

A MATTER OF LIFE OR DEATH: HOW EXTREME CONTEXT RESEARCH MATTERS FOR MANAGEMENT AND ORGANIZATION STUDIES

MARKUS HÄLLGREN¹
UMEA University

LINDA ROULEAU
HEC Montréal

MARK DE ROND
Cambridge University

Organization scholarship has seen an escalation of interest in research into extremes. Comprising several interconnected domains, this growing body of research is decidedly fragmented. This fragmentation risks limiting its potential for advancing management and organization studies. Drawing on 138 articles published in top-tier journals between 1980 and 2015, the purpose of this review is to resolve some of this fragmentation by sharpening definitions and by developing a context-specific typology to help differentiate between contributions from research into *risky* contexts, *emergency* contexts, and *disrupted* contexts. Doing so allows us to let the various literatures speak to each other and to outline ways to enhance the cumulative potential of extreme context research.

INTRODUCTION

War, terrorism, gun violence, industrial pollution, air accidents, political controversy, extortion, and computer hacking headline our media reports with increasing frequency. When considering these alongside such natural disasters as floods, draughts, forest fires, and earthquakes, the fragility of our world becomes ever more apparent. Still, even as we may have had our fill of global warming and war-mongering, of divisive “poor man’s idea of a rich man” politicians, Brexit brayers and Europhiles, all indications suggest they are far from done with us.

These developments and events raise important questions around how individuals, organizations, and society might go about preparing for their impact. For organizations, such questions relate to

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¹ Corresponding author.

production capacity, resources, consumer markets, and their workforce. What can today’s organizations learn from those that have had to respond to industrial accidents, information leaks, or acts of terrorism in the recent past? What might they learn from organizations whose daily reality revolves around mitigating risk in unusually fragile ecosystems (e.g., disposing of radioactive waste) or regular exposure to risk of injury or death (e.g., fire fighters)?

Some good stuff apparently. Substantial contributions to management and organization studies (MOS) were originally derived from extreme contexts (Bamberger & Pratt, 2010; Bartunek, Rynes, & Ireland, 2006), including from aircraft carriers (Weick & Roberts, 1993), health care actions teams (Faraj & Xiao, 2006), the Bhopal chemical leak (Shrivastava, 1987), the Mann Gulch fire (Weick, 1993), the 1996 Mount Everest expedition (Elmes & Frame, 2008), the Colombia and Challenger shuttle (Starbuck & Farjoun, 2005), the partial nuclear meltdown on Three Mile Island (Perrow, 1984), and collective action on Flight 93 (Quinn & Worline, 2008), among others.

Perhaps, it is the heightened awareness of today’s political, economic, and ecological uncertainties that explains a surging interest in extreme contexts. Perhaps, it is an awareness of the cost of tripping

up—the *Global Assessment Report on Disaster Risk Reduction* (UNISDR, 2015) put a price tag of some \$250 billion on the cost of natural disasters during the last decade alone (van de Vegt, Essens, Wahlström & George, 2015). Or perhaps, it is a recognition that extreme contexts provide a unique platform for the study of hard-to-get-at organizational phenomena. For example, they may well be able to showcase the best and worst of human and organizational behaviors and accelerate processes otherwise impeded by bureaucracy, power plays, and politicking. They may provide particularly rich insights into organizational processes of adaptation and prioritization, resilience (following an extreme event), and barriers to inertia (where organizations fail to respond). And they are likely to be more generous with information than what one would derive if taking the average of ordinary cases. As Stinchcombe (2005) suggests, we learn far more about religion from members of religious sects or cults—insofar as sects and cults tend to be more absorbing of the lives of their members—than from members of everyday religious organizations. Similarly, Riesman and Becker (2009: x) highlight Everett C. Hughes’s fondness for extreme cases in that he believed they might help him “uncover what people were probably doing in more ordinary situations but were too unreflective to recognize or too conventional to admit.” They write as follows:

“Becker’s report that musicians hated their audiences led him to speculate that many other service workers also hated the people they served. Thus, doctors and nurses probably disliked many of their patients, sometimes knowing they did and at other times not knowing. Alerted by extreme cases, he could then find in daily life what was overlooked by researchers who accepted prevailing pieties.” (2009: x)

Yet notwithstanding a strong interest in extreme contexts research (ECR), the literature is badly fragmented. The bulk of it is broadly oriented toward understanding how organizations avoid, or cope with, extreme or unexpected events so as to provide managerial frameworks and/or best practice examples for avoiding, or coping with, adversity. Recent reviews by Bundy, Pfarrer, Short, and Coombs (2017) and Williams, Gruber, Sutcliffe, Shepherd, and Xiao (2017) on crisis management and resilience suggest that we are really only just beginning to scratch the surface of a field in dire need of theoretical and empirical rigor, and conversations across disciplines (see also Coombs, 2007, 2010; James, Wooten, & Dushek, 2011; Pearson,

Roux-Dufort, & Clair, 2007; Sellnow & Seeger, 2013). Whereas our review differs from each of these in important respects,² what applies to studies of crises applies to studies of extreme contexts: the literature is predominantly based on small samples, varied and decidedly disjointed.

Despite this fragmentation, however, one discerns three general, empirically distinct categories within the literature. These are distinguishable along contextual lines such that we can reasonably straightforwardly parse the relevant empirical works into those that draw from *risky* or *emergency* or *disrupted* (RED) contexts. Thus, research on US Special Forces operations in Iraq might be considered to epitomize a risky context, whereas fieldwork with the emergency department of a South Chicago hospital would constitute an emergency context, and a study of the Boston Marathon bombing would be a disrupted one.

Although context specificity—defined here as “variations in situational or environmental features that affect the occurrence and meaning of organizational behaviour” (Johns, 2006: 386)—could become a trap for building cumulative theoretical knowledge, it can also be a lever for counterfactual reasoning and, as Whetten (2009) suggests, offer potentially innovative contributions to MOS. For example, insufficient attention to context could lead to a poor understanding of how variables at one level of analysis affect those at a different level of analysis, to an underappreciation of the significance of apparently trivial context effects, and be responsible for what remains “one of the most vexing problems in the field: study-to-study variation in research findings” (Johns, 2006: 389). He proceeds to offer two approaches to multilevel analysis, one based in journalistic practice, the other on classic social

² Our analysis differs from Bundy et al. (2017) excellent review in several respects: the fact that they focus on crises—and, specifically, their management—and include such crises as financial or reputational that we explicitly exclude in concentrating on those that pose a direct risk to life and limb, in that we include the literature on HROs, include two European journals excluded from their review, and cover a longer time period than they do (1980 to 2015 period as opposed to 1998 to 2015). Our analysis also differs in relation to Williams et al. (2017) review in that it integrates two distinct literatures (crisis and resilience) into a process model. While our review comprise part of these literatures, ours are broader and considers the context rather than the theoretical genre as we foresee issues in integrating the literature into a process model that fits all explanations.

psychology, that may help us better understand the role of context (Johns, 2006).³ Thus, research (most notably in Organizational Behavior) has seen growing interest in multilevel empirical studies as a means of contextual theorizing, including in ECR. One example of the latter is a recent attempt to understand how organizational, professional, and cultural contexts help determine the incidence and degree of posttraumatic stress syndrome among rear-located medics at work in warzones (de Rond & Lok, 2016). Context matters.

Our objective in this paper is threefold: (1) to propose a typology to help organize what remains a vastly fragmented literature, (2) to explore the role and relevance of ECR by highlighting how it has helped advance MOS, and (3) to outline promising directions for future research. The paper is structured as follows: a brief introduction to ECR is followed by a discussion of specific works that epitomize each of the three categories. For each we ask (a) What are the significant research themes that have come to characterize this particular category, and how have these developed over time?, and (b) What are some of the key insights that research in this category has arrived at? We organize 138 research articles along the RED categories so as to be able to critically review the body of work in each, to describe its empirical and theoretical trajectory in broad brush-strokes, and to take stock of particularly relevant insights for MOS generally. In broadening our discussion to include all three categories of extreme contexts, we conclude by highlighting specific contributions of ECR to MOS and by exploring opportunities for future research.

WHAT ARE EXTREME CONTEXTS?

The conspicuous fragmentation of ECR is evident from the array of constructs in use (see Table 1). Perhaps, this is because the field is still relatively nascent or because its contributors may hitherto not have recognized family resemblances between studies of unconventional settings from such sub-disciplines as research on occupations, organizational behavior, organizational theory, and communication. Variation in the terminology used to describe relatively similar empirical phenomena does not help. Thus, we talk of *adverse* events (van de Vegt et al.,

2015), *rare* events (Harding, Fox & Mehta, 2002; Lampel, Shamsie & Shapira, 2009), *unusual* events (Beck & Plowman, 2009; Garud, Dunbar, & Bartel, 2011), *surprises* or *unexpected events* (Bechky & Okhuysen, 2011; Cunha, Clegg, & Kamoche, 2006), *non-routine* events (Waller, 1999); *extreme* events (Buchanan, 2011), *hazardous organizations* (Roberts, 1990), *hyperturbulence* (Meyer, 1982), *edgework* (Lyng, 1990), *extreme operational environments* (Barin Cruz, Aguilar Delgado, Leca & Gond, 2016; Gerde & Michaelson, 2016), *extreme situations* (Bouty et al., 2012), and *extreme environments* (Lanzara, 1983). Some of these terminologies identify specific and observable features of what “extreme” comprises, whereas the remainder refers to the experience of the “extreme” by those effected. What these terms have in common is that each is typically used in reference to an organization that has been, or is vulnerable to being, adversely impacted by a sudden, often unanticipated, event or series of events.

Given that our review covers a particularly wide range of research articles—from industrial accidents to terrorist incidents and to high reliability organizations (HROs)—we adapted, and then operationalized, definitions provided by Hannah, Uhl-Bien, Avolio, & Cavarretta (2009) that distinguish between, and then relate, events and contexts. *Extreme events* are defined in terms of three necessary conditions: they “must (1) have the potential to cause massive physical, psychological, or material consequences that occur in physical or psychosocial proximity to organization members, (2) the consequences of which are thought unbearable by those organization members, and (3) are such that they may exceed the organization’s capacity to prevent those extreme events from actually taking place” (p. 898). The distinction between physical and psychosocial proximity suggests that people need not be first-hand witnesses to extreme events to be affected by them; rather they can be traumatized by exposure to those who were physically present at the time (e.g., by hearing first-hand accounts or exposure to others’ injuries). This is consistent with research on secondary traumatization, the symptoms of which are similar to those of posttraumatic stress disorder (U.S. Department of Veteran Affairs; The National Child Traumatic Stress Network).

Given this conceptualization of events, *extreme contexts* become environments “where one or more extreme events are occurring or are likely to occur that may exceed the organization’s capacity to prevent and result in an extensive and intolerable magnitude of physical, psychological, or material

³ The potential of multilevel theorizing, its pitfalls, were already identified by Goodman (2000), Cappelli and Sherer (1991), Klein and Kozlowski (2000), Kozlowski and Klein (2000).

TABLE 1
Constructs and Definitions Related to Extreme Contexts Research

Adverse events	The larger scale and impact of adverse events.(e.g., failure of communication systems, high time pressure, and loss of team members) is the result of the increased density of global networks of people, organizations, and countries. High-risk events that, at first, seem to cause only local, isolated effects can now snowball in magnitude and do damage to vital infrastructures that impact events on a regional and even global scale. (van de Vegt et al, 2015: 971)
Edgework	Edgework departs from existing perspectives by conceptualizing risk taking as a form of boundary negotiation—the exploration of “edges” These edges can be defined in various ways: the boundary between sanity and insanity, consciousness and unconsciousness, and the most consequential one, the line separating life and death. (Lyng, 1990: 857)
Rare events	Events are more likely to be considered “rare” when individuals or organizations that observe or directly experience these events see them as unusual in the sense that they depart from ordinary experience with the same type of event, or are unique in the sense of having no close parallel. (Lampel, Shamsie, Shapira, 2009: 836). Rare events include “characteristics such as extreme rarity, the difficulty of defining appropriate comparison cases, the potential for causal factors operating at multiple theoretical levels, and the potential for important interaction between causal factors” (Harding, et al, 2002: 209)
Surprise or unexpected events	Any event that happens unexpectedly or, any event that takes an unexpected turn (Cunha et al., 2006: 319). A break in expectations that comes from situations that are not anticipated or do not advance as planned (Bechky & Okhuysen, 2011: 239)
Unusual events or experiences	Unusual events occur unfrequently and thus prevent unique learning challenges because organization’s lack of experience (Beck & Plowman, 2009: 910). Situations that bear little or no resemblance to the types of experience that have occurred in the past. (Garud et al., 2011: 587)
Non-routine events	Unexpected event that requiring rapid adaptive action through collecting and transferring large amounts of information (Waller, 1999: 128)
Hazardous organizations	Organizations. . . “engaged in production or services that require extraordinary attention to avoiding major errors because errors could lead to destruction of the organization and/or a larger public. These organizations are hazardous (in the engineering sense) and until they experience failure they are generally invisible to the public at large which needs their services but fails to realize the costs required to obtain them.” (Roberts, 1990: 160)
HROs	Contexts in which “the capacity to continuously and effectively manage working conditions, even those that fluctuate widely and are extremely hazardous and unpredictable (Weick, Sutcliffe, & Obstfeld, 1999)” (Bigley & Robert, 2001: 1281)
Hyperturbulence environments	An environmental jolt from a sudden and unprecedented event that are disruptive and potentially adverse. (Meyer, 1982: 515)
Extreme events	All extreme events share the following sequence narrative: precrisis, emergency planning, crisis (or event, incident), crisis management, inquiry, change implementation (Buchanan, 2011: 274–275). A discrete episode or occurrence that may result in an extensive and intolerable magnitude of physical, psychological, or material consequences to organization members (Hannah et al., 2009: 898)
Extreme action teams	Teams whose highly skilled members cooperate to perform urgent, unpredictable, interdependent, and highly consequential tasks while simultaneously coping with frequent change in team’s composition and training their team’s novices members. (Klein et al., 2006: 590)
Event system	The key event characteristics of novelty, disruption, and criticality, which provide particularly important information about strength event. (Morgeson, Mitchell, & Liu, 2015: 520)
Extreme environments	In the immediate postimpact emergency, the environment is loosely connected, broken down in bits and pieces; current decision-making and organizational structure become fragmented and erratic. (Lanzara, 1983: 76)
Extreme operational environments	As natural, technological, and complex disasters in conflict zones which may pose the most severe environments in terms of resources, communication, institutional support from governments and large multi-national corporations, and societal support in terms of clear expectations and norms. (Gerde & Michaelson, 2016: 2). Times of great uncertainty and/or crisis which challenge human capabilities, organizational operations, and social institutions (Gerde & Michaelson, 2016: 3)
Extreme situations	Management situations that are at the same time 1) evolving (rapid, discontinuous and simultaneous changes or time-speed pressures), 2) uncertain (probability and moment of occurrence of events), and 3) highly risky (vital and/or symbolic, related to natural processes and/or human activities). (Bouty et al., 2012: 476–477)
Extreme contexts	An environment in which one or more extreme events are occurring or are likely to occur that may exceed the organization’s capacity to prevent and result in an extensive and intolerable magnitude of physical, psychological, or material consequences to organization members. (Hannah et al., 2009: 897)

consequences to—or in close physical or psychosocial proximity to—organization members” (Hannah et al. 2009: 898). This definition allows us to achieve a number of aims. First, it makes a vast literature manageable by excluding studies of organizational crises other than those triggered by extreme events. Thus, for example, whereas a chemical spill would be admissible, a crisis prompted by a hostile takeover would not. Second, it allows us to emphasize the distinction between events that are likely to occur and those that actually have. For instance, a context can be characterized as extreme when an event has occurred engendering a temporary rupture in the normal life of an organization, or in a community of organizations with significant (even intolerable) consequences at the individual as well as at the collective levels. Moreover, a context can be characterized as extreme when organizational routines are specifically implemented in daily operations or in plans and modalities in order to prevent or prepare for events that are likely to occur and that would affect the normal life of an organization with significant (even intolerable) consequences for its members as well as for the groups and communities related to the organization. Third, it allows us to draw a distinction between extreme contexts as a result of “disruptions” (e.g., a business school shooting), contexts that are designed around “emergencies” (e.g., a firefighting unit), and contexts that are inherently “risky” (e.g., high altitude mountaineering), and organize the literature along this taxonomy. Before proceeding to do so, we explain our methodology in developing this taxonomy and in selecting works to be included.

