LEARNING FROM DISASTER? PROCESSES OF CONTESTATION IN AN ORGANIZATIONAL FIELD IN THE WAKE OF AN EXTREME EVENT

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Institute for Management Research
Radboud University

Bruno Verweijen

Supervisor: Prof. Dr. Kristina Lauche

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TABLE OF CONTENTS

LIST OF TABLES/FIGURES

1

GENERAL INTRODUCTION

In April 2010, offshore drilling rig Deepwater Horizon was engaged in deepwater drilling operations in the US Gulf of Mexico when it lost pressure control over the Macondo well. Oil and gas violently blew out of the well, found an ignition source, and exploded. Eleven workers on the platform got killed in the explosion, which subsequently set off the largest accidental offshore oil spill in worldwide history. An estimated 4 million barrels (636 million liter) of oil spilled into the Gulf of Mexico during 87 days before the well got capped and the oil spill stopped (National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011). The oil spill had devastating effects. Involved companies BP, Transocean and Halliburton were charged in a civil lawsuit and had to pay heavy fines and compensations. The price of BP shares plummeted, almost leading to bankruptcy. Furthermore, the oil spill had catastrophic effects on wildlife and local communities in the Gulf and coastal regions. Coastal industries, like fishery and tourism, were heavily impacted due to ecological damage, while inhabitants got exposed to toxic oil residue during clean-up operations.

Technologically intensive organizations and industries play an important role in our society. They contribute to the achievement of public values, such as energy production, by conducting complex tasks that involve complex technologies. However, as the Macondo disaster illustrated, the very organizational processes that produce benefits for society may also produce potentially catastrophic risks. When organizations do not properly manage these risks they turn into hazards with serious consequences, such as industrial disasters. The literature on risk states that it is impossible to completely reduce the risk of disasters to zero, which implies that industrial disasters will sometimes happen. Therefore, when disasters occur, organizations have the ethical, financial, social and political responsibility to learn from this rare experience and improve risk management practices. Yet, as the Macondo case illustrates, directly experiencing a catastrophic disaster is highly undesirable for organizations and society. To avoid direct disaster experience, but still benefit from the opportunity to improve risk management practices, hazardous organizations should collectively learn from the disaster experience of one of their peers. Collective learning from disaster at the level of an organizational field is a process of ongoing interactions between field actors – corporations, regulators, associations, unions etc. - to improve disaster risk management practices. This allows an organizational field as a whole to improve its resilience, lowering the potential for negative effects on organizations and society.

Despite its importance, field-level learning from disaster is a complex and ambiguous process and there is evidence that it may fail to make substantial improvements in risk management. A failure to learn lessons at the level of an organizational field may result in the recurrence of similar disasters across organizations. The objective of this doctoral thesis is to better understand how actors in an organizational field collectively attempt to learn from disaster. I aim to achieve this research objective in a step-wise fashion. As a first step, I substantiate theoretically and empirically why field-level learning in the wake of a disaster is necessary in high hazard sectors. Second, I aim to shed light on the processes of field-level learning from disaster, to better understand *how* it unfolds, and explain *why* it unfolds in a particular direction. In particular, I will investigate the *political* nature of field-level learning from disaster, conceptualizing it as a process of contestation between field actors with different interests, knowledge, and positions in the social hierarchy, about the interpretation of a disaster's causes and formulation of solutions. As such, the main research question for this dissertation is: *How and why do actors in an organizational field initiate and maintain the contested process of field-level learning from disaster?*

While the focus of this dissertation is on *politics* of learning from disaster, I would like to stress that I do not refute the efforts of individuals and organizations in the North Sea offshore industry to learn from the Macondo disaster. Various important lessons learned have been learned, especially about well control, oil spill containment, and response. For instance, the offshore industry developed capping stacks to stop subsea blowouts (International Association of Oil and Gas Producers, 2011a), guidelines on well operations crew resource management (International Association of Oil and Gas Producers, 2014), guidelines on competency and for well crews (Oil & Gas UK, 2014), and updated oil spill response capabilities (International Association of Oil and Gas Producers, 2011b). These examples illustrate that the oil and gas industry learned important lessons. However, by approaching learning from disaster from a political perspective I highlight the struggles between disparate interests involved in learning. These are frequently overlooked, because learning is predominantly understood as a means to improve the effectiveness of organizational practices and structures (Lampel, Shamsie, & Shapira, 2009). As such, this dissertation provides an alternative perspective on how learning from disasters takes place.

In this introduction, I position this dissertation in the literatures on learning from disasters, collective learning, politics of learning, and institutional theory. First, I introduce the core theoretical concepts of this dissertation and I further elaborate the theoretical contribution. Then, I paint a more detailed picture of the Macondo case and introduce the research

setting. At that point I zoom in further on the societal and managerial relevance of this research project. Then, I explain the research design that was used to achieve my research objective. And finally, I provide an overview of the following chapters and introduce my research questions.

ORGANIZATIONAL RISK AND DISASTER

As the risk society thesis claims, we currently live in a society in which wealth production is increasingly accompanied by the production of risk (Beck, 1992; Giddens, 1990; 1991; Rosa, Renn, & McCright, 2014). Technological development since the Industrial Revolution has contributed to a decrease in some risks, for instance health risks due to improved hygiene and health care. However, the use of increasingly complex technologies has introduced a new type of risk: low-probability, high-consequence technological risks, which may materialize as "man-made" disasters (Turner, 1976). In this thesis, I define disasters as low-probability, high-impact organizational accidents that are triggered by the failure of complex, hazardous technologies; inflict immediate damage on people, the natural environment, local communities, and organizational assets; and which may threaten the legitimacy and survival of organizations, industries, and technologies. (Beck, 1992; Pearson & Clair, 1998; Perrow, 1999; Smith & Elliott, 2007; Turner, 1976; Turner & Pidgeon, 1997). Disasters develop slowly over time, as diverse small errors accumulate and poor decision-making gets normalized, until an operational error finally triggers a disaster (Dekker, 2011; Reason, 1997; Turner, 1976; Vaughan, 1996). Hence, while indications of a looming disaster may be evident in hindsight (Dekker, 2014), disasters are a catastrophic surprise for the people involved. As such, we conceptualize a disaster as an organization-induced *extreme event* – "a discrete episode or occurrence that may result in an extensive and intolerable magnitude of physical, psychological, or material consequences to – or in close physical or psycho-social proximity to – organization members" (Buchanan, 2011; Hallgren, Rouleau, & De Rond, 2018; Hannah, Uhl-Bien; Avolio, & Cavarretta 2009, p. 898). Hence, disasters differ from other organizational crisis in that they "pose a direct risk to life and limb" (Hallgren et al., 2018, p. 112; Hannah et al., 2009; Pearson & Clair, 1998). Furthermore, in our definition, disasters are rare events that disrupt previously accepted norms and beliefs and trigger a legitimacy crisis. Hence, while disasters are per definition organizational accidents, we do not perceive all organizational accidents to be disasters. For instance, the *Burmah Agate* oil spill did not trigger a legitimacy crisis, while the Exxon Valdez oil spill – having similar impact – did (Hoffman & Ocasio, 2001).

Organizational scholarship has reported well-known case studies into organizational disasters, such as the Bhopal gas release that killed approximately 3000 people (Shrivastava, 1987); space shuttle disasters like the NASA *Challenger* explosion (Vaughan, 1996) and *Colombia* explosion (Vaughan, 2005); the Tenerife airline collision (Weick, 1990) and many others. Only in the offshore oil and gas industry the last 30 years, society has experienced the Piper alpha disaster in 1988 (McGinty, 2008), the Exxon Valdez oil spill in 1989 (Hoffman, 1999), the Montara oil spill in 2009 (Hayes, 2014), and the Macondo disaster in 2010 (Hopkins, 2012) to just name the most well-known incidents. It has even been reported that the amount and impact of organizational disasters seems to be increasing (Buchanan & Denyer, 2013; Perrow, 1999). This illustrates the importance to manage organizational risks (Power, 2007; Van der Vegt, Essens, Wahlstrom, & George, 2015). Risk has become a central principle for organizing and managing in organizations, leading to an explosion of administrative practices to represent and manage risk (Beck, 1992; Power, 2007) In line with these societal developments, the topics of risk and disaster have become an increasingly recognized area in organization research. This is indicated by special issues on this topic in Organization Studies (Gephart, Van Maanen, & Oberlechner, 2009) and Journal of Management Studies (Scheytt, Soin, Sahlin-Anderson, & Power, 2006), as well as an increasing number of conceptual and empirical research studies on organizational risk (Van der Vegt et al., 2015; Maguire & Hardy, 2009; 2013; Hardy & Maguire, 2016; Currie, Lockett, Finn et al., 2012; Power, 2007); organizational crisis management (Bundy, Pfarrer, Short, & Coombs, 2016; Denyer & Buchanan, 2013; James, Wooten, & Dushek, 2013; Kahn, Barton, & Fellows, 2013; Maitlis & Sonenshein, 2010; Williams, Gruber, Sutcliffe et al., 2017), and extreme events (Buchanan, 2011; Hallgren et al., 2018; Hannah et al., 2009).

FIELD-LEVEL LEARNING FROM DISASTER

Learning is an important response to disasters and crises as it aims to prevent potential future recurrences (Buchanan & Denyer, 2013; Elliott & Smith, 2006; Hallgren et al., 2018; Jasanoff, 1994; Lindoe, Baram & Renn, 2014; Pearson & Clair, 1998; Smith & Elliott, 2007; Williams et al., 2017). I define learning from disaster as a change process initiated in response to an organizational disaster, which involves the identification of lessons learned and their institutionalization in organizational practices and structures, with the purpose to enhance disaster prevention and response capacity to avoid similar disasters in the future (Crossan, White, & Lane, 1999; Deverell, 2009; Elliott & Smith, 2006; Lampel et al., 2009; Smith & Elliott, 2007; Toft & Reynolds, 2005). Given the apparent increase in amount and impact of disasters and other crises (Buchanan & Denyer, 2013; Perrow, 1999),

learning from disasters has become an increasingly important research topic (Lampel et al., 2009). Learning from disaster is a distinct form of learning with particular implications and challenges for organizations (Lampel et al., 2009). First, as opposed to incremental organizational learning in which actors accrue experience over time, learning from disasters occurs in a punctuated fashion based on small samples of experience (Lampel et al., 2009; March, Sproull, & Tamuz, 1991; Miner & Mezias, 1996). Second, as opposed to behavior-based and routine trail-and-error learning, learning from disaster is a form of non-routine *inferential learning* (Chandler & Hwang, 2015; Miner & Haunschild, 1995; Miner & Mezias, 1996), as it involves making deductions about what caused a disaster and what solutions should be implemented to avoid recurrence (Buchanan & Denyer, 2013; Elliott & Smith, 2006; Lampel et al., 2009; Smith & Elliott, 2007; Toft & Reynolds, 2005). However, the complexity of disaster causation patterns and their infrequent occurrence create problems for organizations; it is challenging to draw useful inferences from such complex and limited experience (Lampel et al., 2009; March, Sproull, & Tamuz, 1991; Perrow, 1999). In order to better understand how organizations learn from rare experiences like disasters and crises, there has been an increase in scholarly focus on the topic across academic disciplines, as indicated by special issues in *Organization Science* (Lampel et al., 2009), *Journal of Contingencies and Crisis Management* (Deverell & Hansen, 2009), and *Safety Science* (Carroll & Fahlbruch, 2011). Nevertheless, despite the increase in attention, it is argued that the phenomenon is still insufficiently understood (Buchanan & Denyer, 2013; Elliott & Smith, 2006; Lampel et al., 2009). Most studies that do address learning from disaster or crises in general focus on learning by involved organizations (cf. Lampel et al., 2009), but ignore the fact that learning may take place in higher-level learning ecologies, such as populations of organizations or industries (Haunschild & Chandler, 2008; Knight, 2002; Knight & Pye, 2004; Miner & Haunschild, 1995; Miner, Kim, Holzinger, & Haunschild, 1999; Shrivastava, 1983; Wenger, 2000). Several scholars have indicated the importance of investigating learning from disasters and crises at higher levels of analysis (Bundy et al., 2017; Elliott, 2009; Elliott & Smith, 2006; Kim & Miner, 2007; Lampel et al., 2009; Shrivastava et al., 1988). Yet, detailed empirical investigations of the mechanisms of such higher-level learning following disasters remain scarce (Lampel et al., 2009; Kim & Miner, 2007).

In this dissertation we address this gap and contribute to the literature on learning from disaster by investigating learning at the level of an organizational field following a disaster. An organizational field – a central concept in new institutional theory – is defined as a community of organizations with disparate interests that interact frequently with each other about a central issue of interest, including competitors, suppliers, consumers,

regulatory agencies, special interest groups, and associations, (DiMaggio & Powell, 1983; Hoffman, 1999). An organizational field perspective is essential for understanding change in an industry (Davis & Marquis, 2005; Hoffman, 1999). Rather than focusing on a single type of organizations, such as the concept of population or industry, the concept of organizational field places organizations from an industry in a wider context of social relations and institutions (McAdam & Scott, 2005). For instance, Hoffman (1999) took an organizational field perspective to study how actors like NGOs, government bodies, and insurance companies became increasingly influential in the U.S. chemical industry between 1960 and 1993 by engaging in federal legal cases to shape institutional norms about corporate environmentalism. Furthermore, an organizational field perspective is relevant for learning research, as it sensitizes learning researchers to the embeddedness of learning processes in a wider institutional environment (Coopey & Burgoyne, 2000; Elliott & Smith, 2006; Haunschild & Chandler, 2008). From the perspective of organizational institutionalism, an institution is a "more or less taken-for-granted repetitive social behavior that is underpinned by normative systems and cognitive understandings that give meaning to social exchange and thus enable self-reproducing social order" (Greenwood, Oliver, Sahlin, & Suddaby, 2008 , pp. 4-5). Elliott and Smith (2006) have shown how learning in the UK football industry in the wake of four stadium disasters was constrained by institutions, in particular regulatory arrangements. Hence, an organizational field perspective will better explain collective learning in the wake of a disaster.

We build on our definition of learning from disaster as well as the literatures on population-level learning (Miner & Haunschild, 1995; Miner & Anderson, 1999; Miner, Kim, Holzinger, & Haunschild, 1999), network learning (Knight, 2002; Knight & Pye, 2004), and institutional learning (Haunschild & Chandler, 2008) to define field-level learning from disaster as a collective learning process involving ongoing interactions between field actors with different interests, knowledge, and positions in the social hierarchy, in the wake of a disaster, aimed at improving disaster prevention and response by identifying lessons learned and changing the nature and mix of institutionalized risk management practices and structures enacted in an organizational field. As such, field-level learning may trigger institutional change (Haunschild & Chandler, 2008). As our definition indicates, we are primarily interested in collective learning *by* a group of organizations as a whole – i.e. learning as a group – as opposed to learning by single organizations *within* a collective (Knight, 2002; Miner et al., 1999). Hence, field-level learning can be understood as a form of vicarious learning performed by a collective of actors. Furthermore, while learning tends to be motivated by aspirations for increased efficiency and performance, we conceptualize

field-level learning primarily as a *process*, focusing on the interactive practices of actors, rather than an *outcome*.

Field-level learning from disaster is important for organizations for several reasons. Because of their catastrophic impact, trail-and-error learning from direct disaster experience is unfeasible (Pearson & Clair, 1998; Smith & Elliott, 2007; Turner, 1976; Vaughan, 1999). Instead, organizations may learn from the disaster experience of other organizations in their industry (Sagan, 1994). Quantitative studies have provided evidence that vicarious learning from crises and disasters may decrease the likelihood of hazardous events in a population of organizations (Baum & Dahlin, 2007; Haunschild & Sullivan, 2002; Kim & Miner, 2007 Madsen, 2009; Madsen & Desai, 2010). Second, disasters may have universally applicable lessons, which are also relevant for organizations beyond those involved in the disaster (Elliott & Smith, 2006; Toft & Reynolds, 2005). Disaster causation may be partly driven by the influence of harmful institutional factors that exist in an organizational field (Elliott & Smith, 2006; Hynes & Prasad, 1997; Power, 2007; Wicks, 2001). Since these factors pervade all organizations in a field, other organizations may also be affected. As Shrivastava et al. (1988, p. 297) argue, this has implications for learning:

Crises cannot be understood simply as organizational phenomena. Crises have fundamental trans-organizational causes, involving social, political, and cultural variables. Therefore, their prevention and management cannot be achieved at the organizational level alone. Changes must occur in social and cultural institutions, and strategies must be developed to promote more effective social control of technologies.

As such, field-level learning from disaster may be initiated to change institutionalized, trans-organizational causes and improve safety practices (Elliott & Smith, 2006). However, field-level learning may also be an important means for restoring legitimacy (Barnett & King, 2008; Brown, 2000; Lampel et al., 2009). This is important as the legitimacy crises that are implicated in disasters may spill over to other organizations when stakeholders them as being similar (Barnett & King, 2008; Desai, 2011; Jonsson, Greve, & Fujiwara-Greve, 2009; Yu, Sengul, & Lester, 2008). By demonstrating their involvement in learning activities, organizations may avert political interventions (Barnett & King, 2008).

Despite the empirical evidence that field-level learning takes place, and its relevance in the context of learning from disasters, so far there has been limited attention to this phenomenon in the organizational learning literature in general (Miner & Haunschild, 1995;

Haunschild & Chandler, 2008), and learning from disaster and crises literature specifically (Kim & Miner, 2007; Lampel et al., 2009). For instance, the quantitative studies of vicarious learning from crises do not tease out the mechanisms by which field-level learning from disasters or other rare events may occur. In particular, it is unclear from these studies whether any collective field-level learning occurred, or whether individual organizations learned vicariously (Kim & Miner, 2007). Furthermore, those studies that did pay attention to field-level mechanisms in the wake of disaster tend to focus a particular kind of learning, namely policy learning (e.g. Birkland, 2009; Clarke, 1999; Hoffman, 1999; Jasanoff, 1994) – i.e. developing new policy instruments, or changing the definition of policy problems, the scope of a policy, or the objectives of a policy (Birkland, 2004; May, 1992). Also, studies on learning from disasters tend to focus on public inquiries as the arena in which learning takes place (cf. Hardy & Maguire, 2016; see also Brown, 2000; 2004; Dwyer & Hardy, 2016; Gephart, 1984; 1993; 2007; Topal, 2009). While these mechanisms are important, we argue that more research is needed on the diversity of field-level learning processes in the wake disaster. In particular, the role of industry organizations – corporations or industry associations – as drivers in field-level learning has received less attention. Yet, there is evidence, for instance, that industry organizations may create a new association in the wake of a disaster to avoid future failures and/or develop new procedures (Knight, 2002; Miner et al., 1999). For instance, the Bhopal disaster triggered chemical companies in various countries to organize themselves in the Responsible Care program to drive field-level improvements in risk management practices (Barnett & King, 2008; Bowman & Kunreuther, 1988; Nathan & Kovoor-Misra, 2002). Also, firms may organize industry-level cooperation following a disaster in the population. In the wake of the Three Mile Island disaster in 1979 in the US nuclear industry, organizations cooperated through associations and promotional networks to regain public confidence and improve technology (Miner et al., 1999).

LEARNING FROM DISASTER AS A CONTESTED PROCESS

Despite examples of successful learning from accidents (e.g. Madsen, 2009) it has been argued that disaster or crisis learning is not straightforward (Antonacopoulou & Sheaffer, 2014; Jasanoff, 1994). For instance, learning from disaster may not go beyond the adaptation of established goals and practices, leaving underlying assumptions and values untouched (Deschamps, Lalonde, Pauchant, & Waaub, 1997; Deverell, 2009; Drupsteen & Guldemund, 2014; Elliott & Smith, 2006; Hoffman & Jennings, 2011; Smith & Elliott, 2007). In this dissertation I explain the challenges of learning from disaster by zooming in on the

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issue of politics of learning, which I define as the contestation of alternative interpretations and proposals for learning among actors with different interests, knowledge, and positions in the social hierarchy (Coopey, 1995; Coopey & Burgoyne, 2000; Fox, 2000; Wenger, 1998). Risk is a highly contested issue, as different actors struggle to define risks in terms of cause and effect, instigator and affected, and limits of appropriateness (Beck, 1992; Gephart, Van Maanen, & Oberlechner, 2009; Hardy & Maguire, 2016; Tsoukas, 1999; Renn, 2008). Especially disasters have sociopolitical consequences that may disrupt societies (Hallgren et al., 2018). Research on public inquiries in the wake of disasters has indicated the political nature of learning from disaster (Brown, 2000; 2004; Gephart, 1984; 1993 Gephart, Steier, & Lawrence, 1990; Topal, 2009). Political struggles involved in learning from disaster may involve conflicting narratives about the disaster and proposed solutions (Smith & Elliott, 2007). In line with these insights, I recognize that learning from disaster takes place in a highly politicized and non-transparent environment with varying interests and differential power positions and relations (Easterby-Smith, Crossan, & Nicolini, 2000). A focus on politics is important for understanding learning, as it helps to explain why and how learning occurs, or why it may not happen at all (Coopey and Burgoyne, 2000; Easterby-Smith, Crossan, & Nicolini, 2000; Fox, 2000; Lawrence, Mauws, Dyck, & Kleysen, 2005). From this perspective, politics are perceived the central mechanism of change (Coopey & Burgoyne, 2000; Suddaby & Greenwood, 2010). Yet, despite these insights, the issue of politics and power remains relatively under-investigated in learning from disaster, which largely focuses on the issue of effectiveness – i.e. becoming better at preventing incidents and decreasing in accident rates – rather than issues of politics and contestation (Hallgren et al., 2018; Lampel et al., 2009). Yet, as Sagan (1993; 1994, p. 236) has pointedly remarked: "however much organizational members want to learn, they want to protect parochial interests too". For instance, organizations may deny the need for vicarious learning from the disastrous experience of other organizations, because managers believe that a similar accident could not happen in their own organization (Elliott & Smith, 1993; 1997; 2006; Sagan, 1994; Smith & Elliott, 2007; Toft & Reynolds, 2005).

My conceptualization of an organizational field – an arena in which actors with different interests debate with each other over a central issue – draws attention to political processes in organizational fields (Hoffman, 1999; Mazza & Pedersen, 2004; Brint & Karabel, 1991). From this 'conflictual' perspective, organizational fields are "structured by the composition of interests" (Mazza & Pedersen, 2004, p. 877). However, Brint and Karabel (1991) have emphasized that the influence of different field members on this debate and the direction of field evolution is not equal among field members. They argued that organizational fields

are "arenas of power relations, with some actors – generally those possessing superior material and/or symbolic resources – occupying more advantaged positions than others" (p. 355). Similarly, from this perspective institutionalized structures are manifestations of power relations, embedding dominant meanings and interests that have become taken-for-granted (Brint & Karabel, 1991; Hardy & Clegg, 1996; Lawrence et al., 2005; Suddaby & Greenwood, 2010). Focusing specifically on learning, Coopey (1995) recognized that actors have different opportunities to influence learning processes. The social hierarchy – formal or informal – affects the potential for negotiation and may restrict learning (Bunderson & Reagans, 2011; Coopey & Burgoyne, 2000; Lawrence et al., 2005). Institutionalized meanings and epistemic disciplines may impose particular interpretations onto actors, thereby fundamentally shaping the learning process (Carroll, 1995; 1998; Gherardi & Nicolini, 2002). Hence, it is argued that "the presence of disciplines, institutions, and authoritative voices are both the *medium for*, and the *product of* collective activity" (Easterby-Smith, Crossan, & Nicolini, 2000, p. 793).

While institutionalized power relations may shape learning, I argue that the phenomenon of learning from disaster at the level of an organizational field introduces new implications for these relations. First, while organizational fields are characterized by an informal hierarchy with central and more marginal actors (Fligstein & McAdam, 2011), fields do not have a formal hierarchy like organizations (Knight, 2002). As such, field actors maintain more autonomy and thus are better able to strive for their interests (Hoffman, 1999; Miner & Haunschild, 1995; Moynihan, 2009; Müller-Seitz & Macpherson, 2013). Second, following a disaster or other high-impact crisis, established social positions in an organizational field may become contested (Hoffman, 1999). Actors that previously occupied a marginal field position may try to become more involved in the practices that define the field (Maguire & Hardy, 2009). In the wake of a disaster, actors aim to make sense of the event through the construction of diverse accounts of what happened, which drive the generation of different solutions for improving risk management practices (Brown, 2000; 2004; Gephart, 1984; Hoffman & Jennings, 2011; Müller-Seitz & Macpherson, 2013). Meaning becomes highly contested and often negotiated among a wide range of actors who are likely – because of their different positions, interests, and identity – to construct it differently from one another. In fact, following disasters, field-level discourses may resemble a war of meaning (Hoffman, 1999). Marginal actors may improve their position by using their political will and skill to influence established understandings and practices and embed new ideas and practices in routines, structures, and cultures (Fligstein 1997; 2001; Howard-Grenville, 2007; Lawrence et al., 2005, Macpherson & Jones, 2008; Maguire & Hardy, 2009). Still, this

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remains a challenging process, as it is generally the interpretations and lessons of powerful actors that will take precedence, limiting the types of lessons that will be accepted (Brown, 2000; Deschamps, et al., 1997; Elliott & Smith, 1993; 2006; Gephart, 1984; Hoffman & Jennings, 2011; Sagan, 1993; 1994).

RESEARCH CONTEXT

The offshore oil and gas industry is an extreme context (Hallgren et al., 2018; Hannah et al., 2009, p. 898) – i.e. "an environment 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 consequences to—or in close physical or psycho-social proximity to—organization members." This is clearly demonstrated by the occurrence of the Macondo blowout and oil spill, whichs killed 11 offshore workers and became the largest accidental oil spill in the history of offshore oil and gas operations (Read, 2011). This large-scale accident is a relevant case for studying field-level learning from disasters. Several studies have already labelled the Macondo blowout as a major crisis (Antonacopoulou & Sheaffer, 2014; Buchanan & Denyer, 2013; Hoffman & Jennings, 2011; James et al., 2011). Also, the Macondo blowout and oil spill matches Shrivastava and colleagues' (1988) key defining characteristics of industrial crises, such as large-scale damage to human life and the environment; large economic costs; large social costs; and multiple stakeholder involvement and conflict.

The Macondo disaster did not just trigger a crisis for the involved companies – BP, Transocean, and Halliburton – it was a shock throughout the US and even the global offshore industry. Also in Europe did actors perceive the need to re-evaluate established risk management practices and regimes to assess their appropriateness (EC, 2011). As such, it seems that the crisis spilled over from the involved companies to the European offshore industry, causing European actors to establish learning initiatives. In this dissertation, I focus specifically on learning activities in the North Sea offshore oil and gas industry. This is a useful setting for studying contested field-level learning from the Macondo disaster for several reasons. First, the North Sea region is the most productive offshore oil production region in Europe (Lindoe, Baram, & Renn, 2014), hence, it is likely that stakeholders like the public or governments will question whether a similar accident could happen there, thereby creating appropriate conditions for crisis spillover. However, contestation of learning by industry actors may also be expected. The North Sea region is a mature region with a long history of oil operations (Hale 2014; McGinty, 2008), which is both geographically

and culturally distanced from the Gulf of Mexico (Baram, 2014). In 1988 the North Sea region experienced the Piper Alpha disaster in which 167 people got killed. This disaster triggered a major overhaul of the risk governance regime in the North Sea, which since then is perceived as one of the premier regimes in the world (Baram & Lindoe, 2014). As such, industry actors may not perceive the lessons learned from the disaster to be relevant for them (Sagan, 1994; Smith & Elliott, 2007). Furthermore, studies on social learning in fields (Kraatz, 1998; Strang & Macy, 2001) have shown that a focal organization is more likely to imitate a network member when it has a sub-standard performance. However, in our case the opposite is true – the Gulf of Mexico had recently experienced a disaster, while the North Sea region had not – which may cause industry actors in the North Sea region to resist adoption of lessons learned.

RESEARCH DESIGN AND METHODS

Extreme events and contexts "may provide particularly rich insights into organizational processes" (Hallgren et al., 2018, p. 112). I take a qualitative approach to studying the institutional origins of disaster (Chapter two) and the contested nature of field-level learning from disaster (Chapters three and four). Qualitative research is particularly useful for the research objective of this dissertation as it explains the *how* and *why* of complex social phenomena (Denzin & Lincoln, 2000). In particular, qualitative research is rooted in an interpretivist epistemology, which emphasizes that knowledge is socially constructed and actors assign different meanings to social phenomena (Berger & Luckmann, 1967; Bryman, 2012). This is relevant for this dissertation because the contestation of learning from disaster involves a struggle among different meanings (e.g. Gephart, 1984). As such, a qualitative approach will emphasize actors' interpretations of the Macondo disaster, why they develop particular accounts and learning solutions, and why different actors contested each other. Furthermore, qualitative research is sensitive to the influence context on social phenomena (Yin, 2008). I take an organizational field level of analysis to learning from disaster, in which we recognize the importance of the institutional context in shaping learning processes (Smith & Elliott, 2006; Wicks, 2001).

My inquiry focused on field-level learning processes and dynamics in the North Sea region following April 20, 2010, when the Macondo disaster occurred. We collected a variety of data sources from diverse actors playing a key role in the field-level learning dynamics. I focused particularly on nationally operating actors from the Netherlands and the United Kingdom, as well as actors operating on the transnational level. Industry bodies, such as

associations - trade, industry, and professional –, and regulators played a central role in this dissertation. Associations generally play a central organizing role in mature organizational fields (Greenwood, Suddaby, & Hinings, 2002), such as the North Sea offshore industry (McGinty, 2008), and may play an important role in field-level learning from accidents (Bowman & Kunreuther, 1988) so we expected these actors to be involved in learning and distributing lessons from Macondo. Regulators play a fundamental role in high hazard industries to maintain high levels of safety performance and they frequently respond to disasters by formulating new regulations (e.g. Jasanoff, 1994). As such, we also expected these actors to play an important role in field-level learning from Macondo. We identified other actors through our data collection.

I collected a variety of data sources to empirically investigate the contested nature of field-level learning. The main data source in my dissertation include publicly available, secondary data sources, such as, accident investigation reports, industry reports, regulatory documents, speeches, power point slides, website content, etc. Secondary data is relevant for this dissertation for two reasons. First, secondary data is produced "naturally" instead of "at the request of a social researcher" (Bryman, 2015, p. 543). This limits the potential reactive effect of data collection, increasing the validity of the data. Second, because secondary data is produced *during* the process, potential problems with retrospective bias – a well-known shortcoming in research on unexpected events (Lampel et al., 2009) - are limited. Importantly, I do not perceive secondary documents as a neutral window to an underlying reality (Bryman, 2015). Instead, secondary data are produced with a particular purpose and aimed at a particular public (Atkinson & Coffey, 2004). Since I aim to uncover and explain contestation of learning, I consider secondary data to be relevant data source for our research objective. Furthermore, I read several books about the offshore oil industry in general, and risk management in particular.

Furthermore, I conducted 43 semi-structured interviews with experts in the North Sea region, which were either recorded and transcribed verbatim, or notes were taken. The interviewees included individuals working, for instance, for the European Commission, national regulators, the government, oil companies, consultancies, associations, training providers, and unions. In these interviews, I was interested in their perspectives of the Macondo disaster, focusing on on what the Macondo blowout meant to them – e.g. how they interpreted the event, their perception of what should be learned –, what their organizations were doing in response to Macondo, and how they perceived learning

initiatives organized by other actors. Hence, our interviews provided more insight in the *why* and *how* of actors' sensemaking of Macondo, learning initiatives, and contestation.

Finally, the third body of data consisted of notes taken during various (non-)participant observations. I attended four industry conferences – in London, Aberdeen, Esbjerg, and Amsterdam - in which I focused on industry responses to the Macondo disaster, as well as broader Health, Safety, and Environment (HSE) topics. These conferences contributed substantially to my understanding of the organization and operation of the North Sea offshore oil and gas industry, the learning initiatives that were organized in the wake of Macondo, and how HSE was organized and perceived in the industry. I also conducted observations at a well control training center in the Netherlands to experience how offshore crews are trained and learn how training practices changed in the wake of Macondo.

