Crisis management at the borders:
Unfolding practices of "boundary work" in a transboundary crisis

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Résumé :

While the literature has acknowledged the importance of reshaping boundaries to response to a crisis, little is known about how such a process unfolds when boundaries are multiple and ambiguous. Drawing on the concept of "boundary work", i.e., how actors individually and collectively shape boundaries between organizations, this article explores the practices of boundary work that intervene in the process of a transboundary crisis. We build a qualitative case study of the Mont-Blanc tunnel fire in 1999. We depict this crisis as a process in which boundaries' permeability varies, through three main practices performed by actors across multiple borders: borders interlinking, borders endorsing and borders negotiating. Those findings contribute to the research on crisis management, by explaining how the plurality of boundaries facilitate or block the resolution of the crisis. We also enrich the literature on boundary work by enlightening its collective and dynamic nature.

Mots-clés : Crisis – Transboundary – Boundary work – Process- Practices.

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1. INTRODUCTION

The "grand challenges" of our contemporary world exacerbate organizations' interdependences (George and al., 2016), leading "transnational corporations and nation-states to both compete and collaborate" (Beck, 2008, p. 797). Consequently, we are witnessing the rise of transboundary crises (Boin and al. 2014; Noordegraaf, Douglas and Klem, 2017), which occur across geographical, political and organizational boundaries, such as the recent and controversial European migratory crisis. Moreover, in the actual context of a global pandemic, managing transboundary crises becomes a growing and urgent concern for scholars and practitioners, as it generates issues that go beyond established organizational principles (OCDE, 2003; Ansell, Boin and Keller, 2010).

The prominent literature on crisis management acknowledges the importance of collective responses, through coordination (Wolbers et al., 2018) or sensemaking (Maitlis & Sonenshein, 2010) for instance. Prior studies show that crises often involve a multiplicity of organizations, who need to move beyond pre-existing organizational boundaries, in order to integrate their distinct schemes of interpretation and action (Bechky & Okhuysen, 2011). Scholars have thus recently called for a better understanding of the transboundary nature of crises (Wolbers et al., 2018; Langley and al. 2019). Little is known about how actors redefine and renegotiate multiple and intermingled boundaries (Ansell, Boin and Keller, 2010), in particular in a context of uncertainty, ambiguity and urgency (Hirshleifer and Hong Teoh, 2009). In line with this call, we suggest considering crisis as an of ongoing process of defining and modifying organizations' boundaries (Stjerne & Svejenova, 2016).

To do so, we draw on the concept of "boundary work", i.e., the individual and collective practices that shape the social, symbolic, material and temporal boundaries between organizations (Langley and al., 2019). Examining boundary work implies considering boundaries as socially constructed frames used to interpret and act during a crisis. It provides a lens to focus on how boundaries' permeability varies through the crisis process (Beckman &

Stanko, 2020), and to characterize the collective practices that emerge to redefine boundaries (Stjerne & Svejenova, 2016). We thus address the following research question: how does boundary work unfold in a transboundary crisis, in which boundaries are multiple and ambiguous?

To address this question, we build a qualitative case study of a transboundary crisis, the Mont-Blanc tunnel fire in 1999, which involved a plethora of actors from different organizations. Through an inductive analysis of this crisis, we reveal three main practices of transboundary work: borders interlinking, borders endorsing and borders negotiating. For each practice, we describe how actors modify, create or maintain organizational and national boundaries to achieve integration. Those results contribute to enrich the literature on crisis management and on boundary work. First, in line with recent calls, this study contributes to better understand how crisis processes unfolds in a context of plurality of boundaries. Our results highlight boundaries' permeability as a critical driver of the process of crisis. Second, our case study provides insights on collective and dynamic boundary work, while prior literature has mainly focused on individual practices.

The article is structured as follows. First, we present our theoretical background, which articulates the literature of transboundary crisis with the concept of boundary work. Then, we expose our methodology and our findings. We conclude with a discussion of the contributions and limits of the study.

2. THEORETICAL BACKGROUND

2. 1. THE RISE OF TRANSBOUNDARY INTEREST IN CRISIS MANAGEMENT

Research on crisis started with Hermann work on organizational crisis, defined as "*a phenomena that (1) threatens high-priority values of the organization, (2) presents a restricted amount of time in which a response can be made, and (3) is unexpected or unanticipated by the organization*" (Hermann, 1963 : 64). Additionally, some authors contributed to enrich Hermann's definition by emphasizing a processual perspective of a crisis by contrast to this event-driven approach (Roux Dufort, 1997; Trousselle, 2014). In this more recent perspective, crisis is consider as a process with different stages (detection, crisis response, post crisis learning phase) that go beyond the analysis of a triggering effect (Forgues, 1993 ; Mason, Drew and Weaver, 2011). In particular, phase of response in process-based approaches to crisis becomes a significant part of the crisis because it tends to reassess

the role of actors (organization or individuals) (Pearson and Clair, 1998; James and al, 2011; Williams and al, 2017). Their actions can indeed impact, positively or negatively, the trajectory of the crisis and can then exacerbate or slow its spread. Several example in crisis management highlight the negative "snowball effect" by often relying on an accumulation of human, technical and environmental dysfunctions leading to a crisis vicious circle (Shrivastava, 1987 ; Pauchant and Mitroff, 1990).