METHODOLOGY

Given the fragmentation of the ECR literature, and an inconsistent use of terminology, we could not rely on a keyword search alone. To keep our review manageable, we focused on 35 years of publication in nine leading MOS journals: *Academy of Management Journal*, *Academy of Management Review*, *Administrative Science Quarterly*, *Organization Science*, *Strategic Management Journal*, *Journal of Management*, *Journal of Management Studies*, *Human Relations*, and *Organization Studies*. Although journal selection will always be contentious, these nine journals are widely considered members of a class of “top tier” journals, as reflected in the Chartered Association of Business Schools and *The Financial Times* rankings. They include three leading non-US journals. These journals are highly

selective in focusing on the ability of papers to make significant theoretical contributions to MOS. Thus, we would hope that these journals afford good coverage of significant theoretical contributions which we wish to examine in this review. Moreover, by including both North American and European journals, we hope to access a more complete overview of the contributions from ECR in MOS (Meyer & Boxenbaum, 2010; Sandberg & Alvesson, 2011). Finally, there is a precedent insofar as these journals have previously been selected for reviews of the type proposed here (see, e.g., Locke & Golden-Biddle, 1997; Wolfe, 2005). It is of course possible that our choice of journals will have excluded some excellent studies of extreme contexts. That said, we hope it has allowed us to capture the bulk of ERC output with a potential of significant theoretical contributions over the 1980–2015 period.

A *Web of Science* request for all articles published in these nine journals resulted in direct access to 14,961 articles. We took, as our starting point, each of the articles’ titles. Using our operationalization of Hannah et al.’s (2009) definition of extreme contexts as an indicator, we rejected 14,439 as irrelevant, leaving us with 522 papers. We read the abstract of each of the remaining papers to discard another 242 and to leave us with 280 papers to download and read in full. A careful evaluation of these 280 papers allowed us to set aside a further 142. The remaining 138 articles constitute our final dataset. These articles all refer to extreme contexts in one way or the other. Of course, our choice of articles was in some cases a judgment call that was discussed within the author team. For example, Nye, Brummel, & Drasgow’s (2010) article discusses sexual harassment in the US military, yet context seemed largely irrelevant to their argument (meaning that, unfortunately, sexual harassment is not limited to the military, nor a defining feature of it).

Before organizing these 138 articles by year and author(s), journal, theoretical orientation, methods used, empirical setting, contribution, and number of citations, we returned to the original 14,961 and re-queried the set against key words in the title and abstract of each of papers (to include *crisis*, *crises*, *disaster*, *accident*, *resilience*, *reliability*, *risk*, *error*, *unexpected*, *action team*, *hospital*, *extreme*, *fire*, *police*, *terror*, *failure*, *safety*, *death*, *injury*, *fatal*, *fatality*, *war*, *train*, *airport*, *nuclear*, *chemical*, *biological*, *danger*) so as not to inadvertently miss relevant studies. Table 2 illustrates the distribution of these articles across year and journal whereas Figure 1 shows their distribution over time. The table

TABLE 2
Distribution of Articles across Years by Journal

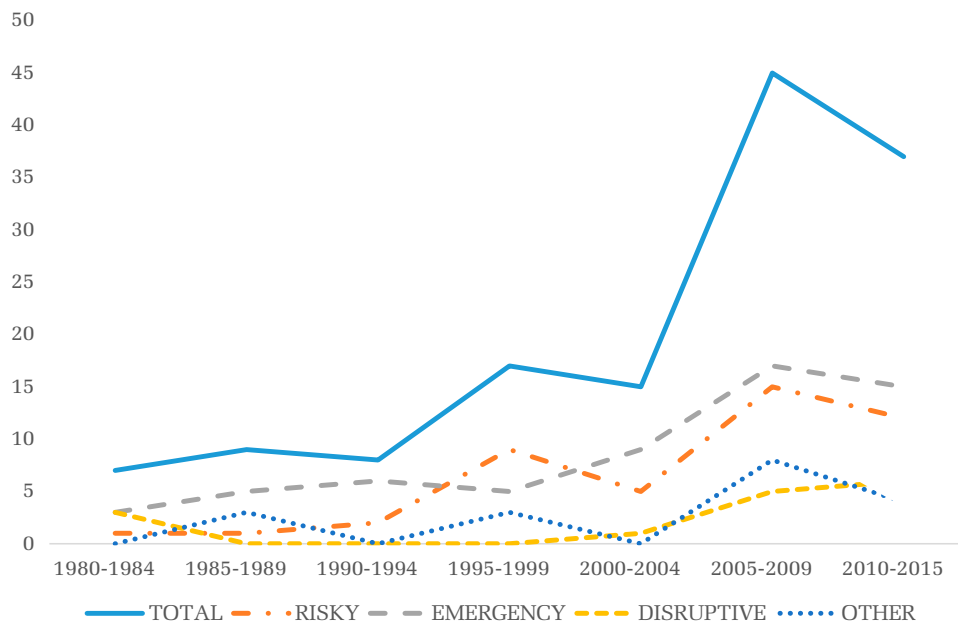
	1980–1989	1990–1999	2000–2009	2010–2015	Total
AMJ	2	5	5	11	23
AMR	0	3	1	1	5
ASQ	2	4	5	0	11
HR	1	2	17	5	25
JoM	2	2	0	1	5
JMS	8	3	5	7	23
Org Science	0	3	14	6	23
Org Studies	1	3	13	5	22
SMJ	0	0	0	1	1
Total	16	25	60	37	138

and graph show that the 138 papers are fairly evenly distributed across leading North American and European journals; 82 of these were published during the last decade alone, indicating a surge of interest. Three particular years stood out (1988, 2006, and 2009), corresponding with the publication of special issues on related topics to extreme contexts (Gephart, Van Maanen, & Oberlechner, 2009; Lampel et al., 2009; Scheytt, Soin, Sahlin-Andersson, & Power, 2006; Shrivastava, Mitroff, Miller, & Miclani, 1988).

Next, we categorized the 138 studies along the three empirical categories. Specifically, we sorted the articles according to the empirical context or

event(s) they relied on in developing their argument. Inspired by Thompson (1967), and based on the idea that a core activity to an organization receives more attention and preparedness than a noncore activity, we categorized the events and contexts accordingly. This allowed us to position every study along two axes depending on whether the incident really *did* happen (e.g., Mann Gulch) or *could* happen (e.g., simulated scenarios in a High Reliability Organization), and whether whatever happened (or could happen) was (or would likely be) directly *related* to the core activities of the organizational context in question (e.g., Bhopal’s chemical leak), or whether it was (or would be) *unrelated* to these

FIGURE 1
Timeline of ECR Publications in Top-Tier Journals



activities (e.g., a tsunami). This generated a heuristic: a two-by-two matrix that differentiated studies by “actual” or “potential” and by “related” or “unrelated” (see Figure 2). Of these four analytic distinctions, three are inhabited insofar as our sample, perhaps unsurprisingly, did not include any articles for the “potential and unrelated” category. Although a theoretical possibility, this quadrant would call for studies of unexpected adverse incidents that have not yet happened but could happen and would not be related to any of the organization’s core activities.

We labeled the remaining three categories *Risky* (R, potential and related), *Emergency* (E, actual and related), and *Disrupted* (D, actual and unrelated). Of the set of 138 papers, 45 fall into the “R,” 60 into the “E,” and 15 into the “D” category. The remaining 18 papers are conceptual or methodological (rather than empirical) and only briefly discussed (see Appendix A).

This empirical classification helps us integrate existing substreams, including high reliability organizations (HROs), organizational resilience, and crisis research (e.g., the HRO literature is distributed across “risky” and “emergency” contexts). It also allows us to distinguish between papers based on an apparently similar event but quite different context (e.g., a shooting of a terrorist by an anti-terrorist unit as different from a shooting in a business school). Finally, studies in each of these three categories differ methodologically (e.g., “actual” studies typically rely on interviews or archival research whereas “potential”

studies tend to use more diverse methodologies, such as simulations) and also along theoretical traditions.

Following below are literature reviews of ECR as organized along the three empirically distinct categories: risky, emergency, and disrupted (or RED) contexts. Each review is, in turn, structured along a set of guiding questions that closely approximate the overriding research interests of the relevant articles.

RISKY CONTEXTS

Risky contexts are characterized by near-constant exposure to potentially extreme events such that an unusually great degree of emphasis is inevitably placed on the reliability of systems and the particular routines, processes, and materials these involve. Such events, were they to happen, would significantly disrupt operations and pose a danger to the larger population. Risky contexts include, but are not limited to, HROs (see Weick, 2004; Weick et al., 1999) and/or settings for “normal accidents” (see Perrow, 1984; Sagan, 1993) that are often categorized under the rubric of the “organizational resilience” literature (Linnenluecke, 2015). Given the constant risk of an extreme event, safety is (or ought to be) the principal concern of the design of the organization’s processes and anyone involved with a risky context, even if extreme events rarely happen. This is reflected in the nature of the literature that is focused on avoiding potential, sometimes hypothetical

FIGURE 2
Matrix of the Contexts Activities According to the Events Occurrence

		Contexts activities	
		Related	Unrelated
Events occurrence	Potential	<p><i>Risky context</i> e.g. nascar racing - Bothner et al, 2007; oil drilling – Topal, 2009; firefighting (Bigley & Roberts, 2001)</p>	
	Actual	<p><i>Emergency context</i> e.g. hospitals – Nembhard & Tucker, 2011; space exploration Vaughan, 1990; police –Cornelissen et al, 2014; wildland firefighters – Weick, 1990</p>	<p><i>Disruptive context</i> e.g. genocide – Clegg et al, 2012; natural disasters - Shepherd & Williams, 2014; terrorist attacks - Quinn & Worline, 2008</p>

scenarios, or catching minor deviations from the operational plans before they have accumulated into something devastating.

Risky contexts are the second largest subtheme, representing 45/138 articles in our dataset. The scholarly literature on risky contexts points toward four dominant research themes: (1) How do organizations manage risk? (2) How do individuals, teams, and organizations deal with, or act upon, risk? (3) What roles do stakeholders play in risky contexts? (4) What have individuals, teams, and organizations learned from managing risk?

Organizing around Risk

Large swathes of social life are infused with technologies and activities (some more visible than others) that have the potential to harm people or to cause significant material destruction (Gephart et al., 2009; Scheytt et al., 2006). Whereas the “risk society” literature focuses, in no small part, on risks that are invisible—for example, the blindsiding of certain risks due to the way risk is socially constructed—studies of risky contexts are principally concerned with how organizations structure their operations in environments where risks are knowable and specified, and the consequences of anything going awry significant. Not surprisingly perhaps, contingency theory appears to be the prevalent theoretical device to help us understand how businesses organize around risk (see Table 3).

The earliest contributions in our dataset explore the differences between risky and conventional contexts, or what are also called “low reliability” organizations (Roberts, 1990; Waller, 1999). Some of these early contributions argue that reliable organizations are unique compared with less reliable organization, and thereby, the MOS literature is less well equipped to describe what makes organizations reliable (see Klein, Bigley, & Roberts, 1995; Roberts, 1990; Weick & Roberts, 1993). The characteristics of reliable organizations include dealing with a high interdependence between activities, environmental uncertainty, and (primary) goals (Roberts, 1990). This is supported by structural mechanisms, organizational support for constrained improvisation, and cognition management methods that combined ensure high levels of reliability under volatile environmental conditions (Bigley & Roberts, 2001). Following a contingency approach, early contributions to the literature focus on designing organizational structures to better address the coordination issue in risky contexts. A recurring question in this line of

research concerns centralization/decentralization and its impact on risk where, in times of crisis, an organization may tolerate decentralization even if it prefers centralization during normal operations (Madsen, Desai, Roberts & Wong, 2006, see also Waller, 1999). Research suggests that an increase in programmed, centralized responses does not translate to better safety. Rather, the ability to leverage individual responsibility and distributed knowledge (Argote, 1982) is pertinent to safe operations. This can be accomplished by designing “modules” in which operational units are combined and responsibilities delegated in a flexible way while maintaining a clear command structure (Bigley & Robert, 2001).

The role of organizational culture and group norms in ensuring safety surfaces as another significant theme in the early literature (Klein et al., 1995: 773), where culture is conceived of as a “collective mind” where individuals and parts of the organization may compensate for each other’s shortcomings by being sensitive to nuances in the operations, and where actors consciously think of their actions as interrelated with other activities as part of a larger system (Weick & Roberts, 1993). As a rejoinder to the organizational design literature, Bierly and Spender (1995) show that structure and culture alike are required for reliable performance as they allow for centralization and decentralization simultaneously (see also Klein et al., 1995). That this is not always straightforwardly achieved is evident from Collinson’s (1999) who finds that although organizational rules and policies appear to be safety oriented, in practice are not always implemented or simply paid lip-service to. In Collinson’s world, safety culture means impression management, and faulty report processes mean that accidents and threats go unreported.

In sum, organizations that operate in risky contexts share a challenge in requiring flexibility and stability, simultaneously. This balance can be achieved in a modularized way of operating, facilitated by, and complemented with, a strong organizational culture that allow for continuous improvisation based on the situational needs.

Working in Risky Contexts

As our review has suggested thus far, organizational design and culture are important to ensuring reliable operations. In addition, risky context researchers have been keen to understand the experience of working and making operational decisions

TABLE 3
Organizing Around Risk

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Argote (1982)	Contingency theory/ Coordination	Undefined number of interviews & questionnaires	Health care (30 Emergency departments)	In situations with low input uncertainty, programmed responses are appropriate	250
Roberts (1990)	Contingency theory/ High reliability theory	Undefined number of 5-10 day cycles of observations during 36 months	Military (Three aircraft carriers)	HRO's characteristics: interdependence, uncertain environment, and goal	273
Weick and Roberts (1993)	Group mind/High reliability theory	Four illustrative examples, three based on observations	Military (Aircraft carrier)	The concept of collective mind as patterns of heedful interrelating	1323
Bierly and Spender (1995)	Contingency theory/ HROs	Undefined experience on submarine	Military (Nuclear submarine)	Culture, experience, and the interaction/support of bureaucracy create reliability	67
Klein et al. (1995)	Organizational culture/ HROs/ contingency theory	187 + 469 questionnaires & undefined observations	Aviation & Nuclear industry (Air traffic control & nuclear power plant)	Differences between HROs and other organizations in people/ security; task security; satisfaction	176
Collinson (1999)	Safety/Impression management	98 interviews, unknown number of observations	Oil industry (two Offshore oil platforms)	Performance and employee assessment create impression management	71
Waller (1999)	Team literature	50 simulations of ten 3-person teams	Aviation (five events)	Team performance contingent on timing of tasks and coordination	113
Bigley and Roberts (2001)	Contingency theory/ HROs	Unstructured observations, 25 semi- structured interviews (3 phases)	Fire fighting (Fire department HQ, two stations)	Structure, organizational support for improvisation, and cognition management methods provide reliability	242
Katz-Navon et al. (2005)	Organizational culture	632 questionnaires, documentation of previous year's error treatments of the units	Health care (47 hospital medical units)	The need to complement programmed responses with staff's interpretation and understanding to ensure safety	94
Madsen et al. (2006)	Contingency theory/ HROs	Undefined interviews & observations for multiple years	Health care (Pediatric intensive care)	The ability to design for flexibility, distributed knowledge & emergent organization, and shifting balances of centralization/ decentralisation	3
Carroll et al. (2006)	Contingency theory/ HROs	Simulation and implementation of designs	Space (six cases at NASA)	Context and tools matter. Suggests focus on "misfits"	13
Leveson et al. (2009)	Contingency theory/ HROs	Illustrative examples	Conceptual	Safety is a systems property connected by institutional, organizational, group, and individual actions	61
Hawkins (2015)	Leadership/Actor Network Theory	18 + 15 interviews & undefined observations	Military (Ship)	Affordances through materiality define non-neutral actants role in leadership	1

as, after all, organizations must elaborate patterns and processes to mitigate risk while also requiring their managers and employees to be alert. Unsurprisingly, continuous exposure to risk renders

risk assessment an important feature of daily life and an important input into decision-making. The propensity to accept risk is not just a matter of risk but one of risk in relation to gain. Thus, Nascar drivers

take more risks as their positions are threatened by lower ranked drivers (Bothner, Kang, & Stuart, 2007, see also Sitkin & Weingart, 1995 on propensity and perception of risk). Similarly, those charged with decisions on the adoption of new technologies rely principally on a trade-off between growth and safety, where decision tends to be biased towards a self-serving behavior. Whereas Nascar drivers put themselves at risk, technology geeks risk extending this to the wider public (Osborn & Jackson, 1988).