The data analysis followed a similar pattern in the chapters of my dissertation. In line with my definition of field-level learning from disaster, I focused on interactions between actors about changing risk management practices. The first step in the analysis was to identify important events, such as the organization of task forces and the publication of reports and order them according to moment of occurrence. I was particularly sensitive to what our interviewees mentioned as important events. After the identification of events, I used MAXQDA to code the data inductively and create first order concepts that were close to the empirical data (Strauss & Corbin, 1994). After reorganizing the first order concepts into conceptually distinct labels, I grouped together similar concepts to create second order categories, resulting in increased abstraction of data. By going back and forth between our empirical strategies and theory, we were able to refine our empirical categories and connect these to theoretical constructs.

STRUCTURE OF THE DISSERTATION

This dissertation consists of three main chapters in which I empirically investigate field-level learning from the Macondo disaster. Each chapter focuses on a different research question and draws upon different elements of my data set. Table 1 presents an overview of the empirical chapters.

Chapter two presents the starting point for the line of argumentation in this dissertation. It proposes new institutional theory as a useful theoretical perspective for studies of accident causation, as it helps to better understand how the institutional environment affects

1

disaster development and recurrence in and across organizations in an organizational field. I argue that applying a institutional perspective on disaster causation has important implications for learning from disaster: from an institutional perspective, learning from disaster should not just occur by the organization(s) involved in the causation of a disaster, but should take at the level of an organizational field to resolve potentially harmful institutionalized beliefs and practices in an organizational field. As such, I argue that field-level learning should not be perceived as just a possibility for learning, but rather as a necessary responsibility.

Chapter three builds upon the insight from chapter two that field-level learning is important in high hazard industries, to investigated *how* field-level learning occurs and *why* in a particular 'direction'. Field-level learning from disaster is conceptualized as a contested process between powerful, established- and less powerful, marginal communities for participation in field-level learning processes. The chapter introduces notions from the transformation perspective on knowledge sharing and the communities-of-practice literature to highlight that field-level learning from disaster is a process in which marginal communities struggle to overcome epistemic and political boundaries to transform established knowledge in an organizational field.

In chapter four we again investigate how a marginal actor challenges established actors in the North Sea offshore sector in the wake of Macondo. However, while chapter three illustrates the contested learning between powerful established communities and less powerful marginal community, in chapter four the challenging marginal actor is particularly powerful – the European Commission (EC), which triggers alternative dynamics of contestation compared to chapter three. In chapter four, I argue that field-level learning becomes especially urgent when a disaster triggers a legitimacy crisis that spills over to the organizational field. Field-level learning following crisis spillover is conceptualized as a dynamic, contested process in which opposing actors continuously enact their competing interests in response to opposing actors' actions.

Chapter five delivers on the research objective of this dissertation by reflecting on and discussing the findings of the previous empirical chapters. This chapter brings the different chapters together to elaborate the theoretical contributions, societal and managerial relevance, and boundary conditions of this dissertation.

Table 1. Overview of empirical chapters

Chapter	Research question/objective	Empirical data	Academic publications and conference submissions
2 – How many blowouts does it take to learn the lessons? An institutional perspective on disaster development	Introduce an institutional perspective on disaster development to better understand how disasters develop, and why similar why similar disaster development patterns can recur even after they have been identified and targeted in recommendations before	31 publicly available industry documents: e.g. accident investigation reports; secondary analyses of accidents; industry reports; 6 semi-structured expert interviews; Five days of non-participant observations and informal conversations at a well control training center	A version of the paper on which this Chapter is based is accepted for publication in Safety Science
3 – Justifying 'superior' knowledge from the periphery – struggles of a marginal community to influence learning in the wake of a disaster	How does a marginal community attempt to influence learning from disaster processes that are driven by established communities?	23 semi-structured interviews; 30 publicly available industry documents: e.g. safety guidelines, secondary analyses of the Macondo disaster; trade journal articles; 3 private industry documents: regulator inspection guidelines, safety guidelines Three days of participant observation at a Human Factors workshop	The paper on which this Chapter is based has not yet been submitted to an academic conference or journal
4 – Field-level learning from disaster as a dynamic process of contestation – The case of the North Sea oil industry in the wake of the Macondo disaster	How do field actors contest each other's learning initiatives over time following spillover of disaster implications to a different organizational field?	109 industry documents: e.g. press releases; industry reports on the Macondo disaster; progress reports, regulatory reviews; recommendation reports; position papers; powerpoint slides; 17 documents from European Commission: Press releases; regulatory review; legal proposals; communication document; 21 semi-structured interviews; 14 publicly available speeches;	Previous versions of the paper on which this Chapter is based have been presented at the 9th International Process Symposium in 2017 (PROS) and the European Group of Organization Studies (EGOS) conference in 2017

1

Chapter 1

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HOW MANY BLOWOUTS DOES IT TAKE TO LEARN THE LESSONS? AN INSTITUTIONAL PERSPECTIVE ON DISASTER DEVELOPMENT

ABSTRACT

Accident researchers have long tried to understand why similar disasters and near misses keep recurring within and across organizations in high hazard industries. So far such explanations have primarily addressed technical, human and organizational factors. However we argue that these models of disaster development do not adequately capture the influence of the external institutional environment that often affects an entire sector. If the external context has been considered at all, it has mainly been conceptualized in economic or regulatory terms. We propose institutional theory as a broader theoretical perspective that helps to conceptualize how the institutional environment affects disaster development in organizations, and why similar disaster development patterns can persist even after they have been identified and targeted in recommendations before. Based on an empirical illustration from the offshore oil and gas industry, we demonstrate the added value of institutional theory for accident research. Our qualitative analysis shows how institutionalized beliefs about risk, and institutionalized practices of risk management have failed to keep up with the increasing operational complexity in the offshore drilling industry. Despite this mismatch, we find that these harmful beliefs about risk are reinforced in occupational training practices. As such, harmful institutionalized beliefs and practices become the accepted normality across many organizations in the industry, leading to systemic shortcomings in risk management in the entire sector. Hence, we argue for the need for professionalization in occupational training in the offshore drilling industry to improve risk management.

INTRODUCTION

In this paper we argue that the new institutional theory in organizational sociology (DiMaggio & Powell, 1991; Scott, 2008) (hereafter 'the institutional perspective') is helpful to further understand how disasters develop. We support our argument by providing an empirical illustration from the offshore drilling industry to show the potential of the institutional perspective. We illustrate that similar dysfunctional practices can be found across organizations, which contribute to the occurrence of similar blowout accidents and near misses. We conceptualize these as institutionalized practices that are shared across an industry.

Organizations are open systems whose internal processes are affected by their external context (Thompson, 1967). Here, the concept 'external context' is not used to refer to the

immediate task environment, which may be complex and uncertain (Bigley & Roberts, 2001), but to the broader social context in which organizations are embedded and how this affects organizational safety performance (Dyhrberg & Jensen, 2004). Shrivastava, Miller, Mitroff and Miclani (1988) argue that disasters "cannot be understood simply as organizational phenomena. Crises have fundamental trans-organizational causes, involving social, political, and cultural variables. Therefore, their prevention and management cannot be achieved at the organizational level alone. Changes must occur in social and cultural institutions, and strategies must be developed to promote more effective social control of technologies." (p. 297). Organizational accident research has increasingly acknowledged the influence of external context on how disasters develop over time. For instance, Rasmussen (1997) developed a multi-level model of nested decision-making, involving actors such as governments, regulators, and associations that influence safety decision making in organizations. It has been investigated how dysfunctions in the regulatory context, such as political pressures for efficiency, inadequate safety regulations, and under-resourced regulators, have contributed to disaster development (Dekker, 2011; Johnson, 2014; Leveson, 2011; Lindoe, Engen, & Olsen, 2011; Rasmussen, 1997; Reason, 1997; Vaughan, 1996; 2005; Wilpert, 2007). Also, researchers have studied how the economic context of organizations, especially market competition, may create cost-saving pressures that undermine protective measures in organizations (Dekker, 2011; Johnson, 2014; Reason, 1997).

While the influence of the economic and regulatory context on disaster development is very relevant, we agree with Dyhrberg and Jensen (2004) that a broader perspective on external context is required to create a more nuanced understanding of the complexity of contextual influences on disaster development in organizations. Specifically, we follow Dyhrberg and Jensen's recommendation to integrate the institutional perspective in accident research to better account for the institutional environment of organizations (see also Vaughan, 1999). Institutions – e.g. rules, norms, values and beliefs – are relatively stable social structures that channel the behavior of social actors in a particular direction by defining socially accepted ways of behavior (Berger & Luckmann, 1991; Jepperson, 1991; Scott, 2008). As such, institutions are 'shared' - actors expect from each other that they conform to institutions. In this sense, institutions create social control. By enacting institutions in practices, an actor is granted social approval – or legitimacy – by other actors, which increases the actor's potential for survival (Suchman, 1995). For instance, an organization may incorporate best-practice safety procedures in its organizational practices because this is expected by the regulator, their employees, or the industry

2

association. These social expectations for legitimate behavior – as predefined by various institutions – drive similar behavior across organizations in an industry (Meyer & Rowan, 1977; Scott, 2008). As actors continuously enact institutions over time in their practices, certain behavior becomes increasingly habitualized (Berger & Luckmann, 1991). Practices have become persistent and are not actively questioned anymore, they are taken-for-granted as 'the way we do things' (Berger & Luckmann, 1991; Jepperson, 1991). In other words, practices have become institutionalized. To summarize, institutions are blueprints *for* action that are reinforced *by* action, which have become stable over time (Jepperson, 1991; Meyer & Rowan, 1977).

While conforming to institutions provides an organization with social legitimacy, the fact that institutionalized practices are resistant to change may create problems, especially when operational conditions in which these practices are applied are changing rapidly. This may result in a mismatch between operational requirements and institutionalized practices in an industry (Elliott & Smith, 2006; Wicks, 2001). As such, institutionalized practices in an organization may become dysfunctional (DiMaggio & Powell, 1991). In high-hazard industries, dysfunctional practices may have serious implications for safety. Hence, an institutional perspective on disaster development explains that institutions, which transcend individual organizations, may contribute to the development of disasters *in* organizations (Dyhrberg & Jensen, 2004; Elliot & Smith, 2006; Wicks, 2001). Furthermore, the institutional perspective on disaster development provides an alternative explanation for the persistent recurrence of similar disasters across organizations or plants (Elliot & Smith, 2006; Wicks, 2001). The observation that similar disasters seem to recur has driven various scholars to search for explanations why this happens (Carroll & Fahlbruch, 2011; Hopkins, 2008; Le Coze, 2013; Leveson, 2011; Vaughan, 2005). From an institutional perspective, harmful practices that seem to be specific to organization(s) involved in a particular disaster may in fact be institutionalized across an industry (Dyhrberg & Jensen, 2004; Elliot & Smith, 2006; Wicks, 2001). In this case, they may influence other organizations in a similar fashion. If the influence of the institutional environment is not recognized in disaster investigations, the same harmful practices may contribute to similar disasters in other organizations (Elliott & Smith, 2006).

Due to its specific focus on the institutional environment, the institutional perspective complements organizational level analyses and other environmental perspectives (Dyhrberg & Jensen, 2004; Elliot & Smith, 2006). Yet, few safety scholars have systematically applied the new institutional perspective to uncover the diversity of institutionalized

rules and practices, and how these play a role in the development of disasters. Explicit regulative forces are usually acknowledged (e.g. Vaughan, 1996), but the influence of less evident, taken-for granted occupational beliefs and norms lacks investigation (for three exceptions notably in the management literature see the empirical studies of Elliott & Smith, 2006; Hynes & Prasad, 1997; and Wicks, 2001). Hence, it seems that Dyhrberg and Jensen's (2004) suggestion to incorporate the institutional perspective in accident research has yet to be fully addressed. We aim to continue where these authors have left us and apply the institutional perspective to investigate the influence of taken-for-granted occupational beliefs and norms on disaster development. We support our theoretical argument by providing an empirical illustration in the offshore drilling industry to show the potential of the institutional perspective. We analyzed multiple investigation reports of blowout accidents and serious near misses, industry reports, interviews, and non-participant observations to illustrate the role of institutional factors in similar development patterns across organizations. The drilling industry has experienced rapid changes in operational conditions due to technological innovations and subsequent advances in deeper waters and harsher natural environments (Read, 2011). We find that institutionalized beliefs about major accident risk have not co-evolved with the increasing complexity of drilling operations. Despite this mismatch, we find that these beliefs are reinforced through occupational training practices. This negatively affects offshore workers' risk management competencies. Based on our analysis, we argue that offshore workers are not adequately prepared to oversee and address the complexity of operations. We argue that this gap between working conditions and risk management competences is an industry level problem, and we argue that professionalization of occupational training is required to improve how major accident risk is managed.

THE ADDED VALUE OF INSTITUTIONAL THEORY FOR DISASTER RESEARCH

To indicate the added value of the institutional perspective for disaster research, we first introduce institutional theory and discuss its core premises and concepts. Then we specify these insights to the issue of disaster development and argue why the institutional perspective is a relevant contextual theory for disaster research, and particularly useful for explaining why the recurrence of similar disasters is so persistent in industries.

Institutional theory

The notion of institution has different meanings in economic, political, and sociological theories (DiMaggio & Powell, 1991; Scott, 2008). In this paper, we adopt the organizational sociology perspective on institutional theory (Scott, 2008; Jepperson, 1991; Meyer & Rowan, 1977). From this perspective, institutions are understood to be relatively stable social structures that shape the behavior of social actors – e.g. rules, norms, values and beliefs (Berger & Luckmann, 1991; Scott, 2008 Jepperson, 1991; Meyer & Rowan, 1977). Concerns for legitimacy drive actors to enact institutions in their practices (Suchman, 1995). Legitimacy is "a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). It is beneficial for organizations to incorporate institutions into organizational practices and structures, and behave accordingly, because legitimacy will provide – either explicitly or implicitly – a social, political and regulatory license to operate, which improves their access to societal resources and chances of survival. In contrast, non-conformity with institutions will result in a variety of pressures aimed to realign behavior. As such, institutions provide both guidelines for and constraints on action (Scott, 2008). Concerns for legitimacy pushes organizations towards comparable conduct (DiMaggio & Powell, 1983). This process of homogenization is called institutional isomorphism, defined as ''a constraining process that forces one unit in a population to resemble other units that face the same set of environment conditions'' (DiMaggio & Powell, 1991, p. 66). As actors increasingly enact institutions in their practices to be deemed legitimate; it becomes more likely that other actors will conform to the institution in the future as well (Scott, 2008). As such, certain patterns of behavior become increasingly taken-for-granted in organizations and industries. Such persistent and customary practices do not tend to get questioned anymore – these practices have become institutionalized (Scott, 2008; Jepperson, 1991; Berger & Luckmann, 1991).

Scott (2008) distinguished between three types of institutions – regulative, normative, and cultural-cognitive. Regulative institutions include regulations and other formal rules that are backed by enforcement power (Scott, 2008). Regulative institutions are explicit and written down, in other words, they are the formal 'rules of the game'. Specialized actors, like regulators, inspect conformity to regulative rules and, when necessary, provide rewards or punishment to influence future behavior. DiMaggio and Powell (1983) called this process *coercive* isomorphism. Normative institutions include values – notions of what is desirable – and norms, which define *how* to pursue values (Scott, 2008). Normative institutions may be explicit, like standard operating procedures, while others are implicit,

such as unwritten and tacit expectations. Furthermore, they are often role-specific: we have different expectations of people in their family role than in their professional role. Normative isomorphism is normally associated with professionalization – e.g. definition of professional standards, extensive training (DiMaggio & Powell, 1983; Wilensky, 1964). Finally, cultural-cognitive institutions include shared frames of reference - assumptions, beliefs, and worldviews - through which actors unconsciously make sense of the world around them (Scott, 2008). Cognitive interpretive processes are shaped by "external" cultural frameworks, creating similarities in perspectives among actors in a collective. For instance, Carroll (1998) has shown that occupational groups, like engineers, have particular ways of interpreting and understanding how industrial incidents occur. To a large extent, cultural-cognitive institutions are reinforced through imitation, for instance when actors are socialized in a particular group. This is called *mimetic* isomorphism (DiMaggio & Powell, 1983). For taken-for granted cultural-cognitive institutions, non-conformity is inconceivable and will lead to confusion, because particular behavior is understood as 'the way we do these things' (Jepperson, 1991; Vaughan, 2005).

An institutional perspective on disaster development

We use the concept disaster development (Turner, 1976), rather than disaster causation, to avoid simplistic images of 'broken parts' that cause disasters (Dekker, 2011) and to acknowledge that disasters incubate over long periods of time through complex interactions of contributing factors. As such, we don't perceive institutions as immediate causes for disasters, but recognize that they will interact with organizational, human, and technological factors inside organizations in a complex disaster incubation phase.

It is important for organizations to conform to the institutional environment, but in some cases institutionalized practices can turn into contributing causes of major accidents (Elliot & Smith, 2006; Vaughan, 1999; 2005; Wicks, 2001). For instance, Wicks (2001) and Hynes and Prasad (1997) investigated the 1992 explosion at the Westray mines in Canada and found that a variety of implicit normative institutions contributed to the disaster. Social expectations associated with the miners' roles as providers for their family, their blue-collar identity, and a culture of masculinity widely pervaded the mining industry. These normative institutions, related to the miners' occupational culture, negatively affected miners' risk perception and created a mindset of invulnerability among miners (Wicks, 2001). Elliott and Smith (2006) investigated soccer stadia disasters in the UK and found how widely shared and persistent, but incorrect beliefs of regulators and stadium officials about risks eroded safety levels in football stadia across the industry. These actors persistently believed that

hooliganism was the primary risk in the soccer industry, leading to an absence of attention for crowd safety management. This contributed to similar disaster development patterns in four stadia. These examples show that dysfunctional practices and beliefs may persist in organizations across an industry, even when they are no longer appropriate for particular situations (DiMaggio & Powell, 1991). Dysfunctional practices may be so taken-for-granted that actors do not question the appropriateness of these practices, even following disasters (Elliott & Smith, 2006). Hence, a mismatch may emerge between operating conditions and institutionalized rules. In this situation, institutionalized practices become harmful and contribute to the recurrence of similar disasters across different organizations.

In this paper we are primarily interested in the role of taken-for-granted institutions in disaster development patterns, because these have so far been overlooked in accident research compared to the extensively documented influence of more evident regulative institutions (Dyhrberg & Jensen, 2004). We focus specifically on taken-for-granted occupational beliefs and norms. We use the example of major accident risk management in the offshore drilling industry to illustrate how harmful beliefs about risk contributed to multiple disasters and serious near misses, and lower levels of safety in general in the industry. Furthermore, we show how harmful beliefs about major accident risks are reinforced by occupational training practices. Occupational training plays an important role in the development of normative rules about professional behavior in industries, shaping the assumptions and competences of the workforce (DiMaggio & Powell, 1991; Meyer & Rowan, 1977). We show that occupational training practices in the drilling industry have not co-evolved sufficiently with increasing complexity of operations. Hence, we argue that professionalization of training is necessary.

METHOD

Research context

We chose the offshore drilling industry as a suitable research context to illustrate the influence of the institutional environment on disaster development. First, the offshore drilling sector experiences blowouts and other high potential well control incidents rather frequently. The International Association of Oil and Gas Producers (2014) reported that the global offshore drilling industry experienced 11 severe and 69 lesser loss of primary control events in 2013. Several sources indicate that many of these accidents and near misses – despite differences in specific technical variables, and people and companies involved – closely resembled each other in terms of underlying contributing causes

(National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011; Petroleum Safety Authority Norway, 2014; SINTEF, 2011). Most reports state that this problem originates from the growing gap between a) the increasing complexity of drilling operations as the industry approaches reservoirs in increasing water depths and more complex geological formations, and b) stagnant practices of safety management employed in industry and regulators (e.g. SINTEF, 2011). One area in which this gap manifests itself is major accident risk management and occupational training for offshore workers. Compared to other high hazard settings, such as aviation and nuclear energy production, the degree of professional safety training in the offshore drilling is deemed relatively low (National Academy of Engineering, 2011). It is recognized "that the industry must strive to improve well control competence of personnel involved with all oil and gas well operations consistently throughout the world" (International Association of Oil and Gas Producers, 2012 , p. 1). We focus on this example because it provides a clear illustration of how institutionalized beliefs and practices in an industry may negatively affect safety levels, and contribute to disaster development in organizations. And while this example is specific to the offshore drilling industry, harmful institutionalized practices may be present in various industries (e.g. Elliott & Smith, 2006).

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Research design and strategy

To uncover the influence of institutionalized practices on disaster development and safety levels in organizations, we apply an exploratory qualitative research approach. We compare multiple cases of major accidents and serious near misses in the offshore drilling industry. Per definition, low probability-high consequence disasters are rare events, so when they occur they present a formidable opportunity to develop an in-depth understanding of the phenomenon and its causal dynamics (Flyvbjerg, 2006). It has been argued that the uniqueness of a disaster limits our ability to extract generalizable lessons (Lampel et al., 2009). From the perspective of a single investigation into one particular disaster, a disaster development trajectory may appear as a unique interaction of organization-specific causes. However, we argue that the analysis of multiple investigations into different disasters may uncover similarities in contributing causes that point to the impact of institutions and institutionalized practices beyond the idiosyncrasies of individual organizations. Additionally, we include several investigations into high potential near misses in our sample. Near miss investigations are useful to increase our sample size, because they follow similar causation trajectories as major accidents, and happen more frequently (Weick & Sutcliffe, 2007). As such, we take a similar approach as Christiansen, Farkas, Sutcliffe, and Weick (2009) who see rare events not as unique occurrences, but as "exaggerations of a

type of stimulus that organizations routinely encounter on a smaller scale" (p. 846). We argue that this redirects attention towards more general patterns, like institutionalized beliefs and practices, which are per definition generalized.

Data collection

Our data collection followed several steps. Initially we became aware of the influence of institutionalized practices on accident causation and recurrence through informal conversations with experts during industry events, such as the Society of Petroleum Engineering's Summit on Human Factors in Houston in 2012 and its workshop on "Getting to Grips with Human Factors on Drilling Operations" in London in 2014. In parallel we gathered various industry reports and publicly available investigation reports about the Macondo and Montara accidents that occurred in the offshore drilling industry in 2009 and 2010. While reading these documents it struck us that these disasters seemed to follow similar development patterns, which clearly had institutional causes.

The second phase consisted of a more structured approach to data collection. The first step was to collect multiple accident investigation reports of the Macondo blowout disaster. A myriad of Macondo reports has been published, but we only included reports in our data set that investigated at least the causation trajectory of the accident. As such, reports that focused solely on the oil spill response, as well as the environmental, financial, and judicial impact were not included. On the basis of this criterium, we selected thirteen Macondo investigation reports. Then, we searched for investigation reports of other well control incidents in the offshore drilling industry that were similar to the Macondo disaster. Selection criteria were: 1) the investigation reports had to deal with well control incidents in the drilling phase, 2) they had to be publicly available and published in English. We ended up with six additional investigation reports of well control incidents across the world. Most of these well control incidents were also mentioned in the Macondo investigation reports because of similarities between the accidents. To triangulate our data from the investigation reports, we also collected industry reports published in the wake of the Macondo disaster by actors from the North Sea offshore drilling industry. The objective of this step was to investigate how actors from this offshore region – one of the most mature and advanced offshore areas in the world (Lindoe, Baram, & Renn, 2014) – assessed the relevance of the lessons of the Macondo investigation reports for the North Sea industry. We assumed that if actors from a mature offshore region would identify relevant lessons, this could indicate the presence of dysfunctional institutionalized practices. Because the Macondo disaster was perceived as a stress test for the global offshore drilling industry, a

myriad of secondary analyses into Macondo – based on the official investigation reports – and reviews of risk regimes were published. These documents included evaluations of lessons learned from Macondo and other incidents. In total, twenty-two documents were collected from governments, regulators, and (inter)national industry associations from the UK, the Netherlands, and Norway. We also included six expert interviews in our data sample that we conducted as part of a larger research project about learning from accidents in the offshore drilling sector. Our interviewees provided more information about industry-wide safety problems. We conducted the interviews under the condition of anonymity, so we provide a description of the interviewees' occupation instead of their name when we present an interview quote in the findings. Finally, we included observational notes of five days of non-participant observations and informal conversations at a well control training center in the Netherlands. The observations and conversations at the training center provided us with insights in how offshore workers acted in a simulator with realistic drilling scenarios and helped to generate a more detailed perspective of risk management and training practices in the industry. For an overview of our complete data set see tables 2 and 3 below.

Data analysis

The objective of our data analysis was to identify harmful institutionalized practices in the offshore drilling industry. In our data analysis, we applied techniques from the Template Analysis approach (King, 2012). Template Analysis is "a style of thematic analysis that balances a relatively high degree of structure in the process of analyzing textual data with the flexibility to adapt it to the needs of a particular study" (King, 2012, p. 426). Central to Template Analysis is the development of a coding scheme that is based on a subset of data, which is then applied to further data, adapted, and reapplied. As such, it does not impose a rigid coding structure on the data, but is reshaped in a step-wise fashion through the data analysis phase as more data is analyzed. Template Analysis is particularly helpful when dealing with large sets of data, like our own, which made it very useful for this study. Template Analysis encourages the researcher to further develop those analytical codes that are backed by the richest empirical data. This matched the exploratory nature of our study well. In advance of the analysis, we formulated a few a priori themes that corresponded to some of the key theoretical concepts for our study. These were our sensitizing concepts (Blumer, 1954) that gave us a general sense of reference and guidance for our analysis, but which were used tentatively and could be redefined or discarded (King, 2012). Examples of our initial sensitizing concepts were institutional factors like regulations, industry-level professional standards, and shared understandings about safety.

Table 2. Secondary data: Collected documents

Abbreviation	Document title	Source	Year	Document type	# of pages
BOEMRE report	Report Regarding the Causes of the April 20, 2010 Macondo Well Blowout	The Bureau of Ocean Energy Management, Regulation and Enforcement	2011	Macondo accident investigation report	212
BP report	Deepwater Horizon Accident Investigation Report	BP	2010	Macondo accident investigation report	192
Hopkins investigation	Disastrous decisions – The Human and Organizational Causes of the Gulf of Mexico Blowout	CCH Australia Limited (Publisher)	2012	Book investigating the causation of the Macondo disaster	194
Republic of Marshall Islands report	Deepwater Horizon Marine Casualty Investigation Report	Republic of the Marshall Islands - Office of the Maritime Administrator	2011	Macondo accident investigation report	65 (excl. appendices)
Transocean report	Macondo Well Incident - Transocean Investigation Report Volume I	Transocean	2011	Macondo accident investigation report	223
US Coast Guard report	Report of Investigation into the Circumstances Surrounding the Explosion, Fire, Sinking and Loss of Eleven Crew Members Aboard the Mobile Offshore Drilling Unit Deepwater Horizon in the Gulf of Mexico, April 20 – 22, 2010, Volume I	US Coast Guard	2011	Macondo accident investigation report	130 (excl. appendices)
NAE report	Macondo Well Deepwater Horizon Blowout – Lessons for improving offshore drilling safety	National Academy of Engineering and National Research Council of the National Academies	2011	Macondo accident investigation report	197
DHSG report	Final report on the investigation of the Macondo well blowout	Deepwater Horizon Study Group	2011	Macondo accident investigation report	126
President report	Report to the President: Deep Water – The Gulf Oil Disaster and the Future of Offshore Drilling	National Commission of the BP Deepwater Horizon Oil Spill and Offshore Drilling	2011	Macondo accident investigation report	398
CSB volume 1	Investigation Report Volume 1 – Explosion and Fire at the Macondo Well	US Chemical Safety Board	2014	Macondo accident investigation report	37

Table 2. Secondary data: Collected documents (continued)

Abbreviation	Document title	Source	Year	Document type	# of pages
CSB Volume 2	Investigation Report Volume 2 – Explosion and Fire at the Macondo Well	US Chemical Safety Board	2014	Macondo accident investigation report	112
CSB Volume 3	Investigation Report Volume 3 – Explosion and Fire at the Macondo Well	US Chemical Safety Board	2016	Macondo accident investigation report	250
CCR Report	Macondo – The Gulf Disaster	National Commission of the BP Deepwater Horizon Oil Spill and Offshore Drilling	2011	Macondo accident investigation report	371
PSA Snorre A report	Investigation of gas blowout on Snorre A, well 34/7-P31A	Petroleum Safety Authority Norway	2004	Snorre A accident investigation report	53
PSA Gullfaks C report	Audit of Statoil's planning for well 34/10-C-06A	Petroleum Safety Authority Norway	2010	Gullfaks C accident investigation report	16
Montara report	Report of the Montara Commission of Inquiry	Montara Commission of Inquiry	2010	Montara accident investigation report	395
MG Hulme Jr. report	Incident investigation report M.G. Hulme well control incident – riser unloading	Transocean	2009	MG Hulme incident investigation report	21
Bardolino Operations Advisory	Operations advisory – loss of well control during upper completion	Transocean	2010	Bardolino Incident report	9
OLF report	Deepwater Horizon – Lessons Learned and Follow-up	Norwegian Oil Industry Association	2012	Secondary analysis of lessons learned and review of risk regime	84
PSA DwH report	Concluding Report on its follow-up of the Deepwater Horizon accident	Petroleum Safety Authority Norway	2014	Secondary analysis of lessons learned and review of risk regime	25
SINTEF report	The Deepwater Horizon accident: Causes, lessons learned and recommendations for the Norwegian petroleum activity	SINTEF	2011	Secondary analysis of lessons learned and review of risk regime	11

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Table 2. Secondary data: Collected documents (continued)

Abbreviation	Document title	Source	Year	Document type	# of pages
Maitland report	Offshore Oil and Gas in the UK – an independent review of the regulatory regime	Department of Energy and Climate Change, Health and Safety Executive, Marine Coastguard Agency	2011	Secondary analysis of lessons learned and review of risk regime	122
Government response to Maitland report	Offshore Oil and Gas in the UK – Government Response to an Independent Review of the Regulatory Regime	Department of Energy and Climate Change, Health and Safety Executive, Marine Coastguard Agency, Oil and Gas UK	2012	Secondary analysis of lessons learned and review of risk regime	61
House of Commons report	UK Deepwater Drilling—Implications of the Gulf of Mexico Oil Spill - Second Report of Session 2010–11, Volume I	UK House of Commons Energy and Climate Change committee	2011	Secondary analysis of lessons learned and review of risk regime	44 (excl. appendices)
HSE Deepwater Horizon Interim report	Deepwater Horizon Incident Review Group Interim Summary Report	Offshore Division Hazardous Installations Directorate Health and Safety Executive	2011	Secondary analysis of lessons learned and review of risk regime	12
OSPRAG report	Strengthening UK Prevention and Response – Final Report	Oil Spill Prevention and Response Advisory Group	2011	Secondary analysis of lessons learned and review of risk regime	48
OGP report 460	Cognitive issues associated with process safety and environmental incidents	International Association of Oil and Gas Producers	2012	Industry report	20
OGP report 463	GIRG Deepwater Wells	International Association of Oil and Gas Producers	2012	Industry report	40
OGP report 476	Recommendations for the enhancement to well control training examination and certification	International Association of Oil and Gas Producers	2012	Industry report	36
NSOAF report	Multinational Audit "Human and Organizational Factors in Well Control"	North Sea Offshore Authorities Forum	2012	Industry report	18
PSA RNNP report	Study in Trends in the Risk Level in the Petroleum activity	Petroleum Safety Authority Norway	2012	Industry report	50

Table 3. Primary data: Interviews and non-participant observations

Semi-structured interviews		
Description of interviewee	**Industry actor**	**Duration of interviews**
UK trade unionist 1	Trade union	103 minutes
UK trade unionist 2	Trade union	80 minutes
Well control instructor	Well control training center	69 minutes
Drilling consultant	External consultant	125 minutes
HSE manager	Oil and gas company	103 minutes
Human factors specialist	Oil and gas company	45 minutes
Non-participant observations		
Location	**Purpose of observation**	**Duration of observation**
Well control training center in the Netherlands	To observe offshore workers during training on human factors. Both classroom training and scenario-based well control training in a simulator room were observed, which provided insight in their knowledge of human factors and level of non-technical skills	5 days in total (one training course of 3 days and one of 2 days)

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Our analysis started with the Macondo investigation reports and on the basis of this subset of data we developed an initial coding template. We coded the causes and contributing causes identified in the investigation reports. At the same time, we were sensitive to indications of potential harmful institutional practices. For instance, most of the reports indicated that similarities existed between Macondo and Montara and other accidents and near misses that had occurred in the offshore drilling industry (e.g. National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011; Petroleum Safety Authority Norway, 2014; SINTEF, 2011). Based on this coding template, we analyzed the other well control incident reports and adapted our initial template. Some of the themes that emerged in the analysis of the Macondo investigation reports re-emerged in the analysis of the second subset of data. As such, these themes became more prominent in our readapted coding template. Finally, we used this coding template to analyze the subset of secondary analyses and risk governance review reports, as well as our interviews and observations, again adapting coding template. We went through multiple rounds of adaptation as we analyzed our other data sources to come up with a coding template of prominent themes and codes in our data.