By emphasizing the crisis impact on stakeholders, crisis management tend also to extend the scale of crisis analysis and highlight the importance of inter-organizational (and institutional) features in these situations (Pearson and Clair, 1998; James and al, 2011; Williams and al, 2017). We could argue for example that Shrivastava analysis of Bhopal crisis was processual in the sense he analyzed the Union Carbide crisis as a combination of several environmental and human dysfunctions that are not limited to its triggering event (i.e a gas leak in a plant in Bhopal). By doing so, the analysis was not limited to operators' errors in the plant (human dysfunctions in a single organization) but also involved the role and responsibility in the actions of a broader network (organizations and states) (Shrivastava, 1987). This change in scale make authors aware of various inter-organizational challenges in crisis response: problems of effective communication (Hilliard, 2000) or collaboration and coordination issues between actors that are not familiar with each other (Comfort,2006 ; Kapucu, 2006 ; Moynihan, 2009 ; Waugh and Streib,2006). This crisis response failures are often emphasized in the literature through delay in responses, conflict between responders, misunderstanding or transfer of responsibilities (Ansell, Boin and Keller, 2010; Kendra and Wachtendrof, 2003).

But despite an abundant literature, the evolution of the nature of crises in the contemporary society challenges existing knowledge on crisis response. First, the unpredictable and turbulent nature of crisis situations makes it difficult to define *ex ante* who will engage in which part of the response (Rimstad and Sollid, 2015), and thus to anticipate formalized coordination practices and processes. Second, the emergence of new organizational forms with permeable, dynamic and ambiguous contours, such as business ecosystems (Hannah and Eisenhardt, 2018), open-labs (Lifshitz-Assaf, 2018) or open teams (Crampton and Hinds, 2014) generate problems in adjusting organizational differences. Third, the increasing systemic nature of risk, such as climate risks, financial risks, cyber-attack risks, cannot be tackled through isolated responses. Consequently, crises tend to become more and more transboundary: they transcend administrative levels, ministerial areas (political borders) and

organizational borders as well challenging existing interfaces between institutional and organizational actors (Christensen, 2015 ; Fimreite and al, 2014 ; Kettl, 2003).

Thus, they occur in spaces in which borders that shape crisis response are multiple, heterogeneous and ambiguous. When those risks are materialized, they require responses within cross-organisational spaces, such as cross-border zones (Ayton and Rao-Nicholson, 2018). In this case, crisis response requires managing this multiplicity of borders, whether geographical (e.g. differences in national regulations, political administration and rules) or organisational (e.g., involvement of multiple organisations with different cultures and expertise and imperatives). However, literature in crisis management remains fragmented between a political perspective of transboundary crisis (political science studying inter-institutional features of a crisis and its impact on geographical borders) and managerial perspective (organization theories that insist on organizational boundaries).

Academic research thus calls for a better understanding of the conditions under which organizations solve ambiguities due to the interdependence of borders and the duality of institutional and organizational features (Langley and al., 2019, T'Hart, Sundelius, 2013).

2. 2.   BOUNDARY WORK AS A VALUABLE LENS TO INVESTIGATE TRANSBOUNDARY CRISIS

Despite scholars acknowledge borders and boundaries as a core aspect of crises, their role remains poorly studied (Lamont and Molnar, 2002). On the one hand, a border is "*a potential or real mechanism that reduces or regulates flows between two heterogeneous spaces, and makes these flows visible*" (Star, 2010, p. 154). It can be strictly national, such as the delimitation of geographical territories (Ansell and al., 2010), or more broadly, organizational (Tillement and Journé, 2016). On the other hand, a boundary is understood more widely as any form of separation between heterogeneous spaces (Jeunemaitre, Dumez, 2016). Table 1 explains the distinction between the two concepts.

Table 1. Distinction between borders and boundaries

	BORDER	**BOUNDARY**
ASSOCIATED DIMENSIONS	Usually associated with the political dimension (separation between States)	Used more widely for any form of separation between heterogeneous spaces

	Low permeability: clear and institutionalized delimitation that makes it more rigid (even though it may be subject to change over a very long period of time)	High permeability: its contour evolves and is subject to greater strategies of evolution and modification
PERMEABILITY		
INSTITUTION-NALISATION	Established by strict conventions and agreements that allow for a clear clarification of actors' perimeters	Rarely ruled with much precision – Can be tangible but subject to potential modification
EXAMPLES	Geographical or organizational borders	Cultural, normatives boundaries

Boundaries are an inherent aspect of organizations, as they delimitate and distribute areas of actions, norms and knowledges (Wolbers and al., 2018). Those boundaries institutionalize a space of political, administrative or institutional or cultural duality (Dumez and Jeunemaitre, 2010), in which different stable perceptions and modes of action co-exist. Some boundaries take a tangible form (e.g., enacted rules), while others remain symbolic (e.g., cultural differences between two groups). While borders are quite stable, boundaries are permeable and can be crossed. Thus, to allow coordination, particularly in a context of crisis, scholars suggest that crossing these boundaries is necessary to generate common interpretations and to orientate actions toward the same goal (Kalkman and al., 2018).

