate information from the Vastmanland County Board, and we use our Facebook page very much, eh we also check the situation continuously since we are the closest region. That's it
Institutional positioning	Communication positioning the network in larger social systems	

Table II.
Data excerpts
illustrating each
of the four flows

Source: (McPhee 2015)

Meeting content	Meeting										Communicative constitution of adaptive capacity
	1	2	3	4	5	6	7	8	9	10	
Information sources (contact information for crisis communication representatives)	x	x									171
Venues for information dissemination	x		x	x					x		
Justification for using the “Questions and Answers” database	x										
Explaining how to use the “Questions and Answers” database	x										
Contact information for those responsible for “Questions and Answers,” where Q&A published	x	x	x								
Use of the emergency number 113 13	x								x		
Reference to 1177 for medical questions	x				x						
Regulatory Notice about using 113 13 (SOS Alarm)	x								x		
Dissemination strategy for using MyPages and generating Q&As		x		x	x	x	x	x	x		
Dissemination problems: too many, outdated questions on Q&A database		x	x	x	x				x		
Language translation services (need for)	x	x				x	x				
Specific resident information:											
Fire location, activity	x	x	x	x	x	x			x	x	x
Health concerns	x	x	x	x	x				x	x	
Utilities: damage, power outages			x			x					
Recovery: property damage compensation				x	x	x	x		x	x	x
Transportation closures, openings	x	x	x	x	x	x	x	x	x	x	x
Insurance information							x	x	x	x	
Tax, insurance expertise available								x			
Note: An x denotes that the content listed was discussed in the meeting											

Table III.
Informational resource needs

questions asked: what explanatory power might communicative “flows” have for understanding how adaptive capacity emerges for a network of organizations who coordinate to manage information about an event? And, what specific enabling practices do we find at the places where pairs of flows intersect?

Overall, deductive coding of flows revealed that three of the four flows were present in the data set: reflexive self-structuring, activity coordination, and institutional positioning. One of the flows, membership negotiation, was minimally present during the meetings. One possible explanation for this was that the data were limited to the telephone conferences, and did not include the contacts taken by the MSB coordinators in order to recruit participants of different authorities and organizations to the network. We believe that if we had observed those conversations, we might have seen more evidence of membership negotiation.

Theorizing on the structurational “four flows” model describes moments for change or adaptation unfolding at the intersection of two or more flows (Browning *et al.*, 2009; McPhee and Iverson, 2009; McPhee and Zaug, 2009). Indeed, our findings located evidence for a communicative explanation for adaptive capacity at such intersections, and include the communicative constitution of a responsive affiliation, stabilizing structuring practices, and adaptive structuring practices.

Communicatively constituting a responsive affiliation: institutional positioning and activity coordination

We found that communication identifying resources and competencies occurred at the intersection of institutional positioning and activity coordination flows. Institutional positioning addressed how network members represented and related to those external to the network, namely, constituents; and activity coordination captured how actors identified informational resources and their division of labor for disseminating crisis information. The intersection of these two flows illustrated how the crisis network developed a responsive affiliation.

A responsive affiliation refers to coordination among previously unconnected individuals to develop an emergent group for taking action amid unfolding circumstances (Wachtendorf and Kendra, 2006). The institutional positioning and activity coordination flows intersected to develop a responsive affiliation as network members communicated to devise and revise strategies to make informational resources available. For example, crisis communicators established an informational network across various organizational websites. When deciding how to address emerging issues in Meeting 2, the moderator said:

This meeting is supposed to be very much focused around questions and answers that all of you add into MyPages. There has been a lot of content added this morning, and it feels urgent that these questions and answers that are being directed to 113 13 [the crisis hotline] are entered in the MyPages, so that we can get these FAQs [frequently asked questions] published on your [organizational] websites as well as [the national crisis information website] krisinformation.se

The above excerpt shows how the moderator acknowledged the onslaught of information added to the crisis hotline (113 13), then identified informational resource needs (e.g. information directed to 113 13 needs to also appear in MyPages to serve the common Q&A database), and finally split the division of labor among organizational representatives by asking them to publish the information on their home websites as well.