FINDINGS

We found that while the offshore drilling industry has evolved towards conducting more complex operations, organizational risk management practices have not sufficiently coevolved to match this complexity. In particular, we identify an insufficient degree of professionalization of major accident risk management in the drilling industry as a whole. This statement is based on three main findings. First, we find that risk management practices seem to built upon taken-for-granted conceptualizations of major accident risk that are inadequate for dealing with low probability-high impact disasters. Specifically, *risk management practices depict a static, fragmented, and solely technical conceptualization of risk*, rather than a more appropriate conceptualization of risk as holistic, integrated and dynamic. Second, we found that current *practices of occupational training reinforce these inappropriate conceptualizations of risk* in the industry, as training is focused on strengthening technical-procedural competence at expense of non-technical skills and systems risk management. Third, we found that *variable practices of occupational training and selection prevent standardization of risk management competence* in the drilling industry. The institutionalized acceptance of variability in training undermines opportunities to create a uniformly high level of risk management in the industry. Hence, we traced how harmful institutionalized conceptualizations of risk are reinforced by institutionalized practices of occupational training. We now zoom in on the three main findings.

Risk management practices depict a static, fragmented, and solely technical conceptualization of risk

Our analysis has indicated that risk is generally conceptualized in the drilling industry as a static, fragmented, and technical phenomenon. We argue that this represents an institutionalized belief that is taken-for-granted in the industry and generally not actively questioned. However, we also claim that this conceptualization is potentially *harmful*, because it does not match the complexity of major accident risk

A static conceptualization of risk
Offshore operations are characterized by the continuous occurrence of unanticipated events. According to the SINTEF report, "*offshore drilling is often referred to as a continuous process of problem solving where new and unexpected situations arise and must be managed on the spot. This increasing complexity results in new demands on how we think about safety*" (p. 1). This dynamic nature of offshore drilling requires practices to deal effectively with changing circumstances and risk levels. The offshore drilling industry commonly refers to

such practices as 'management of change' (MoC), which involves reassessments of risk and the implementation of mitigating measures. Despite the importance of MoC in drilling, our analysis shows that the inappropriate application of MoC was a recurring issue in the industry. For instance, the Norwegian drilling regulator argued "*Post-Deepwater Horizon reports have exposed a number of deficiencies in risk management, including handling of uncertainty in different phases [and] change management" (*PSA Deepwater Horizon report, p. 12). However, we found that this was not limited to the Deepwater Horizon disaster. Insufficient change management regarding well design, procedures, and personnel shifts were also found to have contributed to the Gullfaks C incident in Norway in 2010, the MG Hulme incident of the coast of West Africa in 2009, the Snorre A blowout in Norway in 2004, and the Montara blowout in the Timor Sea in 2009. In the MG Hulme incident, for instance, unique drilling conditions required the application of non-standard drilling equipment, which was "*a significant change from conventional drilling and this change was not recognized by the rig management"* (p. 14).

Following Macondo, there was a surge in attention for the importance of MoC, trying to create more awareness of the dynamic nature of risk and the inevitability of MoC in drilling. For instance, industry associations in the UK and Norway pointed to the need for better MoC (OGP 476, OLF Deepwater Horizon report). Nonetheless, it seems that this awareness of the importance of MoC still needs to trickle down to individual oil companies. For instance, the North Sea Offshore Authorities Forum (NSOAF) conducted a multinational audit and found that in some companies "*MoC procedures were not covering changes to drilling and well operations*" (p. 15). Similarly, an interviewed drilling consultant stated that "*Collectively, there is an inability to deal with the unexpected [...] Generally, operations are planned for in a detailed fashion, but when something unexpected happens, replanning does not always happen. We don't train crews to do that."* Other informants explained that change management is a challenge in the industry, because it does not seem to match with the workforce's pervasive "*can do, get it done*" mentality (interview with HSE manager) – the preference of offshore workers to get on with drilling rather than taking the time for replanning. Hence, our analysis suggests that the dynamic nature of risk was still only insufficiently recognized. Instead a *static* perception of risk seemed to dominate amongst the offshore workforce, which revolves around an implicit belief that changes in drilling conditions and operations will *not* have a major effect on risk levels.

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An fragmented conceptualization of risk

Our analysis shows that the conceptualization of risk as a static phenomenon is closely related to an implicit and taken-for-granted belief that risk is a phenomenon that is *fragmented* across system components rather than a system characteristic. Investigations of several well control incidents have concluded that risk management frequently focused on system *components*, rather than the system as a whole. For instance, the CCR (2011) argued that in the Macondo case "*the lack of rigorous risk assessments led decision makers to solve problems in isolation instead of considering the cumulative impact their solutions might have on the rest of the project.*" (p. 244). Similarly, in the case of the Snorre A accident, frequently "*only the sub-operation was discussed [during the risk assessment]; and not the overall status of well barriers.*" (PSA, 2004, p. 15). As these quotes show, a recurring contributing cause of drilling incidents was that unexpected problems in system components would be solved *locally* without the rig personnel recognizing the impact of their local solution on the overall risk level of the system as a whole. The fact that changes in a system component – human or technical – will have system consequences was often not addressed. Our data suggest that risk is conceptualized as *fragmented* in system components and managed as a component-level phenomenon.

A clear illustration of the institutionalized conceptualization of risk as a fragmented characteristic concerns barrier management in the drilling industry. To ensure a systems perspective on risk and barriers, best industry practice is to employ a defense-in-depth strategy that requires the application of at least two independent, physical barriers at all times during operations to ensure that if one barrier fails another barrier will prevent loss of control. This was generally referred to as the *"common approach"* (Deepwater Wells report, p. 16) in risk and barrier management and *"widely understood"* (OLF report, p. 24) in the industry. Yet our analysis shows that the application of defenses-in-depth is more problematic than reported by industry actors. In particular, it appears that barrier management has been largely approached from an fragmented component perspective, as illustrated by the emphasis on one critical physical barrier called the Blowout Preventer (BOP). Before Macondo, the BOP had *"an almost mythical status"* (Hopkins investigation, p. 4) in the industry as a fail-safe device. As Hopkins found, this belief undermined the importance assigned to other barriers in the barrier system, as people believed that the BOP would function when required. However, in the case of Macondo, the BOP had failed to prevent the blowout. Initially, this shattered the perception of the BOP as a fail-safe barrier. For instance, the UK regulator argued to "*not regard the BOP as a fail-safe device*" (HSE interim report, p. 2). However, our analysis shows that the utopic ambition to make

the BOP fail-safe still seems to persist in the industry. For instance, the UK House of Commons claimed *"[The CEO of BP] told us 'if it [the BOP] had functioned as designed, there would not have been the [Deepwater Horizon]'"* (p. 14). This places a lot of emphasis on the BOP as *the* critical barrier. Similarly, following the Macondo disaster, the industry has spent significantly more attention on improving the technical design of blowout preventers than on improving other barriers. For instance, the NAE investigation report argued that, *"the design capabilities of the BOP system should be improved so that the system can shear and seal all combinations of pipe under all possible conditions, with or without human intervention."* (p. 73). This is, however, a rather simplistic perspective on barrier management, which ignores the importance of the entire barrier system. As Hopkins argued in the Macondo case: *"the BOP was only the last line of defence and, arguably, not the most important. The defence-in-depth metaphor is the key to a much more sophisticated understanding of this accident."* (p. 4). Furthermore, the UK regulator argued that, *"a BOP is a secondary means of controlling a well, usually relied upon, after problems begin. The panel believes priority should be given to ensuring the primary methods of well control are sufficiently robust"* (Maitland report, p. 12). Yet, we argue that the belief that the BOP is the most important barrier creates an fragmented perception of barriers management that undermines sensitivity to the need for management of the barrier *system.*

A technical conceptualization of risk

The focus on the BOP also shows the predominance of a technical understanding of risk management. The CSB (2014) argues that there is a *"natural tendency [in the drilling industry] [...] to focus on technical barriers because they are physical in nature, and in deepwater drilling they clearly show how they stop the flow of hydrocarbons from the well"* (Vol 2, p. 61). Hence, the conceptualization of barriers as a physical piece of equipment tended to direct the attention of the rig crew towards tangible barrier elements rather than more intangible human or organizational factors. The response to the Macondo disaster demonstrated the focus on technical causes and solutions. For instance, the NSOAF (2014) found that in trying to learn from Macondo *"considerable effort was being paid to address hardware failures"* (p. 5). This technical focus may be unsurprising in an *"industry dominated by engineers"* (CSB Vol 3, 2016, p. 102), but several reports argue that a predominantly technical understanding of risk and accident causation fails to represent the complexity of an accident causation trajectory.. In particular, conceptualizing risk and barriers solely as technical matters ignores the non-technical dimension of risk. For instance, the OGP 460 report (2012) indicates that, *"A focus on engineering issues alone may not be sufficient to prevent future incidents [...] A better understanding of the psychological*

basis of human performance is critical to future improvement." (p. 2). Yet, our analysis shows that understanding of non-technical elements (i.e. operational/human, and organizational barrier elements) in risk management was lacking in the offshore drilling industry. The CSB (2016) observed, for instance, that incident investigations exhibited "*still all-too-frequent focus on technical causes without sufficient focus on systemic and organizational factors*" (Vol 3, p. 245). Therefore, the Petroleum Safety Authority Norway (2014) argues for "*a strengthened understanding of the interaction between technical, organizational, and operational elements*" (p. 15). In fact, our analysis shows that of all incident investigations of the Macondo blowout, only Hopkins' (2012) analysis and the third volume of the CSB (2016) investigation thoroughly addressed how non-technical factors fundamentally contributed to the disaster.

The importance of human and organizational barriers in the offshore drilling industry can again be clearly illustrated by the functioning of the BOP. In the case of Macondo, the rig crew placed substantial trust in an open BOP as a barrier because they assumed it would function as required:

"*an open BOP was perceived as an acceptable barrier because it was assumed the BOP could either be closed manually to control the well during an influx of formation fluids, or automatically by backup emergency systems in the event of loss of well control.*" (CSB Vol 2, 2014, p. 22).

However, "*the BOP did not operate independently of previous barriers. It depended for its effectiveness on the alertness of the drillers on the rig. Given that they had dropped their guard, the BOP was quite unreliable as a barrier against blowout*" (Hopkins investigation, p. 59). As the second volume of the Chemical Safety Board report stresses, "*failure of a technical barrier, such as the BOP, is rooted in inadequate operational and organizational barriers*" (CSB Vol 2, 2014, p. 62). Hence, the effectiveness of the BOP as a technical barrier always depends on non-technical barrier elements. It is of essential importance for rig crews to realize. As industry association IOGP argued following Macondo: "*we regard a BOP as a barrier for the purposes of [a two-barrier] policy even when operated in the open position*", as long as the BOP is "*verified, tested, and certified*" (Deepwater Wells, p. 7)). This emphasis on verification, testing and certification as a *necessary* condition for barrier functioning is a clear indication of the dependence of technical barriers on human and organizational barriers.

Practices of occupational training reinforce institutionalized conceptualizations of risk

In the previous section we have showed how institutionalized conceptualization of risk as static, fragmented, and technical does not match the complexity of major accident risk in the drilling industry. In this section we show how this institutionalized conceptualization of risk, despite being inadequate, is reinforced by common occupational training practices. Specifically, we indicate how this is intricately linked to how workforce competence is conceptualized in the industry. We argue that improving risk management in the offshore drilling industry requires a critical re-evaluation of the institutionalized meaning of competence and occupational training practices.

Incident investigations often find that the workers involved in the incident were not adequately trained and did not have the right competence. According to a British HSE manager, the common reaction after incidents was: "'*How the hell did those guys do that in those circumstances? They must have been either incompetent or improperly trained or we didn't have sufficient procedures.*'" The issue of lacking competence and training, especially concerning complex topics like well integrity and control, resurfaced in most investigation reports. Consequently, "*more job-specific training is often the recommendation in the aftermath of a catastrophic incident*" (CSB Vol. 3, pp. 66-67). This approach to competency development appears to exhibit a belief that a lack of competence is a problem at the level of the individual, which can be solved by remedial training or by selecting appropriately trained individuals. However, our analysis indicates that the problem did not simply lie with individual workers. Instead, this supposed lack of competence seems to have institutional precursors: occupational training practices do not adequately prepare offshore workers for managing major accident risks. In particular, we find that occupational training practices reinforce the inadequate static, fragmented, and technical perspective on risk. For instance, the CSB (2016) observed how traditional training in the offshore drilling industry is "*focused on technical skills*" (Vol. 3, p. 82) and involves "*teaching crews to manage conditions based on plans. As such, post-incident investigations often focus on the need to improve [...] knowledge of procedures and ability to execute them, and steps are taken to revise procedures and manuals* (p. 67). This training practice seems to create a reinforcing cycle of commitment to technical knowledge. Yet, a technical orientation appears to be just one part of the equation. As the CSB argued:

First, task-specific or technical competency training does not guarantee error-free performance. A highly skilled, technically competent person can make glaring human errors [....] Second,

within complex systems, "rules, regulations, policy or procedures cannot be written to address all the situations that people may face,". Consequently, "expertise is required to recognize when the unexpected is present or may arise." Thus, technical competency is only one aspect of an individual's performance capabilities." (CSB Vol 3, 2016, p. 67).

The quote indicates that task-specific and technical competence is inadequate for dealing with unexpected situations. Therefore, several reports recommend developing workers' *non-technical* skills, such as "*interpersonal communication, situational awareness, problem solving, decision-making and management"* (OLF, 2012, p. 29). According to the CSB (2016) *"non-technical skills are necessary to prepare individuals to manage the natural variability inherent within the complex system"* (Vol. 3, p. 67). Our observations in the well control training center provided a clear example of the importance to improve non-technical skills among the offshore workforce. In one instance in the simulator room, the crew was working through a scenario that included a slowly developing well control incident. The crew realized that something was not right, but in their confusion they grew silent, focusing solely on their individual tasks and trying to figure out what was going on. This caused breakdowns in communication, situational awareness and collective decision-making, contributing to a deteriorating situation. What this observational note, as well as the quotes show, is that an expanded conceptualization of competence that includes both technical and non-technical elements would arguably be beneficial for major accident risk management. However, our interviewees also point out that it would be difficult to achieve: "*having this conversation [about non-technical skills] is extremely hard* [because] *that reflective attitude is pretty weak actually in the oil and gas culture*" (interview British HSE manager).

Furthermore, we found that the training of technical-procedural competence promotes skills to do individual tasks at the expense of *system* risk management competences. For instance, the NAE (2011) investigation states "*One indication of the lack of appreciation for an overall system safety view is the limited level of system safety training provided by the operators and contractors"* (p. 96). This seems to undermine the ability of offshore workers to oversee the increasing complexity of offshore operations. The National Commission (2011) reports a "*scarcity of experienced personnel that can grasp the complexity of offshore operations and make quick and correct decisions."* (p. 229). The Norwegian regulator similarly concluded "*that drilling contractor personnel sometimes have a too narrow focus and that they do not have a big picture perspective*" (RNNP report, 2011, p. 18).

According to the CSB (2016), disasters like the Macondo blowout should raise questions "*fundamentally about the meaning of competency*" (p. 67). While our analysis showed that major accident risk management requires training in non-technical skills and systems risk, in the offshore drilling industry competency is mainly conceptualized as technical and task-specific. This institutionalized conceptualization of competence is reinforced through occupational training practices, which undermine the potential to attain a genuine systems perspective on risk. Hence, we claim that offshore workers are not sufficiently equipped with the competencies necessary to deal with the increasing complexities of offshore drilling. As such, we argue that a broader meaning of competency is necessary. The introduction of training on system risk management and non-technical skills will partly help to achieve that. Yet, we argue that the impact of such changes to occupational training will not be sufficient. We found that personnel training and selection practices are highly variable across the industry and of relatively low level. Without addressing this taken-for-granted variability in training and selection, it is unlikely that occupational training in major accident risk management will reach a uniformly high level in the industry.

Variable practices of occupational training and selection prevent standardization of risk management competence

We found that variability in training and selection practices across installations and organizations was widely accepted and taken-for-granted in the industry as appropriate practice. For oil companies, maintaining the flexibility to adapt practices to organizational needs is a deeply embedded institutional norm. Therefore, attempts for standardization of practices is generally resisted. We argue, however, that while tailored training practices are beneficial for the technical side of operations, standardization of system safety and non-technical skills training are important to improve major accident risk management competence in the industry, since these issues pervade all high-risk operations.

The first element of variability that emerged in our analysis relates to diversity in tertiary education and company training, which contributes to a heterogeneous workforce in terms of competence. The NAE report (2011) emphasized the problematic nature of variability in tertiary education in their report of the Macondo blowout:

"Drilling personnel come from all walks of life. They usually start in the onshore drilling industry, learning by experience with hardly any formal education in key areas such as the overall drilling system, geology, fluid flow, and chemistry. Offshore drilling personnel can be recruited from a variety of institutions and organizations, including technical schools and

general colleges, and from those with specialized naval backgrounds. Few recruits are likely to have even a fundamental understanding of the overall drilling system and the environment into which the system is deployed." (p. 107).

Hence, variability in educational background seemed to undermine understanding of the drilling system as a whole. Furthermore, the NAE report points out that variability in company training exacerbates this issue, as *"different companies have training and career paths that vary greatly. There are few industry standards for the level of education and training required for a particular job in drilling."* (p. 107). While training standards certainly exist in the industry and have even been updated in the wake of Macondo, the application of standards is left to the discretion of companies. This allows companies to adapt training to local demands determined for instance by geological conditions or organizational structure. However, our analysis of investigation reports indicates this flexibility can also presents a risk, as competence levels may be insufficient to match the complexity of particular operations. For instance, in the case of Macondo, the Chief Council Report reported that, *"Transocean has argued that the members of its rig crew were tradesmen, not engineers, and could not have been expected to interpret the complex results of the Macondo [well integrity] test"* (p. 162).

An important reason for the persistent variability in workforce development practices in the offshore drilling industry is an industry-wide personnel shortage as a consequence of a recurring *"boom and bust"* cycle in the industry (interview with UK trade unionist 1) that has led to *"years of underinvestment and lack of proper training schemes"* (interview with UK trade unionist 2). Periods of underinvestment in training appear to have created chronic discontinuities in experience and competence across the pool of industry workers. Higher rig positions are reportedly filled with personnel who lack the necessary experience and training to adequately deal with the responsibilities and knowledge required of these positions. For instance, the NSOAF report (2014) has indicated:

"because of the general shortage of experienced drilling personnel, it was acknowledged [by companies] that staff were often being promoted into positions early on in their training and development. This caused some organisational difficulties in keeping planned competency assurance programmes for drill crews fully effective." (p. 11).

While the NSOAF report states that premature promotions create only *"some"* difficulties, other sources are more critical. A well control instructor that we interviewed mentioned:

"Out of necessity people are promoted quickly. An assistant driller becomes driller after half a year. [He] can't ever get the right experience, but after half a year he is training an assistant driller himself. This way poor competence is fostered."

Our analysis shows that the practice of premature promotions and the absence of structured competence development programs for rig personnel have undermined the knowledge base of the profession as a whole. Given that workforce development mainly took the form of on-the-job training, the content and means of training depended predominantly on the knowledge and attitude of the on-site mentor, causing substantial variation between drilling rigs, as a well control instructor we interviewed explained: *"if you have a shit driller [as a teacher], you will become a shit driller. It shouldn't be dependent on one or two people who are responsible for your training"*. This irregularity of competence development was also acknowledged in the reports. For instance, SINTEF stated that, *"different accident investigations have identified needs for structured competency building"* (p. 4), while the OSPRAG report indicated the need to develop minimum criteria to reduce the *"high degree of variation in how Competency Management Systems (CMS) are structured across all organisations"* (p. 12). The RNNP report (2011) added that, *"informants were careful to point out that the competence 'on paper' [i.e. certification] was good enough, but that practical experience and technical system knowledge could be lacking"* (p. 30).

The previous discussion shows how practices of occupational training vary across organizations and installations. It appears that career progression has become a 'pull' mechanism, where workers move up the rig hierarchy as soon as a higher position becomes available. But as one human factors specialist put it: *"there seems to be a lack of respect for professional training, unless you are an engineer"*. Similarly, the Montara Commission, focusing specifically on the issue of non-technical skills, identified that *"decision-making about well control issues should be professionalized"* (p. 158). While there are benefits to the customization of training practices to meet specific local and organizational demands, we strongly argue that at least some facets of occupational training should be standardized to professionalize competence development for the offshore workforce. In particular, we propose standardization of non-technical skills and system risk management training, given the relevance of such competencies regardless of specific circumstances. Nevertheless, it seems that the industry remains determined to reject standardized occupational training. For instance, the industry body International Association of Drilling Contractors as well as Oil and Gas UK have argued that competency management systems *"should be tailored*

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to each company's specific organization structure, culture, and operational requirements"
(Government response to Maitland report, 5. 53).

DISCUSSION

The aim of this paper was to identify how taken-for-granted beliefs and institutionalized
practices in an industry can contribute to recurring disaster development patterns in
organizations. We illustrated this empirically with the example of institutionalized beliefs
and practices of risk management and occupational training in the offshore drilling industry.
Based on our findings we claim that risk management needs to be professionalized in
the industry, involving standardized training in understanding and managing system risk
and in non-technical skills, in order to overcome the dominant conceptualization of risk
as static, fragmented, and technical. We found that worker competence was generally
perceived as an issue to be addressed by 'fixing the individual' through more technical
training. We argue that taking such an individualized approach to occupational risk is
insufficient, because this does not recognize the influence of the institutional environment.
Harmful conceptualizations of risk can be traced back to persistent institutionalized training
practices in the industry, which have not co-evolved with the increasing complexity of
offshore operations. To address the risk arising from the mismatch of complex operations
and risk management and training, we claim that the *nature* of training in the offshore
drilling industry needs to change to better equip the offshore workforce for these new
circumstances. While it takes effort and perseverance to change institutionalized practices,
we claim that it can be achieved through professionalizing these practices by means of
standardization of worker training and career progression, and through balancing technical
and non-technical skills training.

Call for professionalization of risk management and training

Highly professionalized occupations are characterized by actors with deep occupational
knowledge acquired through long prescribed training and the existence of high-level
professional standards (Wilensky, 1964). Hence, professionalization may be demonstrated
by universality of credential requirements and the robustness of graduate training
programs (DiMaggio & Powell, 1983). Professionalization drives homogenization of
the workforce, as individuals increasingly possess similar high-quality competence,
assumptions and normative beliefs. One of our core findings was that the drilling industry
lacks professionalization of the offshore workforce: there was little standardization of
training and development with variability between organizations and locations and people

were often not sufficiently competent to deal with the complexities of offshore operations. According to Rasmussen (1997), variability in industry-wide competence represents an environmental stressor that can undermine the quality of organizational safety decisions across organizations. Yet, our evidence shows that the variability in competence of the offshore workforce were not just accepted in the field; it was the preferred and taken-for-granted way of working in the offshore drilling industry. This assumption is problematic, because it leaves open the possibility that offshore workers may receive insufficient training to match the increasingly complex offshore drilling systems and technologies (Dekker, 2011; Read, 2011). When safety practices are stagnant in the face of technological advances, this creates a reinforcing cycle of decreasing safety (Marais, Saleh, Leveson, 2006).

Despite the taken-for-granted variability in workforce development and competence, workers still resembled each other in one respect: their static, fragmented, and technical conceptualizations of risk, and their 'can-do, get-it-done' mentality. These implicit assumptions are deeply engrained in the offshore occupational culture and seemed very persistent even in the wake of multiple disasters. Research on male-dominated occupations in hazardous, frontier workplaces, such as offshore drilling (Ely & Meyerson, 2010), mining (Hynes & Prasad, 1997; Wicks, 2001), NASA (Vaughan, 2005) and the Australian Air Force (Hopkins, 2006) has shown that this mindset is embedded in the shared identity and cultural beliefs of the workforce. Furthermore, men in physical and dangerous workplaces tend to be preoccupied with manual, technical work and "pride themselves on their skill in handling tools and machinery" (Ely & Meyerson, 2010, p. 7). Part of this persistence likely originates from the fact that the majority of offshore workers in the industry come from a technical or mechanical background, and that this training and education have created important normative determinants for behavior (DiMaggio & Powell, 1983). Accident investigations and subsequent improvements are also likely to focus on technical issues (Lundberg, Rollenhagen, & Hollnagel, 2009), often resulting in the promulgation of more technical procedures (Hale & Borys, 2013; Thorogood, 2012). However, the predominant focus on technical competence in training and development will have only limited effect on organizational safety if it ignores the role of non-technical skills, which has been indicated by scholars as fundamentally important for understanding how disasters are caused (e.g. Dekker, 2014; Perin, 1995)

Institutional vs. organizational factors

An accident that seems to be a unique and isolated incident may in fact originate from practices and beliefs that are institutionalized in a wide variety of organizations (Elliott &

Smith, 2006; Wicks, 2001). The institutional environment may entail harmful institutionalized practices and beliefs that permeate organizational boundaries and have detrimental effects on safety levels across organizations. As such, harmful institutionalized practices make organizations more 'crisis-prone' (Pauchant & Mitroff, 1992). Yet, not all organizations in an industry experience the same kind of disasters or near misses, or at the same rate. While organizations in an industry is subject to similar institutional processes, not every organization will be affected by and respond to institutional influences in a similar fashion (DiMaggio & Powell, 1991; Scott, 2008). Organizations can mitigate or interpret institutional influences differently based on specific internal organizational attributes. Mindful and resilient organizations (Weick & Sutcliffe, 2007) with a strong safety culture may go beyond conforming to taken-for-granted, but dysfunctional practices and implement additional training requirements. For instance, Ely and Meyerson (2010) investigated two highly reliable oil platforms where workers reoriented away from the traditional and potentially disruptive masculine norms, identity and beliefs towards mindful practices and beliefs. As such, organizations may be able to avert penetration by and proliferation of an institutional source of risk in their organizational structure and practices. However, organizations that lack a strong safety culture may be rather susceptible these institutional risks, and even mindful organizations may have difficulties to protect itself from the continuous exposure of an institutional risk in the long run, slowly drifting into failure (Dekker, 2011). Hence, it is important for accident and safety research to recognize that organizational safety results from the combination of influences from the institutional environment and organizational characteristics.

Implications for learning from failure

Finally, we argue that the application of the institutional perspective to accident research has important implications for understanding learning from failure. The problematic nature of learning from failure is reflected in the fact that accidents with seemingly similar causation trajectories keep recurring (e.g. Vaughan, 2005). Some scholars have concluded rather pessimistically that we fail to learn (Hopkins, 2008; Kletz, 2003). Yet the institutional perspective can shed more light on why this failure to learn occurs: Because the *occurrence* of disasters ultimately is an organizational phenomenon, accident investigations tend to focus on identifying organizational causes (Carroll, 1998; Elliott & McGuiness, 2002). For instance, much has been written in accident investigation reports and accident literature (e.g. Hayes, 2012) on how worker competence plays a role in major accident causation. Yet, these practical reports and scientific studies tend to locate the lack of competence development in the organizational system. Consequently, recommendations aimed to

improve worker competence have focused on the individual, team, or organizational levels of analysis. Yet, we argue that the culmination of contributing causes into an *organizational* accident does not imply that all important contributing causes originate from within organizational boundaries. It is important for accident investigations to also deal with the *institutional* context outside the culpable organizations (Elliott & Smith, 2006; Wicks, 2001). For instance, professions shape the collective and shared assumptions and norms from which individual actors work (DiMaggio & Powell, 1991; Perin, 1995). As such, an institutional perspective to accident research emphasizes the need for macro-level learning at the level of the industry (Elliott & Smith, 2006). Authors adopting a complex systems approach (e.g. Dekker, 2011; Leveson, Dulac, Marais, & Carroll, 2009) have emphasized the importance of analyzing macro-level factors in major accident causation. Similarly, researchers in the field of learning from accidents have increasingly stressed the need for macro-level learning to capture lessons of value for collectives of actors in a field (Cedergren, 2013; Hovden, Storseth, & Tinmannsvik, 2011). Yet true systemic learning that addresses relation between different levels of analysis is still rare (Dekker, 2011), and the institutional context rarely receives adequate attention (Dyhrberg & Jensen, 2004; Elliott & Smith, 2006).

Limitations and future research

Our study has focused on taken-for-granted beliefs and practices in one specific industry, and our specific findings about the institutionalized lack of professionalization may or may not generalize to other high-hazard domains. This limitation notwithstanding, the objective of this paper was to show that the impact of taken-for-granted institutionalized practices on organizational safety deserve more attention, and our case serves as an example to illustrate this point. There may be other taken-for-granted industry practices at work: harmful institutionalized practices have been found to contribute to accidents in industries as diverse as the UK soccer industry (Elliot & Smith, 2006) and the mining industry (Wicks, 2001). Future research should aim to develop a deeper understanding of the influence of institutional environment on organizational safety (Elliott & Smith, 2006). We invite other scholars to apply the institutional perspective to identify other institutional sources of risk in diverse high-hazard industries to develop a better understanding of the role of the institutional environment in accident causation and recurrence.

Another limitation of this study is the focus on accident and near-miss reports as database. To be able to identify the influence of institutional sources of risk on organizational in an industry, one needs to compare the findings of multiple accident reports. Yet, disasters

2

are rare events, hence the availability of investigation reports on different accidents in one industry is limited. We partially solved this by triangulating accident reports with interviews, industry reports and near-miss reports, but more diverse accident reports would have solidified our findings.

CONCLUSION

In this paper we aimed to deepen our understanding of why similar disasters recur in high hazard industries. We build upon Dyhrberg and Jensen's (2004) suggestion to apply institutional theory to accident research to understand the persistence behind this phenomenon. In particular, we argued that taken-for-granted beliefs and practices may become sources of risks if their rigid nature prevents them to co-evolve along with changing operating conditions. Institutionalized beliefs and practices will penetrate organizations in an industry and may contribute to similar accident development patterns. Empirically, we illustrated this by using the example of major accident risk management and occupational training in the offshore drilling industry. This example shows how causes for accidents that appear to originate from within the involved organizations may actually have institutional origins. We argue that to learn effectively from disasters and prevent their recurrence, one should look outside of organizations for the contributing influence of institutions on disaster development. Looking for similarities between disaster development patterns is one way to identify the influence of taken-for-granted beliefs and practices. By understanding the relation between the institutional environment of organizations and disaster development we provide an alternative insight on how external context affects organizational safety. We argue that harmful institutional elements will continue to contribute to similar disaster development patterns in organizations unless an industry-wide effort is made to change harmful institutional elements.

How many blowouts does it take to learn the lessons?