When organizations bridge or melt their away boundaries (Bechky, 2003; Faraj and Xiao, 2006), they engage in what scholars call "boundary work" (Kreiner and al., 2009). Boundary work is defined as a strategic practical action for the purpose of establishing epistemic authority, by drawing and redrawing boundaries (Lamont and Molnar, 2002; Phillips and Lawrence, 2012). Boundary work relies on the idea that boundaries are created, maintained, or changed to simplify and classify the world within, across and around organizations (Ashforth, Kreiner and Fugate, 2000).

Through boundary work, organizations intend to reach "integration", i.e., bringing together a set of differentiated activities to allow unified actions (Argote, 1982; Heath and Staudenmayer, 2000; Bechky and Okhuysen, 2011). During a transboundary crisis, actors transcend normative, functional, knowledge boundaries by changing their normal functioning

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and adapting on the run (Faraj and Xiao, 2006; Godé, 2011; Bechky, 2006). These adaptations are explained in different manners by emphasizing bricolage (Adrot and Garreau, 2010), plug and play teaming (Faraj and Xiao,2006) or changing in role structure (Bigley and Roberts, 2001). Recent studies suggest that reaching integration in extreme situations such as crisis requires a discontinuity of activities, which Wolbers and al., (2018) call fragmentation (reinforcing boundaries instead of bridging them). Langley and al. (2019) distinguish three practices of boundary work: competitive boundary work (mobilizing boundaries to dominate the other border), collaborative boundary work (aligning boundaries to collaborate) and configurational boundary work (delimitating domains of joined and separated action).

Those studies point out the lack of understanding of the specific practices that emerge in a context of multiple and ambiguous boundaries, such as transboundary crisis. First, the multiplicity of boundaries may complexify the way actors cope with the need of integration. A transboundary crisis transcends political boundaries (by impacting countries with different laws, chains of command, cultures and governments), functional boundaries (by impacting different sectors of activity with different natures, operating modes and operational logics are attached) and temporal boundaries (by spreading effects are neither instantaneous nor limited in time) (Ansell, Boin and Keller, 2010). This multiplicity of boundaries raises dilemmas such as: which nature of boundary (national or organizational) should predominate over the others? Second, the ambiguity of boundaries, i.e., the fact that actors may not be conscious that they are overlapping different borders, may impede boundary work practices to emerge (Noordegraaf et al., 2017). Consequently, this study aims at unfolding the practices of transboundary work, by addressing the following research question: *how does boundary work unfold in a transboundary crisis, in which boundaries are multiple and ambiguous?*

3. METHODS

3. 1. CASE SELECTION

To unfold practices of boundary work in a transboundary crisis, we selected a case of crisis in the particular context of a cross-border region. We investigated the case of the Mont-Blanc tunnel fire at the French and Italian border, which occurred on March 24, 1999 when a truck caught fire in the French side of the tunnel. The ensuing violent fire lasted nearly 53 hours,

causing the death of 39 victims and the closure of the tunnel for three years, for rehabilitation and modernization.

We argue that the Mont-Blanc tunnel crisis has a high "revelatory potential" (Gioia, 2013) of crisis coordination at the interface of several boundaries. First, this case which occur in a cross-border area. It thus exacerbates political boundaries, one of the dimensions defining the transboundary nature of a crisis (Boin, 2010). As a consequence, this crisis required to take into account differences between France and Italy in terms of geography, culture, administrative and legal jurisdictions that could impact organizational responses. Second, the geographical context of border regions reveals specific coordination issues related to boundaries between nation states and organizations (Dahles et al., 2007): borderland makes it possible to structure permanent social and cultural exchanges (Donnan and Wilson, 1999) for organizations which are embedded in this political and cultural territory and can then influence interactions of the responders involved in a transboundary crisis situation.

Third, this case is relevant to investigate inter-organizational coordination at the interface of several borders (and different boundaries associated to each border), because it involved multiple and heterogeneous actors to face the situation: ATMB (French tunnel operator company), SITMB (Italian tunnel operator company), Chamonix and Courmayeur fire brigade, Swiss fire brigade, hospitals, Aoste barracks, Chamonix municipality and Haute-Savoie prefecture, etc. These organizations use different protocols and routines, and come from different sectors (public vs. private). This heterogeneity illustrates the existence of several operational, functional and normative boundaries (Wolbers et al., 2018).