Examining the intersection of activity coordination and institutional positioning flows helps explain how a responsive affiliation occurs through communication. Such an explanation is helpful for examining how the network ensured the robustness and redundancy of crisis messages when a key informational venue malfunctioned due to high web traffic. In Meeting 2, several participants reported they did not have access to MyPages. To make matters worse, the website of the county government of Västmanland, where crisis information was published, had technical problems, which meant that communications professionals could not update the website with new information. The County Board representative noted:

There are problems with our uh web tool. Right now, we cannot update our website but we are working through Facebook and Twitter to get information out to the public. It is not that the web is down, it's that our web tool is currently down. However, people can read what was posted lately on Facebook and Twitter, and can access questions [and answers] on evacuation.

The County Board representative notified the rest of the crisis communicator network both about problems with their website, which did not have sufficient capacity during the crisis, and a work-around for disseminating information through social media platforms (Facebook, Twitter) that provided redundancy. The crashed website prompted crisis communicators to use common social media platforms to disseminate information. For example, the chief communication officer of the county board used her own personal Facebook account to convey crisis information before they could redirect the public to MSB's website (Krisinformation.se). It is possible the responsive affiliation of crisis communicators was even better able to provide time sensitive updates via Facebook and Twitter due to the ubiquity of these platforms in everyday life. Hence, that the County Board's website crashed early during the wildfire prompted an improvisational response through coordinating institutions and information by using existing, robust communication platforms in unplanned ways to foster redundancy of information, and to make the information easily accessible to the public.

Moreover, a major change in the responsive affiliation took place in Meeting 7 as representatives from Swedish Insurance, Insurance Agency, Building and Planning, Consumer's Insurance Bureau, LRF (the Federation of Swedish Farmers), and the Tax Agency were invited to join the meeting (Table I). While the issues in need of coordination had changed, these representatives' participation in the meeting also changed the composition of the responsive affiliation, and in doing so, altered the group's understanding

of informational needs, and the division of labor among network participants. In particular, as the fire situation progressed, crisis communicators began transitioning from acute, emergency information needs to longer-term informational needs regarding residents' concerns about insurance, tax, and re-building lost structures. This quote illustrates that some organizations transferred to stand-by mode, as commented by the moderator:

Swedish Veterinary Association and the Public Health Agency have told us at this stage that they will attend again when it- when there is an issue that really involves them but they are naturally prepared to support if needed.

This quote illustrates that the Swedish Veterinary Association and the Public Health Agency were no longer participating since there was no issue involving them anymore. They had been concerned with public informational needs concerning the evacuation of animals and the danger of the smoke from the fire. The changing composition of the network as the crisis progressed, combined with the changing informational needs, raised an additional capacity to the information: that is, in addition to robustness, redundancy, and accessibility, crisis communications professionals should also consider the timeliness of information. For example, it would make little sense to address long-term information needs (e.g. insurance information) when managing acute concerns such as evacuation. Likewise, just because acute information needs have waned does not mean the crisis information response is finished; instead, information needs switch toward long-term concerns.

Stabilizing structuring practices: institutional positioning and self-structuring

Our findings showed that stabilizing structuring practices emerged at the intersection of institutional positioning and self-structuring. Stabilizing structuring practices included efforts to devise rules and procedures for the network of crisis communicators to follow in their meetings; these rules and procedures were “stabilizing” because they provided a sense of order and predictability to the meetings. Institutional positioning captured the way network members represented constituent interests in the meetings, while self-structuring addressed metacommunication about, and following of, the agreed rules and procedures. Stabilizing structuring practices most notably included the roll call of participants, which highlighted the organizations present, and the reporting of information needs and communication activities. Participants were, for example, reminded by the moderator to say the name of their organization before speaking to ensure that all could follow who was talking. These seemingly mundane practices were important to note because they gave crisis communicators a systematic procedure for identifying the organizations represented and their constituents' information needs such that none would be overlooked:

Moderator: this is the coordinating function of MSB, and it is [name] who will lead this meeting. You are welcome, and today we will update each other on what happened during the past 24 hours and we are going to discuss questions and answers, and during the meeting I want you to put yourselves in silent or speaking mode by pushing the star on your phones. [...] I proceed to the agenda for today and will start with a roll call of participants, and I want to know if the County Board of Västmanland is here

CBV: yes

The meeting procedure structured how organizational representatives participated in identifying informational needs across their various local areas and in relation to their organization's specific areas of concern. Stabilizing structuring practices likely contributed to efficient meetings by providing a predictable scaffold for interaction (Majchrzak *et al.*, 2012), which contributed to making sure information the group needed to post on the MyPages site was complete and, as such, robust. Stabilizing structuring

practices included both talk about, and following, the agenda during each phone call. Flexibility was maintained, and participants were not unduly constrained, since the agenda included an “open” item, in which anyone could suggest new issues that were not previously discussed.

Adaptive structuring practices: activity coordination and self-structuring

Adaptive structuring practices emerged at the intersection of activity coordination as members decided what to do, and self-structuring as network members engaged in metacommunication about procedures to follow (and as they followed those procedures). Adaptive structuring practices were evident as members devised new procedures for handling emerging issues, including addressing information in other languages, eliminating outdated questions and answers, and simplifying the over-abundant information on the website.

In Meeting 2, the MSB moderator asked if anyone had questions to the representative from the crisis hotline 113 13, and the representative from the national emergency number 112 said:

[...] is there any need to answer questions in English and is there a need to provide information referring to 113 13 in English besides Swedish? (over) [name] at Krisinformation.se the languages we were given information are needed have been Somali and Finnish and English and then someone mentioned that there are quite a few Germans that have cabins in these areas, so those languages are probably the most applicable. I just worked on getting VMA [the general alert “Important Message to the Public”] translated into Finnish and German [...] there is probably an interest but I do not know exactly how big it is.

The above excerpt illustrates the importance of adapting the information to needs of the public to get information in other languages than Swedish. A refugee accommodation for Somalis in the area, and cabin owners with other nationalities as well as a population of Finnish speakers (a recognized minority language in Sweden) had been noticed, and thus the organizations coordinated crisis information had to respond to these needs that were previously not considered.

Furthermore, from Meetings 4-9, representatives struggled with the problem of having too much information on the Q&A page, which resulted in difficulty finding the most recent questions and answers, sifting through outdated questions, and encountering conflicting information. As a result, the crisis communication representatives developed new ways to delete old questions, and devise a more streamlined Q&A page. For instance, in Meeting 9 a representative from Krisinformation.se said, “There is plenty of information [on the Q&A page], but the media has criticized the lack [of information] [...] When you are about to add a new query, check what is already there so we avoid having outdated information.” This excerpt shows how crisis managers revised the time order with which they made updates to MyPages. In doing so, they altered their self-structuring to add an extra step before posting new content. This allowed them to avoid cluttering the site with too much redundancy or outdated information, and pushed them to rely on each other’s knowledge of the new procedure to fix emerging problems with it.

Crisis communicators also altered their process of updating MyPages toward the end of the fire incident when the public Q&A page had amassed a substantial number of questions and it was becoming difficult for users to find questions and answers. Meetings 9 and 10 involved discussion about how to edit MyPages to remove outdated questions, to devise an easier-to-read version of the Q&A page, and to provide questions and answers about enduring (rather than short-lived) issues related to the fire. For example, in Meeting 9 the Chair said: “We’ve talked about the need to post questions and answers here that are long-lived – that uh apply over time, and are more general.” In these final meetings, the Chair acknowledged that the purpose of the Q&A page should shift since the fire incident was

winding down. Instead of posting a wide array of questions and answers, the new goal of the Q&A page was to display information with longevity – addressing residents' longer-term concerns in the aftermath of the wildfire.