Because of the nature of their operations, a common characteristic for many risky context organization is 24/7 access to expertise (Klein, Ziegert, Knight, & Xiao, 2006; Valentine & Edmondson, 2015). Therefore, many organizations rely on teamwork, irregular shift schedules, and a steady flow of new and old colleagues. This high degree of interdependence can, however, create challenges in coordinating work and in managing interpersonal relationships, particularly as relationships in risky contexts may develop differently than they otherwise might in stable settings (Valentine & Edmondson, 2015). It is thus little surprise that to coordinate work effectively has surfaced as a dominant theme in this cadre of work (see Table 4).

One response to effective coordination in unpredictable, high-stakes environments is “team scaffolding” (Valentine & Edmondson, 2015: 408). As a mesolevel structure, scaffolding allows for extremely fluid groups of people (e.g., shift workers in health care) to coordinate their work and increase the efficiency of the operations in a way that purely role-based team work do not allow. Similarly, Klein et al.’s (2006) concept of “dynamic delegation,” or “senior leaders’ rapid and repeated delegation of the active leadership role to and withdrawal of the active leadership role from more junior leaders of the team in response to challenging task demands” (Klein et al., 2006: 598). Such delegation allows for the ever-changing, urgent, unpredictable, highly interdependent, and consequential setting to function, thanks to deindividualized structures that increases co-workers’ skills.

It may well be that this ability to coordinate work in dynamic, unpredictable, and complex settings therefore explains the importance of trust in co-workers’ character and competency. For example, in an investigation into firefighters, Colquitt, LePine, Zapata, & Wild (2011) find that such risky activities as entering a burning building were associated with more trust in colleagues than job-related situations that involved less risk. This suggests that trust is not only associated with specific individuals but

a function of context and task. Being competent includes the competence of being flexible, to show ambition and social competence, and to be able to demonstrate high capability and modesty simultaneously (Lindberg & Rantatalo, 2014). It also means being able to balance between productivity and safety, and between bureaucratic control and meso-level structures (Waring & Currie, 2009).

Finally, to ensure safety and extract relevant information about pending safety issues, there is a need to “listen in” on conversations and thereby cognitively and collaboratively develop and maintain shared situational awareness (Roth, Multer & Raslear, 2006, see also Weick & Roberts, 1993). That said, too much information may create decision paralysis. Drawing on the observations of eight crisis action teams and their work of analyzing then-current terrorist threats, Woolley (2011) investigates the conditions under which too much information is gathered and the motivations for gathering this information. She finds that a defensive strategic orientation contributes to more information collection—to the point of an inability to decide—whereas an offensive strategic orientation makes the information collection more limited and bearable.

In sum, organizations operating in risky contexts are able to maintain their operations by relying on different, fluid forms of teamwork, where individuals and groups are replaceable and interchangeable on the basis of a common technical and multifaceted competence.

Managing Stakeholders in Risky Environments

Given the high degree of risk to which they are exposed, and their dependence on external stakeholders for operating licenses and resources, organizations that operate in risky contexts have to be particularly astute at managing constituents. A different set of studies have looked at how such organizations have responded to “existential” events, or those that threaten the organization or the industry’s very existence.

A common denominator within this set of studies is that organizational efforts to managing stakeholders in risky contexts have tended to normalize the risk of an extreme event, legitimize their operations, and identify with the institutional context they exist within (see Table 5). This normalization and legitimation of operations can be achieved through diverse types of public relations efforts. Given the extreme consequences that could result from anything going wrong—from harm to life to economic

TABLE 4
Working in Risky Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Osborn and Jackson (1988)	Agency theory/ Prospect theory	NRC records from 41 plants 1975–1981, documents & undefined interviews	Nuclear industry	Executives drawing upon myths, thereby jeopardizing safety	43
Sitkin and Weingart (1995)	Decision-making	Simulation with 71 students	Sports (Challenger launch decision disguised as racing)	Risk propensity and risk perception mediates risky decisions	282
Meszaros (1999)	Sensemaking	Action research with 12-h case presentations & panel discussions	Chemical industry (six cases from chemical comp.)	Information processing then relying on heuristics to make decisions, influencing choice	9
Klein et al. (2006)	Leadership	150 h observations & 33 interviews & secondary material	Health care (Trauma center)	Dynamic delegation is at the heart of reaching reliable and safe operations	176
Roth et al. (2006)	Coordination/ HROs	26 interviews & undefined observations	Railroad (five locations)	Situational awareness through communication. Regulation loops are not only formal but also emerge through situated practice.	34
Bothner et al. (2007)	Decision-making	Panel data from Nascar 1990–2003	Sports (Nascar Winston's cup)	Conduct influenced by relative position and crowding around positions	41
Waring and Currie (2009)	Managerial work	200h observations, 44 interviews	Health care (One hospital's implementation of safety system)	In addition to knowledge management, incident reports undermine professional autonomy	88
Colquitt et al. (2011)	Trust/High Reliability Theory	3 longitudinal questionnaires of 126 firefighters & performance evaluations of supervisors	Police (Seven fire companies in one fire department)	Trust as task and context dependent	27
Candrian (2014)	Communication/ Critical discourse	200 h observations, 15 interviews, secondary material	Health care (Emergency department & hospice)	Taming practices naturalize death and shape a particular discursive culture	0
Lindberg and Rantatalo (2014)	Competence/ Practice theory	39 interviews	Blue light services & Health care (Police & doctors)	Redefinition of competence as a balance between performance and being humble	2
Valentine and Edmondson (2015)	Coordination/ Team	33 interviews, 40-h observations, work hours of 620 individuals during 503 days	Health care (Interactions in emergency department)	Roles do not provide sufficient structure, but team scaffolds do by providing boundaries	4
Woolley (2011)	Strategy/Team	256 h video, 40 h observations, secondary material	Military (eight teams assessing/planning terrorist threat)	Breadth vs depth balance, offensive teams are confident, defensive team display possibilities with few conclusions	

costs to the potential for “hyperturbulence” (Meyer (1982) cited by Sullivan-Taylor & Wilson, 2009: 251)—risky industries enjoy special scrutiny. Given this level of scrutiny, effective public relations are important to organizations interested in preserving

and maintaining their legitimacy following extreme events (Desai, 2011). Aside from public relations, legitimation can be achieved by means of public hearings, including public consultation. However, as Topal (2009: 293) points out, these processes can

TABLE 5
Managing Stakeholders in risky contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Reed et al. (1997)	Institutional theory/ Learning/systems theory	Secondary material	Military industry (nuclear weapons in the US)	A need to acknowledge fear, risk, and culture in institutional theory	6
Douglas and Mars (2003)	Cultural theory	Conceptual	Terrorism (Dissidence)	Institutions around potential terrorists shape world perception through information restrictions	19
Gibson and Abell (2004)	Identity theory	16 interviews	Military (Army soldiers)	The motivation to serve in the military as more complex than pride and patriotism	12
Fraher (2004)	Field theory	Auto-biographic observations during 18 years	Aviation (Commercial and military aviation)	Pilots' desire to carry a handgun is a result of national heroic culture, industry, and individuals	7
Laegreid and Serigstad (2006)	Institutional theory/ Coordination	17 interviews & secondary documents	Homeland security (Multiple agencies)	9/11 did not chock the system, instead solution space was provided by agencies. Reforms are encouraged/ discouraged depending on viewpoint	13
Topal (2009)	Critical sensemaking/ risk society	Report	Oil industry (West Edmonton well)	Public inquiries rely on structural sensemaking that put citizens in danger	10
Sullivan- Taylor and Wilson (2009)	Institutional theory/ High reliability theory	25 interviews	Tourism (six tourism companies)	Organizations treat (terror) risk as a normal distribution, failing to view events as uncertainty rather than probability	11
Desai (2011)	Institutional theory	Analysis of accidents by AAR & 705 press releases 1980–2003	Railroad (Class 1 railroads)	Organizations influence impressions of field following events and scrutiny. Similar organizations are less likely to act defensively	28
Thornborrow and Brown (2009)	Identity/Power	70 interviews	Military (Paratroopers)	Preferred versions of the self, disciplines employees' identity work	72
Helms and Patterson (2014)	Institutional work/ Organizational stigma	52 interviews, history & autobiographies, media	Sports (Mixed Martial Arts)	Boundary workers protect clients from stigma. Organizations gaining acceptance through stigma attributes	5
Bloomfield and Vurdubakis (2015)	Ethical decision-making/ sociomateriality	Conceptual	Military (Robot warfare)	Sociomateriality need to acknowledge the ethical agency and “how” of machines	1

be manipulated to conceal or normalize the risks of new technologies “through the demonstration of participation, general interest, and rational evaluation.” What contributes to this normalization and legitimization is the fact that it is often the same organizations that are simultaneously responsible for the production, assessment, and management of risks (Laegreid & Serigstad, 2006: 1395).

Risk normalization can, perhaps paradoxically, benefit from stigmatization. For example, mixed martial arts successfully normalized the risk associated with extreme violence by addressing relevant stakeholders through production work, rule work, and safety work, and by enticing, pacifying, and educating critical audiences (Helms & Patterson, 2014). Such processes are unrelated to specific events but

involve instead a careful framing of information to help shape public perception (Douglas & Mars, 2003). Finally, the normalization of risk can be observed through stakeholders' discourse in shaping the complex cultures and identities that structure risky contexts. For example, soldiers will often explain their motivation for war in terms of fighting for their fellow soldiers, or their regiment, rather than for patriotic reasons. By challenging taken-for-granted assumptions "[these] are institutional discourses which make the outright denial of 'serving the country' problematic" (Gibson & Abell, 2004: 885) and contribute to identity formation (Thornborrow & Brown, 2009; Fraher, 2004). Work in risky contexts, in other words, can be viewed as an identity project that requires a certain competence.

In sum, research on risky contexts has demonstrated that efforts to manage external and internal stakeholders contribute to the normalization of risk. This happens when, for example, organizations use media and/or public hearings to help legitimate their activities despite the inherent and obvious risks involved. Moreover, this is not just the consequence of circulating institutional discourses but, rather, it is embedded in the actors' agency and identity that are subject to, as well as constituted by, the discursive practices of other stakeholders.

Learning from Risky Contexts

Organizational learning is a common theme within management and organization theory and a practical challenge to any organization (Cyert & March, 1963; March, Sproull, & Tamuz, 1991). The basic assumption is that organizational learning progresses along a curve with proficiency as the gradual result of repetition or "a modification in organizational performance as a result of experience" (Madsen & Desai, 2010: 453). The learning challenge for those operating in risky contexts is considerable: it is clearly important that organizations learn effectively and yet because extreme events occur only very rarely (particularly within a single organization), real life provides only few opportunities to learn from experience (March et al., 1991). Organizations are thus required to learn from small samples of extreme events—distributed temporarily and geographically among one or several organizations—and/or minor breakdowns within the organization. The bulk of articles in our sample focuses on the latter in that organizational learning is commonly associated with attention to minor events or errors (see Table 6). The attention and attribution of errors is important

because it determines how willing people are to reveal when something minor that may prove undetected is going wrong, allowing others to learn from whatever insights may be gained from what goes or went wrong.

Critical to learning from "samples of one" (March et al., 1991) and/or minor errors is a high degree of psychological safety, making it easier for people to identify, and own up to their involvement in making, mistakes. As Edmondson (2003) demonstrates, leadership is key to fostering psychological safety through effective coaching, communicating, and minimize power and status differences. Vashdi, Bamberger, & Erez's (2013) investigation into action teams suggests that teams are highly dependent on cross-team learning and that reflexive sessions (such as after-action reviews, see Catino and Patriotta, 2013; Ron, Lipshitz, & Popper, 2006) act as substitutes for the stability found in ordinary teams that stay together for an extended period of time and provide a structure that allow them to coordinate their activities. One reason this is effective may be that in a (project) team setting, boundary objects have an impact on knowledge by internally constructing judgment and brokering of knowledge, and forming new knowledge combinations while cautiously validating new solutions. (Dodgson, Gann, & Salter, 2007)

In sum, our review finds that even if the organizations operate in contexts with significant risks, they may learn effectively provided they are able to foster a psychologically safe environment where the attention and attribution of error influences both the ability to catch and willingness to report mishaps. This allows people to learn from errors individually and collectively and to make adjustments.

In Sum: Researching Risky Contexts

Reflecting on a relatively substantial literature on risky contexts, one notes a development within this literature from an interest in HROs to a concern with "macro" institutional studies of the environments within which organizations operate. For example, early contributions are characterized by an interest in identifying, managing, and safeguarding processes that help ensure safe operations. These early developments include investigations of HROs (Roberts, 1990) and, in particular, how safe operations rely on a "double-whammy" of careful organizational design on one hand and a safety-oriented organizational culture on the other (Bierly & Spender, 1995; Collinson, 1999; Weick & Roberts, 1993). Useful illustrations of

TABLE 6
Learning from Risky Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Carroll (1998)	Learning	Action research; undefined interviews & observations	Nuclear & Chemical (Nuclear power plant & chemical plant)	Logics of learning come from occupational and hierarchical levels & differences	97
Marcus and Nichols (1999)	Learning/Resource- based view	24 interviews, expenditures in industry 1986–1989	Nuclear (two Nuclear power plants/ industry)	Allocation, attention, knowledge & resources influence recognition & interpretation of events	73
Edmondson (2003)	Learning/team	165 interviews, attending training programs	Health care (16 cardiac surgery teams)	Develop the notion of interpersonal teams). Leadership is key to HRO and safety	393
Ron et al. (2006)	Learning	13 interviews	Military (Flight squadron)	People reveal errors and learn through the example of others	30
Zhao and Olivera (2006)	Learning/attribution theory	Illustrative examples	Medicine (Conceptual)	Attribution influences assessment, so does context & time pressure	66
Dodgson et al. (2007)	Knowledge/ boundary objects	24 interviews, 3 months of observations	Engineering (fire engineering comp)	Boundary objects and knowledge work practices are intermediaries for internal, integrative and collective processes	39
Catino and Patriotta (2013)	Learning	37 interviews, 4 observations of debriefing, documentation of 70 accidents in in-house magazine	Military (two airbases, ITAF HQ)	The importance of culture for appreciating failures. Learning influenced by emotions and intensity	13
Vashdi et al. (2013)	Learning/team literature	Action research, 362 surgical teams, performance data before and after	Health care (362 surgical teams)	The importance of reflexivity in action teams allow for learning and coordination	22
Desai (2015)	Learning/ Attribution theory	CAPG surgery among 116 hospitals 2003–2010	Health care (116 hospitals)	Location, and concentration of failures influence effectiveness of learning	2

the interplay of structure and culture include Klein et al. (1995) investigations of the US air traffic control system, and a nuclear power plant, highlighting the unique structural and cultural dynamics for safe operations.