Finally, the Mont Blanc tunnel fire was a relevant case to investigate transboundary coordination, because most common explanations suggest that the crisis' magnitude resulted from the lack of coordination of relief teams at each side of the French and Italian borders. Thus, due to the legal and newsworthy impacts of the incident, the case provides detailed investigations on coordination during the crisis. Information such as security procedures and routines, real-time recordings of activities and events during the fire, and reports of discussion during the following trials, allowed us accessing to coordination practices.

3. 2. DATA COLLECTION

We gathered a corpus of archives (Bensadon, 2019) related to the evolution of the Mont-Blanc tunnel crisis, before, during, and after the incident. We selected around 600 pages of

legal, administrative or legislative reports, biographies and testimonies of relief teams collected in national, departmental and communal archives, the official press (official journal, bulletin, notice), newspapers (daily newspapers, weekly press, professional journals). Finally, we used sound archives (Descamps, 2001) to retrace what happened in the shelters of the tunnel.

3. 3.   DATA ANALYSIS

Data analysis encompassed three steps. First, we constructed a "narrative" of the case, by tracing the chronology of events. Second, we carried a process analysis (Langley, 1999) to reveal the practices of coordination at several borders. To code the practices of boundary work, we identified all joint actions (e.g., social interaction, group intervention, collective decision, input regulation…) intentionally or unintentionally oriented toward integration, within the Mont-Blanc tunnel during the incident. For each practice, we coded the nature of the action and the nature of the dualities involved by boundaries (e.g., difference of protocols of fire extinction between France and Italy). We also used an open-coding to provide a substantial description of the actions of coordination and their consequences on the crisis. Third, from our database, we proceeded to an inductive coding of the boundary work practices (Corley & Gioia, 2004). We compared similarities in how actors addressed dualities (i.e., by overpassing or by reinforcing the differences of actions), and the consequences on their ability to achieve integration. By doing so, we constructed a taxonomy of transboundary work practices, which is presented in the following section.

4. FINDINGS

First, we present our first order-results, by unfolding the main stages of the Mont-Blanc tunnel crisis, and by highlighting the transboundary coordination situations that emerges. Then, we expose our second-order results, by detailing the taxonomy of practices of boundary work revealed by our inductive analysis.

4. 1.   FIRST-ORDER RESULTS: A CRISIS UNDERPINNED BY BOUNDARIES AMBIGUITIES AND DUALITIES

The Mont Blanc tunnel fire is one of the most emblematic crises experienced at European borders. To understand the organizational response to this crisis and how the coordination process occurred, we briefly retrace the chronology of the event.

Context and history of the Mont Blanc anteriorly to the crisis

While the Mont Blanc tunnel linking France to Italy was officially inaugurated in 1965, the idea of constructing a "passage under the mountain" that can facilitate interactions and connect these two countries was initiated in the last years of the 18th century. The tunnel is localized in the cross-border area, and its tube is 11,6 km long. More than a half of the tunnel is constructed in the French territory (7,6 km in France and roughly 3 km in Italy). In this context, this specific zone started consolidating cross-borders relations, by signing several agreements to govern the tunnel's operations and safety. In order to prevent from any safety risk, two major emergency measures were implemented: the specialized emergency plan in1994 in France, and the Plano de emergenza traforo del Monte Bianco in 1995.

Narrative of the 53 hours-crisis

The Mont Blanc tunnel crisis unfolds in several steps, which show the escalation of the fire from a simple localised fire incident to a transnational crisis:

1. Tunnel warning and entrance blocking (10h52-10h58). The fire started at 10:52 am on the 24 March 1999, inside a truck that entered the tunnel from the French side, a few minutes earlier. The fumes spread very quickly between the garage 14 and garage 18, until the driver ultimately had to stop, still in the French zone. Smokes and high temperatures triggered an alarm, which called in the control rooms, both in France and Italy. Few minutes later, a communication between the two regulators of each control room led to the decision of closing the tunnel's entrances at each country's side, for security matters. Meanwhile, some users trapped in the tunnel were calling for help from where they stand (Garage 22 for users in the Italian side) and were trying to slow down the spread, by unhooking a fire extinguisher.

2. Commitment of internal emergency resources (10h57-11h). 10 minutes after the beginning of the fire and the tunnel closing, the two companies operating within the tunnel (one French company in charge of the security in the French side, the other on the Italian side) sent out some operators and internal resources (emergency vehicles, motorcycles) into the tunnel to survey the situation and obtain further information. These men were then trapped in the tunnel, unaware of the impressive spread of the fire, and were forced to take refuge in different garages. Because the diffusion of the winds was more favourable to an advance on

the Italian side, one of them managed to go out from Italy and saved at the same time some users (including the driver of the truck) trapped in the tunnel.

3. Public assistance for operating internal and users' evacuation (11H- continuously). The fire spread quickly in this confined area, making any intervention irrelevant. At this moment, the situation escaladed quickly, because the internal rescue teams were also trapped with the users and the fire continuously spread, reducing the chance of survival for people trapped in the infrastructure. French and Italian regulators called each firefighter and emergency centres for help. In the French side of the tunnel, public relief teams arrived in the tunnel, roughly twenty minutes after the beginning of the fire.