Discussion and implications

Information and communication are considered to be central resources with adaptive capacities, that is, informational messages and communication activities fluctuate throughout an incident based on communications infrastructure, the promptness with which community members heed messages, the credibility of the messages themselves, and the ability of the community to learn from previous disasters (Norris *et al.*, 2008). This study contributes to literature on adaptive capacity, particularly in unpacking the role of communication processes in making crisis information readily accessible to the public, and ensuring that the delivery of the information is robust and redundant. Our study shows how “communication” of crisis information messages is more than just the transmission of them to the public. Rather, we demonstrate an ongoing organizing process among a facilitated network of crisis communications specialists who compiled, organized, revised, and made crisis information available through a combination of stable, yet flexible communication practices. The infrastructure they used was the central MyPages Q&A database which provided relatively up-to-date information about concerns grounded in the communities that network members served. While the focus of the present study was on network members' efforts to coordinate crisis information using the MyPages technology, future research examining more closely the various appropriations of the MyPages technology (in line with DeSanctis and Poole, 1994) would be fruitful. The Q&A database was updated based on concerns raised in the phone meetings. Due to the central database operated and facilitated by the national Swedish Contingencies Agency, MSB, and published on the national crisis website “Krisinformation.se,” residents and media representatives knew the information they were receiving was from a trusted governmental source. Discussion during the phone meetings addressed the timeliness, accuracy, and credibility of the messages posted to the database.

This study also contributes to theorizing on the structural four flows model of CCO. The four flows model has been critiqued for its limitations in providing specific enough explanation of the ontological existence of an organization (Bisel, 2010; Sillince, 2010; Taylor, 2009). However, the present study shows the utility of the four flows model in examining how communication flows have organizing potential. We offer a borderline case showing a temporary network organization in which three of the four flows were present in the data. Our findings also show where flows “intersected” such that one flow set the conditions for another flow (see McPhee and Zaug, 2009, p. 33). Thus, our findings shed light on communication processes that create and sustain an improvisational organized response.

Adaptive capacity as improvisational communication

Scholars of adaptive capacity argue that disasters cannot be handled by routine protocols and procedures alone, and that effective disaster responses require improvisational responses (Cutter *et al.*, 2008). At the heart of improvisation is the idea that minimal structures provide recognizable patterns that serve as springboards for creativity (Berliner, 1994; Eisenberg, 1990). For example, jazz musicians recognize particular musical phrases that they can build upon while “jamming” to take a musical composition in a new direction. Musicians are able to jam in such a way because musical phrases provide a minimal structure, which lends some degree of predictability to the direction of the music. Our findings suggest that interagency responses to disasters can remain adaptive through three types of minimal structures enabling improvisation.

First, stabilizing structuring practices occurring through communicative routines or procedures can enable adaptive capacity by providing a scaffold for exchanging and making

sense of information, identifying and mobilizing available resources, and tracking resource needs and uses over time. For instance, stabilizing structuring practices provide a minimal structure that serves as a forum for communication in which members might set evolving priorities, and coordinate action in improvisational ways. However, professionals should not rely on stabilizing practices alone because they can hinder disaster response by contributing to communication patterns that are resistant to change (Castor and Bartesaghi, 2016; Weick, 2005). Our findings also suggest that network members should be able to join and leave the group, and as they do so, they should be able to influence group procedures. Next, considering adaptive structuring practices from a structurational communication perspective invites us to reflect on ways that adaptation arises as network members decide on their priorities and needs, while remaining open to changing their interaction processes to meet those needs. In particular, our findings relate to the reflexive self-structuring and activity coordination aspects of the four flows model; specifically, our findings suggest that members of a newly-formed network must have latitude to decide how to organize among themselves, given the changing conditions they face.