These early contributions have given way to institutional and process-oriented approaches. Rather than focusing on how organizations in risky contexts were organized, structured, and “cultured,” the emphasis has shifted toward an examination of such “macro” contributors to safe operations as industry-wide and national cultures (Desai, 2011; Fraher, 2004; Gibson & Abell, 2004). A strong undercurrent of this literature is an emphasis on the processes by which high-risk operations are legitimized (Helms & Patterson, 2014). That these processes can leave

much to be desired for is evident from Topal’s (2009) investigation of public hearings, suggesting that although the official purpose of public hearings is to involve stakeholders in major decisions under the pretense of democratic principles, they often do so but only superficially.

In methodological terms, the majority of studies on risky contexts are qualitative in nature, using single cases (Bierly & Spender, 1995; Helms & Patterson, 2014) and multiple cases (Carroll, 1998; Collinson, 1999; Woolley, 2011) based largely on interviews and observations. Others rely on experiments (Sitkin & Weingart, 1995), simulations (Carroll et al, 2006), and surveys (Katz-Navon et al, 2005). Among the most commonly studied industries are health care (Argote, 1982; Desai, 2015; Edmondson, 2003;

Madsen et al, 2006) the military (Gibson & Abell, 2004; Hawkins, 2015; Reed et al, 1997; Ron et al, 2006), nuclear power (Carroll, 1998; Marcus & Nichols, 1999; Osborn & Jackson, 1988), and aviation (Fraher, 2004; Klein et al, 1995; Sullivan-Taylor & Wilson, 2009; Waller, 1999). Contingency theory (Carroll, Gormley, Bilardo, Burton & Woodman, 2006; Fraher, 2004; Roberts, 1990) and its variants such as organizational design (Katz-Navon, Naveh & Stern, 2005; Lin, Zhao, Ismail & Carley, 2006; Madsen et al., 2006) and systems theory (Bigley & Roberts, 2001; Fraher, 2004; Morgeson, Mitchell, & Liu, 2015; Pearson & Clair, 1998; Shrivastava, Sonpar & Pazzaglia, 2009a, 2009b) have highlighted the role of organizational design and culture in ensuring safe operations (Bierly & Spender, 1995; Bigley & Roberts, 2001; Roberts, 1990). Not only has contingency theory served as a foundation for research on risky contexts, but research on risky contexts has, in turn, contributed to enhance MOS through contributions to contingency theory.

EMERGENCY CONTEXTS

Whereas risky contexts are characterized by the ever-present *potentiality* of catastrophe, in *emergency* and *disrupted* contexts these have become an *actuality*. As we have shown, research into the former involves the challenges of fostering safe operations so as to prevent catastrophe. Studies into the latter concern themselves with organizational responses to actual events. These actual events can be the result of core operations gone awry (such as a chemical spill for a chemical plant) or be entirely unrelated to core operations (such as a shooting in a shopping mall). We refer to the first category of events as *emergencies* and to the latter as *disruptions*. One of the key differences between these categories is the fact that emergencies allow for preparation (insofar as they are related to core activities), whereas disruptions typically catch organizations unawares. For those who find themselves in either of these extreme contexts, expeditious and effective organizational responses are imperative to avoid further aggravating a potentially traumatic and/or dangerous situation. Needless to say, the literature is principally concerned with differentiating between more and less effectively organizational responses.

This body of research comprises the largest in our sample by far (60/138) and clusters around the following questions: (1) How do organizations respond to an emergency? (2) How do individuals and teams

experience an emergency and with what consequences for their behavior? (3) What role do stakeholders play in an emergency context? (4) How do individuals, teams, and organizations learn or fail to learn from the collective experience of emergencies?

Responding to Emergencies

In the early 1980s, it was common to explain catastrophic failure as the result of long periods of incubation interspersed by a series of “unnoticed,” and occasionally minor, problems related to security and technological reliability (Perrow, 1984). It was widely assumed that the failure of one small technical component could initiate a complex set of interactions that could allow a system to collapse. Research on emergency contexts has extended and revisited this engineering view by arguing that accidents and catastrophes are caused not just by technological failures but by human error and through failures of communication within, and between, organizations (Feldman, 2004; Shattuck & Williams, 2006; Shrivastava et al., 1988; Vaughan, 1990). Weick (1988) was one of the first to show that crises and disasters are enacted through human agency and social processes of organizing. Subsequent research has sought to examine, and differentiate between, “nonadaptive” and “adaptive” responses to emergencies, both during incubation (or before the catastrophic event) and during the critical period (or during the catastrophic event as it unfolded) of a crisis (see Table 7).

It is common in research on emergency contexts to reconstitute the chain of events that led up to a particular catastrophe. Good examples of this include three pioneering studies by Weick (1988, 1990, 1993) on Bhopal (a chemical spill), Tenerife (an airplane accident), and Mann Gulch (a fire accident), all of which begin by reconstituting the sequence of small errors preceding each catastrophic event. It is the combination of independent small events such as optimistic evaluation (Lipshitz, 1995), costly flaring (Gephart, 1993), and stressful environments (Feldman, 2004; Weick, 1990) that can have disastrous consequences. The apparent inability of organizations to change chains of events and/or actions leading up to failure—sometimes referred to as a “cosmology episode” (Weick, 1993) or a “dysfunctional momentum” (Barton & Sutcliffe, 2009)—has become an interesting puzzle for social scientists. For example, the reluctance of firefighters to “drop their tools” when ordered to do so is often cited as a classic example of the difficulty for organizational

TABLE 7
Responding to Emergency Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Anderson (1983)	Decision-making	Transcripts and records	Politics (Cuban Missile crisis)	Decision-making in crisis relies on sequential choice, goal discovery and failure avoidance	71
Shrivastava et al. (1988)	Industrial crisis	Illustrative examples	Chemical & Space (Bhopal, Tylenol, Challenger disasters)	Industrial crises are caused by humans, communication, and technological failures	78
Weick (1988)	Sensemaking/crisis	Documentation of explorers/operators' actions	Chemical (Bhopal disaster)	Enactment of commitment, capacity, and expectations affects sensemaking in crisis	348
Vaughan (1990)	Resource dependence theory	Documentation prior, during and after + undefined interviews	Space (Challenger disaster)	Organizational autonomy and interdependence limits effective regulation from agencies	98
Weick (1990)	Sensemaking/Crisis	Transcripts from cockpit conversations	Aviation (Tenerife Air Disaster)	Errors are amplified by routines interruptions, cognitive inefficiency, and coordination breakdown	194
Weick (1993)	Sensemaking	Book & report	Wildland firefighting (Mann Gulch disaster)	Improvisation, virtual role system, attitude of wisdom, and respectful interaction are sources of organizational resilience	1067
Gephart (1993)	Sensemaking/ disasters	Observations & report	Natural gas (Pipeline accident)	Public inquiry is a ceremonial event assigning responsibility rather than blame	167
Lipshitz (1995)	Escalating commitment	One book, two reports	Politics (Operation Desert Storm)	Mindfulness and resourcefulness are central in decision-making under uncertainty	7
Weick (1996)	Sensemaking/ Academic Values	Book & report	Wildland firefighting (Mann Gulch, South Canyon)	As for firefighters and academics, dropping your tools to face threat is unbearable	173
Hynes and Prasad (1997)	Sensemaking/crisis	Secondary material and report	Mining (Westray Mine explosion)	Workplace safety is ineffective because related issues are made invisible and hidden	18
Rudolph and Repenning (2002)	Disasters	Illustrative examples & mathematical modeling	Aviation (Tenerife disaster & USS <i>Vicenze</i>)	Cumulative incidents may lead to disaster. Need to consider novelty and quantity of interruptions	104
Feldman (2004)	Learning	Previous analysis + report	Space (Challenger and Columbia disasters)	Culture of objectivity under time pressure affects understanding of flight risk	20
Busby (2006)	HROs	Two reports	Railroad (two railroad accidents)	Systematic safety reforms coexist with undermining activities	21
Lin, et al. (2006)	Contingency theory	Simulation of 80 organizations + 80 archival real cases	Chemical, navigation, rail, oil, nuclear, space, construction, mining etc.	Adopting a management approach to crisis increases organizational performance	20
Shattuck and Williams (2006)	Natural decision- making/situated cognition	Illustrative example	Military (USS <i>Greenville</i> – <i>Ehime Maru</i> accident)	Accidents result from the complex interactions between a variety of technological and human agents	11

TABLE 7
(Continued)

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Barton and Sutcliffe (2009)	Sensemaking/HROs	28 interviews providing 62 events	Wild land firefighting (62 events)	Redirecting actions during crisis can be done through microprocesses of sensemaking	29
Chikudate (2009)	Critical theory	Accident report	Railway (JR West)	Coexistence of blame and safety cultures impacts workers' decisions	10
Weick (2010)	Sensemaking	Weick (1988) revisited	Chemical (Bhopal disaster)	Exploration, awareness, reliability, and certainty are key to sensemaking	48
Bechky and Okhuysen (2011)	Mindfulness/ improvisation	22 interviews + observations; observations of four movie sets	Police and Entertainment (SWAT & movie crew)	Practices of organizational bricolage (role shifting, reorganizing routines, work reordering) allow to deal with surprises	64
Whiteman and Cooper (2011)	Sensemaking	Undefined ethnography, book + topographic data	Native americans Wildland firefighters (Autoethnography/ Mann Gulch disaster)	Importance of understanding ecological processes and material landscapes	49
Colville et al. (2013)	Sensemaking	Transcripts from witnesses & report	Police counter terrorism operation (Stockwell shooting)	Presence of both old and new routines engenders discrepant sensemaking	14
Cornelissen et al. (2014)	Sensemaking/ commitment	Transcripts from witnesses & report	Police counter terrorism operation (Stockwell shooting)	Communication, emotions and materiality are central in non-adaptive sensemaking	12

members to change their way of doing things even as the threat of a disaster intensifies (Weick, 1993). Examining the Tenerife air disaster, Weick (1990) identified three processes that served to amplify the effects of minor deviations into emergency situations: interruptions of central routines, loss of cognitive efficiency, and breakdown in coordinated action and information flow. Several studies have since sought to advance our understanding of how it is that such “trivial” deviations can give rise to emergency situations. For example, Rudolph and Reppenning (2002: 24) have shown that “organizations (...) have ‘tipping points’, or thresholds of accumulated interruptions beyond which performance rapidly collapses” and threaten their survival. Colville et al. (2013) suggest that the overlap between existing and novel routines in organizational change can also have disastrous consequences. Thus, if a novel central routine overlaps existing routines, this can create dissonant identities for organizational members that, in turn, can generate erroneous decision-making. Barton and Sutcliffe (2009) find that organizational actors can fail to

re-evaluate the situation not because they do not see the first small events that can cause a catastrophe, but because they fail to make sense of these new cues to develop a novel understanding of the situation. So deeply embedded in the unfolding of their work are that the individuals are less likely to re-evaluate, adapt, and adjust ongoing action in the absence of a grave interruption.

Among the factors in the early stages of crises that have received extensive coverage, the loss of cognitive efficiency in decision-making and the misinterpretation of small events feature large. Several studies have looked at the consequences of “escalating commitment,” either around nonrational decision-making or around false interpretation. Through the lens of sensemaking, Cornelissen, Mantere, and Vaara (2014) explore how a collective commitment to a frame—or a false interpretation—builds up and escalates during episodes of sensemaking under pressure. In such situations, the decision-making process is often nonrational from beginning to end, and without consideration for alternative courses of action (Lipshitz, 1995). For

example, research on emergency contexts suggests that a strong “culture of objectivity” in a context where the organizational autonomy is highly valued (e.g., NASA) can prevent managers from becoming sensitive to uncertainty, ultimately impeding their ability to fully understand the risks involved (Feldman, 2004; Vaughan, 1990). Recent research has also accentuated the role of communication, expressed and felt emotions, and material ecological signals that stabilized and reinforced the initial interpretations at the exclusion of alternative ways of framing the very same situation (Cornelissen, Mantere, & Vaara, 2014). Even a failure to make “ecological sense” may endanger the survival of actors in emergency contexts (Whiteman & Cooper, 2011).

As these studies repeatedly show, a breakdown in coordination of action and information facilitated the diffusion of multiple small errors in the decision-making process preceding an emergency. Data flows become “blocked, missed, or altered as they propagate” (Shattuck & Williams, 2006: 1006) through a complex set of interactions between technological and human systems. The presence of multiple players and systems renders the coordination of action and information difficult in conditions that are fast moving and perhaps frightening (Shattuck & Williams, 2006). Such decision-making processes in complex organization involve what Weick (1990; 1996) refers to as “pluralistic ignorance”: team members and groups assume that there is someone somewhere who knows what to do instead of they themselves taking action or expressing concerns that could prevent a catastrophe. The breakdown in coordination might also follow “blunt” changes in the organizational structure implemented for dealing with crisis situations but without paying attention to the nature of the task environment and the symbolic effect of altering their traditional way of coordinating the work (Lin et al., 2006).

Yet other studies attribute the cumulative effects of small events or errors to the normative and political contexts in which the organizations and their members are embedded. This is particularly the case when the legitimacy of workplace safety is ineffective, or not reinforced and regulated by management, workers’ decision-making can be significantly affected which, in turn, can have serious consequences (Hynes & Prasad, 1997). To impose bureaucracy as a solution to imperfect decision-making and foster a safety culture need not be effective. For example, Chikudate (2009), having examined a West Japan Railway accident, suggests that the train driver did not report his previous mistakes to authorities—which might have

helped avoid the accident—because he worried about being disciplined courtesy of a recently institutionalized safety culture. In organizations where safety is a significant political issue, the coexistence of multiple ways by which managers and workers construct and make sense of the tension between responsibility and blame are not negligible for reducing instead of exacerbating small events or errors (Gephart, 1993). Moreover, processes of increasing organizational safety and reliability coexist with organizational processes that are confounding or undermining them. Even if the situation is known to all relevant parties, to change remains difficult despite systemic reforms to increase the organizational safety and reliability (Busby, 2006).

Rather than focusing on explaining nonadaptive responses, yet other studies have sought to understand how some individuals and organization are apparently able to provide adaptive responses in emergency situations. Improvisation and bricolage—or the ability to recombine material, social, and cognitive resources in daily operations (Bechky & Okkhuysen, 2011)—are thought to be fundamental for building adaptive sensemaking in emergency contexts, as are mindfulness (Weick, 1993) and resourcefulness (Lipshitz, 1995). Whereas mindfulness refers to the use of expertise by knowledgeable organizational actors to detect and make sense of potential failures, resourcefulness refers to the individual and the collective capacity to mobilize diverse forms of supports to prevent or avoid failures. Barton and Sutcliffe (2009) suggest that the need to constantly be “giving voice to concerns” and “actively seeking alternative perspectives” are two mindful practices that encourage the re-evaluation of action in emergency contexts: humility and skepticism of expertise were discovered to be antecedents to processes that help overcome or redirect a course of action that might otherwise have fatal consequences.

In sum, questions of how organizations respond to emergencies have principally been addressed by examining collective processes of meaning construction and communication. By highlighting the “enacted,” “social,” and even material processes that unexpectedly transform a relative safe and stable context into an emergency, this sub-stream of research provides an agentic and distributed perspective on such situations by showing the huge range of challenges faced by individuals, teams, and organizations to routinely generated adaptive responses, coordinate action, and share information.