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JUSTIFYING SUPERIOR KNOWLEDGE FROM THE PERIPHERY – STRUGGLES OF A MARGINAL COMMUNITY TO INFLUENCE LEARNING IN THE WAKE OF DISASTER

ABSTRACT

Industrial disasters are important triggers for collective learning in an organizational field. Yet, research has indicated that disasters can trigger contestation between actors in an organizational field that limits field-level learning. Previous research has argued that powerful, established actors in the field may impose their perspective of event definition, causes, and required solutions on other actors, thereby shaping the learning process and re-stabilizing the status quo. However, learning from disaster studies have failed to investigate how marginal actors struggle to influence the learning trajectory. This is an important topic, because marginal actors may drive institutional change in a field following a crisis event. We borrow notions from the transformation perspective on knowledge sharing and the communities-of-practice literature to highlight that field-level learning from disaster is a process in which marginal epistemic communities struggle to overcome epistemic and political boundaries to transform established knowledge. We conducted a qualitative analysis into the activities of the marginal Human Factors (HF) community in the North Sea offshore oil and gas industry to influence field-level learning in the wake of Macondo disaster. Being convinced of their superior knowledge about human error and incident causation, they aimed to justify their specialist discipline and persuade the established drilling- and senior management communities to engage in radical learning. However, the HF community's strategies failed to connect to important values and discourses of the established communities, thus failing to overcome knowledge and political boundaries, and transform knowledge about human error and incident causation in the field. Our study indicates the need for marginal communities to maintain awareness of potential institutional constraints such as institutionalized values, discourses, and learning mechanisms and responsibilities. The failure of marginal communities to overcome knowledge and political boundaries may contribute to field-level learning that reinforces established knowledge and practices, rather than change deeper assumption, values, and beliefs.

INTRODUCTION

When organizations in high-risk industries lose control over potentially hazardous technologies in their production processes, it may trigger catastrophic disasters that harm environment, people, and the organization's survival (Beck, 1992; Perrow, 1999). Consequently, organizations must learn from their disastrous experience to prevent recurrences (e.g. Pearson & Clair, 1998). This is a costly strategy, however, given a disaster's

tremendous impact. To avoid the cost of disaster, high hazard organizations may instead learn vicariously from the disaster experience of others (Madsen, 2009; Nathan & Kovoor-Misra, 2002). This is important, since the harmful practices that contributed to a disaster may be institutionalized across organizations in an organizational field (Elliott & Smith, 2006; Wicks, 2001). Furthermore, spillover mechanisms may expose organizations in a population to legitimacy crises triggered by a disaster (Shrivastava, 1987; Yu, Sengul, & Lester, 2008). Therefore, actors in an organizational field should learn collectively from the disaster experience of a field member. An organizational field is defined as a community of organizations with disparate interests that interact frequently with each other about a central issue of interest, including competitors, suppliers, consumers, regulatory agencies, special interest groups, and associations (DiMaggio & Powell, 1983; Hoffman, 1999).

Through quantitative studies scholars have shown that learning from accidents – represented by a decrease in incidents – may occur at the level of a field (Baum & Dahlin, 2007; Haunschild & Sullivan, 2002; Madsen, 2009; Madsen & Desai, 2010). Yet, other research has shown that collective industry learning from disaster is not straightforward. Contestation between different communities may be expected in the wake of a disaster: Research on field disruptive events has indicated that crises may destabilize established rules, meanings, and social positions in a field and trigger a 'war for meaning' between field actors that limits learning and change (Hoffman, 1999; Muller-Seitz & Macpherson, 2013). Despite these insights, the literature on learning from disasters and crises has paid insufficient attention to learning from disaster as a contested process (Lampel, Shamsie, & Shapira, 2009; Sagan, 1994). First, while research on disaster sensemaking in the wake of a crisis has studied contestation about disaster definition and identification of causes and solutions (e.g. Gephart, 1992), learning from disaster goes beyond this initial sensemaking phase (e.g. Toft & Reynolds, 2005). We propose that even when a particular event definition and set of solutions has pushed out alternative framings, contestation may still occur during later learning phases. Second, most disaster sensemaking studies focus on political strategies of dominant actors to restabilize the status quo by imposing their event definition, identified causes, and proposed solutions on other actors, for instance through formal public inquiries (e.g. Brown, 2000). In contrast, these studies do not pay sufficient attention to the attempts of marginal actors to influence the field-level learning process. We argue that this is an important topic. For instance, research has indicated that learning in destabilized social hierarchies – e.g. following a disaster – is likely to be triggered by low-ranking actors (Bunderson & Reagans, 2011). Also, research on social movements and institutional change following disruptive events has shown that marginal

3

communities may successfully use field crises to challenge the legitimacy of knowledge and practices enacted by established communities and drive changes in institutionalized practices, beliefs, and authority relations (Fligstein, 1997; Fligstein & McAdam, 2012; Hoffman, 1999; Maguire & Hardy, 2009; Micelotta & Washington, 2013). In this study we address these two gaps. Our research question is: *how does a marginal community attempt to influence learning from disaster processes that are driven by established communities?*

To better understand field-level learning from disaster as a contested process between established and marginal communities, we borrow notions from the knowledge transformation perspective on knowledge sharing across 'communities of practice' (CoP) (Bechky, 2003; Carlile, 2002; 2004; Carlile & Rebentisch, 2003; Gherardi & Nicolini, 2002). This body of literature highlights that collective learning between epistemic communities with different interests is a political process in which actors have to overcome knowledge boundaries and to merge their knowledge to create mutual understanding and engagement (Bechky, 2003; Carlile, 2004; Gherardi & Nicolini, 2002). While this may involve searching for common ground and consensus, actors may also use their political skills to influence the learning trajectory according to their interests (Macpherson & Jones, 2008; Mork Hoholm, Ellingsen et al., 2010). By integrating the literatures on learning from disasters and knowledge transformation across communities, our study makes several contributions. First, the knowledge transformation literature helps to conceptualize the contested nature of field-level learning from disaster as a struggle over the transformation of knowledge between different communities. Second, we contribute to the literature on knowledge sharing by studying attempts for knowledge transformation in an organizational field, a setting characterized by the absence of formal hierarchy (Knight, 2002; Moynihan, 2009). Most studies on knowledge sharing and transformation have focused on joint projects in formal hierarchical settings, such as organizations (e.g. Bechky, 2003) or joint ventures (e.g. Tsang, 2002), where managers establish dependencies between communities for the sake of collaborative projects. Our case emphasizes a situation where collaboration is not presupposed as in joint projects and where established communities may easily resist marginal communities' efforts for knowledge transformation (Bunderson & Reagans, 2011), Finally, we contribute to the literature on knowledge transformation by introducing the influence of field-level institutions (Mork, Hoholm, Ellingsen et al., 2010). Knowledge transformation research has focused mainly on (inter)organizational collaborations, and the influence of the external institutional context on processes of knowledge transformation has so far been ignored. Yet, in high-risk industries the institutionalized risk regime plays an

important role in shaping how the lessons learned are likely to be transferred throughout the organizational field (e.g. Elliott, 2009).

In this paper we examine how a marginal community attempted to share its supposed superior knowledge about incident causation with established communities to learn from the Macondo disaster in April 2010. The Macondo disaster was a blowout on an oil platform in the Gulf of Mexico in which 11 offshore workers died and which became the largest accidental oil spill in worldwide history (Read, 2011). While the disaster occurred in the US, the corresponding legitimacy crisis spilled over to other offshore regions. We empirically investigate contestation in knowledge sharing in the North Sea region, because this setting provided a clear example of a struggle of a marginal community – the Human Factors (HF) community – to influence two established communities – the drilling community and the constituency of senior management. Their struggle involved attempting to persuade the established communities to adopt their call for radical change in the wake of the Macondo disaster. This call for change was based on specialist knowledge from the HF discipline about human error and behavior. Human error always plays some role in the causation of accidents in sociotechnical systems (e.g. Reason, 1997), as was also the case in the Macondo disaster (U.S. Chemical Safety and Hazard Investigation Board, 2016). In technological industries human error is frequently identified as the *root* cause of accidents (Dekker, 2014). As such, learning from disaster tends to focus on prescribing more technical training or creating more detailed procedures to constrain human behavior and reduce human failure. This also happened in the wake of the Macondo disaster (U.S. Chemical Safety and Hazard Investigation Board, 2016). Yet, the HF perspective on human behavior recognizes that human error, while possibly being a direct cause to an incident, is often a consequence of situational influences, like job characteristics and/or organizational factors (Health and Safety Executive, 1999). The risk and safety literature has long championed the HF perspective as the appropriate view on safety in hazardous organizations (Dekker, 2014; Reason, 1997). Macondo investigation reports also confirmed the value of HF by showing how human errors leading up to the disaster were rooted in various organizational and cognitive factors (e.g. U.S. Chemical Safety and Hazard Investigation Board, 2016). Hence, the HF community argued that training of personnel was inappropriate. Instead they proposed that effective learning required oil companies to implement HF training and engage in organizational change processes to alter harmful job characteristics and organizational factors.

3

THEORETICAL FRAMEWORK

In this section we first discuss field-level learning from disaster as a process of contestation between field actors. Then, we introduce the CoP perspective on learning and the core notions of epistemic communities and knowledge sharing. Next, we discuss the transformation perspective on knowledge sharing across epistemic communities (e.g. Carlile, 2004). Finally, we bring together the different literatures to develop a knowledge transformation perspective on field-level learning from disaster.

Field-level learning from disaster as a contested process

We build upon research on 'network learning' (Knight, 2002; Knight & Pye, 2004), 'population-level learning' (Miner & Haunschild, 1995; Miner, Kim, Holzinger, & Haunschild, 1999), and 'institutional-level learning' (Haunschild & Chandler, 2008) to define field-level learning from disaster as a collective learning process involving ongoing interactions between field actors with different interests, knowledge, and positions in the social hierarchy, in the wake of a disaster, aimed at improving disaster prevention and response by identifying lessons learned and changing the nature and mix of institutionalized risk management practices and structures enacted in an organizational field. Despite some evidence that field-level learning from disaster and crisis is possible (e.g. Madsen, 2009), studies show that it may be limited by processes of contestation. For instance, research has indicated the political nature of sensemaking during crises. Gephart (1984) was one of the first who identified that different stakeholders have different views of reality and thus may develop conflicting disaster accounts. Sensemaking is political as stakeholders struggle to impose their account on others and thereby shape the future action. Similarly, Deschamps et al (1997) and Hoffman and Jennings (2011) found evidence that respectively the Nestucca oil spill and Macondo blowout each triggered contestation in the US among perspectives on the definition of the disasters, the causes, and the proposed solutions. They show that these conflicting perspectives were rooted in different assumptions or logics about the relationship between nature and society, oil consumption and energy demand. Yet, in both cases the oil industry's perspective dominated other perspectives, hence no deep cultural change occurred following these disasters. Furthermore, Muller-Seitz and Macpherson (2013) found that the search for causes of a disease outbreak in Germany unfolded to become a contested process in which field actors aimed to strive for political objectives rather than create consensus, which limited the potential for field-level learning about the outbreak.

Other studies focused specifically on public inquiries as political arenas in which actors struggle to make sense during crises and disasters. Brown (2000; 2004; 2005) has shown that inquiry reports employ rhetorical strategies of normalization, observation, and absolution to create authoritative narratives. This serves to depoliticize disasters, restore trust in social institutions through the demonstration of control, and bolster the hegemony of dominant groups. Similarly, Gephart (1992) found that public inquiries are ceremonial events that reproduce the legitimacy of state action and control procedures as the legitimatory institutions control the inquiry discourse. Focusing on the transfer and implementation of inquiry findings rather than the inquiries itself, Elliott and Smith (1993; 2006) showed how football stadia in the UK resisted new regulations following four stadium disasters by only symbolically complying. They showed how different regulatory styles of enforcement, such as a lack of enforcement, a punitive approach and a participative approach, resulted in different rates of organizational adoption of new regulatory rules in the wake of a disaster.

Hence, field-level learning from disasters and crises is a contested process that involves contested sensemaking during the crises, as well as passive resistance of political interventions. These mechanisms limit the depth of learning from disasters in a field. However, we argue that current studies on the contested nature of learning from disaster ignore several important points. First, while studies addressed how established perspectives often overcome sensemaking challenges concerning event definition and proposed solutions in the wake of disaster (e.g. Deschamps et al., 1997), learning goes beyond making sense of causes and lessons to learn (Toft & Reynolds, 2005): after the identification of lessons, actors engage in processes to 'materialize' these lessons learned. We argue that even when a particular event definition and set of solutions has pushed out alternative framings, contestation may still occur during these later phases. Second, studies on disaster sensemaking seem to emphasize how powerful communities impose their perspective on other, possibly weaker, communities to resist change (e.g. Brown, 2000; 2004; Deschamps et al., 1997; Gephart, 1992; Hoffman & Jennings, 2011). Nonetheless, in context of destabilized social hierarchies – like after a disaster – marginal actors may drive learning and innovation (Bunderson & Reagans, 2011). Weaker communities may attempt to transform the perspective of the dominant community through the use of influencing strategies (Howard-Grenville, 2007). To shed more light the dynamics of contestation between established and marginal communities in an organizational field in the context of learning from disaster, we adopt the transformation perspective on knowledge sharing between epistemic communities (Bechky, 2003; Carlile, 2002; 2004;

Carlile & Rebentisch, 2003; Gherardi & Nicolini, 2002). This literature is helpful for two reasons. First, it conceptualizes knowledge boundaries between communities that limit knowledge sharing (Carlile, 2004). Furthermore, it provides insights into the political nature of knowledge sharing (Carlile, 2004; Gherardi & Nicolini, 2002; Macpherson & Jones, 2008; Mork et al., 2010). In case of conflicting interests, communities have to negotiate and influence in order to create a shared understanding among the communities that enables mutual engagement.

The transformation perspective on knowledge sharing across epistemic communities

The knowledge transformation perspective on knowledge sharing is rooted in the literature on 'Communities of Practice' (CoP) (e.g. Lave & Wenger, 1991). The CoP perspective to learning was developed to overcome the mainly individual, cognitive perspective on learning, taking a sociocultural, situated perspective on learning that emphasizes that actors learn by participating in collective, distributed practices (Brandi & Elkjaer, 2011; Brown & Duguid, 1991, 2001; Lave & Wenger, 1991; Wenger, 1998; 2000). CoPs originally were conceptualized as tightly knit communities in the workplace in which participation involved regular face-to-face interactions (Brown & Duguid, 1991; Lave & Wenger, 1991). Later, researchers also included more spatially dispersed social learning systems (Amin & Roberts, 2008). For instance, epistemic communities, such as occupational and professional networks, include dispersed members whose relationships are more 'loose' than in traditional CoPs, but nevertheless converge around shared practices, norms, values, assumptions, and identities (Amin & Roberts, 2008; Bechky, 2003; Brown & Duguid, 2001).

From the CoP perspective, becoming a competent actor requires participation in cultural practices of a social learning system – i.e. interacting with other culturally and historically shaped actors and artefacts (Brandi & Elkjaer, 2011; Wenger, 2000). From a political view, CoPs envelope struggles for legitimacy and participation, in which new actors work to participate legitimately in a particular practice, while central actors in a community may confer legitimacy to newcomers and provide 'access' to and 'transparency' of activities, processes, and artefacts (Brown & Duguid, 2001; Contu & Willmott, 2003; Lave & Wenger, 1991; Osterlund & Carlile, 2005; Wenger, 1998). Hence, participation and mutual learning requires newcomers to engage in a trajectory of developing dependencies with other members and becoming increasingly legitimate members of the community.

The literature on knowledge sharing in CoPs indicates that knowledge flows readily within a community because participants share sociocultural resources – i.e. language, stories, artefacts, practices, assumptions, and interpretations (Brown and Duguid 1991; 1998; 2001; Wenger, 1998). However, this shared background can also lead to communities becoming "self-referential cultural systems" (Gherardi & Nicolini, 2002, p. 425) that are predisposed towards the creation and absorption of knowledge that builds upon the community's historically situated beliefs and values, at the expense of other interpretations and knowledge (Carlile, 2004; Carroll, 1995; Gherardi & Nicolini, 2002; Roberts, 2006; Swan, Scarbrough, & Robertson, 2002). Hence, the development of knowledge may become path-dependent as a community's established assumptions, values, and beliefs become reinforced. While the shared background facilitates knowledge sharing *within* communities, it complicates knowledge sharing *across* communities (Brown and Duguid 1991; 1998; 2001). Knowledge transformation facilitates knowledge sharing across communities, because bodies of knowledge need "to be put to work by situated actors in situated work practices and in local interpretations of its meanings and constraints" (Gherardi & Nicolini, 2000b, p. 344). Boundary objects (Bechky, 2003; Carlile, 2002; 2004), boundary processes (Wenger, 1998), or boundary persons (Brown & Duguid, 1998) may be used to facilitate knowledge transformation. The literature provides several empirical examples of processes of and boundaries to knowledge sharing across communities, especially in technically complex environments. In the context of new product innovation, Bechky (2003) identified how differences in language, locus of practice, and conceptualizations of the product created knowledge-sharing difficulties between design engineers, technicians, and assemblers. She found that knowledge sharing succeeded when communities created common ground through 'tangible definitions', i.e. physically demonstrating a problem to a member of another community and thereby bypassing ineffective verbalizations. Similarly, Carlile (2002; 2004; Carlile and Rebentisch, 2003) investigated knowledge transfer in technology and product development settings. Carlile and Rebentisch (2003) identified that the potential for knowledge transfer between communities is complicated by the amount of *novelty* introduced by contextual changes, the amount of *dependence* between communities as it creates the need for mutual adaptation, and the amount and/or type of *specialization* or *difference* between sources of knowledge that introduces differences in language, methods, and artefacts. In other work, Carlile (2002; 2004) developed a knowledge transformation framework that involved different types of boundaries, boundary objects, and boundary capabilities. *Syntactic* boundaries emerge when knowledge differences and dependencies exist between communities, without a common language to facilitate interaction. Such syntactic boundaries may be

3

resolved by using common reference points of data, measures or labels to provide shared definitions that enable the transfer of knowledge. A *semantic* boundary emerges when a novel situation makes existing meanings ambiguous or knowledge differences and dependencies unclear. To resolve a semantic boundary, knowledge needs to be translated by defining and categorizing differences and potential consequences. Standardized forms and methods may provide mutually understood language and structure. Gherardi and Nicolini (2002) also focus on semantic issues between communities in the context of workplace safety in a construction site, and identified how foremen, engineers, and contractors – interconnected communities with different frames of reference – engaged in discursive practices to negotiate meaning and enable alignment between interconnected communities of practice. Finally, *pragmatic* boundaries exist when novel circumstances create conflicting interests between actors, which limit their ability to share knowledge (Carlile, 2002; 2004). This is essentially a political boundary that needs to be solved through the negotiating and defining of common interests. Knowledge developed in one community may create problems in other communities, leading to conflicts of interests. Hence, when negative consequences are identified, boundary objects like *objects, models, and maps* demonstrate differences, dependencies and enable the joint *transformation* of their knowledge. Other research has also highlighted how knowledge sharing is a political process affected by power relations. According to the relational perspective on CoPs (Contu, 2014; Gherardi & Nicolini, 2000b; Osterlund & Carlile, 2005), CoPs are per definition connected through power relations, because they cannot be seen in isolation from other CoPs (Brown & Duguid, 1991; 2001; Wenger, 1998). According to Contu (2014), communities shape social relations and identities through a continuous hegemonic struggle involving articulating and sedimenting differences while marginalizing alternatives. Macpherson and Jones (2008) identified that a managing director of a company invoked power by using influencing strategies to shape an organizational change process. Hence, they highlighted how knowledge transformation may involve the exercise of episodic and systematic forms of power (Lawrence, Mauws, Dyck & Kleysen, 2005). Similarly, Mork et al. (2010) showed how, following a technological innovation in surgery, an established medical community was able to exercise control over the innovation and stifle its progress because they were better integrated within institutional practices and enjoy privileges like legitimacy and resource control. These findings correlate with statements that actors or communities positioned low in a social hierarchy have fewer opportunities for participation or influencing organizational processes, hence have less opportunities to shape learning (Coopey, 1995), even if they have superior knowledge than high-status actors (Coopey & Burgoyne, 2000; Bunderson & Reagans, 2011). Yet, the literature also provides insights in the possibilities of

marginal communities and actors to shape learning. Giroux and Taylor (2002) emphasized that communities in multi-divisional companies engaged in processes of justification of knowledge to form coalitions and secure funding for proposed innovations. Howard-Grenville (2007) showed that the effectiveness of issue selling strategies by marginal communities in the context of sustainability innovations depended on representations of novelty and difference (Carlile & Rebentisch, 2003), as well as its connection to established communities' norms and schemas about what constitutes a (solvable) problem.

A knowledge transformation perspective on field-level learning from disaster

While Carlile's (2002; 2004; Carlile & Rebentisch, 2003) framework of knowledge sharing was developed in product innovation setting, we argue that it helps to conceptualize difficulties of field-level learning in the wake of a disaster. Disasters, as other crises, are per definition non-routine events that may disrupt existing beliefs, assumptions, values, and practices and trigger re-evaluations of appropriateness (Hoffman, 1999; Lampel et al., 2009; Turner, 1976). Hence, first of all they clearly generate *novel* circumstances in a field. Subsequently, field actors may engage in learning to improving operational safety by strengthening disaster prevention and response practices (e.g. Pearson & Clair, 1998). Disasters also highlight the condition of knowledge *differences* between communities, as they use different frames of reference to make sense of incidents (Carroll, 1998; Gherardi & Nicolini, 2002). The different cultural resources and frames of reference may create syntactic and semantic boundaries (Carlile, 2004) between these communities, which need to be overcome to enable mutual engagement in learning from disaster. Finally, the condition of *dependencies* is also relevant in the case of field-level learning from disaster, but it manifests itself differently than in the setting of product innovation. For instance, product innovation in organizations or inter-organizational collaborations is subjected to a formal authority structure, in which dependencies are created by managers for the sake of achieving organizational objectives. However, in an organizational field, such formalized authority structures are absent (Knight, 2002, Moynihan, 2009). As such, while managers may decide to bring occupational communities together in (inter)organizational settings and create dependencies, such converging pressures are likely to be less powerful in a field. Instead, dependencies in a field are represented by institutionalized relations between field actors. For instance, dependencies exist between organizations, industry bodies that represent the industry, and the regulator who is tasked with supervision. The relation between regulator and regulated is partly determined by the regulators' approach to the enforcement of regulations (Elliott & Smith, 1993; 2006). Also, several high-risk

settings are characterized by a co-regulatory regime in which field-level learning is driven by industry associations, who create voluntary standards that organizations may adopt (Baram & Lindøe, 2014). Regulators in turn may use these standards in their inspections of companies safety management systems and practices. Hence, institutional arrangements in an organizational field privilege certain organizations over others (Coopey, 1995). Yet, institutionalized dependencies between epistemic communities may change following a crisis. The field disruption may destabilize established social positions in a field (Hoffman, 1999). As such, epistemic communities that played a central role in a particular practice in a field may be challenged by more peripheral communities that aim to secure a more central position in a field (Fligstein & McAdam, 2012). Therefore, to influence processes of field-level learning and risk management, peripheral communities may aim to alter authority relations and drive mutual engagement with established communities by developing dependencies between themselves and central actors in a field. This allows them to negotiate the learning trajectory and meaning of what is safe and dangerous (Gherardi, Nicolini, & Odella, 1998; Wenger, 1998). Nevertheless, the dominant epistemic community may not be willing to allow this. Established communities have better access to resources and thus may defend their dominance in a field by resist attempts of marginal actors to occupy more central positions (Fligstein, 1997; Fligstein & McAdam, 2012; Maguire & Hardy, 2009). While regulators could assume the position of enforcer in a field and alter dependencies, trends of deregulation and the shift towards modes of co-regulation in Western societies indicate that regulators may lack the resources and/or cultural legitimacy to do so (Power, 2007; Short & Toffel, 2010). Hence, differences in interests may establish pragmatic boundaries between communities (Carlile, 2004). To overcome the differences and enable the development of dependencies with the central community in a field, actors have to use political skills (Lawrence Mauws, Dyck, & Kleysen, 2005; Fligstein, 1997).

METHODS

Research setting and design

We chose the Macondo disaster as our case, because HF issues were found as a key causes of the accident, leading to recommendations to improve HF awareness and understanding in the industry (US Chemical Safety and Hazard Investigation Board, 2016). Hence, it created an opportunity for the marginal HF community to further the HF discipline in the offshore oil industry. We focused in particular on the efforts of the HF community in the North Sea region, because several industry initiatives were organized to improve HFs awareness and knowledge for the industry. Several major oil companies created a HF position in

their safety departments. Industry associations set up committees and task forces that issued reports to raise awareness and provide guidance about HFs (e.g. International Association of Oil and Gas Producers, 2012). North Sea regulators also expressed interest in the topic and collectively engaged in a multi-national audit to assess how oil companies and contractors incorporated HFs in their operations (North Sea Offshore Authorities Forum, 2014). Despite these initiatives, there were several signs of struggles in knowledge sharing. For instance, it seemed that the knowledge produced in these initiatives was not widely adopted by the drilling community.

We use a case study to investigate how HF specialists struggled to participate in field level learning from Macondo by creating and attempting to share specialist knowledge with the drilling community. A qualitative research strategy is useful for this research purpose for two reasons. First, qualitative methods enable understanding a complex phenomenon – in this case field-level learning in the wake of a disaster – in depth and explain how it evolved and why (Denzin & Lincoln, 2000; Langley, 1999). Furthermore, a qualitative approach recognizes to the role of context of social phenomena (Yin, 2008), enabling us to contextualize boundaries to knowledge sharing in the wider institutional setting, in particular the risk regime in which field-level learning is embedded (Elliott & Smith, 2006; Hale, 2014).

Data collection

We collected a variety of data sources from diverse actors playing a key role in discussions about Human Factors in the North Sea drilling sector. The data collection phase consisted of two main phases. We were initially interested in understanding how the HF community attempted to change institutionalized practices of risk and safety management and workforce training. As indicated earlier, there was a lot of emphasis on and activity around HFs in the wake of Macondo, as several initiatives were organized to raise awareness and institutionalize HF knowledge in risk and safety management practices and workforce training. The second author - having researched the role of Human Factors in high-risk settings, and done research and consultancy for the oil and gas industry as an academic researcher at the University of Aberdeen - was involved as an HF champion in several of these initiatives. She contributed to an industry task force about Macondo, contributed to a HF conference in Houston in 2012; and co-organizing a HF conference in London in October 2014. There was a shared conviction in the HF community that they were effectively changing an industry. Hence, we initially set out to investigate how HF specialists institutionalized the HF discipline in the offshore industry.

In this phase, the primary means of data collection were participant observations. Both authors participated in the HF conference in London in October 2014, where the first author contributed as a scribe and wrote extensive notes of the presentations and discussions that took place. Based on these notes an article in a trade journal was written. Both the notes and the trade journal article were included in the data set. Also, the first author conducted non-participant observations at a well control training center in the Netherlands. This well control center offered a scenario well control training that involved training in HFs. In total, the first author observed 5 days of training. These observations were valuable because they provided insights in how the trainers aimed to transfer HFs knowledge to offshore workers, and it provided several illustrations of workers' unfamiliarity with HFs knowledge and their struggles to apply it in the scenario training. In the first phase we also conducted nine interviews with HF specialists from the second author's professional network, between December 2013 and October 2014. We were interested in interviewees' perceptions on the importance of the HF discipline for the offshore industry, initiatives in the field to create and institutionalize HFs knowledge following the Macondo disaster, and their perspective on the status of HFs in the offshore industry. Finally, we collected several industry reports, the majority of which was publicly available. Secondary data is useful for complementing interview data, because it is produced "naturally" instead of "at the request of a social researcher" (Bryman, 2015, p. 543). This limits the potential reactive effect of data collection, increasing the validity of the data. The publication of documents by industry actors allows us to trace the process of knowledge creation and transfer in the offshore industry over time. We collected the reports that referred to Human Factors from websites of industry actors that play an important role in field-level learning in the North Sea offshore industry, such as industry associations and regulators.

While we set out to investigate the institutionalization of HFs after the Macondo disaster, after the HF conference in London we began to realize that the change process was slowing down. During our interviews and observations, HF specialists had referred to challenges involved in the change process, but so far it had appeared to us that these were inescapable elements of change processes. Yet, it increasingly appeared that field-level learning about HF did not proceed, so we decided to investigate further. First, we went to test our intuition by conducting another round of four interviews with people that we interviewed in the first phase. In these interviews we presented this new insight to the interviewees and asked them to comment. All four interviewees confirmed our intuition; hence we proceeded to discuss their perspective on what could have stopped the progress. These interviews increased our confidence in our observation so we decided

to change our broad research – 'why did widespread learning about HFs not occur?' – and engage in another round of data collection. We used a snowball method to let these four interviewees identify other potential interviewees. We then contacted these people and repeated the strategy. In the second phase we conducted an additional twelve interviews between March 2017 and October 2017. The interviews focused more specifically on historically situating the development of HFs in the offshore industry, and barriers that the interviewees encountered in their efforts to put HFs on the map as a safety issue in the offshore industry. Several of our interviewees indicated that the drilling community did not understand HFs, as they attempted to solve the issue of human error by prescribing more technical training. Hence, from the perspective of the HF specialists, the drilling community only focused on the technical competence of personnel. To better understand the drilling community's understanding of HFs, human error, and competence, we collected additional documents. Again, we visited the websites of industry actors that played an important role in field-level learning in the North Sea offshore industry, but this time we also collected documents that referred human error or competency. These documents gave more insights in how the drilling community learned from the Macondo disaster. To understand the historical developments of HF knowledge in the North Sea offshore industry, we also included documents about Human Factors, human error, and competence published before the Macondo disaster occurred. We scanned these documents for references to other relevant documents and actors, visited these websites and repeated this strategy until no new key actors and relevant documents emerged. Similarly, our new interviewees frequently referred to documents, which we then collected. Three documents were not publicly available but shared by an interviewee. This way, we collected a body of interconnected documents (Atkinson & Coffey, 2004) that illustrated two wider, but conflicting discourses on human error. Finally, we included two interviews with drilling engineers in our interview data sample that were collected as part of an earlier research project on learning about the Macondo disaster, in which the interviewees discussed their perspective on the role of human error and technical competence in the causation of the Macondo disaster. This provided extra insight into the drilling community's understanding of human error. In total, we collected 23 interviews.

Data analysis

In this paper we are interested in the struggles of one epistemic community to overcome knowledge boundaries and share knowledge with another epistemic community. We analyse the epistemic community's activities in different communal settings. Lindkvist (2005) differentiates between 'knowledge communities' – i.e. CoPs – and 'knowledge

collectivities', which refer to temporary groups and project teams that are organized with the explicit objective to create and exchange knowledge. In such pressured collectivities of practice, there is no time to develop communal knowledge and tightly-knit communities, yet they may still be regarded as groups that learn as they operates on a collective goal instead of shared values and common understandings. In our analysis we identify three knowledge communities: the HF community, the drilling community, and the constituency of senior management. Furthermore, we identify 'knowledge collectivities': temporary task forces that were organized in the wake of the Macondo disaster and tasked with learning lessons. In our analysis we focus on two related practices in the field of offshore drilling around which the struggles for knowledge sharing revolve: learning from disaster, which occurred in the wake of Macondo, and the practice of risk and safety management which the learning process seeks to improve. We analysed how the HF community struggled for participation in both practices, within the workplace as well as task forces.

The first step in our analysis was to identify important events and order them in a timeline of events. Since task forces are important arenas of knowledge creation and sharing, in the wake of crises and disasters (e.g. U.S. Chemical Safety and Hazard Investigation Board, 2016), we perceived the organization of task forces and publication of guidelines as important events. Furthermore, we were sensitive to what our interviewees mentioned as important events. After the identification of events, we used MAXQDA to code the data inductively and create first order concepts that were close to the empirical data (Strauss & Corbin, 1994). Our analysis followed two analytical steps. In the first step, we focused on how the HF and drilling communities interpreted of the causes of the Macondo disaster and their what solutions they proposed strategies. Furthermore, we focused on the challenges experienced by HF specialists and the strategies they used to emphasize the relevance of HFs for the drilling community. Our initial codes were close to the data. Then we reorganized the first order concepts into conceptually distinct labels, grouping similar concepts to create second order categories, resulting in increased abstraction of data. We identified different calls for action, underlying assumptions, and three central knowledge transformation strategies that the HF community employed. During this first analytical step, tensions emerged from our data between the HF community's strategies and institutionalized assumptions, beliefs, and responsibilities of the drilling community and senior management constituency. Therefore, we engaged in a second analytical step in which we went back to the data to further analyse these tensions. By going back and forth between our empirical strategies and theory, we were able to refine our empirical categories into aggregated constructs and connect these to theoretical constructs, such

as 'synactic-', 'semantic-', and 'pragmatic knowledge boundary'. The codebook is shown in Appendix A.