Recommendation: reflexivity behaviors. We suggest that disaster response agencies and organizations should cultivate collective reflexivity behaviors; reflexivity refers to deliberately discussing collective goals, outcomes, and processes so they can be adapted as needed (Schippers *et al.*, 2014). Network members might introduce reflexivity about whether and how effectively their coordination efforts are working through adding interruptions in their group process that would allow them to evaluate what is and is not working; they might include debriefings that invite metacommunication about how they might coordinate more effectively; or, they might explicitly delegate certain network members to be in charge of particular areas of information.

Second, an important, but rarely discussed, aspect of improvisation is understanding the responsive affiliation. As the fire progressed, the responsive network affiliation changed as new organizations became involved in later stages. At first, activity coordination and crisis communication to the public centered around information on evacuation, roped-off dangerous areas and roads, water bombing and roped-off lakes, while later, issues such as risks on returning, entering damaged forest as well as deforestation and reimbursement, re-building of houses, and moving back cattle (among others) were managed. As a consequence, organizations involved in these issues participated in the network meetings. Based on our findings, we suggest that minimal structures facilitating improvisation can be applied to deliberate development of responsive affiliations. The present study applies the four flows model of constitutive communication to examine how communication activities constituted a facilitated network of crisis communication professionals that responded to a wildfire crisis. Considering how a facilitated network response becomes possible directs our attention to how members of that network come to be connected in the first place, thus, it is necessary to make the responsive affiliation explicit and focal.

Recommendations: network meetings and simulation drills. Our findings show the importance of developing network ties that connect among key organizations involved in responding to the crisis. It is common for agencies and organizations to engage in simulation exercises to train representatives on how to coordinate with each other when a crisis happens (Bergeron and Cooren, 2012). These simulations often involve those in command positions. However, our study highlights the importance of involving crisis communication specialists. Organizations and governments should consider formalizing a responsive affiliation of crisis communication professionals to train alongside incident command personnel in simulation drills. They should also provide opportunities for ad hoc network building among these agencies and representatives so they can become familiar with each other's competencies, informational needs, and jurisdictions. In addition, representatives that join the network should be allowed to have an influence on the agenda that gets discussed.

Conclusion

This study draws from a structurational view of communication that focuses on communication as a constitutive process that produces an organized response. Focusing on constitutive communication processes that bring agencies together and coordinate actions allows us to see that “communication” is not just the exchange of information, but rather the mechanism by which complex and large-scale crisis responses become possible through ongoing interactions among a range of agencies and organizations, especially when organizational representatives are dispersed across a geographic area. It is this constitutive view of communication that sets this study apart from, and ultimately contributes to, the adaptive capacity literature, which tends to adopt an “informational” view of communication. An informational view of communication focuses on the amount and adequacy of information exchanged between parties, rather than on ways communication processes play a central role in building, or structuring, the trajectory and implementation of the crisis response itself. This study showed how a network of previously unconnected crisis communicators drawn from various agencies rapidly comprised a responsive affiliation that developed an emerging, structured response to a major ongoing disaster event. This responsive affiliation managed public crisis information (i.e. the primary resource at stake) across ten teleconference meetings spanning 16 days (i.e. intersection of institutional positioning and activity coordination). Overall, the crisis communicators acquired, organized, deleted, and disseminated crisis information through a combination of stabilizing structuring practices that provided a scaffold for interaction. In particular, their meeting structure provided a consistent procedure by which they could address major informational needs of the agencies represented while avoiding interacting in overly rigid ways amid changing circumstances (i.e. intersection of institutional positioning and self-structuring). Finally, the network of agency representatives employed adaptive structuring practices as they encountered changes in informational needs that required them to tweak their meeting and operating procedures (i.e. intersection of activity coordination and self-structuring). As a consequence, the ad hoc network, organized around a minimal set of structures, successfully enabled adaptive capacity among members. Overall, our findings provide a communicative explanation of adaptive capacity, which contributes additional insight into ways that adaptive capacity is an improvisational process. In this way, our study demonstrates the communicative performance of adaptive capacity, and from that, we contribute recommendations that can enhance interagency disaster response operations.

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