Experiencing Emergencies

Several studies have examined the challenges faced by individuals, groups, and teams trying to make sense of—and to coordinate collective action in response to—emergency situations. These studies tend to focus very specifically on how staff, team members, and their managers experience, react to, and behave in emergencies. As Table 8 suggests, emergency contexts are typically the site of intensely negative emotions, including stress, anxiety, fear, and sadness that can affect the way organizational members under pressure perceive ambiguous cues and interpret them (Maitlis & Sonenshein, 2010).

Even if not explicitly highlighting the role of emotions, Weick's (1990) study of the Tenerife air disaster emphasized the importance of the experience of stress in encouraging the rapid diffusion of small errors which affected the pilot's capacity to make sense of what was happening in the cockpit. Similarly, accidents may greatly increase the level of job tension or the "stress complexity" of the workplace, thereby reducing the ability of employees to adjust to the environment (Chisholm, Kasl & Eskenazi, 1983). In the same way, "anxiety toleration" or the ongoing experience of "facing, working with, and tolerating the unknown" influences the capacity of sensemaking during the critical period of a crisis (Stein, 2004).

Occupational stress research helps shed light on factors moderating relationships between a critical event and the negative emotional states experienced by workers in emergency contexts. For example, when working in contexts such as hospices, trauma (Cooper & Mitchell, 1990), or AIDS units (George, Reed, Ballard, Colin, & Fielding, 1993) in which death is ever present, the impact on the distress and negative moods experienced by nurses is moderated by organizational and social support (Cooper & Mitchell, 1990; George et al., 1993). This is also the case for workers who are experiencing posttraumatic stress disorder. Drawing on questionnaire responses from New York City firefighters, many of whom were previously involved in 9/11, Bacharach and Bamberger (2007) showed that it is unit-level contextual factors such as work unit and control climate that mitigate the level of distress experienced after a traumatic event. By inferring the importance of contextual dimensions of what are often considered to be individual reactions, these researches invite work units' managers to pay attention to the organizational support they can provide to their employees at work under stressful or traumatic circumstances.

By contrast, surprisingly little research has focused on the role of managers in emergency contexts or precisely the sort of "circumstances that few managers can imagine" (Mintzberg, 2001: 759). Our sample comprises only two papers that examine the active role played by managers in emergency situations. Each emphasizes the centrality of middle managers' abilities to make sense of the unfolding situation for those around them. Their role consists in being able to temporarily transform a chaotic situation characterized by conflicting interpretations into a single, coherent vision of the situation. Beck and Plowman (2009) propose a model of middle managers' role in the process of convergent sensemaking at each unfolding stage of a disaster. It involves persuading multiple actors from diverse organizational levels, or even diverse organizations, to coordinate their actions when facing to an emergency situation and to subtly communicating informal but critical know-how about the unfolding situation (cf. Mintzberg, 2001).

Aside from managers' sensemaking abilities, and their role in reducing stress for staff and team members, other behaviors such as courage and engagement also play a role in emergency contexts. For example, Quinn and Worline (2008) explore what enables courageous collective action by looking at how crew members and passengers aboard the Flight 93 (September 9/11) to organize a counterattack against the hijackers. Their analysis suggest that courageous action is created and recreated through a set of narratives, and the resources needed for making these narratives possible (e.g., cell phones). Many workers in emergency contexts such as police and doctors are performing "dirty work," or tasks that can cause harm and stress to others. Although it has been largely assumed that they can only do this by disengaging themselves from these tasks, recent research in emergency contexts show that a large proportion of them cultivate a moral ambiguity about their role (Dick, 2005) or engage their own emotions and demonstrating feelings of empathy and engagement towards others (Margolis & Molinsky, 2008). Despite the stressful climate that is typical of emergency contexts, these resilient behaviors are sources of positive felt emotions.

In sum, the relevant literature points at three observations about how individuals react to emergency contexts. First, negative emotions appear to slow down adaptive capacities and fuel errors and misinterpretations. Second, organizational support to

TABLE 8
Reacting to Emergency Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Chisholm et al. (1983)	Occupational health/disasters	324+298 questionnaires	Nuclear (Three Miles Island, Peach Bottom plant)	Workers experience higher tensions (overload, role conflict) in an interrupted vs a noninterrupted nuclear plant	20
Cooper and Mitchell (1990)	Stress	117 questionnaires	Health care (nurses' exposure to death at seven hospitals, three hospices)	Hospital nurses are stressed and hospice nurses are vulnerable to lack of support	16
George et al. (1993)	Stress	256 questionnaires	Health care (nurses' exposure to AIDS)	Working with AIDS patients has negative effects that can be mitigated by social support	83
Mintzberg (2001)	Managerial work	2 + 2 days of observations	Humanitarian (two managers in two refugee camps)	Communicating and controlling are two main managerial roles in chaotic situations	5
Stein (2004)	Sensemaking/ Anxiety theory	2 illustrative examples	Space & nuclear (Apollo 13 & Three Mile Island)	Capacity for anxiety toleration influences how sense is made during crisis situation	28
Dick (2005)	Dirty work/critical sensemaking	15 interviews + 2 focus group interviews	Police (one police district)	Police officers reframe the meaning of coercive authority by composing a moral identity	49
Bacharach and Bamberger (2007)	Stress	1600 questionnaires	Fire fighting 346 Fire Departments after 9/11)	The importance of context on the experience of work related stress	47
Margolis and Molinsky (2008)	Necessary evil	104 interviews + questionnaires with seven medical students	Police + health care + apparel (Hospital, Police organization, apparel company)	Typology of disengagement styles: grounded, mechanical, integrated, detached	48
Quinn and Worline (2008)	Sensemaking	Books + reports	Terrorism (Flight 93-9/11)	Courageous collective action draws on personal, situational, and collective narratives	36
Beck and Plowman (2009)	Sensemaking/ learning	Illustrative example	Space (Columbia Shuttle)	Middle managers' interpretations evolve over time (divergence/ convergence process)	6
Maitlis and Sonenshein (2010)	Sensemaking/ Crisis & change	Review around Weick (1988)	Chemical (Bhopal)	Shared meanings and emotions are two core theme of crisis and change literatures	110
Beck and Plowman (2014)	Complexity theory	17 interviews + observations of undefined meetings	Space (Columbia space shuttle response effort)	Trust and collective identity are central in emergent interorganizational collaboration	36

employees and the sensemaking role of middle managers appear to be of great importance in emergency contexts. And, third, recent research in emergency contexts suggests that life-threatening contexts can also give rise to positive emotions related to the exercise of courageous and compassionate behaviors toward others that can favor resilience.

The Role of Stakeholders in Emergency Contexts

Stakeholders—governments, industry bodies, the media—are key players in emergency contexts as they can influence the unfolding of catastrophic events in emergency contexts and provide pressure on organizations to act more responsibly during daily operations (Table 9). Stakeholders' presence

and contributions might help them manage the outfall of an extreme event as well as influence the management of the events following a catastrophic situation (Beck & Plowman, 2014; Cooren, Brummans, & Charrieras, 2008).

Emergencies often give rise to divergent accounts among stakeholders on the origins, handling, and consequences of catastrophic events. After all, each stakeholder brings specific interests, motives, and knowledge bases to their interpretations of these events (Gephart, 1984; Patriotta, Gond, & Schultz, 2011). Gephart (1984) describes the discursive struggle in a public arena around a catastrophic event as “political sensemaking.” In these struggles, the capacity of attracting public attention is key for being able to dominate the evolving discourse (Nelkin, 1988). For instance, it has been shown that the level of public attention to media coverage around critical events having caused environmental disasters depends on the external and internal stakeholders’ capacities to contest the accountability for the enactment of the critical event (Hoffman & Ocasio, 2001). Public attention is particularly important when the accident or catastrophe has significant ecological or environmental consequences for larger communities (Brown, 2003; Gephart, 1984; Hoffman & Ocasio, 2001; Patriotta et al., 2011). Businesses will generally be concerned by repercussions following public attention after a crisis in their industry (Bowman & Kunreuther, 1988; Kunreuther & Bowman, 1997). Such strategies can be viewed as ways of restoring legitimacy, support, and attention from board members and external public (Bowman & Kunreuther, 1988).

Accountability, justification, and legitimacy are fundamental aspects actively negotiated, debated, and contested by organizations and relevant stakeholder groups through diverse forms of public discourse (e.g., newspapers reports, public hearings) around a catastrophic event in emergency contexts. For example, Patriotta et al. (2011) describe a controversy around a nuclear accident involving Vattenfall Europe, a large Swedish energy company. By analyzing the press coverage of the accident, they show how different stakeholders engaged in a discursive process of institutional repair to maintain the legitimacy of the nuclear industry. Public hearings constitute another form of discourse that plays a significant political sensemaking role in emergency contexts for maintaining and repairing the legitimacy of powerful stakeholders (Brown, 2003). However, such justification work is efficient only so long as it overlooks peripheral and

powerless players such as workers and communities facing emergency contexts who might have different set of values (Vaccaro & Palazzo, 2015). This is made possible by “silencing their voices” as well as by “normalizing” their identity in a psychological, gendered way that can support the dominant discourse built around a catastrophic and disastrous situation (Elmes & Frame, 2008; Godfrey, Lilley, & Brewis, 2012).

In sum, the key role organizations and their related constituencies play in the aftermath of emergency situations is inherently political and consists of maintaining and restoring the organizational legitimacy and one of its constituents through diverse forms of public discourses. On one hand, organizations are pressured by external stakeholders and public opinion to act more safely and responsibly; on the other, multiple stakeholders are involved in negotiating (through public hearings) an acceptable view of the crisis that may restructure and/or reframe the situation. Instead of portraying organizations and their stakeholders as supportive and/or victims of extreme events, this research gave rise to complex accountability issue by which dominant stakeholders impose their interpretations on the extreme event even if these stakeholders directly or indirectly contributed to the onset of a crisis.

Learning from Emergency Contexts

Research on learning from emergency contexts—at least in our sample—seek to understand how it is that individuals, teams, and organizations learn, or fail to learn, from emergencies. Some studies entertain the assumption that teams and organizations are more likely to learn from extreme than from small events (Baum & Dahlin, 2007; Haunschild & Sullivan, 2002; Madsen & Desai, 2010; Starbuck & Milliken, 1988) whereas others try to explain when and why they fail to learn (Goh, Love, Brown, & Spickett, 2012; Kayes, 2004; Starbuck, 2009). Learning in this research is associated to the organizational capacity to become better at preventing extreme events and the failure to learn is related to the complexity for individuals and teams to make sense of what is happening in emergency context (see Table 10).

At the organizational level, learning is often associated with accident reduction or safety improvements more generally (Baum & Dahlin, 2007; Haunschild & Sullivan, 2002; Madsen, 2009). Studies using archival data based on accidents in diverse industries have demonstrated that accidents tend

TABLE 9
The Role of Stakeholders

Author(s)/ Year	Contributes to What conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Gephart (1984)	Political sensemaking	Two illustrative examples	Petroleum (Oil leaks impacting two communities)	Divergent views of disasters are coexisting and compete for dominance	59
Nelkin (1988)	Communication/ Risk	Four illustrative examples	Nuclear + chemical (Chernobyl, Three Mile Island, Bhopal, Rhine pollution)	Media play a significant role in perception of risk and standards for preventing disasters	6
Bowman and Kunreuther (1988)	Decision-making	20 interviews	Chemical (Chemical company)	After Bhopal, managerial decisions of other related firms need justifications	22
Kunreuther and Bowman (1997)	Decision-making	20 + 10 interviews	Chemical (Chemical company)	Factors influencing key stakeholders: changing reference points, learning from accidents and from others about oneself	5
Hoffman and Ocasio (2001)	Institutional theory	Media articles during four years	Chemical (eight significant events)	Public attention around a critical event depends on political tensions around and within organizations	167
Brown (2003)	Sensemaking/Power	Report	Petroleum (Alpha Piper disaster)	Inquiry reports are authoritative texts that make events more controllable	81
Cooren et al. (2008)	Interactionist/ANT/ Discourse	42 hours of video ethnography	Humanitarian (Refugee camp)	Need to manifest the repeated marking of organizational presence in social disaster	38
Elmes and Frame (2008)	Critical theory	Books + 7 interviews	Sports (Mount Everest 1996)	The Mount Everest story is a myth silencing some voices and lacking contextual factors	9
Patriotta et al. (2011)	Institutional repair/ legitimacy	Media articles, internal documentation	Nuclear (Nuclear power plant incident)	Stakeholders draw upon orders of worth to reconstruct their legitimacy after an accident (institutional repair)	51
Godfrey et al. (2012)	Critical theory/ organized body	Film (Jarhead)	Military (US Marines)	The masculine military body is performatively disciplined, gendered and cyborgian.	18
Vaccaro and Palazzo (2015)	Institutional theory	Observation of meetings, secondary material + 84 interviews	Organized crime	Values may be used by stakeholders to change an institutional order	6

to decrease over time even if their causal structure becomes more complex and heterogeneous. For example, Baum and Dahlin (2007) find a link between aspired-to performance and learning: organizations tend to learn more when they are away from their aspired performance. Madsen (2009) concluded that organizations learn as much from disasters as they do from minor accidents. However, whereas a minor accident induces learning at the individual level, a crisis tends to promote learning at the team or organizational and industry levels. He proposes a multilevel model of learning from disasters and minor accidents suggesting that individual learning from small errors or minor

accidents is not always encoded in organizational routines, although these routines are imperatively transformed after an extreme event.

Despite the prominence of studies concluding that organizations learn more from failures than from conventional settings, Starbuck (2009: 925) suggests that “organizations learn very little from failures.” Recent research into accidents in the airline and mining industry appear to prove Starbuck (2009) correct: decisions at industry levels remain driven by pressures to turn a profit instead of concerns for the security of employees and the communities in which businesses operate (Goh et al., 2012; Madsen, 2013).

TABLE 10
Learning form Emergency Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Starbuck and Milliken (1988)	Learning/HROs	Reports & media	Space (Challenger disaster)	Fine-tuning of organizational success makes failures very likely	177
Hoffman and Stetzer (1998)	Attribution theory/ cognitive	1318+653 questionnaires	Utility (Workers experiencing accidents in utility)	Managers tend to attribute error to workers, whereas workers tend to attribute errors to context	139
Morris and Moore (2000)	Learning	Media + simulation with 42 students	Aviation (82 aviation incidents)	Individuals learn more when they responded to an event with counterfactual thoughts	78
Haunschild and Sullivan (2002)	Learning/accidents	Database on aviation incidents 1987–1997	Aviation (Incidents among US airlines)	When accidents' causes are multiple rather than single, organizational learning is more significant	160
Kayes (2004)	Learning	Media, websites, books etc.	Sports (Mount Everest 1996)	Teams fail to learn when dealing with directive leader and ill- defined goals/problems	36
Baum and Dahlin (2007)	Learning	Database on accidents 1975–2001	Railroad (Freight accidents)	Learning processes from experience are conditioned by aspiration feedback	110
Tempest et al. (2007)	Liminality/learning	Books	Sports (Mount Everest 1996)	Liminality refers to relatively unconnected and less knowledgeable team members in temporary organizations	13
Dunbar and Garud (2009)	Sensemaking/ learning	Reports	Space (Columbia disaster)	Sensemaking is the result of distributed knowledge across artifacts, people, routines, metrics	15
Madsen (2009)	Learning	Database on accidents 1983–2006	Mining (US mining incidents)	Organizations learn from disasters but differently relative minor accidents	30
Starbuck (2009)	Learning	Illustrative examples	Space (Challenger etc.)	Organizations do not learn from rare events	25
Madsen and Desai (2010)	Learning	Database on accidents 1957–2004	Space (Global orbital launch vehicles accidents)	Organizations learn more from failures	79
Nembhard and Tucker (2011)	Learning/team	1440 questionnaires + database on 1040 infants	Health care (Neonatal intensive care units)	Interdisciplinary collaboration is key to get the workgroup to function and learn	24
Madsen (2013)	Behavioral theory of the firm/safety	Database on US incidents 1983 - 2006	Aviation (Aviation incidents)	Accidents are most likely to occur when organizations are near performance objectives	3
Goh, et al. (2012)	System theory/ Accidents	Reports	Mining (Beaconsfield Gold mine accident)	High pressure for production increases the risk tolerability and endangers safety	20
Haunschild et al. (2015)	Learning/innovation	Reports + database on FDA approved drugs 1997–2004	Aviation + Pharma (Challenger, Columbia disasters + pharma incidents)	Organization oscillates between periods of forgetting and learning	0

Haunschild et al (2015) provide a more nuanced explanation in developing a model of “organizational oscillation” between periods of learning and forgetting. Over time, the effects of serious errors or disastrous events fade thus inducing favorable conditions for subsequent problems.