FINDINGS

In this paragraph we demonstrate that sharing of HF knowledge with the drilling community was complicated by the presence of semantic and pragmatic boundaries that limited mutual engagement of the two communities in the wake of Macondo. First, we find that a semantic boundary – rooted in different assumptions about human error – contributed to the creation of divergent disaster accounts and calls for action. Second, we show how the HF community used the Macondo disaster as motivation to become more established in the drilling industry. They engage in strategies of discipline recognition, like emphasizing the success of HF in other hazardous industries, and showcasing their specialist non-technical knowledge to the drilling and senior management communities. However, we show how the self-referential nature of these strategies created pragmatic boundaries that limited sharing of HF knowledge. In particular, it undermined the HF community's legitimacy, as they were unable to connect to the dominant drilling and senior management discourses and values. Third, we demonstrate how the separation between the HF and drilling and senior management community is reinforced by the North Sea risk regime that exists in the North Sea. Institutionalized mechanisms of and responsibilities for learning maintain community boundaries in place.

Developing different call for more radical action

The first official accident investigation report that was published on the Macondo disaster was from BP. One of the central findings of BP's internal investigation report was that a lack of personnel competency was an important contributing cause of the Macondo disaster. To resolve this 'lack of competence', the report recommended to *"Enhance competency programs to deepen the capabilities of personnel in key operational and leadership positions"* (BP report, p. 183), by defining critical competencies and providing more technical and leadership training. The drilling community in the North Sea region embraced BP's 'lack of personnel competence' account and call for more training. For instance, one of the workgroup leaders of a Macondo industry task force argued: "*the competence of the people was 80% of the failure*" (Drilling engineer in major oil company). Almost completely similar to BP, the task force's call for action focused on establishing formal competencies and more training: "*Leadership and Supervisory competencies should be established and assessed for [key] positions*" (OSPRAG report, p. 12), while an association argued "*The*

critical competencies identified comprise 'technical' and 'leadership and supervisory'." (OGUK competency guidelines, p. 8).

We argue that the 'lack of competence' account and the call for more training are based a particular set of assumptions about how disasters caused and therefore should be prevented. The 'lack of competence' account seems to attribute accountability for the accident to the individual and the team. Hence, the drilling community's learning initiatives aspired to achieve *"a reduction in the frequency and consequence of well control incidents caused by lack of individual or team competence"* (OGP 476, p. 5). This quote indicates the drilling community's belief that a lack of individual or team competence is the *root* cause of accidents. In line with these beliefs, the call for action focused on limiting human fallibility and improving control over human behavior through strengthened training and competence management. Hence, call for action focused on 'fixing the person'.

In contrast, the HF community has a radically different understanding of human error. From their perspective, human error cannot be wholly attributed to an individual, as human behavior is situated in contextual influences. Human error is thus not understood as a *root* cause of incidents, but a *consequence* of a complex interplay of organizational and contextual factors. HF consultant #1 emphasized the radical difference between these perspectives: *"it is deeply fundamental whether you believe people behave in-context and situational, or that [human behavior is] individually driven."* Hence, lack of competence was not a satisfying explanation of the Macondo disaster for HF specialists, nor increased technical training an appropriate call for action:

"Improving human performance goes far beyond simply retraining individuals on the technical aspects of offshore operations [...] The performance failures identified post-incident do not point to worker competency per se, but to a variety of situational, contextual, and organizational variables [that affected human behavior]." (CSB investigation report, p. 22-23).

Hence, we argue that the different beliefs about the notion 'human error' and corresponding calls for action reflect a semantic boundary between the two communities that drove the development of different calls for action. In contrast to the call for more training, the HF community proposed that more radical change was required to learn properly from the Macondo disaster. The majority of our interviewees argued for the importance of a deep cultural change in the drilling industry, driven by the implementation of HF knowledge in companies. For instance, one interviewee argued for the need to *"get to that level*

of cultural awareness where [HF knowledge] becomes part of the DNA of the industry"
(HSE manager in small company). Hence, the HF community's call for action focused
on the need for fundamental cultural change in the industry, to be achieved through
the institutionalization of HF awareness, competence, and procedures in oil companies.
Therefore, while semantic differences caused different calls for action, we also argue that
this difference in understanding and meaning motivated the HF community to engage in a
political struggle to further the HF discipline. Our analysis indicated that the HF community
plays a relatively marginal role in the drilling industry, but they perceived themselves as
having superior knowledge about human behavior. For instance, HF specialists discredited
the drilling community's 'naïve' understanding of human error:

*"The majority of people [in the drilling industry] have engineering backgrounds. They apply
engineering metaphors to managing people. So, for instance, in engineering you program
machines to follow a sequence of steps. This analogy is then applied to people, because they
expect people to behave in the same way as a machine does and follow all the steps. And we
all know that it doesn't work like that."* (HF specialist in major oil company #2).

The claim 'we all know that it doesn't work like that' indicates that for the HF community
the inadequacy of this 'engineering perspective' on human behavior and the call for
more training was evident. However, our interviewees frequently portrayed the drilling
community as just not able to grasp HF knowledge. For instance, an interviewee argued:
"*They don't understand it. I have tried to explain it to engineers, but I just don't get anywhere.
It is bizarre, because to me it is so simple, so straightforward*" (HF specialist #4). Hence, we
argue that the HF community perceived themselves as having superior knowledge of
human error and behavior, and therefore were convinced that their call for culture change
should be respected. Despite being a marginal community, they believed that they should
play a central role in learning from the Macondo disaster, as well as daily risk and safety
management practices in oil companies. Therefore, they engaged in a political struggle for
discipline recognition to increase their status and influence, thereby aiming to become an
established community in the industry in the wake of the Macondo disaster. They aspired
to raise the profile of the HF discipline by legitimating it as a *distinct* safety aspect. For
instance, an HSE manager of a small oil company said: "*[HF] is something that needs to
be debated and discussed much more coherently and consistently across the industry. As a
discernable separate initiative.*" Our analysis indicates that awareness of HFs increased in
the offshore industry as a consequence of the Macondo disaster. For instance, several
major companies created a HF position in their safety department or contracted external

3

consultants for HF advice. However, we will show that their strategies to increase discipline recognition were ineffective, because they were self-referential – i.e. they were convincing from their own frame of reference, but did not connect to established discourses. This limited their ability to share HF knowledge with established communities in the industry and drive cultural change. We focus in particular on their practices to engage with two established communities: drilling personnel and senior management.

Using generalized sales pitch to justify relevance of HF for drilling

One of our main findings is that HF community used ineffective rationalizations to explain why HF knowledge is relevant for the drilling industry. For instance, our analysis indicates that the HF community frequently made references to the successful implementation of HF knowledge and procedures in other industries, in particular civil aviation. One HF consultant that we interviewed used this example in a trade journal article: *"Aviation was the first to recognize [the value of HF] and began training flight crews in HFs. Look at them – their safety has gone through the roof"* (HF consultant #2). Yet, we argue that the drilling community likely will not be convinced by these rationalizations, because they are self-referential in the sense that they put the success of the HF discipline at center stage, rather than making HF knowledge relatable to the drilling context. One of our interviewees reflected on this:

"We hold aviation up as the gold standard. And I think a lot of drilling personnel say: 'that's pilots, that's not us.' Maybe a different approach is needed. Maybe an operations technician on an oil rig cannot relate to a pilot [...] How do we make HF relatable to the guy at the front line." (HF specialist in major oil company #3).

Rationalizations referencing to civil aviation focus on bolstering the status of the HF discipline by emphasizing success stories in other settings, rather than emphasizing how exactly it may be *of service* to the drilling community. In particular, by emphasizing the success of the HF discipline in other high hazard industries, these rationalizations claim *generalizability*. However, we found that the drilling community perceives itself as *unique*. Our data presents several indications of this belief of uniqueness. First, even several of the HF specialists that we interviewed mentioned how drilling is a unique endeavor. For instance, one interviewee argued: *"My belief is that the offshore industry is totally unique when it comes to its configuration of risks"* (HF consultant #3). We argue that's such beliefs may limit actors' acknowledgement of insights from other industries. Furthermore, we found that beliefs about uniqueness also operated *within* the offshore industry. The U.S.

Chemical Safety and Hazard Investigation Board (2016) identified that HF failures played an important role in the causation of the Macondo disaster. However, our data indicated that many actors in the North Sea seemed to believe that such a disaster could never happen in the North Sea. For instance, a drilling consultant argued: "*I think there is a great deal of hubris in the North sea about 'our regulations would not have allowed this to happen'*". We argue that these beliefs limited recognition of findings from the Chemical Safety Board investigation. But the differentiation goes even further than this. There even seems to be a dominant perception that individual rigs differ substantially from each other. For instance, while one interviewee was skeptical about this, he acknowledged that the drill crews tend to perceive themselves as unique:

"One rig will tell you that everything about them is different to the other one [...] The guys on one installation and the guys on another one, everything they do and how they do it is almost entirely the same. But they will never tell you about the 95% common ground. They will identify the five per cent difference." (HF consultant #1).

This emphasis on differences between individual rigs can also be found in essentially all guidelines that are produced in the industry. For instance, the industry association OGP mentioned in their Well Control Competency guidelines: "*Training should always be tailored according to the specific operation, environment, rig type and type of well control equipment in use*". While we understand that different situations may require custom approaches to training, and that different rigs may have different cultures, we argue that these diverse examples also demonstrate an institutionalized belief in the uniqueness of drilling operations. This emphasis on uniqueness appears to be a core element of the dominant discourse in the drilling industry. As such, issue-selling strategies that showcase the success of the HF discipline in other industries ignore this institutionalized element of the drilling discourse. Instead, for rationalizations to be effective we argue that they should recognize this belief in the uniqueness of drilling.

Using decontextualized, non-technical knowledge in a technically dominated environment

Another of the HF community's self-referential strategy involved the distribution of HF knowledge in the drilling industry. The HF community created several reports for the drilling community that incorporated HF knowledge. For instance, the Human Factors subcommittee of industry association OGP developed a report that focused on the cognitive aspects of HFs, which focused on explaining core psychological concepts.

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However, the analysis of HF reports that were published in the wake of Macondo showed that they were focused heavily on the psychology of HFs, but were rather decontextualized from drilling practices. In an article in a trade journal, the decontextualized nature of the various HFs initiatives was challenged:

"The common thread throughout all of these publications and activities is that they are directed toward a narrow audience of human factors specialists who are concerned with researching human factors-related issues or setting up of training programs. However, there has been little attempt to communicate the central ideas to those who deal with the problems of human error in all its forms on a daily basis; in particular, the drilling operations community." (Hsieh, 2014).

As these quotes shows, the HF community strived for discipline recognition by emphasizing HF as a separate initiative and producing artifacts, like reports, in which HF knowledge was illustrated. However, we argue that this approach to knowledge sharing was ineffective. It appears that the HF community operated largely from *their* frame of reference, using their specialist vocabulary and presenting HF knowledge in a *decontextualized,* abstract manner. Their reports included little reference to the specific drilling processes and context. Our analysis shows that this self-referential practice created pragmatic knowledge boundaries between the HF and drilling communities that complicated mutual engagement, knowledge sharing, and participation in the drilling community's learning initiatives and daily risk management practices in oil companies. For instance, as several interviewees indicated, this specialist HF vocabulary creates legitimacy problems for the HF community. For instance, a consultant said: *"[drillers] think [HF] is touchy-feely psychological babble"* (Drilling consultant). This indicates that the use of the specialist HF vocabulary undermines the community's credibility with the drilling community. In particular, their use of the specialist HF vocabulary appears to conflict with the established workplace discourse, which is dominated by the drilling community's technical terminology. Our analysis indicates that the drilling community used their own technical specialist vocabulary to exercise authority in the workplace. A UK offshore inspector referred to this:

"I do think that drilling speaks another language. And I know that some of my colleagues, they go to inspect a drilling rig and they don't go anywhere near the drill floor, because they don't understand anything that happens there. That is a problem. There is so much jargon and so many acronyms [...] fundamentally the physics and the engineering of it is quite

understandable but it is presented to you in this format that is just like a foreign language. So you do have to be able to breach that." (Offshore inspector #1).

Another interviewee added: "*[drillers] wear that jargon with such pride*" (HF specialist in major oil company #1). Hence, we argue that the technical drilling vocabulary served as a mechanism for in- and exclusion, reinforcing the drilling community's status, while excluding those who are not familiar with the technical terminology and practices. Succeeding in the offshore industry as a HF specialist therefore seems to require having technical knowledge of drilling processes, terminology and context. For instance, HF specialist in major oil company #1 argued: "*to see the [HF] problem requires understanding the [drilling] context. And that takes some degree of expertise within the area that you are working in*". Yet, it seems that HF specialists did not always succeed in developing this knowledge:

"*I've seen human factors people fail horribly when they get into industry. To have a good ergonomics or occupational psychology [degree] doesn't equip you to go in to an oil rig and achieve very much. [...] You need to understand the person and have the technical grounding.*" (HF consultant #1).

Hence, we argue that the HF community has the implicit assumption that having specialist HF knowledge is sufficient for making a positive contribution to safety in the drilling industry. They did not deepen their technical and cultural understanding of the drilling context and processes. Hence, we argue that the HF specialists' use of non-technical, specialist knowledge and vocabulary, and their lack of knowledge about the drilling context undermined their legitimacy in the drilling industry. Their attempt to engage with the drilling community while holding on to their own frame of reference was doomed to fail, as their language and knowledge did not resonate with the drilling communities technical specialist knowledge and discourse. In fact, the drilling community used their technical drilling discourse to maintain authority relations in the workplace. As such, an inspector of the UK regulator referred to the issue of language:

"*If you are a HF specialist and you need to talk to the driller or their manager, you need to have that credibility, you need to be able to speak in their terms, and there probably are very few HF specialists who are that good.*" (Offshore inspector #1).

Similarly, HF specialist in a major company #2 argued for the importance of *"being able to establish guidelines that someone with a non-human factors background can pick up and understand and see how this is helpful."* These quotes show the importance of contextualizing HF knowledge to the work setting in which it is supposed to be applied. This indicates that knowledge sharing with the drilling community requires the HF community to learn about the technical drilling practices and discourse and mold the two bodies of knowledge. Without such knowledge transformation, sharing HF knowledge is unlikely to occur.

Justifying HF as distinct safety discipline in a efficiency-focused management environment

Legitimacy problems did not just arise between the non-technical HF specialists and the technical drilling community. The HF community also had difficulties to relate to the constituency of senior management in oil companies. The aspiration to establish HF as a distinct safety discipline exposes it to management criteria for budgeting, and competition with other safety issues for attention and budget from senior management. This seems to be a serious hurdle for the HF community, as an external HF consultant argued in our interview:

"As soon as you get behind that first line management, then there is little recognition of the importance of [HF] skills. [...] That is where it falls apart. And that's where the question of 'what is the return on investment' tends to come." (HF consultant #2).

This emphasis on 'return on investment' indicates an important challenge for the HF community, namely to demonstrate the financial value of the HF discipline. As the majority of our interviewees indicated, there is something inherently difficult about showing the value of HF Another interviewee confirmed this challenge:

"A challenge I found is demonstrating how HF adds value. With engineering you can perform modeling, calculations, you can more or less put a money value on a project, piece of equipment, activity, etc. [But when] we do a task analysis and find some conditions that may increase the likelihood of error...so what? 'What is the value of that? And does it really work? We can do so many things to improve safety, why should I as a leader prioritize this activity if it is only probabilistic. Can you guarantee me that it will prevent accidents?' no I cannot. 'Can you demonstrate the impact and value?' No, you cannot. You cannot show any relationship with something that didn't happen." (HF specialist in major oil company #2).

This quote is an indication of Weick's (1987) famous claim that safety is a "dynamic non-event": actors continuously work to maintain reliability, so that no incidents will happen. But it is impossible to establish a causal relation between an intervention and the absence of an event. This complicates the potential for HF specialists to convince senior management that HF as a distinct safety issues that requires formal management. An HSE director of a small oil company reflected on difficulty to mobilize HFs as a distinct safety issue in his company:

"Getting the subject on the table is another aspect about safety alongside everything else that we are dealing with. I have got a whole range of stuff like risk management, competency, asset integrity management. These are items we need [safety] programs for [...] and then you have got human factors. And then the question [from senior management] is: 'Okay, what is human factors and what is really relevant?' [...] We need to hit big items first."

In particular, the impact of quantifiable 'big items' like risk management, competency, and asset integrity is more readily measurable or simulated than the impact of HF on safety. As such, it seems that the HF discipline also suffers from a lack of legitimacy with senior management. Difficulties to establish the value of the HF discipline, for instance in financial terms, undermine the credibility of HF as an issue to be supported by management. Furthermore, it seems that this also threatens the position of HF specialists in oil companies: "*when the downturn came, I was one of the first out of the door*" (HF consultant #3). Instead, to get traction with senior management it seems that it is important to use other strategies, especially to connect it to their discourse and values. For instance, HF specialist in a major company #2 argued for the importance to "*take a topic that they are concerned about. [...] My tone, language, phrasing was adapted to the needs of this particular group, which are based on their experience and context.*" Similarly, HF consultant #1 argued that to get traction with senior management "*We should not refer to human factors. The human factors people have got beyond themselves and tried to create themselves as the objective. They're not. Human performance is the objective*". Instead, he argued:

"We should be going in with a really sound economic bottom line argument, but a lot of the human factors community are not comfortable with that, they've spent too long in the safety camp. You have got to be able to win an argument on business grounds because you are dealing with businesses. As long as people are still going in talking about human factors in terms of safety then it's seen as an overhead in the boardroom." (HF consultant #1).

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This was also recognized by another HF specialist: *"sometimes the emphasis has had to be more on efficiency and that got us a little bit more of a hook than safety unfortunately. If it's the only way forwards, then maybe that will have to be the way"* (HF specialist in major oil company #3). This shows that the effectiveness of HF specialists depended on their ability to adapt to the senior management discourse of financial efficiency. We argue that the HF community was aware on the importance of convincing senior management, which we will illustrate with a short narrative from a HF workshop that the authors participated in.

Narrative of HF workshop – emerging awareness of the 'HF business case'.
In October 2014, a handful of enthusiastic people from the HF and drilling communities organized a workshop in London under the auspices of professional association 'Society of Petroleum Engineers', titled 'Getting to Grips with Human Factors in Drilling Operations'. The organizers of the workshop recognized that the HF community's attempts to spread HF knowledge throughout the North Sea drilling industry in the wake of Macondo had limited effect so far. There was a shared awareness that they were engaged in an uphill struggle. Hence, one of the purposes of this workshop was to discuss how to improve the institutionalization of HF knowledge in the drilling sector. One of the main discussion points was the importance of senior management involvement. The participants were convinced that HF was not "just another initiative", but recognized that "the HF message was not sticking at the top". During the workshop sessions participants were allowed to raise issues that they perceived as important insights concerning this problem. One of the emerging topics was the importance of developing an "HF-sensitive business case" to convince managers of the value of HFs. The participants realized that they had "to frame their objective differently". It was argued that HF was not supposed to be the objective, but they recognized the need to "push the business buttons" by connecting the HF objective to organizational goals, such as operational excellence, efficiency, and costs. Hence, participants agreed that justifications should stress that HF would be good for business and lead to competitive advantage. Issue selling strategies should to emphasize the "win-win situation" of generating benefit for safety and for business. These were fresh insights – the workshop conveners had not planned to conclude with an argument for a business case for HF; it was raised by participants. Still, the discussion did not produce a concrete strategy on how to create an HF business case. While the objective was clear, it remained unclear how participants could achieve this and relate to senior management in their own organizations.

Despite the realization that justifications for HF had to be linked to senior management values, like competitive advantage, efficiency, and financial value, it seems that it had

limited effect over time. As one of the participants argued in an interview in 2017: "*we've not got it into the hearts and the minds of the CEOs of the companies*" (Director of training center). We propose that the severe drop in oil price that occurred during this period, put extra emphasis on 'efficiency' as a management objective. Given the lack of a concrete strategy to develop an "HF-sensitive" business case, combined with difficulty to show the value of HF, we argue that this limited the HF community's potential to sell the issue to senior management. However, this was further complicated by the HF community's aim to strive for recognition of HF as a distinct safety issue, which exposed HFs to budgeting pressures.

Institutionalized learning mechanisms and responsibilities maintain knowledge boundaries

The previous paragraphs addressed how the strategies of the HF community to achieve discipline recognition limited their ability to spread HF knowledge through the drilling industry. Yet, our analysis also indicated that field-level institutions, especially the North Sea risk regime, presented an additional constraint on the HF community's attempts for knowledge transformation. We found how institutionalized responsibilities of risk governance privileged the drilling community as the designated learning authority in the wake of Macondo. This limited the HF community's opportunity to shape field level learning.

In the North Sea goal-setting risk regime, the drilling industry itself is responsible for risk and safety management. For instance, as a UK regulatory inspector argued: "*companies manage their own risk, and we do occasional spot checks*" (Inspector #1). In line with this division of responsibilities, industry actors were also responsible for learning in the wake of incidents. Industry learning tends to be driven by industry bodies, like industry associations, who develop guidelines of conduct for companies. UK regulatory inspector #1 explained how guidelines are used to direct company behavior: "*if you comply with the guidelines you are likely to comply with the law. Guidelines provide that bare minimum. So, we do then use those guideline to hold people to account*". While the majority of interviewees endorsed this form of 'enforced self-regulation', it seems that this institutionalized mechanism of learning reinforced separation between the drilling and HF community during the field-level learning trajectory following Macondo. For instance, to populate its Macondo task force, industry association OGP stated: "*OGP will call for experts and resources from its membership*" (GIRG Deepwater Wells report). However, since HF specialists tend to play

only a marginal role in oil companies, it seems that their contribution in these task forces is limited:

"Maybe there was no deep human factors specialist in the [task force] group that wrote [guidance]. That's a vulnerability for the HF community. They're not getting themselves around the table. But, because [guidance] was written by people with their feet very firmly in the industry it's easy to adopt. It'll be written by people like them, for people like them. It won't be challenging from a human factors point of view because they can't do that. They're working at the level of current knowledge. They're not in the profession to look at what is emerging knowledge. So it'll always be a little bit out of date but it'll always be better than what they're doing now. And those [guidelines] are the ones that really get traction [in the industry] because they're practical. They make a difference, not fantastic but they make a difference. But the HF community are pretty much outside that loop because they're not in the rooms when those groups get put together to write it." (HF consultant #1).

This shows how institutionalized learning mechanisms in the drilling industry privilege established communities as learning agents, thereby stimulating learning from disaster that is predisposed towards refining established knowledge, and reinforcing the dominance of the established communities in the field. Hence, these institutionalized learning mechanisms and responsibilities represent pragmatic knowledge boundaries, which limited knowledge sharing between the HF and drilling communities.

Still, the HF community did play a small role in several industry associations. For instance, some associations had a standing HF committee, or contracted HF specialists to specifically learn HF lessons from the Macondo disaster. In these project groups, the HF community wrote several reports and guidelines on HF. Yet, our analysis indicated that adoption of HF guidelines was limited. While regulators use guidelines to keep companies to account, our findings indicate that two institutional factors limited regulatory pressures for adoption of the HF guidelines. First, a fundamental principle of the risk governance regime in the North Sea is that the adoption of guidelines is voluntary. Companies have the right to diverge from guidelines if they are able to demonstrate that they have a proper alternative. Because of this voluntary nature of adoption, an interviewee argued: *"because they're guidelines rather than standards, the [HF] reports will never receive universal buy-in from everybody"* (Director of training center). A second institutional factor limiting adoption was the lack of HF expertise in the regulator. Our findings show that HFs was not a high-profile topic for the regulator. An inspector with the UK regulator reflected: *"there is a shortage of HF staff*

[in the regulator] and that has definitely affected the kind of decision-making of companies, who have cut HF knowing that they are not getting an inspection next year" (Regulatory inspector #1). In particular, it seems that the HF expertise in regulators has been limited due to resource constraints. For instance, inspector #2 argued:

"*[HF expertise] ebbs and flows within our organisation. Probably ten years ago it was very, very much resourced. And that resource is being depleted. But within the last six months the organisation has looked to increase that resource again [but] it has really just been very recent. And I don't think we're at the point of absolutely embedding that [in the organization] and then coming up with a forward strategy. They're still piloting.*" (Regulatory inspector #2).

Hence, while the adoption of HF guidelines in the offshore industry could be stimulated by the regulator, it appears that HF is not a high-profile issue for the regulator in the wake of Macondo. As such, adopting HF knowledge seems to largely remain a voluntary exercise in the offshore drilling sector. We found that institutionalized mechanisms and responsibilities of learning – task forces made up of established communities; the voluntary adoption of guidelines; and lack of HF expertise in the regulator – have limited opportunities for HF knowledge sharing in the offshore drilling industry. Initiatives for field-level learning, therefore, largely build upon and refined established drilling knowledge, as the drilling community was barely exposed to the knowledge of the marginal HF community. As such, the risk regime seems to limit opportunities for more radical learning.

DISCUSSION

The aim of this study was to better understand the contested nature of learning from disaster. In this section we discuss the main findings and elaborate our theoretical contributions.

Field-level learning from disaster as a process of contestation

We contribute to the learning from disaster literature by conceptualization learning from disaster as a contested process in which communities struggle over the transformation of knowledge at epistemic boundaries. In particular, we argue that the inability of marginal actors to overcome knowledge- and political boundaries between themselves and established communities in the wake of a disaster results in '*paradigmatic learning*' (Deschamps et al., 1997) in an organizational field – i.e. refining established knowledge

and practices, thereby reinforcing them, rather than changing deeper assumption, values, and beliefs.

Research on (technological) risk has argued that risk is heavily contested; different actors have different interests and perspectives on the nature and desirability of risk, leading to the production of conflicting knowledge claims and competing risk discourses – between experts and laypeople as well as among experts (Beck, 1992; Giddens, 1990; 1991; Power, 2007; Rosa, Renn, & McCright, 2014). Following disasters these differences become explicit, as traditional authority relations in a field are destabilized (Hoffman, 1999) and different epistemic communities invoke different mental models of how incidents are caused and should be prevented in the future (Carroll, 1998; Deschamps et al., 1997; Gherardi & Nicolini, 2002; Hoffman & Jennings, 2011). Hence, the notion of politics of expertise (Beck, 1992; Fischer, 1990) is central to the topics of risk and learning from disaster.

Bunderson and Reagan's (2011) review of literature on status and learning suggests that when social hierarchies become unstable – like in the wake of a disaster – high- and low-ranking actors assume different learning attitudes. Low-ranking actors become more proactive and change-oriented, while high-ranking actors become more reactive and defensive. This suggests that in the wake of a disaster, marginal communities may challenge the expertise and authority of established communities, and prompt radical learning initiatives. Similarly, the literature on institutional change shows that disruptive events, like disasters, may drive marginal communities to challenge authority relations and aim for institutional change (Fligstein & McAdam, 2012; Hoffman, 1999). This study confirmed that a disaster triggers a struggle between communities with conflicting calls for action. Our study showed that marginal communities may perceive themselves as having superior knowledge and expecting recognition of their expertise from established communities. Hence, marginal communities attempts to contribute to learning processes in the wake of disaster may be understood as having a dual function: improving prevention, as well as occupying a more central role in the organizational field. Nevertheless, we found that the marginal community experienced difficulties in their effort to influence field-level learning from disaster. We showed that the different understandings of how accidents are caused, and the strategic efforts for discipline recognition respectively created semantic and pragmatic knowledge boundaries (Carlile, 2002; 2004), which they were unable to overcome. Other studies on organizational and institutional change have indicated that a marginal community may be able to alter established authority relations when their proposal for change – meant to improve their authority position – draws on

traditional values (Lawrence, Malhotra, & Morris, 2012), familiar discursive resources from other institutional contexts (Levina & Orlikowski, 2009), or the established community's interpretative schemes (Howard-Grenville, 2007). These studies suggest that a change initiative by a marginal community on one hand needs to radically break with existing authority relations, while still resonating with established and recognizable cultural resources. Yet, in our case, we found that the HF community did not connect to established cultural resources, in particular the dominant drilling and management discourses in the industry. They aimed to disrupt existing authority relations, but operated largely from their own frame of reference. Therefore, their strategies conflicted with established beliefs and values of the established drilling and senior management communities. For example, justifications based on generalization of success stories in other industries created a tension with the institutionalized belief that drilling operations are unique endeavors. Hence, our findings showed that the marginal community's proposal for radical change did not connect to established values and discourses. Instead they aimed to share their knowledge by simply transferring it to the established communities, while the presence of semantic and pragmatic boundaries required them to engage in more active transformation to create common ground (Bechky, 2003; Carlile, 2002; 2004; Gherardi & Nicolini 2000b; 2002). This limited their potential to participate in field-level learning processes in the wake of disaster.

Studies on knowledge transformation between epistemic communities have argued that dominant epistemic community are likely to become self-referential, refining established knowledge and reinforcing assumptions and values (Gherardi & Nicolini, 2002; Roberts, 2006). This study showed that in absence of new knowledge inputs by marginal communities, learning from disaster focused primarily on learning technical lessons, like more technical training and improved competence management procedures. The literature on learning from incidents in high hazard industries has indicated that learning from disaster tends to be dominated by principles of technical rationality, represented by technical experts like engineers (Carroll, 1995; 1998; Carroll et al., 2002; Dekker, 2014; Elliott & Smith, 1993; 2006; Perin, 1995). From this technical paradigm, people are perceived as sources of problems that have to be constrained, often through increased technical training or creating more detailed procedures (Carroll, 1995; 1998). Hence, our findings confirmed the dominance of a technical paradigm in learning from disaster in the offshore oil and gas industry. In line with other studies of learning from disaster, our study confirms that learning from disaster frequently does not go beyond the 'paradigmatic' level (Deschamps

et al., 1997), hence reinforcing the technical paradigm in the wake of a disaster (Elliott & Smith, 2006; Hoffman & Jennings, 2011).

Our investigation of the attempts by HF specialists to manifest themselves as a distinct safety discipline has several similarities with Giroux and Taylor's (2002) investigation of the attempts of quality engineers to put quality management (QM) on the map as a distinct profession. For instance, Giroux and Taylor also identified how the attempt to create a distinct field of expertise involved a struggle for management recognition and budget. In the first phase of justification, quality specialists were advised to "speak the language of money" (p. 506) and to frame QM as an opportunity to attain economic objectives. We found that some HF specialist made similar remarks in our interviews. However, Giroux and Taylor found that "translating specialists' knowledge into a language that top management can understand is not sufficient to transform it into an accepted truth" (p. 509). Only in the context of economic and political crises that challenged the competitive position of US companies versus Japanese companies, was the QM community able to successfully justify QM as an *American* solution and competitive *obligation* that companies had implement to survive. The subsequent explosion of popularity allowed the QM community to solidify their position by framing the effectiveness of QM as undeniable truth. Relating these insights to our case, it seems that the HF community is only in the first phase of justification, and may need to capitalize on future crises to further the HF discipline.

Knowledge transformation in an organizational field in the wake of disaster

Our study also contributes to the literature on knowledge sharing and transformation. We studied attempts for knowledge transformation in an organizational field following disaster; a setting characterized by the absence of formal hierarchy (Knight, 2002; Moynihan, 2009) and destabilized informal authority relations (Fligstein & McAdam, 2012; Hoffman, 1999). Most studies focus on formal hierarchical settings, such as organizations (e.g. Bechky, 2003) or joint ventures (e.g. Tsang, 2002), where managers have a mandate to establish dependencies between communities to organize cross-community projects. Our case emphasized a situation where collaboration is not presupposed, as in joint projects, and where strong converging pressures for mutual engagements may be absent. Our study therefore provided new insights into the dynamics of knowledge transformation. In particular, our emphasis on a marginal community following a disruptive event shifted focus to the importance of political strategies of justification as a means to establish dependencies with dominant communities and transform their knowledge (Fligstein,

1997; Howard-Grenville, 2007; Giroux & Taylor, 2002). Still, this is a challenging process, as established communities may flat out resist marginal community's efforts for knowledge transformation (Bunderson & Reagans, 2011; Maguire & Hardy, 2009). They may exercise episodic power to impose their perspective on other actors, shaping learning processes according to their interests (Lawrence et al., 2005; Macpherson & Jones, 2008).