4. Massive and successive gearing of the rescue teams in the tunnel (10h57- 12h50). From 11.10 a.m., several brigades successively arrived at each national border. Global entries from both sides of the borders were not synchronized (no communication of brigades in the command room before entering, lack of resources such as breathing apparatus for all firefighters entering in the tunnel, initiatives and actions not shared between Italians and French). As a consequence, public rescue teams who were originally called for helping people and internal operators trapped in the tunnel ultimately got also stuck in the tunnel. At this moment, the situation started to be completely out of control, because all rescues teams mobilized were stuck and no means of communication or counting device allowed authorities and regulator to estimate the number of potential people trapped in the tunnel.

5. National contingency plans launching (starting 13h04). Witnessing the dramatic escalation of the crisis, national authorities in France decided to trigger two national emergency plans, at respectively 13h04 and 13h35. This upsurge in France was carried by the prefect, who led the installation of a command post at the prefecture of Haute-Savoie, in order to organize the next operational steps and to deal with victims' families. No national plan was launched on the Italian side, as the authorities considered that the fire had occurred on the French side, and that the French authorities were therefore territorially competent.

Implementation of a new cross-border intervention trajectory (25 and 26 March). The next day, on Thursday 25 March, the fire could still not be extinguished, despite the mobilization of nearly 90 firefighters from Haute-Savoie, 10 people from SAMU (medical organizations) , civil security helicopters (which could not cross the mountain by air because of the smoke), the mobilization of 15 firefighters from the Geneva and an early warning from the Marseille fire brigade, as well as the Bouche-du-Rhone and Var fire departments. During that day, according to estimations, 34 people were presumed dead in the tunnel and 45 people were still

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missing. Because only an entrance from the Italian side was possible, French authorities took the decision of mobilizing all its firefighting means and moving them overland to Italy to initiate an entry into the tunnel. The Mont Blanc separating France from Italy and the impossibility of using air routes due to the fire therefore considerably slowed down the arrival of the French and Geneva rescue teams on the Italian platform of the tunnel. It was only on the 26 of March when French firefighters entered, at 6.am, in the Italian side of the tunnel, and that a joint cross border intervention allowed to definitely stop the fire, after 53 hours of continuously propagation.

To conclude, in each phase of the crisis occurring in this borderland, national and organizational borders were intermingled and impacted the process of coordination (see Table 2).

Table 2. Boundaries involved in the Mont-Blanc crisis

Structural borders	Boundaries	Verbatim
National	Legal	*"We have several national regulations, French and Italian, and we need to deal with that"*
	Cultural	*"It is not always easy to work with Italian and Italian with French because it needs energy when you are culturally different. You don't speak the same language and can have different national identities and history"*
	Topological	*"The separation is clear you have a huge natural frontier that separate us: the Mont Blanc is a huge mountain separating France to Italy. Even in the tunnel under that mountain, 7640 meters in the tunnel are on the French territory, 3960 meters belong to Italian territory"*
	Administrative	*"Because there are two countries, each country has its own agreements, national jurisdictions and institutions in charge"*
Organizational	Normative	*"Companies are different (...). In terms of investment this means that they were often made by each company at different dates and with different technical content. Companies have their own way of working and may have*

		procedures and way of doing things that are not necessarily the same"
	Functional	*"You know firefighters have their profession and we are a company, so we have ours"*
	Expertise	*"The chief of staff says well, I want to talk to my counterpart, I don't want to talk to someone who's one level down. But that's a difference in the way services are organized with different expertise"*

Although the fire started in the French part of the tunnel, it was directly linked to its exit in Italy, the reciprocity of the effects (Italian users in the tunnel affected, circulation of toxic fumes, fire and possible collapse of the tunnel vault) required management of interdependencies on both sides of the national border. The organizations had to deal with cultural differences linked to language, national identities, political and institutional differences (France and Italy have separate national chains of command). The various organizations involved to coordinate the crisis response had to deal with functional differences in addition to the national boundary. Functional boundaries implied managing multiple differences: operational (insufficient ARI equipment for French rescue teams, divergences in tunnel closure techniques by French and Italian tolls), normative (differences in intervention protocols despite the existence of the tunnel's specialized emergency plan) or knowledge differences (actors with multiple skills). Because of the particular situation of borderland, the national and organizational borders are intermingled meaning that several differences in each phase appear simultaneously. Several differences occurred on the same time and impact to process of response, challenging the ability to achieve integration. Actors and interdependencies multiplied, and many ways of acting and perceiving crisis emerge. As a consequence, boundaries of interventions tended to become increasingly blurred. In this context, the multiple boundaries (and all differences generated by each one) shaped the construction of coordination (Table 3).