Moreover, researchers paying attention to team learning are more inclined to explain the failure to learn in emergency context. In the emergency contexts literature, learning appears to entail a process by which “knowledge is distributed across artifacts, people, metrics, and routines” (Dunbar & Garud, 2009: 417). The distributed and indeterminate nature of knowledge and learning where demands—for example, between safety and production—are often conflicting, restrains the team’s capacity to make sense of an emergency situation in convergent ways. The impact of such conflicting demands can have disastrous consequences, as evidenced by studies into the 1996 Mount Everest disaster, where collective leadership, clear goals definition, and the capacity to make sense of unexpected events have been shown to be key for avoiding a breakdown in team learning during emergencies (Kayes, 2004). Prior knowledge of each other and awareness of other’s knowledge are imperative to learning for teams operating in emergency contexts (Nembhard & Tucker, 2011; Tempest, Starkey & Ennew, 2007). Nevertheless, Mooris, and Moore (2000) argue that the individual ability to learn will always be limited by organizational power structures, and the communication climate about safety and the managerial perspective on blame influences the ability to learn in emergency contexts (Hofmann & Stetzer, 1998.) Emergency contexts as liminal space (Tempest et al., 2007) challenge perceptions and cognitive behaviors or the organizational sensemaking capacities that impede active learning from such situations.

In summary, learning in emergency contexts remains a complex and contested issue. Research into how organizations learn tends to assert that they learn more from emergency events than from conventional settings, whereas research into individual and team-based learning tends to highlight the difficulties of learning from emergencies. To better understand how individuals, teams, and organizations learn (or fail to learn), a multilevel approach would seem promising.

In sum: Researching Emergencies

Reflecting on the various studies discussed above, it quickly becomes clear that Weick has had

a disproportionate influence on this subfield. Sensemaking (Weick, 1988, 1990, 1993, 1996, 2010) has become a principal construct in helping us understand how individuals and organizations experience, and respond to, emergencies. This is evident from a strong overall focus on collective meaning construction under severe time pressure. On the one hand, this research has emphasized the loss of cognitive and interpretative efficiency (Colville et al., 2013; Rudolph & Repenning, 2002; Weick, 1990), the difficulty of changing or reorienting action during an extreme event (Barton & Sutcliffe, 2009; Feldman, 2004), as well as the negative emotions experienced by workers in emergency contexts (Baccharach & Bamberger, 2007; Stein, 2004). This research has also highlighted the (often public) political struggles between various stakeholders in maintaining their legitimacy by controlling discourses and meanings (Brown, 2003; Gephart, 1984; Patriotta et al., 2011).

On the other hand, emergency context research has paid attention to the importance of skillful performance (Bechky & Okhuysen, 2011; Weick, 1993) and the presence of positive emotions in emergency situations (Quinn & Worline, 2008). Moreover, it has shown how public attention exercises pressure on organizations to reduce the potential of future accidents (Hoffman & Ocasio, 2001), and how organizations are more likely to learn from extreme events than from conventional settings (Dunbar & Garud, 2009; Madsen, 2009; Madsen & Desai, 2010).

Relatively little of the research relies on interviews and observations. Instead, research on emergency contexts is largely informed by archival data (Busby, 2006; Hoffman & Ocasio, 2001; Patriotta et al., 2011; Weick, 1990, Weick, 1993) and existing accounts, such as books and articles (Beck & Plowman, 2009; Shrivastava et al. 1988; Weick, 1988). The risks associated with the use of post hoc (as opposed to “real time”) data are limited by drawing on records of real-time communications between the main actors concerned (Cornelissen et al., 2014; Gephart, 1993; Quinn & Worline, 2008; Weick, 1990).

The empirical focus of emergency context research has predominately been on critical high-profile *events* in a variety of settings, including space flight (Beckman & Plowman, 2014; Dunbar & Garud, 2009; Starbuck, 2009), chemical (Bowman & Kunreuther, 1988; Hoffman & Ocasio, 2001; Kunreuther & Bowman, 1997), aviation (Madsen, 2013; Morris & Moore, 2000; Weick, 1990), mining (Goh et al, 2012; Hynes & Prasad, 1997; Madsen, 2009), and blue light services (Cornelissen et al, 2014; Dick, 2005; Weick, 1993). Interestingly, similar

(or even the same) events tend to reoccur and become reanalyzed from a variety of perspectives. For example, Mann Gulch was discussed by Weick (1993) and Whiteman and Cooper (2011), Bhopal & Union Carbide by Weick (2010) and Maitlis and Sonenschein (2010), Mount Everest 1996 by Kayes (2004) and Tempest et al. (2007), and the Challenger disaster by Vaughan (1990) and Starbuck and Milliken (1988) to name but a few. This tendency would call for a greater variety in the selection of context and events, to expand the basis of the theorizing efforts.

DISRUPTED CONTEXTS

Disrupted contexts are triggered by extreme events that occur outside the core activities of organizations or communities and are “frequently portrayed as unique, unprecedented, or even uncategorizable” (Christianson et al., 2009: 846). Thus, in contrast to risky contexts, they do not usually allow for preparation (Lanzara, 1983: 72) and catch organizations and/or communities off-guard. However, as noted by Christianson et al. (2009), extreme events are not also necessarily unique or rare, and even if events may never quite recur in exactly the same way, the types of activities that transform chaos into order likely will. This suggests that there are benefits from trying to understand some of the key principles related to such disrupted situations, even if drawn from varied samples, and we review some for these here.

Compared with risky and emergency contexts, studies of organizational responses to disruption are least well represented in our sample (15/138). The articles discussed below provide answers to two broad questions: (1) How do organizations respond to disrupted contexts? and (2) What role do stakeholders play in disrupted contexts?

Organizing During Disruption

Given that organizations are typically structured to provide the efficient production of core goods and services, they can be ill-equipped to handle disruptions, particularly when wholly unrelated to their core activities. When such crises occur, one often sees the emergence of temporary groups or organizations as improvised and short-term responses to a disrupted context. These are highly action oriented and focused on the immediate task at hand (Majchrzak, Jarvenpaa, & Hollingshead., 2007 : 149). Instead of seeing disruptive events as unique and unmanageable, they trigger change through emergent initiatives (see Table 11).

A common theme across multiple articles is the development of temporal organizations. These organizations may be closely associated with an organization (Christianson et al., 2009; Powley, 2009), or to society at large (Lanzara, 1983; Majchrzak et al., 2007; Shepherd & Williams, 2014), a common theme being that of extreme events causing actors to come together. These temporary groups are similar to “ephemeral organizations” (Lanzara, 1983) and disaster response teams (Shepherd & Williams, 2014) that “are there to disappear, after displaying a great deal of activity” (Lanzara, 1983: 88). Such temporary response group can be seen as “collectives of individuals who use nonroutine resources and activities to apply to nonroutine domains and tasks, using nonroutine organizational arrangements” (Majchrzak et al., 2007: 150).

However, horrific disruptive events may be their ability to focus on resources and draw together multiple actors can prove of long-term benefit to the organizations affected. For example, the collapse of a roof provided an opportunity for an otherwise entirely unprepared museum to seek out new solutions (including new partnerships) in an attempt to reopen quickly (Christianson et al., 2009). This was accomplished by a temporary action-oriented team presented with a clear task. One of the “silver linings” of their subsequent (temporary) work was the insight gained by members about their response repertoire, the nature of the environment in which they were operating, and how the organization was perceived by others (Christianson et al., 2009). Similarly, their efforts can highlight levels of resilience within the organization as people come together to cope with the experience (Shepherd & Williams, 2014) through liminal suspension (where an event un-did, and altered, relations that are to be reassembled in an emergent temporal space), compassionate witnessing (where opportunities emerged for members to engage and respond to individual needs), and relational redundancy (where the individuals’ social connections helped activate resilience) (Powley, 2009).

Temporary organizations have proved remarkably efficient in recovering from adverse events compared with their more established counterparts. For example, investigating the improvised aid work following an earthquake in Italy, Lanzara (1983) found that the bureaucratic organization that had been implemented proved incapable of responding to needs on the ground. These needs were met instead by a series of ephemeral organizations that had the necessary flexibility to provide effective aid. This

TABLE 11
Organizing in Disrupted Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Lanzara (1983)	Temporary organizations/ Contingency theory	Unclear number of observations & interviews	Natural disaster (Earthquake in Italy)	The efficiency and emergence of ephemeral organizations vs bureaucratic organizations	47
Majchrzak et al. (2007)	Sociocognitive theory	Reports & research	Natural disaster (Hurricane Katrina)	Stability in volatile contexts relies on individuals, highlighting the importance of trust	136
Powley (2009)	Resilience/social capital	60 interviews	Academia (Shooting at Business School)	Identifies three social mechanisms activating resilience: liminal suspension, compassionate witnessing, and relational redundancy	42
Christianson et al. (2009)	Learning/sensemaking	Documentation and eight interviews	Museum (Roof collapse)	Rare events make deficiencies salient, from which organizations may identify new opportunities and/or improve	48
Shepherd and Williams (2014)	Compassionate organizing	Report	Natural disaster (eight local ventures associated with Black Saturday fire)	Importance of localness and social architecture for compassionate organizing	9

observation is similar to organizational problems faced when having to cope with the aftermath of other natural disasters. See also Majchrzak et al. (2007) who found emergent response teams efficiently coordinating relief despite a lack of expertise, as well as a lack of understanding of the expertise of others, in the aftermath of hurricane Katrina. Instead, these temporary teams create and recreate trust by repeatedly showing a capability to act and coordinated action through accurate expectations about the roles and responsibilities of others. By doing so, these local ventures establish emergent roles, improvises to coordinate, and introduces symbolic actions within the community to ease people's physical, psychological, and financial suffering. The capability to act is sometimes more important than rules, but whereas improvisation is important, so is to have structures and routines for dealing with situations at hand (Majchrzak et al, 2007; Shepherd & Williams, 2014).

In sum, these studies suggest that much of the resilient capabilities in unprepared settings remain "hidden" until an event occurs that makes such capabilities salient. The work on organizational responses to disruption has a relatively positive undertone, suggesting that when society and normal operations are interrupted, profitable new relations

may emerge among people and organizations that have no prior connection. The literature also suggests that these emergent organizational efforts rely on the social fabric of society and the existing structures and operations that are transformed to fit the current temporal needs.

The Role of Stakeholders During Disruption

Ever since the beginning of the 21st century, there has been a small but noticeable interest within ECR into the politicoeconomic consequences of extreme events that disrupt societies. Some of these studies focus on efforts to depoliticize disruptive events and to maintain the legitimacy of those tasked with managing their consequences. Others appear to fall into one of two camps. The first examines the processes that transform society and will typically introduce a particularly dark period. The second looks at market reactions to disrupted periods. Together, these papers seek to understand how stakeholders contribute to creating and maintaining disrupted contexts (see Table 12).

Public inquiries have emerged as a popular tool for investigating institutional disruption (Boudes & Laroche, 2009; Brown, 2000). These inquiries are designed to understand the complex causal relations

TABLE 12
Institutionalizing Disrupted Contexts

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Dietrich (1981)	Political science/ institutional theory	Secondary material	WW2 Holocaust	Role and significance of dehumanization in holocaust	3
Teulings (1982)	Resource dependence theory	Secondary material	WW2 Holocaust	Highlights the dilemmas multinationals face when collaborating with totalitarian regimes	2
Brown (2000)	Inquiry sensemaking	Report	Health care (Murders on children's ward)	Public inquiry is an exercise of power that extends control, blames, absolves, and legitimizes	93
Kets de Vries (2006)	Leadership/ political science	Illustrative examples	Genocide (e.g., Hitler, Stalin, Ceausecu, Polpot, Assad, etc)	The rise of tyrants and how they maintain power through ideology, enforcement of mindcontrol, media, illusion of solidarity, and scapegoats	14
Clegg et al (2012)	Total institutions	Books	Genocide (Khmer Rouge)	The emergence and maintenance of total institutions through a utopian vision; total institutional spaces, and commitment control	8
Boudes and Laroche (2009)	Sensemaking	Reports	Natural event (Heatwave in France)	Identifies a typology of crisis narratives	23
Lamberg and Pajunen (2010)	Institutional theory	Secondary material	Finnish printing industry during WW2	How oppression can be camouflaged	7
Muller and Kräussl (2011)	Corporate social responsibility	Database on 442 Fortune 500 companies stock prices, before and after Hurricane Katrina	Natural event (Hurricane Katrina)	Stock market reactions to social irresponsibility	46
Martí & Fernández (2013)	Institutional theory	Secondary material	WW2 Holocaust	Centrality of human agents in enabling change in highly institutionalized environments	15
Diestre and Rajagopalan (2014)	Attribution theory/ cognitive theory	Database with 78 accidents between 1997–2005	Chemical (Chemical accidents)	Stock market reaction to chemical accidents	2

involved in a catastrophe occurring with a view of preventing similar events from recurring in the future. However, as previously discussed, rather than illuminate, public inquiries tend to normalize, demonize, observe, discern, blame, and absolve by means of rhetorical strategies (Brown, 2000).

Other research within this genre focuses on particularly dark periods in contemporary history, often characterized by atrocities performed in the name of religion, class, or an assumed superiority of one group over another. For example, Kets de Vries (2006) profiled despots and tyrants such as Hitler,

Stalin, PolPot, and Mugabe in an attempt to understand processes that enable violence on a barely imaginable scale. Clegg, Pina e Cunha and Rego (2012) did likewise with the rise of the Khmer Rouge in Cambodia. Tyrant leadership is “the arbitrary rule by a single person who, by inducing a psychological state of extreme fear in a population, monopolizes power to his or her own advantage (unchecked by law or other restraining influences), exercising that power without restraint and, in most cases, contrary to the general good” (Kets de Vries, 2006: 197). What enabled such tyrants to rise to power is the

imposition of an ideology designed to destroy the existing social fabric (the same social fabric that in other disrupted contexts is the root of resilience) and the mobilization of total institutions supported by laws and policies and a “biased” mass media so as to create a distorted worldview (Clegg, Pinha e Cunha, & Rego., 2012; Kets de Vries, 2006). Victims of tyranny appear unable, or unwilling, to resist the normalization of efforts to control them through everyday activities, policies and laws (Dietrich, 1981; Martí & Fernández, 2013). Most studies suggest that to change any total institution requires the introduction of a third party (e.g., the International Criminal Court) (Kets de Vries, 2006) or a yet further dramatic event (e.g., Vietnam invading Cambodia) (Clegg et al., 2012). Total institutions will rarely ever change from within.

In summary, despite their diversity, studies within this cadre share an interest in understanding the (often subtle) sociopolitical processes by which disrupted contexts become normalized through public hearings, the introduction of new legislation, and other macro institutional processes. In disrupted contexts, the role of stakeholders mainly consists in protecting groups and institutions who are managing the consequences of an extreme event.