However, our emphasis on the organizational field also provided insights on the influence of more subtle, systematic power (Hardy, 1996; Hardy & Clegg, 1996; Lawrence et al., 2005) on knowledge transformation, emanating from field-level institutions. The notion of systemic power highlights that behavior is constrained by the unconscious acceptance of assumptions about normality and appropriateness that are embedded in taken-for-granted discourses and institutions (Hardy, 1996; Hardy & Clegg, 1996). In this sence, institutional structures privilege certain actors over others, creating inequality in access to power and resources (Hardy, 1996; Giddens, 1979). Hence, systemic power is vested in institutionalized practices, rather than possessed by individual actors (Lawrence, 2008). In this way, power relations become pervasive and form the backdrop against which learning and change may or may not occur (Hardy, 1996). In high hazard industries, practices of risk management and learning are constrained by the established dominance of the technical paradigm. Technical expert knowledge, in our case concerning drilling, is sedimented in societal institutions and dominates policy and debates about risk and learning (Beck, 1992; Carroll, 1995; Perin, 1995).

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As previous studies on knowledge sharing and transformation focused mainly on (inter) organizational collaborations, the influence of the external institutional context on processes of knowledge transformation tends to be ignored (Mork et al., 2010). Yet, in high-risk industries the institutionalized risk regime plays an important role in shaping learning in an organizational field (Elliott, 2009; Elliott & Smith, 1993; 2006). We showed in our findings that the institutionalized risk regime in the North Sea region embeds taken-for-granted learning mechanisms and responsibilities. For instance, the actors that create the risks – i.e. oil companies and drilling contractors – are responsible for managing and continuously reducing the risks (Baram & Lindøe, 2014). Therefore, important constituencies from oil companies and drilling contractors – the drilling community and senior managers – are designated as learning authorities. Hence, the risk regime embeds systemic power relations, privileging particular actors over others and maintaining pragmatic boundaries between them. This limited the ability of the HF community to participate in and shape field-level learning. These insights confirm Fischer's (1990) emphasis on "the tensions

between expertise and participation" (p. 7) and Blackler and McDonald's (2000) insight that power, expertise, and collective learning are fundamentally related. Institutionalized expertise and associated power relations may limit participation of marginal communities in learning, fostering increasingly elitist and undemocratic decision-making processes, which limit the potential for radical learning (Coopey, 1995; Coopey & Burgoyne, 2000; Fischer, 1990). The literature on CoPs indicates that for peripheral actors to become legitimate participants in a learning community, established actors have to grant them recognition (Brown & Duguid, 2001; Lave & Wenger, 1991; Osterlund & Carlile, 2005; Wenger, 1998). Yet, in our study, it seems that the HF community was not perceived as a legitimate community.

Boundary conditions

The focus of this study on knowledge sharing processes in one organizational field in the wake of one disaster affects the generalizability of our findings. Still, we believe that our findings to some degree generalizable, in particular to other technologically intensive, hazardous industries. Other studies about learning in such environments have indicated that the predominance of the technical paradigm in other industries, such as nuclear power (e.g. Carroll, 1998). Hence, similar knowledge sharing mechanisms and complexities may occur in these settings. To learn more about these mechanisms and complexities, it would be worthwhile to study how HF knowledge is shared in other hazardous industries, such as aviation or maritime transport, or following another serious incident in the North Sea drilling industry. Furthermore, our study particularly focuses on the struggles between a technical community consisting of engineers and a non-technical community of occupational psychologists. It seems that legitimacy issues are especially challenging for a non-technical community that aims to participate in a technically dominated industry. Hence, our findings could be generalizable to other settings where non-technical communities, trained in the social sciences, struggle to receive recognition in a technical industry.

Second, our study focuses on field-level learning processes in the North Sea region as opposed to the US Gulf of Mexico where the Macondo blowout occurred. Such spillover of a legitimacy crisis in the wake of a disaster is likely to affect how actors in different fields learn lessons. Organizational fields are characterized by different field actors and institutional arrangements (e.g. DiMaggio & Powell, 1983), hence, processes of learning and contestation in the organizational field in which the disaster occurred will likely differ from such processes in another organizational field are likely to differ. We have shown that

spillover will trigger particular contestation practices, so our findings are generalizable to other crisis settings.

Third, we investigated attempts for knowledge sharing in a particular institutional setting, namely a co-regulatory regime. In a co-regulatory regime, risk governance responsibilities are shared between industry actors and regulators (e.g. Baram & Lindøe, 2014). Learning is affected by institutions in an organizational field. For instance, learning is more likely to occur in participatory regimes than antagonistic regimes (Elliott & Smith, 2006). However, we also illustrated that in a co-regulatory regime where industry actors have important risk governance and learning responsibilities, it is unlikely that a regulator will impose new knowledge on the industry. As such, in co-regulatory regimes, it may be the case that radical learning initiatives, as proposed by marginal communities, are less likely to occur. Co-regulation is a trend in many Western societies (Power, 2007; Short & Toffel, 2008). Therefore, our findings are relevant to other industries with such regulatory regimes.

Furthermore, while we studied processes of knowledge creation within and sharing by three different epistemic communities, we were not able to observe to what extent organizations adopted and implemented HF knowledge. The literature on learning from disaster has indicated that learning goes beyond the identification of lessons learned, hence, it has been argued that studies should also focus on how lessons are implemented in organizations (Elliott, 2009; Toft & Reynolds, 2005). Yet, because of our field-level focus – focusing especially on knowledge creation within and sharing between communities in a field, as well as zooming in on industry associations and regulators as drivers of field-level learning – and the collection of secondary data sources, interviews, and observations at a conference and training center, we focused particularly on mechanisms knowledge creation and sharing, which shifts focus to different mechanisms of field-level learning than adoption and implementation.

Finally, we presented the three communities as uniform groups. In contrast, several studies on knowledge creation in and across communities have suggested that communities are not necessarily peaceful groups that operate along the same line towards a common goal (e.g. Wenger, 1998). Our data also provided indications that contestation also occurred, for example, within the HF community. A stronger focus on the internal community practices of contestation could provide a better understanding why the community engaged in struggles of discipline recognition, and therefore why field-level learning about HF knowledge was limited.

CONCLUSION

Our research question was: how does a marginal community attempt to influence learning from disaster processes that are driven by established communities? We found that the marginal HF community developed a different call for more radical action than the established drilling and senior management constituencies in the wake of the Macondo disaster. Being convinced of having superior knowledge about human behavior and incident causation, the HF community aimed to justify their call for radical action to the drilling and senior management communities, and share their specialist knowledge with them. To achieve this, the HF community engaged in a struggle for discipline recognition by using self-referential strategies, like 'using a generalized sales pitch', 'using decontextualized, non-technical HF knowledge in a technically dominated environment', and 'using specialist HF language in a management environment'. However, we found that the HF community did not contextualize its specialist knowledge and language to the dominant discourse and values of the drilling and management communities. As such, their justification strategies reinforced knowledge boundaries between the communities, limiting the HF community's ability to transform established knowledge in the field. Furthermore, their attempts to share knowledge were constrained by institutionalized learning mechanisms and responsibilities in the North Sea risk regime, which kept boundaries between the established and marginal communities in place. Our study indicates the need for marginal communities to engage in strategic political actions to influence learning from disaster, while also maintaining awareness of potential institutional constraints such as institutionalized values, discourses, and learning mechanisms and responsibilities.

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FIELD-LEVEL LEARNING FROM DISASTER - A DYNAMIC PROCESS OF CONTESTATION FOLLOWING CRISIS SPILLOVER

ABSTRACT

Never waste a good crisis: When disaster strikes, it presents an opportunity to learn for those directly involved, and for collective vicarious learning at the level of an organizational field. Such field-level learning becomes imperative when a disaster has triggered a legitimacy crisis that spills over to other organizations. However, research has indicated that learning from disaster takes place in an extremely politicized environment, which may undermine attempts to improve disaster prevention. This study explores the politics of learning from disaster in a situation where a resulting legitimacy crisis spilled over to an organizational field in a distant geographic region. This is an important research topic, because spillover affects how political processes of learning take place in the wake of disaster. We interpret field-level learning following crisis spillover as a dynamic, contested process and investigate *how* and *why* actors continuously enact their competing interests in response to opposing actors' actions. Our empirical setting is the organizational field of offshore oil and gas exploration and production in the North Sea in the wake of the Macondo disaster, which occurred in 2010 in the US Gulf of Mexico. Using a longitudinal research design we illustrate how two actor groups – a coalition of industry actors from the North Sea region versus the EU Commission – organized different field-level initiatives following the Macondo disaster and how they contested each other's initiatives over time. This study illustrates how contestation involved a narrative conflict that was rooted in opposing institutional discourses about risk governance, and maintained over time through the dynamic interaction of discursive strategies. Actors aimed to resist crisis spillover by emphasizing differences between institutional arrangements in organizational fields. Furthermore, contestation involved politics of responsibility and expertise, with which actors aimed to assume a position of authority in the learning process.

INTRODUCTION

On April 20, 2010, the global offshore oil industry was confronted with a disastrous accident of a scale rarely experienced before. The oil company BP, together with its main contractors Transocean and Halliburton, had lost the control over the deepwater Macondo well[1], causing a violent blowout that resulted in a series of explosions on the drilling rig Deepwater Horizon (Read, 2011). Eleven people on board were killed in the explosions, and

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1   The Macondo well was a high pressure-high temperature well drilled at an ocean depth of about 1.500 meter (5000 feet), and approximately 4000 meter (13.000 feet) under the seafloor, at a total depth of approximately 5.500 meters (18000 feet) (Hopkins, 2012).

the Macondo blowout caused the largest accidental oil spill in the history of the global offshore industry. While the disaster occurred in the U.S. Gulf of Mexico, it also triggered discussions in Europe about its implications for risk governance in European offshore operations (European Commission, 2011). Different European stakeholders proposed learning initiatives to implement lessons from Macondo and ensure that a similar accident would not happen in the EU. For instance, the European Commission initiated several policy interventions to reorganize risk governance of offshore oil operations. However, these initiatives were heavily contested by stakeholders from the oil industry, who were already in the process of initiating their own learning initiatives. In this paper we seek to understand how this contestation occurred between these different stakeholders and why it occurred in this fashion.

Research has indicated that learning from disaster takes places in an extremely politicized environment (Brown, 2000; 2004; Elliott & Smith, 2006; Gephart, 1984; 1992; Hoffman 1999; Hoffman & Ocasio, 2001; Hoffman & Jennings, 2011; Lampel, Shamsie, & Shapira, 2009; Müller-Seitz & Macpherson, 2013; Perrow, 1999; Sagan, 1993; 1994; Smith & Elliott, 2007). In this paper we are primarily interested in politics of learning from disaster following crisis spillover, i.e. the transfer of a legitimacy crisis from organizations involved in causing a crisis to organizations that were not involved, but appear to be similar (Desai, 2011; Jonnson, Greve, & Fujiwara-Greve, 2009; Yu, Sengul & Lester, 2008). Disasters may undermine trust in the ability of corporations and regulators to control risks (Beck, 1992). A common response following the occurrence of disasters is for societal stakeholders to wonder 'can it happen here?' (Shrivastava, 1987). Hence, disasters may create political urgency for involved organizations, uninvolved organizations, and governmental stakeholders alike to reassure the public that adequate lessons are drawn (Barnett & King, 2008; Brown, 2000; 2004; Lampel et al., 2009; Sagan, 1994). As such, the implications of a disaster may transcend beyond the involved organization(s) to affect an industry as a whole (Desai, 2011; Yu et al., 2008). As our case suggests, the European response to the Macondo disaster is a manifestation of crisis spillover, triggering learning and contestation between actors beyond the US context. Different actors are likely to have different interests and different perspectives on the causes and consequences of a disaster, creating contestation between opposing positions on the need and means for learning (Hoffman & Jennings, 2011; Shrivastava, 1987; Smith & Elliott, 2007). In order to highlight the political struggles between political, public, and industry actors involved in learning following crisis spillover, we conceptualize an industry as part of an organizational field, which is defined as a community of organizations with disparate interests that interact frequently with each

4

other on a central issue, including competitors, suppliers, consumers, regulatory agencies, special interest groups, and associations (DiMaggio & Powell, 1983; Hoffman, 1999).

We argue that the learning from disaster literature needs to better account for political struggles between diverse actors in a field after crisis spillover. In general, research on learning from disasters and crises still focuses on organizational effectiveness at the expense of politics, as well as on learning processes by the organizations involved in the causation of the disaster (Lampel et al., 2009). As such, it tends to pay less attention to the possibility for politics and crisis spillover. The literature on crisis sensemaking is an exception in the broader learning from disaster literature, as it presumes crisis spillover to an organizational field and subsequent contestation to occur following a disaster. These studies emphasize that disasters trigger contestation between actors in a field that have opposing interests, perspectives, and positions in the social hierarchy (Brown, 2000; 2004; Deschamps, Lalonde, Pauchant, & Waaub, 1997; Gephart, 1984; 1992; 1993; Hoffman & Jennings, 2011; Müller-Seitz & Macpherson, 2013). Yet, we argue that these studies provide an incomplete picture of the political processes of learning following crisis spillover.

First, we argue that the actual practices of contestation need additional focus. While studies tend to emphasize the presence of opposing narratives in a field, they do not always investigate in-depth the discursive *practices* that opposing actors employ to contest each other's narrative (Coopey & Burgoyne, 2000; cf. Deschamps et al., 1997; Gephart, 1984; Hoffman & Jennings, 2011; Müller-Seitz & Macpherson, 2013). For instance, Hoffman and Jennings (2011) identified that "seven competing institutional logics form the core of the tensions that lie within the debate over the BP Oil Spill [...] They create positions and thereby solutions and alternatives that are then further refined, debated, and eventually sorted and selected." (p. 7). Yet, they did not provide further insights in how this dynamic process of debating, sorting, and selecting of narrative positions occurred. Instead, studies of politically sensitive events as drivers of institutional change have highlighted that contestation is, in fact, a dynamic process in which opposing actors respond to each other's strategies by adapting their own (Hardy & Maguire, 2010; Hoffman & Ocasio, 2001). Studies on crisis sensemaking in public inquiries and hearings have provided more insight into the dynamics of contested learning. These studies show that inquiries provide actors with the opportunity to challenge opposing viewpoints, but that inquiries also impose restrictions on the search for causes and tend to impose a monological account that serves to restore trust in social institutions (Brown, 2000; 2004; Gephart, 1992; 1993; Topal, 2009). However, because public inquiry boards are able to constrain contestation by imposing restrictions,

these studies do not provide insight into the dynamic processes of contestation outside these quasi-legal, hierarchical arenas, something our study is focused on.

Second, while studies of crisis sensemaking imply spillover from organizations involved in a crisis to the organizational field as a whole, these studies rarely take into account that a legitimacy crisis may even cross boundaries of an organizational field to affect organizations in other geographical locations (Yu et al., 2008). Spillover to other regions is rare, as most crises and disasters do not have such far-reaching effects (Elliott, 2014), but our case of politics of learning in the North Sea after the Macondo disaster clearly shows spillover effects. In this study, we perceive the North Sea and US offshore oil sectors as different organizational fields, as they are characterized by different risk regimes (Lindøe, Baram, & Renn, 2014). We argue that spillover to another organizational field will have important implications for dynamics of contestation in the wake of a disaster. For instance, while public inquiries normally are an important platform for contestation and politics following crises (e.g. Gephart, 1992), in the case of spillover to a different field it is unlikely that such hierarchical, quasi-legal mechanisms for learning are initiated. Inquiries are organized by national governments of the country in which a disaster occurred to formally investigate into the causes of disasters, as well as to assign blame (Brown, 2000; Gephart, 1993; Turner, 1976). In contrast, we argue that when spillover to a different field occurs, the question of relevance to actors in that field shifts from "what happened" and "who is responsible" to "what do the lessons learned mean for us?" Questions of who is to blame for a disaster become less relevant for government bodies, because the accountable actors are under the jurisdiction of a different government. Another implication of spillover for contested learning from disaster concerns the situated nature of learning and contestation. For instance, research on learning in the wake of the Bhopal disaster has indicated that learning is culturally and institutionally situated, leading to the implementation of different changes in India, Europe, and the US (Jasanoff, 1994; Shrivastava, 1987). Furthermore, because fields are characterized by different institutions, such as safety regulations, we expect that actors in a different field may more easily distance themselves from the need to learn, arguing that that 'it could not happen here' (Smith & Elliott, 2007, p. 532; see also Elliott & Smith 1993; 2006). As such, we contribute to the political perspective on learning from disaster by investigating the dynamics of contestation in a *different* organizational field than where the disaster occurred. Our research question is: *How do field actors contest each other's learning initiatives over time following spillover of disaster implications to a different organizational field?*

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THEORETICAL FRAMEWORK

Spillover of legitimacy crises following organizational disasters

Industrial disasters are low-probability, high-consequence organizational accidents, frequently triggered by the failure of complex technology, that impact people, the environment, organizational assets, and potentially broader society (Beck, 1992; Perrow, 1999; Shrivastava, 1987; Turner & Pidgeon, 1997). They differ from other organizational accidents in that they are unusually visible and constitute emotional events that attract public attention (Hoffman & Ocasio, 2001; Vaughan, 1999). As such, industrial disasters inherently carry with them a legitimacy crisis that undermines stakeholders' support of involved organizations, technologies, and potentially industries (Shrivastava, Mitroff, Miller, & Miglani, 1988; Turner & Pidgeon, 1997; Vaughan, 1999). We therefore argue that disasters are a particular kind of organizational crisis (Pearson & Clair, 1998).

The legitimacy crisis of a disaster may also trigger spill over to other organizations that were *not* involved in the disaster itself (Barnett & King, 2008; Desai, 2011; Jonsson et al., 2009; Yu et al., 2008). The occurrence of a disaster indicates that involved organizations failed to manage operational risks (Reason, 1997). As a consequence, stakeholders may presume that similar organizations may also be unable to manage comparable risks and may challenge the legitimacy of an industry as a whole (Desai, 2011), calling for collective sanctions (Barnett & King, 2008). For instance, governmental stakeholders may investigate a disaster, reexamine established public policy and engage in policy learning, i.e. developing new policy instruments, or changing policy problems, the scope of a policy, or the objectives of a policy (Birkland, 2004; May, 1992). For instance, the Santa Barbara oil spill in the US in 1969 became a national crisis that triggered the Nixon administration to impose restrictions on drilling for oil and gas in sensitive environmental areas (Molotch, 1970, cited in Hoffman, 1999).

Spillover of a crisis may occur when societal stakeholders "generalize from deviance by one organization to others that are similar" (Jonsson et al., 2009, p. 195). Consequently, stakeholders undertake actions to minimize association with these other organizations to limit their exposure to presumed risks (Jonsson et al., 2009; Yu et al., 2008). For example, customers may boycott particular products. In this way a legitimacy crisis spreads to other organizations. This suggests that crisis spillover occurs when the following enabling conditions are satisfied: First, a non-routine events, such as an organizational accident, has to receive substantial attention from stakeholders (Desai, 2011; Hoffman & Ocasio,

2001; Jonsson et al., 2009). Studies on the socially constructed nature of disruptive events have highlighted that events like organizational accidents are not inherently disruptive, but that they are enacted as such by stakeholders (Hoffman & Ocasio, 2001; Munir, 2005). For instance, Hoffman and Ocasio (2001) studied why some non-routine events become disruptive for an industry while others do not. They found that such events become crises for an industry as a whole when public stakeholders attributed accountability to the industry as a whole, and when industry stakeholders where worried about the image of the industry, for instance with respect to their ability to manage risks. According to our definition crisis is inherent in disasters, hence we argue that this conditions will per definition be met in the wake of a disaster. Second, stakeholders have to perceive similar characteristics between organizations involved in the disaster and uninvolved organizations (Desai, 2011; Jonsson et al., 2009; Yu et al., 2008). Desai (2011) hypothesizes that organizations that share "relatively central, enduring, and salient attributes with stricken firms, such as major product lines [...] are heavily penalized by association" (p. 267), because stakeholders link negative assessments of legitimacy to aspects central to organizations' identity (Barnett & King, 2008; Jonsson et al., 2009). While individuals always make sense of the world by generalizing based on mental categorization heuristics, crises may alter stakeholders' mental categorizations of organizations (Yu et al., 2008). These categorizations are simplistic, reducing the complexity that stems from organizational differences by focusing on easily available characteristics (Jonsson et al., 2009; Yu et al., 2008). This overgeneralization enables broad and indiscriminate responses in the wake of a disaster.

Politics of learning from disaster following of spillover

Since spillover also threatens the viability of organizations that were not involved in a disaster, these organizations have strong incentives to deal with the resulting field-level legitimacy problem (Barnett & King, 2008; Desai, 2011; Jonsson et al., 2009; Yu et al., 2008). Research shows that organizations may respond to a disaster by organizing collective learning initiatives to improve safety in a high hazard industry (Barnett & King, 2008; Hoffman, 1999; Nathan & Kovoor-Misra, 2002; Rees, 1994; 1997). By learning collectively from the hazardous experiences of organizations in an industry, other organizations are provided opportunities to improve their practices without being directly exposed to the catastrophic costs that are associated with a disaster (Sagan, 1994). Studies into the causation of disasters have shown that such collective vicarious learning is important. Disasters may point to lessons that are relevant to actors that were not involved in a disaster (Toft & Reynolds, 2005), especially when harmful practices, objectives, and beliefs

that contributed to a particular disaster in an organization may in fact be institutionalized in the field as a whole (Elliott & Smith, 2006; Wicks, 2001). As such, organizations may cooperate to create new industry collectives, such as associations or research consortia, or new industry standards to avoid the recurrence of a major failure (Miner, Kim, Holzinger, & Haunschild, 1999). In the wake of the Bhopal disaster, the US chemical industry formed a self-regulatory institution – the Responsible Care Program – leading to changes in risk governance practices across the chemical industry (Barnett & King, 2008; King & Lenox, 2000; Nathan & Kovoor-Misra, 2002; Rees, 1997). Hence, learning from disaster has a clear 'substantive' function (Westphal & Zajac, 1998), aiming to address the causes of the failure (Lampel et al., 2009).

Yet, political perspectives on learning from crises have emphasized that learning does not just revolve around improving practices to prevent recurrences; it also has a 'symbolic' function (Westphal & Zajac, 1998) aimed at protecting narrow organizational interests (Lampel et al., 2009; Perrow, 1999; Sagan, 1993; 1994). For example, while studies on self-regulatory institutions have shown that their establishment has not improved safety levels in hazardous industries (e.g. King & Lenox, 2000), Barnett and King (2008) have argued that they serve primarily to reassure public stakeholders and reduce the probability for stakeholder sanctions in the wake of a disaster. Hence, learning initiatives serve to attenuate stakeholder pressures on organizations by signaling compliance with stakeholder expectations for action (Oliver, 1991). Alternatively, learning from disaster may involve active contestation between actors with opposing viewpoints and interests (Deschamps et al., 1997; Hoffman, 1999; Hoffman & Jennings, 2011; Müller-Seitz & Macpherson, 2013). Organizational fields are characterized by the existence of opposing beliefs and world-views (Brint & Karabel, 1991; Hoffman, 1999). Especially in the wake of a disaster, field-level discourses may resemble a war of meaning on the appropriate definition of causes, consequences, and solutions (Hoffman, 1999; Müller-Seitz & Macpherson, 2013). The literature on crisis sensemaking has shown that actors, driven by divergent interests, knowledge, and social position, develop diverging disaster accounts (Brown, 2000; 2004; Gephart, 1984; 1992; Müller-Seitz & Macpherson, 2013; Shrivastava, 1987). These interpretations become highly contested as actors attempt to implicitly or explicitly impose these views on others to shape learning. An essential element of contestation in the wake of a disaster is the process of allocating and avoiding responsibility and blame (Douglas, 1992; Gephart, 1993; Sagan, 1994). Activist stakeholders may challenge the identity and image of established technologies, products, and industries, striving for institutional transformation, while established industry organizations may aim to preserve legitimacy by countering

negative evaluations and communicate reassuring information (Desai, 2011; Hoffman, 1999; Hoffman & Ocasio, 2001; Maguire & Hardy, 2009). For instance, stakeholders may argue for more stringent regulations on industries (Birkland, 2004; Jasanoff, 1994), while organizations commonly attempt to avoid spillover following disaster by claiming that 'it could not happen here' (Elliott & Smith, 2006; Smith & Elliott, 2007). Maguire and Hardy (2009) argued that established organizations may engage in 'defensive institutional work', i.e. "the authoring of texts that contest problematizations of practices by (a) countering assertions of negative impacts of practices; (b) countering categorizations of practices as unethical, undesirable, or inappropriate; and (c) countering calls for regulatory change" (p. 169).

While disasters provide opportunities for contestation for diverse actors, the political perspective on learning explains that not all actors are equally able to shape the learning process. Powerful actors, with a higher position in the social hierarchy, are able to impose their viewpoints on others thereby dominating the learning process and reinforcing their dominance (Bunderson & Reagans, 2011; Coopey, 1995; Sagan, 1994). For instance, disasters and crises are commonly blamed on the most proximate cause, i.e. human error by the operators of hazardous technology, rather than more latent causes such managerial or design deficiencies (Dekker, 2014; Reason, 1997; Sagan, 1994). Furthermore, studies of crisis sensemaking in public inquiries have shown that these are hegemonic, hierarchical mechanisms in which an authority – the inquiry board or principal investigator – imposes a monological account of the causes of a disaster to influence other's interpretations of the event (Brown, 2000; 2004; Gephart, 1992). As such, public inquiries depoliticize a crisis by creating an impression of control, thereby restoring credibility in social institutions that were undermined by the crisis and reinforcing the dominance of powerful actors like the government and corporations.

The previous discussion shows that political processes play an important role following spillover of crises, constraining learning from disaster. However, we expect differences after spillover to a different region. Jasanoff (1994) has emphasized that learning from disaster is embedded in local cultures and institutional frameworks. Investigating learning from the Bhopal disaster, she identified differences in learning from Bhopal in India, Europe, and US. Hence, we expect that politics of learning from disaster are partly determined by the institutional frameworks in different regions. Furthermore, while public inquiries are an important political mechanisms for developing a disaster account and allocate responsibility and blame (Turner, 1976; Brown, 2000), it is unlikely that such learning

mechanisms are set up in in other nation states, because the responsible organizations are under jurisdiction of a different government. In the absence of the hegemonic functioning of public inquiries, other political processes may play a more central role in shaping learning from disaster. For instance, Reinecke and Donaghey (2015) studied how production organizations and social movement organizations collaborated after the Rana Plaza disaster in Bangladesh – a building collapse that killed 1129 garment workers and injured 2500 more – to create coalition power to establish the legally binding 'Accord for Fire and Building Safety in Bangladesh'.

METHODS

Research setting and design

We focus on the North Sea offshore industry in the wake of the Macondo disaster as the research setting of this study. This is a relevant setting for our research objective for several reasons. First, the Macondo disaster had clear spillover effects in Europe (European Commission, 2011). Second, in Europe offshore operations revolve largely around the North Sea region (Lindoe et al., 2014), a mature field with a long history of offshore drilling and production (McGinty, 2008). Multiple actors in the field engaged in the organization of learning initiatives in the wake of Macondo and contestation of other initiatives. In particular, these processes occurred over a time span of several years, during which actors published many publicly available texts in the process of learning that we could analyze.

We use a longitudinal research design to capture how processes of contestation unfolded over time. This is important, as it creates a better understanding of learning from disaster as a process, taking place from the occurrence of a disaster until implementation of lessons learned and potentially cultural readjustment over time (Buchanan & Denyer, 2013; Elliott & Smith, 2006; Smith & Elliott, 2007). Our inquiry focuses on the period from April 2010, when the Macondo blowout occurred in 2010, until June 2013 when a European directive on offshore safety was established, which appeared to have settled the process of field-level contestation. While focusing on this three-year timeframe, we also remain sensitive to important historical developments in risk governance arrangements in the North Sea offshore sector, because learning is embedded in an institutional and historical context that shapes the learning process (Elliott & Smith, 2006; Handley, Sturdy, Fincham, & Clark, 2006). For instance, we are sensitive to the role of the Piper Alpha disaster, which occurred in the North Sea in 1988 and in which killed 167 people in explosions on an offshore platform (McGinty, 2008). This disaster triggered a major transformation in the

risk governance frameworks in the North Sea offshore sector, thereby fundamentally shaping the institutional context of offshore drilling and production (Lindoe, et al., 2014).

We use a qualitative-process research strategy to understand in depth the complex learning process in the wake of a disaster and explain how it evolved and why (Denzin & Lincoln, 2000; Langley, 1999). Due to the unique combination of casualties, environmental, economic, and socio-political impacts (Read, 2011) and widespread spillover (Elliott, 2014), we argue that the Macondo disaster represents an 'extreme case' for investigation contestation at the field level. Furthermore, a qualitative approach recognizes to the role of context of social phenomena (Yin, 2008), enabling us to contextualize contestation of learning in the wider institutional setting.

Data collection

We collected a variety of data sources from diverse actors playing a key role in the field-level learning dynamics in the North Sea following Macondo. We focused particularly on nationally operating actors from the Netherlands and the United Kingdom, as well as actors operating on the transnational level. We employed the following strategy for the identification of key actors: first, we studied the websites of (trans)national industry associations. Associations generally play a central organizing role in mature organizational fields (Greenwood, Suddaby, & Hinings, 2002), such as the North Sea offshore industry, and may play an important role in field-level learning from accidents (Barnett & King, 2008; Nathan & Kovoor-Misra, 2002) so we expected these actors to be involved in learning and distributing lessons from Macondo. We collected documents about Macondo from their websites. Criteria for selection were: 1) The data sources had to address the Macondo blowout, focusing for instance on change initiatives that were proposed as a consequence of Macondo; 2) the data sources focused on risk and safety management in the North Sea offshore industry in general. We scanned these documents for references to other relevant documents and actors, either ones that they collaborated with in the aftermath of Macondo, or ones whose opinions and actions they contested. We then visited the websites of these actors and repeated this strategy until no new key actors and relevant documents emerged. This way, we collected a body of interconnected documents, all produced as a response to other documents (Atkinson & Coffey, 2004). We identified two central actor groups: on one hand there was a tri-partite coalition of industry actors (national and transnational industry associations, oil companies), national regulators, and trade unions, on the other side was the European Commission.

4

Our main body of data consisted of secondary data sources that were publicly available. Secondary data is useful for this study for two reasons. First, secondary data is produced "naturally" instead of "at the request of a social researcher" (Bryman, 2015, p. 543). This limits the potential reactive effect of data collection, increasing the validity of the data. Second, because secondary data is produced *during* the process, potential problems with retrospective bias – a well-known shortcoming in research on unexpected events (Lampel et al., 2009) - are limited. Importantly, we do not perceive secondary documents as a neutral window to an underlying reality (Bryman, 2015). Instead, secondary data are produced with a particular purpose and aimed at a particular public (Atkinson & Coffey, 2004). Since we aim to uncovering and explaining contestation of learning, we consider secondary data to be relevant data source for our research objective. The second body of data consisted of keynote speeches and presentations from representatives of the aforementioned actors at industry conferences in which actors contested the European Commission's initiative for implementing a new offshore safety regulation. Field configuring events such as industry conferences play an important role in collective sensemaking (Lampel & Meyer, 2008). Again, speeches were not interpreted as neutral, but as a purposeful effort to convey an impression (Atkinson & Coffey, 2011). Finally, 21 semi-structured interviews were done with professionals in the offshore industry that were either recorded and transcribed verbatim, or notes were taken. The interviewees included individuals working for the European Commission, national regulators, the government, oil companies, consultancies, associations, and unions. In these interviews we focused on what the Macondo blowout meant to them, what their organizations were doing in response to the crisis, and how they perceived learning initiatives organized by other actors. Hence, our interviews provided more insight in the *why* and *how* of actors' sensemaking of Macondo, the subsequent learning initiatives, and contestation. We used a snowball strategy to identify new potential interviewees, asking interviewees whom they believed we should approach. Furthermore, we approached potential interviewees whose name was mentioned in the documents that we collected. On average, an interview lasted 75 minutes. Because of the variety of data sources, we were able to triangulate sources, which increased the validity of our findings. Our body of data is shown in table 4.