Table 3. Phases of organizational response at the borders in the Mont Blanc tunnel crisis

Phase	Interactions and collective actions between organizations involved in the response	Boundaries involved

Phase 1	Tunnel warning and entrance blocking: the crisis is not materialized yet. Operators of each company localized in its own control room try to understand the situation and its potential consequences. The French and Italian operators communicate by telephone and take preliminary measures of security (launching alarms, closing doors).	Cultural boundaries (two operator companies with French and Italian operator) and Normative boundaries (each organization has its own control room).
Phase 2	Commitment of internal emergency resources: local attempts by the French and Italian tunnel operating organizations inside the tunnel to restrict fire propagation from each national entrance.	Topological (national level) and normative (organisational level)
Phase 3	Public assistance for operating internal and users' evacuation: each country calls for its emergency public organizations. At the French entrance, one brigade arrived without checking with the French operator that already took some measures and applied some procedures in the tunnel	Functional, normative and topological
Phase 4	Massive and successive gearing of the rescue teams in the tunnel : operational interventions of public emergency management organizations (firefighters, hospital, public administrations) that were successively blocked in the tunnel from both sides	Functional, cultural
Phase 5	National contingency plans launching: organization of national command in France by the launching of an emergency plan	Expertise, administrative and legal
Phase 6	Implementation of a new cross-border intervention trajectory: gathering of French and Italian rescue teams to enter the tunnel from the Italian side of the tunnel	Cultural, functional, normative

4. 2. SECOND-ORDER RESULTS: A TAXONOMY OF PRACTICES OF TRANSBOUNDARY WORK

Our inductive analysis outlines two main dimensions that distinguish the practices of transboundary coordination across the crisis of the Mont-Blanc tunnel: the dynamic of action at the borders (boundary work reinforcement or boundary work bridging), when different borders are involved. We present briefly those two dimensions of analysis.

Boundary work bridging and boundary work reinforcement as ways to achieve integration of action. Our literature review showed that coordination is mainly achieve by relying on integration. However, unifying a set of actions can be difficult to consider in transboundary crisis where many differences related to the existence of several borders exist. Involving many organizations with complex interdependencies transboundary crisis generates fragmentation rather than integration. In fact, boundaries can first be considered as a mechanism that reduces flows between heterogeneous spaces. In this perspective, boundaries appear as a way to separate the actions and responses undertaken by organizations in charge of facing the crisis. Organizations then try to maintain their differences and act more or less independently from each other reducing the number of interactions necessary to do a task. Settling temporary borders becomes then a way to achieve integration.

On the contrary, in some other situations, borderland appear to be an interface where flows between organizations are intensified and regulated. This means that the perception of borders as something that create separation among actors disappear partly or completely. Organizational responders act then as one and unify their actions in order to achieve coordination.

The combination of those two dimensions reveals three practices of coordination at the borders that make integration possible. We then expose and illustrate each practice.

Table 4. Taxonomy of transboundary work practices

Practice	National boundary work	Organizational boundary work	Definition
Borders interlinking	Border bridging	Border bridging	Practices of bridging all boundaries in order to

			achieve coordination.
Borders endorsing	Border reinforcing	Border bridging	Practices of strengthening one border on another.
Borders negotiating	Border reinforcing	Border reinforcing	Practices of generating a new configuration which conciliate both borders.

Borders interlinking. Borders interlinking refers to the practices of bridging all boundaries in order to achieve coordination. In the Mont blanc tunnel fire, this practice is emphasized at the beginning of the fire, when only few actors were involved, so that common understanding was still easily achieved. Also, because the situation did not degenerate yet, actors still knew how to handle the situation and relied on some routines or natural reflexes. Finally, there was no political stake at hand at this moment (crisis did not materialize yet by blame games among actors or bad visibility for one organization or one country) so accountability was still simple to consider.

When the truck in fire stopped in the tunnel few minutes after its entrance from the French side of the tunnel, high temperatures as well as smoke propagation were quickly detected. The two different companies operating for the security of the tunnel (one operating on the French territory in the tunnel, the other on the Italian) through their regulators then commonly and quickly decided by phone call to trigger alarms and security measures by closing tolls. These organizations were able to quickly collaborate because differences at a national level was no longer relevant. The situation was still manageable (no propagation yet) and operators appears both to speak Italian and French. Bridging national borders was indeed made possible because the top management of the two companies operating in the tunnel imposed that people working in control room should be able to understand both Italian and French language. Bridging all boundaries was the easiest way of achieving coordination because in that particular case, all stakeholders act as one and were aligned toward a similar goal that is still manageable (few organizations interacting and no cascading events yet).

Vignette 1. Illustration of practices of borders interlinking

"At 10.54 am, a communication between the different French and Italian monitoring

> rooms takes place following the joint detection of smoke between garage 16 and 21.
> This communication in French between the operators follows the discovery of
> abnormal opacity values and the detection of smoke in the tunnel.
>
> At 10.55 a.m. the traffic lights in France turn red, marking the closure of the toll
> effective. The same action is carried out almost simultaneously on the Italian side
> (10:56 am). At this point, vehicles are withdrawn from the passage at the entrance on
> the French side (semi-trailer cleared to allow access to the emergency services). 3
> light vehicles and 1 LPG that have already passed through the tollgate are evacuated
> from the platform".