In Sum: Researching Disrupted Contexts

Disrupted context research is a city of two tales. On the one hand, it emphasizes the degree to which extreme events can foster collective action, and that resulting temporary action groups can have a profoundly positive impact on handling a situation vis-à-vis permanent organizations. On the other hand, research also shows society’s inability to avoid atrocities being inflicted on entire populations. This paradox is laid to rest when considering that the former is more typically the result of abrupt events impacting on organizational life, whereas the latter is more often the result of a set of small and gradual, cumulative developments. Comparisons with the “boiling frog” parable aren’t lost on anyone.⁴

Method-wise, research into disrupted contexts has clearly favored qualitative methods, dominated by case studies based on second-hand literature (Dietrich, 1981; Clegg et al., 2012; Lamberg & Pajunen, 2010; Teulings, 1982), illustrative cases

(Kets de Vries, 2006), inquiries and reports (Boudes & Laroche, 2009; Brown, 2000) and, occasionally, on a mix between reports, interviews, and observations (Christianson et al., 2009; Lanzara, 1983; Shepherd & Williams, 2014;). Aside from investigating atrocities (Dietrich, 1981; Kets de Vries, 2006; Martí & Fernández, 2013), many studies revolve around one-off freak events, keen to understand the longer-term effects on society and the inability of permanent organizations to provide the needed relief (Boudes & Laroche, 2009; Muller & Kräussl, 2011). Thus, Shepherd and Williams (2014) investigated compassionate behavior in a society in the aftermath of the Black Friday fires in Australia. Focusing on man-made freak events, Brown (2000) examined the circumstances surrounding a nurse accused of systematically killing patients; Powley (2009) investigated a freak shooting at a business school; and Christianson et al (2009) the collapse of a museum roof. Although such man-made events may never recur in the same location (unlike earthquakes, draughts or floods), it is important to try and understand why they did happen, how they might be prevented, and how their consequences can be best managed.

BREAKING NEW GROUND IN MOS

Our purpose in this review paper was threefold: to create some semblance of order in a fragmented literature by means of a typology as the basis for a review, to explore the role and relevance of ECR to MOS by highlighting various ways in which the former has contributed to the latter, and to outline promising directions for future research. We imagined that doing so might be helpful in view of the fragmented and somewhat disjointed nature of ECR. Fragmentation may well have kept this literature at the periphery of MOS (Buchanan & Denyer, 2013; James et al., 2011) by making it difficult to connect the various studies and leverage their contributions. Perhaps as a result, a series of specialist journals—*Journal of Crisis and Contingencies Management*, *Journal of Risk Research*, *Journal of Humanitarian Assistance*, among others—have done the heavy lifting in publishing ECR research. But, research studies on extreme contexts are appreciated by a far wider academic audience than the niche journals. Citation counts suffer from limitations, but an indication of the impact of ECR on MOS is given in the individual citations (see Tables 3–12, column to the far right) and the overall citations (6563 citations in total). Reviewing the 6563 publications that cite our

⁴ The premise is that if a frog is put suddenly into boiling water, it will jump out, but if the frog is put in tepid water which is then brought to a boil slowly, it will not perceive the danger and will be cooked to death.

138 articles, 982 articles are related to extreme contexts per our definition. This represents 14.9%. Assuming that subsequent citations of the citing articles will drift further away from extreme contexts in a process of theoretical diffusion, there have been, and will be, a contribution to MOS in general from research on extreme contexts. In this final section, we hope to show some of the significant contribution ECR has made to MOS and will likely continue to do in future years.

Our review sought to respond to the fragmentation of ECR by developing a typology as one (and likely not the only) means of organizing the ECR literature, the intent being that of allowing ECR the best possible chance of successfully advancing MOS. This would seem timely given a conspicuous increase of interest in research into extreme contexts. The three categories that comprise our typology express contextual differences between articles that describe organizational responses to extreme events that could happen (risky contexts), to extreme events that did happen and are related to the organization's core activities (emergency contexts), and to extreme events that happened but are unrelated to core activities (disrupted contexts).

Reviews of the literature in each category have highlighted a set of unique contributions. For example, given its focus on maintaining safe operations, research into **risky** contexts tends to focus on relating organizational design and organizational culture in balancing stability with flexibility in operating complex technological systems. Advances into the importance of psychological safety, structural flexibility, and the fluid coordination of work have translated particularly well to other subfields of MOS. Constructs developed within the risky context literature, such as "collective mind" (Weick & Roberts, 1993), "task prioritization" (Waller, 1999), "team scaffolding" (Valentine & Edmondson, 2015), "dynamic delegation" (Klein et al., 2006), and "temporary organization" (Lundin & Söderholm, 1995) now regularly feature in the wider MOS literature. The importance of improvisation (Argote, 1982 and as developed by Weick, 1993) as well as the idea of surveilling "local misfits" have reinvigorated reflections on organizational structure (Hatch, 1999) and renewed a number of areas in MOS (see, e.g., the literature review on organizational bricolage by Hadida, Tarvainen, & Rose, 2015).

By contrast, **emergency** context research explores the repertoire of responses of individuals, groups, and organizations following an extreme event. Contributions from this body of work include

sensemaking—or how it is that those affected (re)construct meaningful narratives following an extreme event so as to act collectively and effectively—under pressure. It has also emphasized the role of stress and negative emotions by showing how adaptive responses contribute to misinterpretations and the importance of support from managers and colleagues. The influence of Weick on ECR is indisputable and somewhat transversal to research on risky, emergency, and even disrupted contexts (where 4/10 papers are also among the most cited by MOS (Weick and Roberts (1993) 1323 times, Weick (1993) 1067 times; Weick (1988) 348 times, and Weick (1990) 194 times). Developed primarily through his work on emergency contexts, the notion of mindfulness or alertness (Weick, 2010), and such related constructs as resourcefulness (Lipshitz, 1995), commitment (Cornelissen et al., 2014), and resilience (Linnenluecke, 2015), have found a large and receptive audience in MOS (see, e.g., the literature review on mindfulness in organizing by Vogus & Sutcliffe, 2012). As Brown et al (2015) demonstrate, political sensemaking has also received plenty of attention in MOS, whereas ecological sensemaking has mostly been relegated to discussions of environmental, embodied, and material issues in play for organizations (Stigliani & Ravasi, 2012; Pina E Cunha, Clegg, Rego, & Gomes, 2015).

Given that most papers on **disrupted** contexts are relatively recent, their contributions to advancing MOS have so far been limited. With his paper on ephemeral organizations, Lanzara (1983) figures as a pioneer in research on disrupted contexts. He was also one of the first to use the expressions "extreme environments" and "ephemeral organization." The latter has been adopted in various MOS domains such as "organizational improvisation" (Kamoche & e Cunha, 2001); temporary and project organizations (Meyerson, Weick & Kramer, 1996); and studies of innovation, technology, and artifacts (Ciborra & Lanzara, 1994). By focusing on the disruption of social and organizational institutions, the papers reviewed here have fostered discussions of resilience and social responsibility at the institutional and societal levels. These topics are central for understanding relationships in business, within society, and even in discourses around ethics (Gerde & Michaelson, 2016). But research into disrupted contexts has also contributed to advancing such under-examined notions such as liminality (Powley, 2009) and compassionate organizing (Shepherd & Williams, 2014). In recent years, MOS has become highly receptive to these notions for advancing

conversations on organizational change (Howard-Grenville, Golden-Biddle, Irwin, & Mao, 2011), compassion (George, 2014), and professional identity (Johnsen & Sørensen, 2015).

Four trends may further enhance ECR's potential to advance MOS. First, recent developments suggest the emergence of a more complex ontology that takes seriously the distributed and heterogeneous nature of organizing in extreme contexts. By taking into account the distributed nature of organizational structures and units (Carroll et al., 2006) and of knowledge and expertise (Dunbar & Garud, 2009), and heterogeneous networks of discourses, human knowledge, objects, and artifacts (Cooren et al., 2008; Martí & Fernández, 2013; Hawkins, 2015; Bloomfield & Vurdubakis, 2015), ECR proposes a more sophisticated understanding of the origins and management of extreme events.

Second, what may once have been a hard line between extreme and conventional contexts has begun to fade research wise, in that recent papers have been keen to bridge settings but also theorize more broadly. Bechky and Okhuysen (2011), for example, draw comparisons between a SWAT team and film crew, a research strategy mimicked by more recent papers (Garud et al., 2011; Haunschild et al., 2015; Morgeson et al., 2015). This development is critical as it provides the basis for empirical and theoretical transferability and generalizability.

Third, ECR is becoming an active contributor to a more general interest within MOS in process studies of organizations (Barton & Sutcliffe, 2009; Busby, 2006; Goh et al., 2012; Haunschild et al., 2015). Extreme contexts would seem well suited to advancing process research, given an innate interest in the sequencing of events leading up to catastrophe, and in its subsequent development under severe time constraint.

Fourth, ECR has become more ambitious methodologically. Gephart's (1984) rigorous, systematic analysis of public inquiry-derived texts is perhaps one of the earliest examples of methodological innovation. More recently, scholars have relied on content analysis and grounded theory to theorize extreme contexts (Quinn & Worline, 2008; Shepherd & Williams, 2014; Whiteman & Cooper, 2011). Yet others relied on action research (Vashdi et al., 2013), video-ethnography (Coreen et al., 2008), film (Godfrey et al., 2012), and self-report methods (Bacharach & Bamberger, 2007; Margolis & Molinsky, 2008).

These developments suggest plenty scope for cross-fertilization between ECR and MOS along

methodological and theoretical grounds, and highlight the continued potential for ECR to help advance MOS. As alluded to early in this paper, this is partly because extreme contexts do showcase the best and worst of human and organizational behaviors, accelerating processes otherwise impeded by bureaucracy, power plays, and politicking, and partly because extreme contexts provide insights into processes of adaptation and prioritization, resilience, and inertia.

THE FUTURE OF ECR AS A SUBFIELD OF MOS

Our purpose in this review paper was to create some semblance of order in a fragmented literature by means of a typology, to explore the role and relevance of ECR to MOS by highlighting various ways in which the former has contributed to the latter, and to outline promising directions for future research. We now turn to this third and final objective by targeting four contemporary themes in MOS: (1) organizational routines, (2) embodiment and emotions, (3) institutional theory, and (4) process and practice studies. As evident from the questions that guided our RED discussions (and which themselves were derived from the various studies we reviewed), these themes have also attracted some interest in ECR. For example, studies into organizational responses would highlight the role of routines; likewise, those into individual and organizational responses to emergencies would often point to the role of emotion. The RED literatures are distinct in that their treatment of these themes corresponds to their unique empirical contexts. We hope to show that research into risky, emergency, and disrupted contexts can, individually and collectively, help advance MOS in ways that leverage these extreme contexts.

Exploring the Role of Routines in ECR

Previous sections have looked at how "organizations manage risk," "respond to an emergency and to a disruptive event," and have shown that routines are central in these processes (Bechky & Okhuysen, 2011; Bigley & Roberts, 2001; Colville et al., 2013; Christianson et al., 2009; Dick, 2005; Dunbar & Garud, 2009; Klein et al., 2006; Madsen et al., 2006; Weick, 1990). The emphasis on routines in ECR began with Weick's (1990) observation that the "interruptions of central routines" was one of three key processes amplifying the consequences of small events or errors. A subsequent generation of

researchers has explored different types of operational routines such as policing routines (Dick, 2005), task performance routines (Klein et al., 2006), and task normalization routines (Dunbar & Garud, 2009). Yet others have looked at the impact of “new routines (Colville et al., 2013) or “reorganizing routines” (Bechky & Okhuysen (2011) to better understand how individuals and teams react to change in extreme contexts.

Although previous studies have made significant advances regarding organizational routines, there remains a conspicuous tendency to “black-box” routines in the three contexts, at least in top-tier journals. Aside from exploring the roles of specific types of organizational routines, there is value in embracing theoretical conversations around organizational routines as “repetitive, recognizable patterns of interdependent actions, carried out by multiple actors” (Feldman & Pentland, 2003: 95). Research in extreme contexts can contribute to better understanding of routine dynamics as an effortful accomplishment, where routines can be performed in many different ways for ensuring stability as well as change (Feldman, 2016; Feldman, Pentland, D’Adderio & Lazaric, 2016; Pentland & Rueter, 1994). For example, *risky* contexts can advance organizational routine research by paying greater attention to how strategic and operational routines can contribute to achieving a balance between centralization and decentralization, efficiency and flexibility, and value maximization and risk reduction. In *emergency* contexts, the fine-grained analysis of the dynamics between central and peripheral routines, as well as the overlap between existing and novel routines, can help us to better understand how a sequence of small interruptions can lead to accidents and crises. The dynamics between the preservation and restoration of organizational routines, or the recreation of new patterns of actions in disruptive contexts, can advance our knowledge of the micro-foundations of temporary organizations. Research into the organizational routine dynamics in risky, emergent, and disrupted contexts might help MOS to better understand how these routine dynamics emerge and unfold, and can be managed in more conventional settings.

Research into organizational routines suggests an interest in the relevant features of organizational routines that are central for understanding how organizations adapt themselves to change (Danner-Schröder & Geiger, 2016; Feldman et al., 2016; Feldman & Pentland, 2003). Studies of extreme contexts—in which coordination is particularly

important—may help generate insight into how it is that specific configurations of patterns and interpretations become inscribed in organizational life, and the impact these have on people’s ability to coordinate their efforts in risky, emergency, and disrupted contexts. For instance, *risky* contexts can be a rich source of data for helping us understand how, when, and under which conditions formalized routines may or may not contribute to attribution of minor errors, and thus impact learning and/or inertia. As extreme events have interrupted the more or less regular flow of action in *emergency* contexts, future related research could provide opportunities for deepening our comprehension of the innate complexities between central and peripheral organizing routines. By paying attention to the multiple facets by which the variation and selective retention of coordination patterns emerge, evolve, and stabilize in *disrupted* contexts, it will provide a better understanding of the complexity and precariousness of adaptive responses to change in MOS.

Exploring the Role of Emotions and Embodiment in ECR

Organization scholars have invested significant effort in trying to understand “skillful performance” (Sandberg et al., 2017) in risky, emergency, and disrupted contexts (as mainly shown in the subsections on “working in risky contexts” and “experiencing emergency contexts”). We suggest this body of work could be extended to include research into emotions and embodiment as related to skillful performance. Although organizations in *risky* contexts operate on a precipice—where the possibility of catastrophic failure occurring is forever on the horizon—everyday reality is such that, for extended periods, nothing much may be happening at all. It is commonly said of soldiers at war that only 10 percent of their time comprises adrenaline-fueled action, with the rest of it involving terrible boredom. As described in de Rond (2017), boredom in the context of a war hospital can cause doctors to hope for new work to come in (even if this means others must get hurt in the process, for which doctors feel guilty), to subject casualties to nonemergency operations, to interfere with each other’s patients and criticize clinical decisions, and to become existentially bored: bored not from having too little to do but from finding too little meaning in one’s daily preoccupations. What role does existential boredom play in ensuring the continuation of safe operations? Are there more, and less, effective ways of managing boredom? Are people likely to develop

boredom-induced fatigue which might help compromise their ability to identify minor deviations that could have potentially significant consequences? Although briefly discussed by Weick and Roberts (1993), this remains an area ripe for exploration.

The focus within *emergency* contexts has largely been on stress (Bacharach & Bamberger, 2007; Cooper & Mitchell, 1990; Stein, 2004) and the role of negative emotions (Kayes, 2004; Maitlis & Sonenshein, 2010; Weick, 1990). Some have begun to consider the role of positive emotions in emergency contexts. Future research might focus on emotions underlying courageous action (Quinn & Worline, 2008), on engagement and trust (Colquitt et al., 2011) as experienced and/or cultivated among organizational members during emergencies. More promising yet are future studies that would explore such “ambivalent” emotions such as weariness, disappointment, fatigue, guilt, pride, and their impact on coordination, attention, and learning (from small deviations). These emotions remain under-examined in MOS, and it would seem that ECR provides some unique opportunities to help us understand how they affect sensemaking and communication (Cornelissen et al., 2014). Moreover, much work remains to be done in understanding how emotional regulation constrains and enables managerial decision-making during and after emergencies. Future research might also explore how managers deal with the emotional tension between feeling responsible for what is happening, and yet the need to also distance themselves from the situation at hand to be able to function effectively. Multiple opportunities exist to further embrace the “turn to affect” in MOS (Gherardi, 2017) and advance our knowledge of what a skillful performance in extreme, as well as in conventional contexts, is really all about.