Finally, since we perceive learning as embedded in a social and historical context, we studied sources that provided background information on risk governance in the North Sea region. We studied a book and the official investigation report of the Piper Alpha disaster, an explosion, which occurred on the Piper Alpha platform in the North Sea in 1988 and killed 167 people on board. As our data sources indicate, this disaster was an

essential trigger for reshaping the offshore risk governance regimes in the North Sea. We also studied a book focused specifically on risk governance in offshore oil and gas operations, as well as a general book on risk governance in hazardous industries. These sources provided information on dominant risk discourses and practices, which enabled us to better explain processes of contestation.

Table 4. Empirical data

Actor	Data sources	Number of documents
European Commission	- Archival data: Press releases, regulatory review, legal proposals, communication document, written speeches; memo's - Interviews	17 documents, 458 pages 3 speeches: 3 pages transcript 4 interviews: +/- 4,5 hours
National regulators - Two regulators from the UK - One regulator from the Netherlands	- Archival data: Press releases, recommendation reports, powerpoint presentations, regulatory reviews, public consultations - Interviews - Speeches	9 documents, 315 pages 15 powerpoint presentations 3 interview: +/- 4 hours 4 speeches: 27 pages transcript
Industry Associations - One national industry association from the UK - One national industry association and one from the Netherlands - One national contractor association from the Netherlands - One international industry association - One international contractor association	- Archival data: Position papers, press releases, recommendation reports, letters, annual reports, powerpoint presentations - Interviews - Speeches	69 documents, 420 pages 6 powerpoint presentations 6 interviews: +/- 8,5 hours 5 speeches: 33 pages transcript
International Oil and gas companies	- Archival data: public consultations - Interviews	7 documents, 39 pages 4 interviews: +/- 4,5 hours
Trade unions - Two trade unions from the UK - One trade unions from the Netherlands	- Interviews - Speeches - position paper	1 document: 4 pages 3 interviews: +/- 4 hours 1 speech: 1,5 page transcript
National government Ministry of Economic Affairs (the Netherlands) House of Commons (UK)	- Archival data: Regulatory review; parliamentary questions and answers from Minister of Economic Affairs - Interviews - Speeches	2 documents, 198 pages 1 interview: +/- 1 hour 1 speeches: 8 pages

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Data analysis

The first step in our analysis was to identify important events of field level learning and contestation related to the Macondo disaster and to develop a chronology of events. The concept 'event' may indicate different occurrences at different levels of analysis, but in this paper we are specifically interested in field-level events – i.e. learning initiatives –defined as events that occur outside the control of individual organizations, and impact the broader organizational field (Müller-Seitz & Schüssler, 2013). While the European Commission and industry associations may be perceived as individual organizations, we perceive them as collective actors because, first, these entities are dependent on their members for their existence, respectively member states and oil and gas companies, and second, learning initiatives of the Commission, as a transnational regulator, and associations, as (trans)national industry representative, per definition have a field-level impact. In this paper we distinguish between, but include both organized events, like the publication of formal reports or conferences; and unexpected, disruptive events, disasters and other crises (Christianson, Farkas, Sutcliffe, & Weick., 2009; Müller-Seitz & Schüssler, 2013). For the identification of critical events in the North Sea sector we were sensitive to what our interviewees mentioned as important events. The interviewees referred to several events in the wake of Macondo that played an important role in the collective learning and contestation process. Furthermore, they mentioned historical events that shaped the development of the risk governance framework in the North Sea sector, which in turn played an important role in how actors in the North Sea sector made sense of the Macondo disaster. We also used secondary data to identify the events that were referred to in the text. Table 5 shows the chronology of events starting with the Macondo disaster.

Subsequently to the development of the event chronology, we collected texts that were produced as a response to the Macondo disaster and subsequent events that we identified in the previous phase (Gephart, 1993; Phillips, Hardy, & Lawrence, 2004). We analyzed actors' discursive contestation practices, disaster accounts, and learning initiatives related to the Macondo disaster. We used MAXQDA to code the data inductively and create first order concepts that were close to the empirical data (Strauss & Corbin, 1994). After reorganizing the first order concepts into conceptually distinct labels, we grouped together similar concepts to create second order categories, resulting in increased abstraction of data. From this step, several strategies of contestation emerged from the data. By going back and forth between our empirical strategies and theory, we were able to refine our empirical categories and identify three overarching abstract concepts. The codebook is shown in Appendix A.

Table 5. Chronology of Key Events in Europe Following the Macondo Disaster

Date	Event
April 20, 2010	The Macondo disaster occurs
May 2010	EU Commission organizes first offshore safety meeting with industry to discuss the implications of the Macondo disaster (starting point 1st phase of contestation)
May 2010	National industry association mobilizes national regulators and trade unions the create UK task force
July 2010	European Commissioners call for moratorium
July 2010	EU Commission organizes second offshore safety meeting with industry to discuss the implications of the Macondo disaster
July 2010	International industry association creates international task force Y
October 2010	EU Commission publishes a communication in which they hint at EU legislation
January 2011	UK government officially rejects call for moratorium
May 2011	EU Commission organizes stakeholder consultation on the issue of a potential EU regulation
October 2011	EU Commission publishes proposal for EU offshore safety regulation
November 2011	Publication of position report from UK industry association against proposal for EU regulation
January 2012	EU Commission organized stakeholder meeting concerning the proposed EU regulation
February 2012	Publication of position report from international industry association against proposal for EU regulation
February 2012	Publication of joint Dutch industry and trade union position paper against EU regulation
April 2012	Publication of joint UK industry and trade union position paper against EU regulation
June 2012	Trade association organized a seminar on proposed regulation
October 2012	EU Commission proposes a directive instead of regulation
June 2013	EU adopts offshore safety directive

4

During our first round of analysis, we identified two conflicting narratives of risk governance emerging in the contestation, each one supported by a different actor group, that affected how actors perceived and approached the learning process. Hence, we engaged in a second round of analysis to develop a narrative account (Hardy & Maguire, 2010; Nigam & Ocasio, 2010) of the learning and contestation practices through which the two actor groups responded to the Macondo disaster. The first narrative, which we label the 'responsible self-regulation' narrative, was predominantly supported by industry actors - associations and oil companies; unions; and national regulators, and revolved around. The other narrative, which we label the 'harmonized regulation and centralized control' narrative, was supported by the European Commission. Finally, we analyzed data on risk governance in the offshore industry and hazardous industries in general and linked

the narrative accounts to broader institutional discourses on risk governance (Hardy & Maguire, 2016).

FINDINGS

We show how the attempts to learn from the Macondo disaster in Europe involved a struggle between the European Commission and a tripartite coalition from the North Sea region. We identified how these opposing actor groups advanced conflicting risk governance narratives in the wake of the Macondo disaster. These narratives were enacted in different learning initiatives and discursive strategies of contestation. We identify a dynamic process of contestation, in which the actor groups responded to each other's strategies by altering their own strategies. We first present an overview of the conflicting narratives, describing how they vary in their interpretation of particular risk governance principles. Then, we present the dynamic process of contestation, in which the actor groups adapted their strategies of contestation over time in response to each other's actions.

Conflicting risk governance narratives

We identified that the conflict between the two actor groups was driven by two opposing narratives of risk governance, which had different implications for how learning from the Macondo disaster was deemed to occur. The tripartite coalition enacted the narrative of 'responsible self-regulation', while the Commission enacted the narrative of 'harmonized regulation and central control'. These narratives represent different interpretations of fundamental principles about risk governance: 'Who should be responsible for risk governance?', 'at what level should risk governance be organized?', 'What is the appropriate improvement philosophy', and 'Who should have control over risk governance and natural resource extraction?'. A summary of the risk governance narratives is shown in Table 6.

These findings shows how the learning conflict that ensued in the wake of the Macondo disaster between the EU Commission and the tripartite coalition emerged from their fundamentally different interpretations of what good risk governance entailed. This in turn affected their perspective on what comprised constituted appropriate approaches to learn from the Macondo disaster. We furthermore identified how these narratives were enacted by the opposing actors in discursive strategies of contestation, which aimed at undermining each other's position. In particular, they adapted their contestation strategies in response to their opponent's actions.

Table 6. Summary of narratives

	Risk governance narrative	
	Responsible self-regulation	*Harmonized regulation and centralized control*
Enacted by	Tripartite coalition consisting of industry actors (associations, oil companies), national regulators, and trade unions operating in the North Sea region	EU Commission
Ostensible reasons for taking responsibility for learning from Macondo	Having expertise of and experience with offshore drilling operations; not complacent	Protection of EU citizens and environment is an aspect of the EU Commission's mandate; oil spills may cross boundaries of nation states
Illustrative quote	*"We are the experts on regulating and dealing with risk and we were responding responsibly [to Macondo] [...] We are reflecting on what changes we need to make but we don't have faith in Brussels, because they don't have the same experience as we do."* (Interview HSE manager)	*"Improving the safety of citizens and the protection of the environment cannot rely on industry's discretionary initiative and self-regulation alone."* (Facing the Challenge of the safety of offshore oil and gas activities, 12 October 2010)
Underlying risk governance principles		
Improvement philosophy	Learning from Macondo should be incremental. It is a matter of continuous improvement of established national risk governance practices.	Learning from Macondo should be radical. It requires comprehensive policy intervention, leading to uniform offshore safety legislation across the EU
Illustrative quote	*"There were no serious shortcomings [in the regime], but there were possibilities for recommendations for continuous improvement."* (Interview Dutch regulator).	*The risks at stake, the need for legal certainty and the principles of "better regulation" speak in the Commission's view in favor of a single new piece of specific legislation for offshore oil and gas activities"* (Facing the Challenge of the safety of offshore oil and gas activities, 12 October 2010)
Rooted in specific institutional discourse	The notion of 'continuous improvement' has been a central element of the discourse on risk governance since the investigation of the Piper Alpha disaster (Cullen, 1990), which recommended a goal-setting approach to risk governance: *"The whole philosophy underlying the legislation is one of progressive improvement"* (p. 279)	The notion of comprehensive intervention aimed at improving legal certainty is rooted in the EU discourse of 'better regulation': *"EU action must lead to a simple, clear, stable and predictable regulatory framework for businesses, workers and citizens that continue to add value as problems evolve, new solutions emerge and political priorities change."* (EU Commission Better Regulation guidelines, p. 4)

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Table 6. Summary of narratives (continued)

	Risk governance narrative	
	Responsible self-regulation	Harmonized regulation and centralized control
Responsibility for safety and risk governance	Responsibility for safety lies with the oil companies, because they create the risks	Responsibility for EU citizens and environment lies with EU governmental bodies
Illustrative quote	*"[The goal-setting regime] places the responsibility on those who create risks to demonstrate that they have adequately assessed the risks associated with their work activities and put in place appropriate measures to control these risks."* (UK regulator consultation).	*"Politics and business need to work together to ensure that the European environment and the public are as safe as they possibly can be."* (Press release 11 May 2010)
Rooted in specific institutional discourse	*Assignment of responsibility to the industry is a central aspect of the goal-setting regime, which was established following the investigation into the Piper Alpha disaster (Cullen, 1990). The investigation recommended "the concept of self-regulation" (p. 371). It was stated that "The primary responsibility [...] lies with those who create the risks" (p. 256), and "should not be held by the department with policy responsibility for that industry" (p. 258). Instead, "the regime should have as its central feature demonstration of safe operation by the operator" (p. 282).*	*Protection of citizens and environment is rooted in the Precautionary Principle. As the Commission's Communication on the Precautionary Principle (2000) states, the principle aims to "establish protection – particularly of the environment, human, animal, and plant health" (p. 2), and assigns a responsibility in this regard to the Commission: "Judging what is an 'acceptable' level of risk for society is an eminently political responsibility" (p. 3).*
Level at which risk governance is organized	Risk governance should be organized by nation states, respecting cultural, geological, and environmental differences. It should grant companies the flexibility to tailor methods to local circumstances.	Risk governance should be organized trans-nationally by the European Commission

Table 6. Summary of narratives (continued)

	Risk governance narrative	
	Responsible self-regulation	*Harmonized regulation and centralized control*
Illustrative quotes	"In terms of oil spill response, relying on a one-size-fits-all approach to responding to incidents in differing geographical areas is ineffective. In our areas of operation, operators must have individually approved plans which demonstrate response plans that are tailored to the assessed risks of particular operations in specific locations." (E.On consultation)	The [risk governance framework] in Europe is largely determined by provisions in the national legislation of individual Member States. This results in licensing, operational safety and environmental protection regimes, which vary from one Member State to the next. This heterogeneity complicates the understanding and management of health, safety and environmental risks in Europe and increases costs for companies. The Commission proposes to work towards an overhauled and more coherent legal framework for offshore exploration and production activities in Europe which ensures EU-wide application of state-of-the-art practices (Facing the Challenge of the safety of offshore oil and gas activities, 12 October 2010)
Rooted in specific institutional discourse	"Detailed standardization of permit forms and procedures would not be practicable or beneficial. Installations having different populations and different types of operations might well have different management organizations. Procedures must be sufficiently flexible and be capable of regular reviews and improvement to suit local situations" (Cullen, 1990, p. 295)	The notion of comprehensive intervention aimed at improving legal certainty is rooted in the EU discourse of 'better regulation': "EU action must lead to a simple, clear, stable and predictable regulatory framework for businesses, workers and citizens that continue to add value as problems evolve, new solutions emerge and political priorities change." (EU Commission Better Regulation guidelines, p. 4)
Control over risk governance and natural resource extraction	Control over risk governance should be left to the individual Member states. National regulators should co-operate with oil industry actors	Control over risk governance should shift from national regulators and industry to the EU Commission.
Illustrative quotes	"Any action taken at the EU level should respect the general principle of subsidiarity regarding regulation of individual Member States' offshore oil and gas activities and, therefore, the right of individual Member States to control their respective energy resources." (Oil & Gas UK public consultation).	"I want to get the assurance that controls [over industry] are effective. In this respect, I would not hesitate to propose a European framework for 'controlling the controllers' if need be" (Speech Oettinger, 7 July 2010).

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Dynamic strategies of contestation

We identified how the EU Commission attempted to learn from Macondo by implementing two policy interventions – a drilling moratorium and an EU-wide offshore safety legislation – to improve risk governance in the EU offshore industry and increase their influence in the European offshore industry. The tripartite coalition resisted these proposals using three recurring strategies – discrediting the EU Commission, self-idealization, and proclaiming unity. Eventually, this led the EU commission to develop a legislative vehicle that both the EU Commission and the tripartite coalition approved, namely an offshore safety Directive, as opposed to an EU Regulation, which the EU Commission initially proposed.

EC strategy: Enacting Precautionary Principle by recommending moratorium on drilling

The Macondo disaster was a shock for oil industry actors, governments and the public alike. It was widely perceived as a uniquely severe accident. An expert advisor for the European Commission called it "*the worst ever incident in the history of the offshore oil and gas industry: the combination of 11 men dead and the massive pollution*" (Interview). Given the severity and visibility of the impact, Macondo attracted the attention of high-ranked individuals in the European Commission, the regulative body of the European Union. In particular, the European Commissioner for Energy, Günther Oettinger, soon voiced his ambition to intervene in the offshore industry to prevent the occurrence of a Macondo-like disaster in Europe. Hence, he proposed to temporarily suspend new drilling projects that resembled the Macondo project:

"*until the exact causes [of the Macondo disaster] are known, the Precautionary Principle should prevail. Utmost caution must be exercised for the moment with respect to new drillings. Given the current circumstances, any responsible Government would at present practically freeze new permits for drilling with extreme parameters and conditions. This can mean de facto a moratorium on new drills until the causes of the accident are known.*" (Speech Oettinger, 7 July 2010).

As this quote shows, the Commissioner based his proposal for a drilling moratorium on a claim of comparability, arguing that similar "*extreme parameters and conditions*", like deep water, also exist in the EU waters. Hence, his underlying assumption was that "*if it could happen in the Gulf of Mexico then it could happen in Europe*" (Interview expert advisor). A temporary moratorium would provide the Commission with time to review the status of existing risk governance arrangements while being sure that no potentially Macondo-like

projects were initiated in the meantime. The statement of Commissioner Oettinger also indicates that the proposal for a moratorium is rooted in the Precautionary Principle. The Precautionary Principle is a central risk governance principle for the EU Commission, which prescribes to suspend risk-taking activities in situations of uncertainty to "*reduce the risk of adverse effects to the environment, human, animal or plant health*" (Communication on the Precautionary Principle). The adherence of the Commission to this precautionary discourse also explains why it responded to the Macondo disaster by proposing a moratorium. For the EU Commission, the Macondo disaster introduced new uncertainty about the safety of deepwater drilling and the appropriateness of the risk governance regime for dealing with such risks, perceiving a precautionary approach to be necessary. However, since implementing moratoria is a matter for national governments, the Commission had to persuade national governments to do so.

We argue that this strategy is radical. The EU Commission had not played a large role in offshore risk governance prior to the Macondo disaster, but it used its legitimacy as a regulator to attempts to implement a significant restriction on offshore operations. Unsurprisingly, the call for a moratorium immediately caught the attention of oil industry actors and regulators in the North Sea region, who viewed a moratorium as a threat to business opportunities and economic development, as well as to their position as established risk governance authorities. The calls for a moratorium particularly triggered the UK industry association and an international association to take a lead role in responding to the Macondo disaster, as well as this threatening situation to avert its implementation. Other actors from the North Sea region followed.

Tripartite counter strategies: challenging the need for radical precaution

Discrediting policy initiative by contesting problem framing and solution.
Industry actors attempted to limit spillover of a risk governance crisis from the U.S. to Europe by contesting the EU Commission's claim that Macondo could also happen in the EU because of the presence of similar deepwater conditions in the EU. Instead, they aimed to invoke an alternative problem framing:

"most of these calls for drilling moratoriums tend to focus on deepwater areas. In truth, the depth of water is not the critical element here. Rather, what is critical are the practices and procedures employed to drill the well and to regulate those who are doing that drilling. In this regard, policy and practice in the UK are substantially different to those employed in the US Gulf of Mexico." (Press release UK Task Force, 7 September 2010).

Industry actors, led by the industry associations, aimed to shift the focus from deepwater as the *"critical"* risk factor to the risk governance regime in place, effectively saying that if the regime is effective, water depth doesn't matter. Furthermore, they framed the approach to risk governance between the US and the North Sea as being *"substantially different"* – the US regime being inferior. This allowed the North Sea constituents to discredit the US regime and distance themselves from it. This strategy aimed to limit generalizability on the basis of shared characteristics between the US and North Sea risk regimes, thereby limiting spillover. In turn, this enabled them to frame the moratorium as irrational; a *"wholly unjustifiable, knee-jerk reaction* (UK Task Force press release, 14 July 2010). Hence, by invoking an alternative problem framing, the tripartite actors could discredit the US risk regime, as well as the rationale behind the EC's proposal for a moratorium.

Self-idealization by demonstrating effectiveness of risk regime.
The alternative problem framing enabled the tripartite actors to promote and justify the risk governance regime in the North Sea region. For instance, the UK industry association: *"refuted that there should be a moratorium on deep-sea drilling in UK coastal waters [...] Our dynamic [regulatory] regime has served us well over twenty years of operations during which time a blowout has not been experienced."* (Press release UK Task Force, 13 August 2010). This quote shows how the tripartite actors highlighted the positive safety record in the North Sea and presented the risk governance regime as the primary reason for it. In particular, industry actors and regulators attributed the robustness of their regime to changes that they implemented in the wake of a different offshore disaster that occurred in the North Sea in the past:

"We had our own sort of Macondo moment nearly 25 years ago, Piper Alpha, in which 167 people died. So this whole topic is sort of deep within the psyche. We did a hell of a lot of moving, changing and shaping following Piper Alpha leading to our legislative regime for offshore safety." (Speech UK Regulator).

By discursively reenacting the Piper Alpha disaster and the lessons that were learned then, the tripartite actors contested the EU Commission's position that a radical intervention was required following the Macondo disaster. This shows how the coalition discursively construed similarities between the Piper Alpha and Macondo disasters, despite the fact that these had different causes and consequences. Furthermore, they contested the similarity that the Commission established between the US and Europe in the wake of Macondo. By discursively creating resemblance between the disasters, they could appeal

to improvements implemented following the Piper Alpha disaster, thereby rejecting the need for radical intervention following Macondo: *"there were no serious shortcomings [in the regime], but there were possibilities for recommendations for continuous improvement"* (Interview Dutch regulator). This quote shows the coalition's approach to learning from Macondo. In contrast to the EU Commission's proposal for radical intervention, the tripartite group aimed for *"continuous improvement"* of the established regime. We found that the notion of continuous improvement has been a central principle in the risk governance discourse in the North Sea risk region since the Piper Alpha disaster (Patterson, 2014), which suggests that learning should occur by upgrading established practices. This creates an image of continuous upgrading towards ever-higher levels of safety. A moratorium conflicts with this image, as it indicates doubt in the established risk governance practices and industry's ability to manage offshore risks.

Despite arguments that the risk regime was already robust, industry actors demonstrated that they took the Macondo disaster seriously. Our data shows that the tripartite actors anticipated that the Macondo disaster would trigger political consequences because it was such a shock. For instance, the director of the UK association reflected in an interview: *"we realized that we had to mobilize and do something about it, because if we didn't then there would be a serious push for ramifications."* As such, two industry associations in the North Sea – one transnational and one from the UK – organized separate multi-stakeholder task forces. In particular, the director of the UK association explained how UK task force was created to reassure public and political stakeholders that offshore risks were properly managed in the North Sea: *"[UK task force]] was driven by a need to demonstrate to the public that they didn't need to worry that Macondo would happen in the UK. And also to persuade the regulators not to take wrong actions."* As such, they were keen to emphasize that *"Our industry is not complacent on [safety] and [UK Task Force] is already carrying out a thorough review of UK procedures and practices and will institute any changes seen to be necessary"* (Press release UK Task Force, 13 August 2010) By indicating that the task force was supported by different stakeholders groups, it was presented as a broadly supported, legitimate initiative. Furthermore, by portraying their initiative as comprehensive and proactive (*"already carrying out a thorough review"*). This shows that by showcasing the depth and the proactiveness of their response, the associations aimed create an image of responsibility and ability concerning the need learn from the Macondo disaster, as well as manage risks in general. As such, the tripartite coalition presented itself as being in charge of learning and risk governance.

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Proclaiming united stance to legitimate task force initiative.
While the industry associations quickly initiated Task Forces as a response to the Macondo disaster, the director of the UK association explained that it was important to exhibit that they were *"not moving ahead on our own"* (Interview), but that *"industry, the regulators, and the trade unions are all engaged [in UK Task Force]"* (Press release UK Task Force, 13 August 2010). As such, they invoked an image of universal buy-in by industry actors, regulators, and unions. Our data analysis shows that this proclamation of their united stance was an important strategy of the associations in their response to Macondo. This strategy aimed to legitimize the industry's learning initiatives by portraying the task force as broadly supported by other stakeholders, in particular those with higher levels of public trust than the oil industry[2]. For instance, the director of the UK association argued: *"what was incredibly important was that the trade unions came out and support the industry position"* (Interview). Similarly, a trade unionist reflected on their role in an interview:

"[The Commission] was quite happy to stand against the industry. If you want good press in this country just slag of BP and Shell, so standing up against oil companies is not an unpopular thing to do. Standing up against the workforce representatives is."

Hence, proclaiming that the initiatives were widely supported by industry actors, as well as other stakeholders provided legitimacy to the initiative. Particularly the involvement of trade unions and national regulators provided the initiatives with credibility that industry actors lack given their poor reputation in society.

Furthermore, proclaiming to be united in their response to the Macondo disaster also provided another source of legitimacy. Given the involvement of a multitude of actors, the associations could showcase the collective expertise and experience that underpinned the task forces. For instance, the international association reported how it *"pooled its knowledge and experience to create three dedicated teams drawn from some 20 companies and comprising more than 100 technical experts and senior managers"* (International Task Force, report). Hence, by emphasizing the involvement of a multitude of actors from

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2   While national regulators and industry actors cooperated regularly the North Sea co-regulatory regime, the relation between trade unions and oil industry actors is in the UK offshore industry is more antagonistic (Hale, 2014). We found that cooperation between these actors in the Macondo task forces was enabled by the success of another multi-stakeholder task force, which was set up following a helicopter crash in the UK in 2009 in which 16 offshore workers died.

various stakeholder groups and their collective expertise, the associations were able to present the task forces as unparalleled learning initiative.

EC strategy: shifting policy learning objective to harmonizing risk governance

The Commissioner's call for a Moratorium eventually failed to materialize as the coalition was able to persuade national governments to not implement a temporary moratorium. For instance, the UK government concluded:

"A moratorium on deepwater drilling would decrease the UK's security of supply and increase the UK's reliance upon imports of oil and gas. A moratorium could also harm the wider British economy. There is insufficient evidence of danger to support such a moratorium." (UK Energy and Climate Change Committee).

But that did not mean that the Commission was convinced by the coalitions arguments to leave the disaster response to them. In fact, the Commission perceived an important role for themselves in the response to Macondo, arguing that, "*improving the safety of citizens and the protection of the environment cannot rely on industry's discretionary initiative and self-regulation alone.*" This quote indicates that the Commission did not perceive the tripartite coalition's arguments for self-regulation and demonstration of learning initiatives in the wake of the Macondo disaster to be sufficiently convincing. Instead, the Commission argued that the protection of citizens and the environment required their involvement in offshore risk governance. Already in July 2010 did the EU Commissioner for Energy state that he would "*not hesitate to propose a European framework for 'controlling the controllers' if need be*" (Speech Oettinger). As such, in October 2010 the Commission published the communication document, which formulated their ambition to set up a new EU wide offshore safety legislation. As reported in the communication document, the Commission had conducted a review of regulatory regimes in the EU and identified an alarming "*fragmentation of legal frameworks in the EU*", arguing that, "*this heterogeneity complicates the understanding and management of health, safety and environmental risks in Europe and increases costs for companies. Importantly, it risks slowing down coordinated response to accidents affecting several Member States*". Therefore, the Commission identified the need for "*further harmonization in this sector*" by means of "*a single new piece of specific legislation for offshore oil and gas activities*". Together, the previous quotes illustrate how the Commission disputed the "*industry's discretionary initiative and self-regulation*" by framing the resulting heterogeneity in risk governance arrangements as problematic. Instead, it perceived the need for more "*harmonization*" by

developing a new legislation that would embrace the whole of the EU. Following this line of argumentation, the Commission appears to position itself, being a transnational regulator, as best equipped to coordinate the transnational harmonization of regulations. Hence, motivated by its perceived responsibilities towards citizens and the environment, and constructing a problem and solution framing focused on the variation in risk governance and need for harmonization, the Commission formally positioned itself as *responsible* for risk governance and learning from the Macondo disaster. Despite attempts by the coalition to emphasize their positive track record and emphasize the improvements since Macondo, the Commission maintained that *"the good historical record of the sector was highlighted; nevertheless, even industry stakeholders admit that there is a need to challenge the industry to do better"* (Impact assessment).

Tripartite counter strategies: challenging the need for radical policy learning

Discrediting policy learning initiative by contesting need for uniformity.

Our data shows that Commission's learning initiative to harmonize legislation triggered substantial contestation by the tripartite coalition. They particularly challenged the proposal for an EU-wide uniform legislation as an appropriate means to improve offshore safety. For instance, the UK industry association argued:

"a mandatory 'one-size-fits-all' approach [...] would be counter-productive to both socio-economic and health, safety and environmental risk management objectives as they would not take into account the fundamental differences and risks present for different operations under different geological and reservoir conditions." (UK association public consultation).

The coalition partners framed the proposal for EU-wide legislative harmonization as "*counter-productive*" to risk governance and socio-economic objectives, because it would ignore "*fundamental differences*" between individual operations and Member states. Instead, coalition partners argued, risk governance practices had to be "*tailored to the assessed risks of particular operations in specific locations*" (E.On public consultation). These quotes show how the proposal for harmonized legislation is rejected because it promotes *uniformity* of risk governance, whereas actors from the North Sea region upheld that risk governance should be *tailored* to local conditions. As such, the Commission's proposal conflicts with an core organizing principle of risk governance in the North Sea. Part of the contestation of the tripartite coalition can be understood as resistance against a radical learning initiative that conflicted with an institutionalized norm of risk governance. Besides the conflict with institutional norms, the tripartite coalition also questioned the

Commission's *capacity* to govern offshore risk by challenging their expertise. They argued that the Commission had "*absolutely no experience or competence in the regulation of safety in the offshore oil and gas* industry" (Press release Oil & Gas UK). Several interviewees referred to the Commission as inexperienced bureaucrats whose positive intentions would do more harm than good: "*They believe you can improve safety by creating more rules. But it does not work like that; you will end up with more bureaucracy than safety [...] those dangers you only recognize if you have experienced it in practice*" (Dutch association interview). It is therefore framed as a step *backwards* that would counteract the Commission's ambition to improve offshore safety.

While the preceding discussion shows how contestation between the Commission's and tripartite coalition's focused on the issue of improving *safety* in the EU, we argue that contestation also revolved around the deeper issue of *power*. In particular, the EU Commission's proposal for an EU-wide offshore safety legislation can be interpreted as an attempt to increase influence in the industry by occupying a more central position in offshore risk governance. In contrast, the tripartite coalition – which had been responsible for risk governance so far – aimed to resist the Commission's attempt and maintain their dominant position. For instance, arguing for a tailored approach to risk governance also implies that established co-regulatory arrangements – and therefore decision-making authority – between industry actors and national regulators would be maintained. The control struggle was also indicated by the tripartite coalition appeal to a fundamental argument about national versus supranational control over natural resources:

"Any action taken at the EU level should respect the general principle of subsidiarity regarding regulation of individual Member States' offshore oil and gas activities and, therefore, the right of individual Member States to control their respective energy resources." (Oil & Gas UK public consultation).

We showed that contestation to a large part revolved around the issue of safety. Yet, the last quote indicates a parallel, and less explicit, legal discussion about national versus supranational authority about risk governance and natural resources. This discussion hinged on the question 'who should be in control of risk governance and natural resources?'.

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Self-idealization by presenting regime as exemplary.

While the coalition opposed the notion of a European legislation, they did endorse the idea of promoting 'state of the art practices' across the EU. But, while the EU Commission perceived to achieve this through a new uniform legislation, the tripartite coalition equated 'state of the art practices' to their own risk governance arrangements. As such, they presented their own risk regulations as a format to be copied by the Commission and other Member states

"In addition to the lessons from the Deepwater Horizon incident, this is an ideal opportunity for the European Commission, and Member States, to learn from the offshore oil and regulatory practice adopted by experienced national regulators." (UK regulator consultation).

As this quote shows, the coalition framed the occurrence of Macondo as an *"opportunity"* for other actors to learn from the *"experienced"* North Sea regulators. It seems that the Commission's preference for a legislative solution enabled the coalition to frame themselves as expert role models that were willing to educate supposedly less knowledgeable actors on offshore risk governance. They promoted their co-regulatory "goal-setting" regime as a format for good risk governance, while opposing to the Commission's proposed uniform "prescriptive" legislation, which would not allow the tailoring of risk governance practices to local circumstances. For instance, the UK regulator stated:

"The UK's offshore safety regime places the responsibility on those who create risks to demonstrate that they have adequately assessed the risks associated with their work activities and put in place appropriate control measures. It has the flexibility to require operators to consider new standards or best practice as they emerge and to drive them to continually improve [...] The UK feels that these goal-setting regimes, rather than prescriptive ones, are best suited to the continuous adoption of state of the art practices. The Commission should consider the benefits of such approaches when developing its proposals." (UK Regulator consultation).

This quote again indicates the radically different stance of the tripartite coalition as compared to the Commission regarding core risk governance principles: 'responsibility for risk governance' – i.e. both industry actors and regulators versus solely to an 'outside' regulator; 'level at which risk governance is organized' – i.e. allow for tailoring risk governance practices to local circumstances versus uniformly prescribed practices; and

'improvement philosophy' – i.e. aiming for gradual continuous improvement versus radical changes of the risk regime.