Borders endorsing. Borders endorsing refers to the practices of strengthening one border on another. In these situations, bridging all boundaries was not possible because many organizations start being involved in the process of response, so that obtaining a consensus was difficult. Also, because several borders were intermingled, many differences expressed themselves simultaneously. Consequently, one border imposed itself on others, so that some differences were erased, and integration was still possible to achieve. In the Mont Blanc tunnel fire, this practice of border endorsing is illustrated starting the phase three when the crisis escalates, and each country called for its emergency public organizations in order to help with the fire. Because operating organization could not manage a situation that overpass them, many other actors become involved in the process of response. At this particular moment, organizational boundary bridging still remains: the two organizations (and their respective operators in each control room) continued to interact, they followed their common security agreement and agreed to call for public reinforcements from each country. Organisational differences, particularly on a normative aspect, were therefore not apparent since, despite the technical investments made individually by each of the companies, they nevertheless agreed operationally on the application of certain procedures. However, while bridging organizational boundaries, integration was made possible by a reinforcement of national borders. In fact, by calling public emergency support, many other organizations (e.g firefighters, police officer) appear at each entrance of the tunnel. Each of this profession was then represented on both side of the borders, drastically raising the number of actors interacting. More than the additional stakeholders, these actors had also different cultures, followed different legal administrations and were geographically separated by a mountain. To

avoid difficulties associated to aligning these numerous and different actors, national borders were then reinforced. This means that all rescue teams intervened at this moment on their own national territory, to avoid misunderstanding and institutional complexity. In a sense, this can also explain why Italy, despite the propagation of the fire, chose not to launch any national emergency plans while France activated two of the highest national security plans two hours after the beginning of the fire.

Vignette 2. Illustration of practices of borders endorsing

"At 11:58, CODIS 74 receives a call on the #18 from French ATMB regulator in these terms: "This is the Mont Blanc tunnel, we have a truck in the tunnel that, at first seems to be on fire."

"On the same time, the COURMAYEUR fire brigade was notified of the fire by the Italian control room at an hour that could not be precisely determined (probably between 11:00 and 11:05). They arrive (three of them) at around 11:15 at the entrance to the tunnel."

Borders negotiating. Borders negotiating refers to the situation of junction between different practices of boundary work reinforcement. This means that at some point, the situation was blocked because each stakeholder temporarily seemed to reinforce its own boundary of intervention, by marking its difference with the other organizations (organizational border) and/or the other country (national border). This compartmentalization led to the diffusion of too many different approaches and sometimes incompatible ways of doing. This was exacerbated by a series of cascading events that made even more imperative to find a joint response to the crisis. As a consequence, a negotiation between responders started with the idea of generating a new configuration at the borders, so that the actors could somehow find an arrangement to make integration possible.

In the Mont blanc tunnel fire, as soon as the fire started to spread, each organization operating in the tunnel contacted the authorities in charge. In France for example, CODIS (Centre opérationnel départemental d'incendie et de secours) was called and it was finally the public rescue teams, more qualified in fire management, who took over the management of the operations and claimed for responsibility (expertise boundary reinforcement). This led to fuzzy and incompatible actions. In terms of ventilation, French operator company activated it

in blowing mode while Italy operator used it in extraction mode. Both of these actions lead to accelerate to propagation of the fire.

As a consequence, and because actors did not succeed in stopping the fire, they ultimately started to re-connect and explore common ways of doing. Also, and as illustrated earlier in phase 6, the situation was critique because no attempt to stop the fire was possible through the French entrance. The wind was indeed blowing over France, making fumes and fire unmanageable. French firefighters decided to cross the national border after unsuccessful air attempts due to the spread of smoke. When they arrived, they ultimately brought the resources needed in order to stop the fire and accompanied Italian brigade in extinguishing the fire. In that situation, boundary reinforcement remained. Because the fire started in France, French authorities were indeed accountable for commanding operations and then claimed their authorities (expertise boundary reinforcement). The role of the brigade that reached Italian entrance was then to help facilitate the disappearance of smoke so that French firefighters who stayed at the French entrance could continue their own work. However, despite the persistence of boundary reinforcement, some arrangements appeared necessary to achieve integration. Thus, a short negotiation of "who should do what" started. Nevertheless, because few firefighters crossed the border to reach Italian entrance, interactions between a small number of actors were easier to consider. Also, because of cultural and normative differences (e.g., different French fire brigade cable on Italian side water point) parallel processing was more relevant than engaging in a long attempt to unify all the tasks.