As with emergency contexts, sudden disruptions to operations can generate strong emotions, and therein lies an opportunity to advance our understanding of the role of emotions in the emergence of temporary and ephemeral organizations (Lanzara, 1983). Within our sample of top journal publications, little research focuses on how individuals and groups experience, and cope with, catastrophic events (see Table 13). Powley (2009) and Shepherd and Williams (2014), having studied how individuals and local organizations contribute to alleviate suffering during the aftermath of a disaster, are notable exceptions. *Disrupted* contexts appear to be a uniquely well-suited context for studying “compassionate organizing” and develop knowledge

about “emotional resilience” at the individual, organizational, and local community levels. Such research may offer transferable insights to MOS as organizational studies of change are presumably a natural extension to research on disrupted contexts (Maitlis & Sonenshein, 2010).

Finally, ECR generally, and *emergency* contexts in particular, are well equipped to advance our understanding of embodied practices. For example, sensations provided through, and by, the body are generally a necessity to assess and cope with difficult situations. Wacquant’s (2015) advocacy for a “carnal sociology”—where understandings are derived *from*, rather than *of*, the body—might provide a new set of tools for those keen to explore embodiment in a context where the body is likely to play a disproportionately important role. These tools are inherent in the various features of embodiment a carnal sociology brings to the fore, including the idea that bodies are *sentient*: they are capable of feeling and conscious of those feelings, they *suffer* and they are *skilled*. This ability to sense, suffer, and perform skillfully is *sedimented*, meaning that it was cultivated over time through engaging in the world and *situated* in that these sediments themselves are “shaped by our unique location and peregrinations in physical and social space” (Wacquant, 2015: 3). Wacquant suggests that it is only by exploring how these elements work in concert through time and space that one begins to take “full epistemic advantage of the visceral nature of social life” (Wacquant, 2005: 446). He provides a powerful illustration of his approach in his work on pugilism. Notwithstanding stark differences between boxing, a tsunami, and the usual humdrum of organizational life, what might the former tell us about the role of the body in how we coordinate and communicate? And what are the effects of time (including time limits), materiality, and spatiality on the embodiment of individuals facing emergencies?

Exploring the Role of Institutions in ECR

Few if any of the extreme studies reviewed here have seriously engaged with institutional scholarship, even if ECR would seem to have plenty to contribute to the theorizing around institutional or field-level logics (Thornton, Ocasio & Lounsbury, 2012) and “institutional work” (Lawrence & Suddaby, 2006). We briefly explore the potential of each of these below.

Multiple logics are at play in extreme contexts through the multiple regulative, political, ecological,

TABLE 13
ECR Research, Development and Ways Forward

	R	E	D
Main characteristic	Planning for nonoccurring extreme events	Handling extreme events whilst being prepared	Handling extreme events while being unprepared and the development of extreme events
Organizing around potential risks and responding to extreme events	Importance of structure (centralization–decentralization) and culture (norms versus leadership) Emphasize balance, informalities, and adjustments	Centrality of nonadaptive sensemaking and breakdown in coordination Highlight the importance of skillful performance	Immediate response by locally emergent and unstructured organizational forms Highlight hidden resilience makes capabilities and social connections salient
Behaviors and reactions to extreme events	Individual and teams decision-making (risk assessment and interpersonal competence)	Stress and negative emotions impact sensemaking in extreme contexts Importance of organizational and managerial support	Nil
Stakeholders' roles	Normalizing and legitimizing risks Identity work	Restoring legitimacy	Institutionalizing disruption through abetment and total institutional processes
Learning from extreme contexts	The importance of attribution of, and attention to, errors that influence the ability and capability of learning, predominantly among individuals	Organization learns more from extreme events than conventional situations by becoming better at accidents reduction and safety improvements, or they fail to learn at all at an individual or team level	Nil
Main empirical settings	Military, Nuclear, Aviation, and Health care	Health care, blue light services, natural disasters and chemicals	War time, natural disasters
Seminal influences Specialized literature	Shrivastava, Roberts, Pearson & Clear Risk and HROs	Weick, Gephart, Starbuck Organizational crisis and occupational stress	Goffman, Lanzara Temporary forms of organizing genocide literature
Main theoretical conversation in MOS	Contingency and system theory	Sensemaking, narrative studies	Institutional theory and inquiry sensemaking
Examples of theoretical contributions	Improvisation, task prioritization, local misfits, collective mind, team scaffolding, dynamic delegation, role of safety and identity cultures, error attribution & attention, and psychological safety	Skillful performance (commitment, identities, and expectations; mindfulness and resourcefulness); New forms of sensemaking (political and ecological); and Processual model of organizing (redirecting action; reforming and maintaining technological systems, organizational oscillation)	Ephemeral organizations, responsibility, liminal suspension, organizational courage, and compassion
Main evolution	From contingent factors to organizational processes Generalization over time from risky to conventional contexts	From cognitive and discursive sensemaking to multifaceted forms of sensemaking	From genocide/holocaust to the organizing of unprepared extreme events
Main methodologies	Interviews, observations, simulations, and surveys	Secondary archival data (media, reports, databases, recorded conversations)	Secondary archival data (reports, books, media) and interviews
Main aspects for MOS advancement	Teamwork, the transformation and normalization of risk	Nonadaptive sensemaking, extreme contexts make emotions and materiality salient, and institutional inertia	Makes hidden (positive and negative) capabilities salient and actionable

and security/safety “controversies” that regularly traverse such contexts (Patriotta, Gond & Schultz, 2011). Public hearings, media discourses, and governmental documents about risks and catastrophic events provide empirical richness for understanding how multiple logics (e.g., governmental, civilian, professional, economic, safety, and so on) coexist and dominate institutional discourses. More specifically, *risky* contexts offer opportunities to explore how organizational actors and external stakeholders address conflicting pressures between logics of risk anticipation or risk control versus logics of risk taking or logics of productivity. Risky contexts research specifically can provide new insights into how institutional logics produce a risk anticipation or a safety culture and shape accordingly the subjective identities of managers and employees. By examining how guidelines and standards dedicated to regulate emergency situation are translated into practices during emergencies, research into *emergency* contexts will be able to examine questions of coordination and leadership among multiple stakeholders. Or research could focus on how multiple institutional logics at play (professional, safety, organizational, political, and so on) contribute to structure the conditions in which accountability is negotiated, repaired, and diverted during emergency situation. As *disrupted* contexts are generally not restricted to unique institutional boundaries (e.g., multiple regulative agencies and diverse institutional stakeholders are involved, Laegrid & Serigstad, 2006), research on disruptive contexts would certainly be of significant relevance for advancing our knowledge about trans and interinstitutional logics and collaborations: growing trends in institutional theory (Thornton, Ocasio & Lounsbury, 2012).

A second avenue for future research into the role of institutions builds on the recognition that extreme contexts rely on sets of interactions between suppliers, producers, and distributors and technologies and social processes (Goh et al., 2012; Madsen, 2013). These institutional networks are often fragile. Studies of extreme contexts are, in this respect, potentially very fruitful in providing alternative understandings of the diverse forms networks assume in risky, emergency, and disrupted contexts. For example, the notion of institutional work can be helpful in understanding the institutionalization of risk management and to advance our understanding of the relation between multiple institutional levels. In this respect, the complexity of the multiple efforts that managers in *risky* contexts provide for building,

maintaining, and transforming the psychological and organizational safety climate merits further investigation. In *emergency* contexts, an institutional work perspective (Lawrence & Suddaby, 2006) can help deepen our knowledge about how, why, and under what conditions a rapid, effective, and appropriate response is provided in this context. Such a response is always the result of collaborative efforts from multiple institutional stakeholders. Finally, institutional work can help us to better understand the interplay between temporal organizations that emerge during a disaster, and permanent organizational structures, and how they might productively inform each other. In matters of life and death, the way collective actors contribute to new ways of dealing with risks, emergencies, and disasters, and normalize and legitimate existing field practices provides alternative understandings about how fields are institutionalized.

Exploring Process and Practice in ECR

Since the mid-2000s, there has been a palpable interest within ECR in developing processual and, to a lesser degree, practice-based approaches for exploring the complex dynamics inherent in extreme contexts. As many studies have looked at the development of an extreme event over time, ECR offers considerable potential for advancing process studies in ways other than to reduce them to a sequence of discrete episodes. For example, *risky* contexts research can furnish insights about the intricacies of tensions and contradictions that feature large in risky environments (e.g., Goh et al. (2012) for vicious cycle of production and protection; Busby (2006) for reliability seeking versus reliability confounding; Haunschild et al., 2015; and for processes of learning and forgetting). Research in *emergency* contexts can help advance a processual perspective on coordination, teamwork, and leadership in which artifacts and distributed knowledge are taken into account (Bloomfield & Vurdubakis, 2015; Cooren et al, 2008; Dunbar & Garud, 2009; Hawkins, 2015; Martí & Fernández, 2013). As *disrupted* contexts are particularly complex and precarious, they have much to offer in terms of exploring the multimodality of processes by which individuals, teams, and organizations respond, and adapt, to a catastrophic event (Christianson et al., 2009; Martí & Fernández, 2013; Powley, 2009).

Even if only marginally so, a practice perspective has begun to surface ECR as focused on the situated, nascent, and informal activities of individuals

(Barton & Sutcliffe, 2009; Bechky & Okhuysen, 2011; Christianson, et al., 2009; Quinn & Worline, 2008). Research into *risky* contexts allows us to explore the everyday life of organizing, working, and influencing others before a catastrophic event occurring. Focusing on everyday processes will allow researchers to redirect their “attention away from unique aspects of a specific rare event” (Christianson et al., 2009: 846) and thus provide a more complex understanding of what people do day-to-day to enact psychological safety and organizational reliability. Research in *emergency* contexts can help us better understand the relational and mundane practices by which small events or errors are produced and reproduced. For example, Barton & Sutcliffe (2009) suggested that the process of redirecting action rely on two practices: giving voice to concerns and actively seeking alternative perspectives; practices that are similar to “doubting” and “updating” proposed by Maitlis & Sonenshein, 2010). To better understand how “individuals redirect action” in emergency contexts will enhance our knowledge of the micro-social dynamics inherent to sensemaking and evaluative practice and might be useful to researchers interested in these topic in other type of contexts.

Relative to advances in emergency and risky contexts, research on *disrupted* contexts is still in its infancy. Nevertheless, a practice approach might help shed light on how knowledge and skills are mobilized to help safeguard well-being, security, and human freedoms. In addition, organizational responses to disruptive events can be revealing of the improvisational and generative roles that emerge in everyday practices, and subsequently advance our knowledge of how workers, managers, and other stakeholders enact organizational change.

In sum, we have outlined a typology that will hopefully help future researchers to consider the context specificities that influence and integrate research into various extreme contexts. Our typology suggests there are not only resemblances but also important differences, across the literature that have hitherto not been considered. Whereas we argue for some consolidation, we do not foresee, nor call for, a theory of extreme contexts. Rather, we call for more contextualization, more robust theorizing, and more methodological innovation. The rollercoaster that is today’s headline news should provide ample opportunity for novel empirical work, sophisticated theorizing, and methodological innovation. Although reports of political shifts, corruption, chaos, hacking, terrorism, droughts, flooding, and

earthquakes may be unsettling, the occasions they provide for relevant organizational research could hardly be more tempting.

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Markus Hällgren (markus.hallgren@umu.se) is a professor of management and organization at Umeå School of Business and Economics, Umeå University. His main research interest lies within the everyday practice in extreme contexts. He has done research on mountaineering expeditions to Mount Everest and K2, hospital emergency departments, zombies, and the police. He leads the research program Extreme Environments – Everyday Decisions (www.tripleED.com) and is coresponsible of the “Organizing Extreme Contexts” network. His work has been published in outlets such as European Management Journal, Scandinavian Journal of Management, and International Journal of Project Management.

Linda Rouleau (linda.rouleau@hec.ca) is professor of strategy and organization theory at the management department of HEC Montreal. Her research work focuses on strategizing and sensemaking in pluralistic contexts. In the last few years, she has published in peer-reviewed journals such as Academy of Management Review, Organization Science, Accounting, Organization and Society, Journal of Management Studies, Human Relations, etc. She is coresponsible for the GéPS (Study Group of strategy-as-practice, HEC Montreal) and involved in leading an international and interdisciplinary network on “Organizing Extreme Contexts.”

Mark de Rond (mejd3@cam.ac.uk) is a professor of organizational ethnography at Judge Business School, University of Cambridge. A recurring feature in his work is the experience of being human in challenging environments. He has embedded with Boat Race rowing crews, war surgeons in Helmand, adventurers on the river Amazon, and peace activists walking from Berlin to Aleppo. His work has been published in such outlets as AMJ, AMR, SMJ, Org Science and, in line with the ethnographic tradition, in book form.



APPENDIX A. OTHER CATEGORY ARTICLES INCLUDED IN THE REVIEW

Author(s)/ Year	Contributes to What Conversation?	What Data and Methods are Used?	What is the Empirical Context?	What are the Key Findings?	WoS Impact
Jasanoff (1988)	Law/Accidents	Essay	Technological accidents (Bhopal etc.)	Public and private law play a crucial role in industrial accidents	4
Quarantelli (1988)	Coordination/ Disasters	Conceptual	Natural and technological disasters	Communication, authority, and coordination are three pitfalls of disasters	134
Shrivastava et al. (1988)	Learning/ Industrial crisis	Editorial	Industrial crisis	Set of responses to significant questions about industrial failures	24
George and Clegg (1997)	Fieldwork access	Methods	Civil war in Sri Lanka	Duration and costs of fieldwork in disrupted contexts are difficult to evaluate	4
Pearson and Clair (1998)	Organizational crises	Conceptual	Illustrative examples	Propose an integrative and multidisciplinary framework	158
Scheytt et al. (2006)	Risk society/HROs	Editorial	Risk, regulation and meta-organizations	Three features of risk management: production of risks, regulation of risks, and contested nature of risks management knowledge	21
Weick (2007)	Data analysis	Methods	Firefighting (Mann Gulch disaster)	Lessons for generating richness when analyzing data	123
Gephart et al. (2009)	Risk society	Editorial	Illustrative examples	Approaches for examining risk as: cognitive schema, sociocultural frame, normal accident, and sensemaking	32
Lampel et al. (2009)	Learning	Editorial	Illustrative examples	Propose a framework for studying how organizations learn from rare events	61
Perrow (2009)	Normal accident theory	Response to Shrivastava et al. (2009a, 2000b)	Illustrative examples	Argue that “normal accident” theory does not need reconciliation with HROs	5
Shrivastava et al. (2009a)	Open system/NAT vs HRO	Conceptual	Illustrative examples	Propose an open-system view of the incubation and drifts towards an accident	18
Shrivastava et al. (2009b)	Open system/NAT vs HRO	Response to Perrow (2009)	Illustrative examples	Complexity in sociotechnical systems is relative and function of human agency and understanding	1
Garud et al. (2011)	Learning	Conceptual	Space & industrial goods (Columbia & 3M)	Propose a framework of narrative development processes and learning from unusual experiences	28
Prasad (2014)	Reflexivity	Methods	Academia (Qalandiya, military border in occupied Palestinian territories)	The ethnographer’s self is built through deep engagement in neocolonial space	9
Morgeson et al. (2015)	Open-system theory	Conceptual	Illustrative examples	Propose an event-system theory taking into account space and time	11
van der Vegt et al. (2015)	Organizational resilience	Editorial	Illustrative examples	Inspire management and organization theory researchers to address the “grand challenge” of extreme contexts	7