Vignette 3. Illustration of practices of borders negotiating

"From the beginning of the alert until 17:00 on the Italian side, if the 4 fresh air ducts were pushed to the maximum, the exhaust duct was also kept in insufflation mode, unlike the one operated from the French control room and the requirements of the written safety instructions common to both countries. (Technical Operating Regulation updated to 26 March 1985)"

On Friday, 26th of March, at 6.00 a.m some of the French and Geneva fire-fighting resources were activated from the Italian entrance in liaison with the Italian fire brigade.

they will try to lower the internal temperature of the tunnel by using misting systems,

which (together with the fumes) hinders the progress of the rescuers on the French side. At 12:00 noon misting cooling appears effective and the rescuers progress about 150 meters per half hour. 47 French firefighters are engaged in correspondence with their French counterpart.

5. DISCUSSION

This study aimed at unfolding the practices of boundary work in a situation of transboundary crisis. By examining the Mont Blanc crisis, we showed how coordinating crisis responses shapes, and is shaped by, many boundaries associated to each (national and organizational) border. We highlighted three practices of transboundary work that intervene in the crisis: borders endorsing, borders negotiation and borders interlinking. We showed that each practice relies on a specific behaviour toward existing boundaries (reinforcing or bridging boundaries) and has different consequences on coordination achieved through integration. Those results have several implications. First, we develop the theoretical contributions on literatures on crisis coordination and on boundary work. Second, we expose some practical implications. Third, we discuss the limitations of the study and suggest some future research directions.

5. 1. THEORETICAL CONTRIBUTIONS

First, in line with recent calls, this study contributes to better understand what makes collective response possible in a context of transboundary crisis (Kalkman et al., 2018). By explaining the difficulties of tackling multiple and ambiguous boundaries, we provide explanations on why some organizations succeed in collectively answering global threats, while others fail (Van Der Vegt et al., 2015). Our taxonomy extends Wolbers et al. (2018)'s study on coordination, by showing how fragmented practices, here borders endorsing, can paradoxically lead to an integrated coordination. These authors have indeed shown how fragmentation through boundary work reinforcement is inevitable in crisis situation although questioning the principle of integration. However, our work underlined that this fragmentation, through boundary work reinforcement, is not opposed to integration, but is rather a way to achieve it. In other words, boundary work reinforcement does not generate fragmentation, but can be a way to achieve more integration in situations of transboundary crisis. Those findings provide a frame to guide future studies on crisis management across multiple boundaries. In particular, investigating the triggers of each practice would help

understanding why specific practices of transboundary crisis coordination emerge and are successfully managed or not.

Second, this study also provides insights to enrich boundary work literature. By investigating simultaneously several borders and their impact on coordination in a particular social context, we contribute to fill the gap identified by Langley and al. (2019), of "treating nexuses and ecologies of boundaries in situ" (Langley and al, 2019 : 729). As we are not only analyzing organizational borders, the dynamic of boundary work when several borders are involved highlights how actions on one boundary reverberate on others, and have then several impacts on coordination. Furthermore, our study of the Mont-Blanc crisis provides a case in which some boundaries are not salient (Langley et al., 2019), since the coordination within this common generates ambiguity of boundaries between French and Italian borders. We show that even when boundaries are not salient, actors can engage into boundary work, such as jumping over their perimeter of action, if they perceive a legitimacy of their own intervention, i.e., through providing a more adequate response to an unsolved problem from the other border. Boundaries thus only become salient when the actions emerging from one border collide with existing logics of the other border.

5. 2.   PRACTICAL IMPLICATIONS

This study has several practical implications to enhance crisis management practices in cross-border organizations. First, it emphasizes that problems of coordination in cross-border contexts go beyond tradition explanation of coordination failure, such as language differences or cultural gaps. To enhance their ability to manage crisis, cross-border organizations may thus pay attention to clarify how organizational and functional boundaries are settled within devices and protocols. Second, we show that boundaries' permeability does not systematically help reducing uncertainty. Consequently, organizational resilience, in a cross-border context, does not only rely on flexibility (i.e., the ability to overpass existing boundaries), but also on the existence of mechanisms that orientate actors in arbitrating between crossing and respecting organizational boundaries. Finally, our results invite cross-border organizations, which cannot avoid the multiplication of boundaries (either geographic or organizational), to explicitly map and account for this multiplicity of boundaries, in order to identify, as much as possible, *ex ante* incoherencies and incompatibilities that could be avoided when a crisis occurs.

5. 3.   LIMITS AND FUTURE RESEARCH DIRECTIONS

In this study, we focused on a specific context of an operational crisis between two countries. Other contexts of crisis, more with a less clear temporality or across several institutional actors such as the Eurozone crisis (Ayton & Rao-Nicholson, 2018) may reveal other forms of coordination. Moreover, we focused on coordination in real time. Future researches could for instance compare coordination before, during, and after a crisis (Maguire & Hardy, 2016), to explore transboundary work evolves over time. Finally, our analysis relies mainly on documentation, and thus does not reveal actors' perceptions. Cognitive processes play an important role in situations of crisis (Weick, 1993; Taarup-Esbensen, 2019). Future studies could explore how actors collectively make sense of organizational boundaries while addressing a transboundary crisis.

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