To promote the effectiveness of the co-regulatory regime, the coalition partners continued to showcase their learning initiatives in the wake of the Macondo disaster, both rhetorically and physically. While they, at first, aimed to reassure other stakeholders by emphasizing their preoccupation with and depth of their response efforts, now they were able to showcase tangible achievements of the Macondo task forces. One of the core objectives of the task forces was to improve the industry's capacity to respond to and solve oil spills by developing well capping and oil spill containment equipment.

"The new cap demonstrates the industry's determination to learn from experience and continuously improve the safety of operations so that risks to people and the environment are reduced. The capping device was designed and manufactured over a period of only seven months – an extraordinary feat given the complexity and uniqueness of the required functionality and design requirements." (Press release UK Task Force, 14 March 2011).

As the previous quote shows, the coalition backed up their earlier claims of responsibility, indicated by their preoccupation with learning the lessons of Macondo, with "*extraordinary*" achievements that are presented proof of "*the industry's determination to learn and continuously improve the safety of operations*"

Proclaiming united stance - supporting national regulators as risk governance authority. It seems that the Commission's focus on a legislative solution triggered the tripartite coalition to foreground the national regulators as the primary role models for the EU Commission:

"The [North Sea] Member States in which we operate all have highly competent, technically knowledgeable and professional national regulators. These expert inspectors are clearly best placed to supervise, inspect and verify industry compliance and we support the assertion that this should be carried out in their capacity as national regulatory bodies as they are close to the operational interface." (Chevron public consultation).

This quote shows that industry actors supported national regulators in the North Sea countries by defending their mandate, supporting their credibility as risk governance agents given their "*high level of technical competence and knowledge*" and their experience

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at "*the operational interface*". As such, industry actors defended the national regulators' position as risk governance authority. In particular, as this quote also seems to indicate, industry actors presented themselves as preferring to be scrutinized by the regulator. In fact, industry argued that having expert regulators was in their own benefit: "*the industry actively seeks sound and appropriate regulation, delivered by strong and professional regulators.*" (Press release UK Task Force). Hence, the industry actors' support of the national regulators helps to reiterate their united stance in opposing the Commission's aim for an EU-wide offshore safety legislation. We argue that this strategy aimed to protect not just the regulators' interests in the overarching debate about 'who should have control over risk governance', but also of the industry actors themselves. By arguing that risk governance should maintain with the national Member States, and portraying national regulators as highly qualified, industry actors basically argued to maintain the established co-regulatory regime, in which they also had risk governance responsibilities. Hence, this strategy of supporting the national regulators and proclaiming unity served both these actors' interests.

EU Commission strategy: rejecting contestation to continue pursuit of uniform legislation

The coalition partners rejected the ambition for an uniform safety legislation across the EU and argued for the importance of tailored risk governance through a goal-setting regime. However, despite these efforts, the Commission published in October 2012 a formal notification to introduce uniform, EU wide offshore safety Regulation. The Commission argued for "*a comprehensive offshore reform raising throughout Union, through new law, the level of risk management and emergency preparedness in the offshore industry.*" In particular, they argued for a Regulation as legislative instrument as opposed to a Directive, because it "*has advantages over a Directive due to its clarity, consistency and speed of implementation through direct application [and] would also provide for a more level playing field.*" (Proposal for a Regulation). A Regulation requires Member states to implement the legislation directly into national legislation, while a Directive allows Member states to adapt the legislation to match pre-existing national legislation. This indicates that a Regulation will best achieve to the Commission's objective of uniform legislation across the EU, thus comprising the preferred legislative vehicle. While the Commission did recognize the tripartite coalition's learning initiatives, referring for instance to "*the capping device currently being developed by [UK Task Force]*" (consultation summary document), it appears that it ignored the coalition's strategies to contest its pursuit for uniform legislation throughout the EU.

Tripartite counter strategies: engaging in dramatic resistance

Discrediting Regulation to achieve alternative policy initiative.
Our data shows that the tripartite coalition's contestation strategies became more dramatic in response to the Commission's decision to pursue a Regulation. The coalition engaged in new means of contestation, such as formulating multi-stakeholder position papers to formally voice their objections to the Commission, as well as organizing a conference to collectively discuss and contest the proposal for a Regulation. They framed the Commission's proposal as "*a red line issue*" (Speech UK Regulator). The coalition partners again appealed to an image of regression of offshore safety in the North Sea, but it was more dramatic than in the previous phases. They invoked the metaphor of collapse and destruction. For instance, two members of the Dutch industry association argued

"it is like this: you have constructed a building with LEGO, but the Commission denies that it is any good and wants to destroy it and" [his colleague jumps in] "and gives you a stack of cards and says: build a new house of cards instead." (Dutch association interview).

This quote shows how the Regulation was framed as destroying established risk governance arrangements, replacing it with an unstable alternative, and thereby permanently cripple the industry. The use of the 'collapsing building' metaphor as a discursive strategy of contestation makes sense from the perspective of the tripartite coalition; it represents the exact opposite of their advocated notion of 'continuous improvement', which instead invokes an image of progressively building upon an established foundation. For instance, a UK trade unionist argued "*It took us 20 years to get to this stage, let's not undo it, let's maintain what we have got and built on it*" (interview), and the regulator argued "*We want to add things on top which will improve [safety].*" (UK regulator speech). This image of building as progressive improvement was also invoked in the coalition's attempt to persuade the Commission to consider and alternative policy learning initiative. While the coalition had previously rejected the proposal for an EU legislation, now that it became clear that the Commission would push through, the coalition changed its contestation strategies towards trying to influence the type of legislative vehicle. Instead of an uniform and inflexible Regulation, the coalition proposed a Directive as a more appropriate alternative:

"We strongly believe that a properly worded Directive would more effectively align with the Commission's objectives for the EU, allowing the Member States to use their discretion to adjust to local circumstances and to align with existing regulatory frameworks. This will avoid inconsistencies and contradictions with current national legislation and with industry

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best practices, which ultimately could be detrimental to offshore safety." (Dutch industry association).

This shows that, now it became clear that the Commission would continue to pursue policy learning, the coalition aimed to persuade the Commission to make the policy as favorable to their interests as possible. From the perspective of the coalition, a Directive would be an appropriate alternative, as it matched the coalition's interests for a tailored approach to risk governance and continuous improvement.

Self-idealization by showcasing commitment to safety and learning as motivation to fight*.*
Now that the coalition aimed to convince the Commission to change the Regulation into a Directive, they changed their contestation strategy. On one hand, they increasingly presented themselves as a partner to the Commission, willing to collaborate with them on their shared objective to improve offshore safety. However, they portrayed themselves as being willing to clash with the Commission if they ignored them.

"we will work with the EC, bring us in to the discussion, let us participate, let us bring our expertise and our knowledge to you. Let us improve safety; that is what we are committed to. Do not shut us out. But if you do that, then we will work, and we will shout and we will spread the word that what you do will put peoples' life at risk and we will not support that. We cannot." (UK unionist speech).

It seems that the coalition, whose opposition against an EU legislation was already ignored by the Commission before, now made an ultimate attempt to influence the Commission's proposal. The coalition presented itself as determined to defend their risk governance regimes and commanded cooperation from the Commission. It seems that they give the Commission a choice between smooth co-operation versus them digging their heels in and going to the trenches, hence using a more forceful frame of contestation than before. But, as one of our interviewees reflected, this image of fighting was primarily a rhetorical strategy, as their actual ambition was to collaborate with the Commission to influence the outcome of the policy change, which they apparently expected to come through regardless of their resistance:

"We took the tactical decision that although we were fundamentally opposed to the regulation, and we were going to argue against it all the way through, we would continue to

work constructively with the Commission so that whatever instrument they were developing, it was as good as it could be." (UK regulator).

Hence, while it seems the coalition invoked a frame of being willing to fight, it seems that their primary objective was to get more involved in shaping the legislative instrument. By claiming voice and warnings, the coalition aimed to increase their sphere of influence.

Proclaiming united stance.
To contribute to their strategy to influence the final shape of the legislative vehicle, the coalition partners now aimed to persuade each other to put in all their effort. In particular, they appealed to the shared objective that brought all coalition partners together, namely safety.

"we are all very united in a common cause in opposition to these proposals [...] we are actually more united under this safety banner than we probably have been for many years and probably since Piper Alpha. I see this very much as we few, we happy few, we band of brothers gathered together before the European Union fortress." (Speech HSE director industry association).

Hence, the frame of being a *"band of brothers", "united under this safety banner"* invokes an image a united coalition with a single purpose, as well as 'us' versus 'them'. While regulators, unions, and industry actors are frequently not on the same page concerning issues of safety, due to their varying interests, these differences were strategically ignored. Reiterating their united stance also seems to reaffirm each actor's sense of purpose and motivating them to continue to contest the Commission as a learning agent. For instance, it was argued *"we have to keep our pressure on the commission [...] We must remain united in our efforts and move the EU away from regulation and to a directive"* (Speech HSE director industry association), and *"we are beginning to get traction [...] so don't give up hope."* (UK regulator speech).

EC strategy: adapting policy learning to accommodate opposing perspective

Eventually, the Commission did succumb to the coalition's pressure to drop the proposal for a regulation, and instead promulgated a proposal for a Directive, an alternative legislative vehicle that leaves more opportunity for customizing legislation to Member states' pre-existing legislation. This allowed the North Sea countries to adapt the legislative requirements of the Directive to their existing goal-setting regimes. Hence, the proposal for

a Directive respected both the Commission's ambition to assume responsibility of offshore risk governance, and the North Sea countries' ambition to maintain their existing regimes. The coalition approved this new proposal, which signaled the end of the contestation.

DISCUSSION

The aim of this study was to better understand the politics of learning from disaster in the wake of crisis spillover to a different organizational field. We found that contestation between two actor groups was represented by a conflict between two opposing risk governance narratives. In particular, the contestation revolved around core issues of risk governance, such as: 1) 'Who should be responsible for risk governance?'; 2) 'At what level should risk governance be organized'; 3) 'What is the appropriate improvement philosophy?'; and 4) 'Who should be in control of risk governance and natural resource extraction?' We demonstrated how the two actor groups responded to each actions, adapting their own practices of learning and contestation to influence each other's initiatives. Hence, we found that the process of contestation was dynamic. We furthermore showed how the differences between the narratives were rooted in different institutional discourses of risk governance. Research has indicated that learning from disaster tends to be embedded in a 'dominant discourse about risk' (Hardy & Maguire, 2016, p. 81; see also Brown, 2000; 2004; Gephart, 1992), which shapes how learning takes place. However, our findings indicated that learning was inherently coloured by a conflict between two powerful discourses. As such, while previous research on learning from disaster has emphasized the ability of established actors in an organizational field to impose their interests on other actors (e.g. Brown, 2000), our study confirms statements in the literature on institutional change that a 'challenger' – i.e. an actor that aims to disrupt established institutions and authority relations – may drive field-level learning (Fligstein, 1997; Fligstein & McAdam, 2012; Maguire & Hardy, 2009). We visualize the process of contestation in a process model in Figure 1.

This study makes several contributions to the literature. First, we contribute to the political perspective on learning from disasters and crises (e.g. Sagan, 1994). The crisis literature has indicated that different stakeholders may produce their own event narratives (Buchanan & Denyer, 2013; Hoffman & Jennings, 2011; Smith & Elliot, 2007). Our investigation goes beyond the identification of a narrative conflict to show how this conflict is sustained over time through dynamic practices of contestation following spillover of the legitimacy crisis to a different organizational field. In particular, this study identified three core practices of

Figure 1. Process model of contestation following spillover in the wake of a disaster
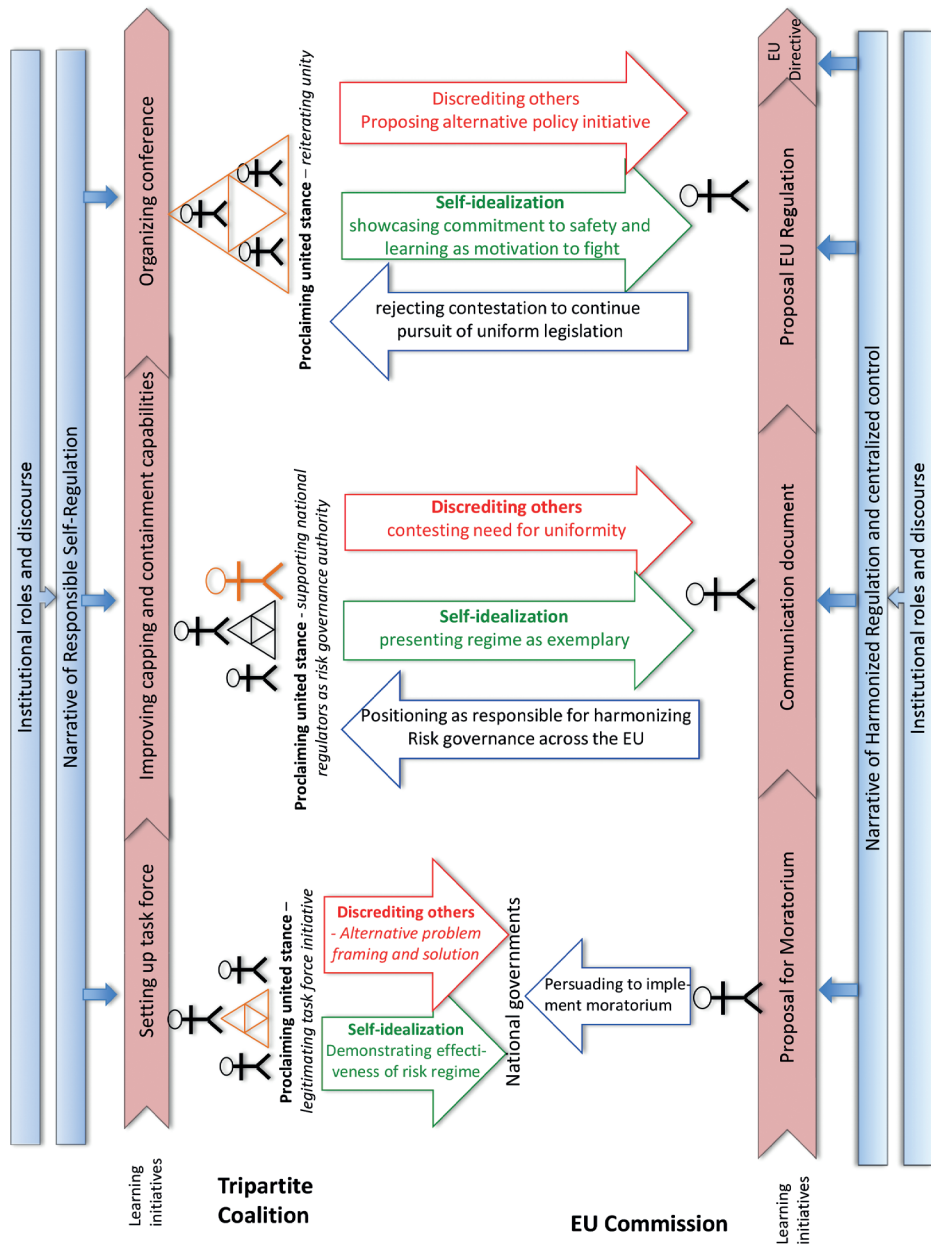
contestation that served to limit the intervention of a powerful actor: *discrediting others*, *self-idealization*, and *proclaiming a united stance*. The strategies of 'discrediting others' and 'self-idealization' served to claim sole learning authority at the expense of other

potential learning agents. These findings confirm evidence from studies on institutional maintenance that established actors in an organizational field may defend their position in the wake of disruptive events (Maguire & Hardy, 2009; Micelotta & Washington, 2013). The strategy of 'discrediting others' aimed at undermining learning initiatives by other actors, in particular the EU Commission, by challenging interpretations of disaster causes, formulations of solutions, as well as risk governance expertise. This confirms studies on disruptive events in organizational field that identified that a central aspect of contestation in the wake of a field-level crisis involves challenging problem- and solution framings (Hoffman & Jennings, 2011; Maguire & Hardy, 2009). On the other hand, the strategy of 'self-idealization' aimed to bolster the image of established actors and practices, for instance by asserting the appropriateness of the established institutional arrangements – e.g. the risk governance regimes in the North Sea – or demonstrating preoccupation with responding to a disaster. This strategy confirms studies on organizational impression management, which showed that such strategies serve to create favorable images and induce goodwill in stakeholders (Elsbach et al., 1998; Elsbach & Sutton, 1992). We also found that the coalition supplemented their 'self-idealization' strategy by 'proclaiming a united stance'; a strategy that legitimated the learning response by showing that it was broadly supported and built upon diverse expertise.

It seems that the strategies of 'discrediting others' and 'self-idealization' have much in common with practices identified in the literature on organizational re-legitimation in response to crisis events (Elsbach, 1994; Elsbach & Sutton, 1992; Elsbach, Sutton, & Principe, 1998; Marcus & Goodman, 1991; Maguire & Hardy, 2009; Pfarrer, DeCelles, Smith, & Taylor, 2008). This literature distinguishes between technical arguments – i.e. signaling efficiency and effectiveness in organizational performance - and institutional arguments – i.e. referring to compliance with institutionalized practices – for protecting or restoring legitimacy (Elsbach, 1994). The strategy 'discrediting others' had clear technical elements. For instance, learning initiatives by the EU Commission were framed as having a the negative impact on safety, and the US risk regime was framed as inferior in terms of effectiveness. On the other hand, the strategy of 'discrediting others' invoked institutional elements. For instance, because the Commission went down the path of new legislation, the coalition was able to invoke institutionalized beliefs and practices of risk governance from the North Sea risk regime (Elsbach, 1994; Elsbach & Sutton, 1992), such as the principle of continuous improvement. The strategy of 'self-idealization' also featured technical arguments. For instance, the coalition discursively reenacted regime changes that were implemented following the Piper Alpha disaster in 1988, arguing that they had

already experienced 'their' Macondo and that the current regime in the North Sea region had never experienced a blowout since then. As such, they were able to use normative arguments (Elsbach, 1994; Maguire & Hardy, 2009), presenting the North Sea regime as highly legitimate and an example for other regulators. Finally, the strategy 'proclaiming united stance' also had technical features. The involvement of three different constituencies demonstrated that the coalition had organized a well-resourced and effective learning initiative that built upon deep and broad expertise. Earlier research confirms that multi-stakeholder collaboration enables more effective responses to disasters (Reinecke & Donaghey, 2015; Van der Vegt, Essens, Wahlstrom, and George, 2015). However, it also had an important symbolic function. It was important to demonstrate that the task force initiatives did not just involve industry actors, but also trade unions and national regulators, which provided credibility and legitimacy to the initiative that oil industry actors were lacking.

Our study also contributes to the political perspective on learning from disaster by identifying specific politics of learning. First, our discursive strategies of contestation resemble political strategies found in the literature on identity politics and 'othering' in discourses about issues like race (Alcadipani, Westwood, & Rosa, 2015; Jack & Westwood, 2009). These discourses are often characterized by othering practices in which an 'Other' is defined in negative and inferior terms while the Self is defined in positive and superior terms. Furthermore, our findings show that these identity politics revolved primarily around a politics of responsibility, and a politics of expertise. Research on crises has shown that responsibility is a contested issue following crises (Bundy & Pfarrer, 2015; Douglas, 1992; Gephart, 1984; Smith & Elliott, 2007). Organizations may attempt to dispute responsibility for a disaster by denying involvement and shifting blame in order to avoid the burden of accountability on the organization (Ashforth & Gibbs, 1990; Bundy and Pfarrer, 2015; Elsbach, 1994), or by arguing that 'it won't happen here' (Smith & Elliott, 2007). Our findings show that crises can also trigger negotiations about other aspects of responsibility, in particular about who is responsible for the *learning response*. Our findings show that established actors may want to claim learning authority and take on the burden of responsibility for learning. This struggle for responsibility can be understood as an attempt to gain or maintain an authority position in the field, as other actors are denied responsibility for and influence in the learning process. As such, the politics of responsibility aim to avert interventions from challengers in the organizational field, while challengers may want to take responsibility for learning to impose radical change (Maguire & Hardy, 2009). As we have shown, actors aimed to invoke legitimate categories – such as

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expertise, stakeholder support (Elsbach et al., 1998) – in their narrative strategies to claim responsibility. This shows that the politics of responsibility are closely related to politics of expertise. Resistance against alternative learning proposals may involve contestation of expertise of challenging actors in the field, while established actors may presented themselves as experts in risk governance. Our findings confirm earlier studies on risk and learning from crisis, which states that denial of expertise and disregard for outsiders may play a central role in contestation about risk and learning (Beck, 1992; Maguire & Hardy, 2013; Smith & Elliott, 2007). Research on (technological) risk has argued that risk is heavily contested; risk is open to social definition and construction (Beck, 1992), and thus mediated through interpretation and argumentation (Gephart, 1984; Maguire & Hardy, 2013). Different actors have different interests and perspectives on the nature and desirability of risk, which fosters competing knowledge claims and risk discourses (Beck, 1992; Giddens, 1990; 1991; Maguire & Hardy, 2013; 2016; Power, 2007; Rosa, Renn, & McCright, 2014). Hence, in the context of risk, expertise becomes highly politicized (Beck, 1992; Fisher, 1990). However, despite the presence of competing perspectives, learning from disaster tends to be dominated by principles of technical rationality, represented by technical experts like engineers (Carroll, 1995; 1998; Carroll et al., 2002; Dekker, 2014; Elliott & Smith, 1993; 2006; Perin, 1995). Such 'legitimized' expertise may be used to prevent some outside groups from entering into debates (Maguire & Hardy, 2013; Smith & Elliott, 2007). Our findings confirm these insights, as the tripartite coalition used appeals to technical expertise to resist the Commission's involvement in learning.

This study also indicated how strategies of contestation change as a narrative conflict progresses. In early phases, 'discrediting others' primarily involved contestation of alternative problem- and solution definitions. When the EU Commission proposed new EU legislation of offshore safety, implying that they aspired a more central role in risk governance in Europe, the coalition more specifically challenged the EU Commission's supposed lack of expertise. Similarly, the strategy of 'self-idealization' changed over time. Initial self-idealization practices were anticipatory forms of impression management (Elsbach et al., 1998). Even before the Commission proposed a moratorium, the coalition was aware of the need to organize learning initiatives to avert expected political responses. As such, they organized multi-stakeholder task forces in order to demonstrate a proactive and resourceful response. This confirms Barnett and King's (2008) observation that proactive learning through self-regulation helps to avert regulatory interventions in hazardous industries. When the Commission explicated their intention to develop a EU Regulation as opposed to a Directive, self-idealization strategies changed into intimidation

(Elsbach et al., 1998), presenting themselves as motivated to fight the EU Commission if their rational demands were ignored. The focus of the 'proclaiming a united stance' strategy shifted when the EU Commission communicated its intention to develop EU-wide safety legislation. Given the emphasis on new legislation, the coalition's arguments became more focused on showcasing the involvement of national regulators in the initiative and supporting their expertise and position in the risk governance regime. When the EU Commission indicated their motivation for an EU Regulation, the coalition engaged in an ultimate attempt to strengthen the ties between the coalition partners, motivating each other to maintain their pressure on the Commission and portraying themselves as a "band of brothers". These findings confirm the broad range of organizational responses that may be enacted to deal with a legitimacy crisis, varying from mere acceptance of stakeholder pressures for change to outright rejection (Maguire & Hardy, 2009; Pfarrer et al., 2008).

Our study has investigated the politics of learning after to spillover of a crisis that originated in a *different* organizational field. Some elements of our findings appear similar to findings of studies on politics of learning that did not focus specifically on the context of spillover. For instance, the strategy of 'discrediting others' has similarities with strategies of avoiding blame that are well-known in crisis management literature (Pfarrer et al., 2008; Smith & Elliott, 2007). However, we show that the context of spillover to another field introduced new opportunities for avoiding blame. For instance, we found that the tripartite coalition aimed to exploit the fact that both regions are characterized by different institutional arrangements – the risk governance regime. For instance, the coalition's challenged the EU Commission's problem framing by arguing that it was not water depth that played a critical role in causing the disaster, but the US risk regime. By redirecting attention to differences between the risk regimes in both regions, they could more easily distance themselves from the Macondo disaster and the US regime. They had similar opportunities with the strategy of 'self-idealization'. Coalition partners appealed in their discursive strategies to institutionalized risk governance principles – continuous improvement, tailoring risk governance to local conditions, and decentralized control – that are central to the North Sea risk regime. Because of the differences in risk regimes between the US and the North Sea, the coalition was able to portray the North Sea regime as an example for other regulators to adopt. Finally, we also argue that spillover to a different region had implications for the strategy of 'proclaiming a united stance'. While collaboration between stakeholders in the North Sea regime is still not the norm, their relation is less adverse than in the US (Lindoe et al., 2014). Hence, we argue that there were better conditions to form a multi-stakeholder coalition in the North Sea region in the wake of the Macondo disaster.

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Boundary conditions

As for any single qualitative case study, this study has methodological limitations. We focus on a crisis as a result of a disaster spilled over to a different geographical region and how the spillover led to contestation of learning in this different region. Elliott (2014) has argued that events with such far-reaching effects are rare. Yet, there have been other disasters that had similar effects, like Bhopal (Nathan & Kovoor-Misra, 2002; Bowman & Kunreuther, 1988; Shrivastava, 1987; Jasanoff 1994) and Fukushima (Wittneben, 2012). We argue that our findings are generalizable to settings of major disasters, as well as other types of crises, such as the failure of banks (Kim & Miner, 2007). Furthermore, scholars have observed an increase in major crises (Perrow, 1999), or at least an increase in the perception thereof (Buchanan & Denyer, 2013). Hence, we argue that our findings may become increasingly relevant in the future. This research approach allowed us to unpack the complexity of contestation in the wake of a disaster.

Furthermore, we argue that the *scope* of spillover is an important boundary condition of our study: we investigated spillover from the US field of offshore drilling and production to a different organizational field. We argued that field-level learning and contestation would take different forms in the original context. For example, in the original context in which a disaster occurred politics focus to a large extend on the issue of culpability (e.g. Sagan, 1994), whereas spillover mostly initiates political struggles about the implications of a disaster for Furthermore, because organizational fields are characterized by particular institutional arrangements – institutions, authority relations – (e.g. Yu et al., 2008) there will be a larger 'institutional distance' between the organizations involved in the disaster and other actors in the field, likely affecting opportunities and strategies of contestation.

Literature on learning from disaster states that, in the wake of a disaster, the social construction of reality is often portrayed through the 'lens of the powerful' (Smith, 2001) – as those in positions of authority and power aim to serve their own interests and utilize their position to write their history according to their terms. Our case is particularly interesting because both central actors in our case, the coalition and the Commission, were almost equally powerful. The financial power and technical expertise of the oil industry, augmented by the national regulators' and unions' social legitimacy and expertise of the national regulators and trade unions, created a strong coalition in terms of resources and credibility. The Commission, on the other hand, can be regarded as a powerful regulatory body. The presence of two powerful actors likely fostered prolonged contestation. Without these opposing centers of power, contestation would likely have subsided earlier. Finally,

our main body of data sources consisted of publicly available secondary sources, such as documents and video recordings of speeches. While the choice for these naturally occurring data makes sense given the fact that a large part of contestation occurred through production of publicly available texts, this also means that our findings depended on what actors decided to showcase in their bodies of text. While we have anecdotal evidence that substantial lobbying activities took place by the coalition in Brussels, we were not able to engage in observations of contestation that occurred hidden from the public eye.

CONCLUSIONS

Our research question was: *How do field actors contest each other's learning initiatives over time following spillover of disaster implications to a different organizational field?'* We conclude that actor groups engaged in recurring discursive practices of contestation, in particular 'self-idealization' – aimed at reassuring other stakeholders and overcoming potential 'outside' intervention – 'proclaiming united stance – to support self-idealization by demonstrating broad stakeholder support and deep expertise – and 'discrediting others' – aimed at undermining other learning initiatives. Together, these practices aimed to capture learning authority and responsibility and withhold it from other actors. The practices were continuously updated to match changes in the opposing actor's learning initiatives. We also showed how the different learning initiatives and discursive practices of contestation constituted two conflicting narratives of risk governance – the narratives of 'responsible self-regulation' and 'harmonized regulation and centralized control'. These narratives differed in their interpretation of four core risk governance principles: 'who should be responsible for risk governance?'; 'at what level should risk governance be organized'; 'what is the appropriate improvement philosophy'; and 'who should be in control of risk governance and national resource extraction. These interpretations were rooted in different institutional discourses and responsibilities of risk governance.

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Chapter 4

Field-level learning from disaster - a dynamic process of contestation following crisis spillover

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DISCUSSION

The objective of this dissertation was to better understand how actors in an organizational field collectively attempt to learn from disaster. Focusing specifically on field-level learning as a contested process, the main research question was: *How and why do actors in an organizational field initiate and maintain the contested process of field-level learning from disaster?* The main research question was approached through three sub-questions, which I investigated in three separate studies. The first research study theoretically and empirically demonstrated why field-level learning is relevant in the wake of a disaster. The second and third research studies focused on politics of field-level learning from disaster, which was conceptualized as a process of contestation of interpretations of disaster causes and solutions between actors with different interests, perspectives, and social positions.

In this section I will first discuss the main findings of the three research studies and answer the research questions of each chapter. Then, the three studies are brought together to formulate the theoretical contributions of my dissertation to the literatures on disaster causation, learning from disaster, and institutional theory. Third, the implications for practice will be discussed. Finally, the boundary conditions of this dissertation, and directions for future research are elaborated.

SUMMARY OF MAIN FINDINGS

Chapter Two: How many blowouts does it take to learn the lessons? An institutional perspective on disaster development

In Chapter two, the objective was to better understand how disasters develop and why similar disaster development trajectories recur by introducing the organizational sociology of new institutional theory. This study was initiated as a consequence of an increasing awareness – through informal conversations with experts, and reading industry- and accident investigation reports about the Macondo and Montara blowout disasters – that institutional rules, norms, and beliefs seemed to contribute to the occurrence of similar disaster development patterns in the offshore industry. Based on this initial insight it was decided to investigate further. Using various data sources, such as accident investigation reports of multiple offshore accidents and serious near-misses, industry reports, semi-structured interviews, and non-participant observations, this study provided an empirical illustration of institutionalized beliefs of risk and practices of risk management and occupational training in the offshore drilling industry. A mismatch was identified between the complexity of offshore drilling operations and risk management and training, which increases the risk for accidents. First, this study showed that accidents and near-misses in

the offshore industry demonstrated that risk was conceptualized as a static, fragmented, and technical phenomenon. I argued that this conceptualization is inadequate for a hazardous, complex, and dynamic setting as offshore drilling. Furthermore, this study traced back these harmful conceptualizations of risk to persistent institutionalized training practices in the industry, which have not co-evolved with the increasing complexity of offshore operations. For instance, it was shown that worker competence was generally perceived as an issue to be addressed by 'fixing the individual' through more technical training. Yet, I argue that taking such an individualized approach to occupational risk is be insufficient, because this does not recognize the influence of the institutional environment. Furthermore, the study indicated that occupational training practices varied across the offshore industry, and that this variability was widely accepted.

Based on these findings, I argue that risk management needs to be professionalized in the offshore industry, involving standardized training in non-technical skills and system risk management. To address the risk arising from the mismatch of complex operations and risk management and training, I argue for the need for a broader conceptualization of competence and claim that the *nature* of training in the offshore drilling industry needs to change to better equip the offshore workforce for these new circumstances. While it takes effort and perseverance to change institutionalized practices, I argue that it can be achieved through professionalizing these practices by means of standardization of worker training and career progression, and through balancing technical and non-technical skills training. Furthermore, while contributing causes may appear to be unique for the involved organizations, they may actually be institutionalized in an industry. Hence, this study proposes that to learn effectively from disasters and prevent their recurrence, one should look outside organizations for the potential existence of institutionalized dysfunctional practices and beliefs. Looking for similarities between disaster development patterns is one way to identify the influence of taken-for-granted beliefs and practices. All together, the findings of Chapter Two indicate the need for field-level learning in the wake of a disaster to resolve harmful institutional factors.

Chapter Three: Justifying 'superior' knowledge from the periphery – struggles of a marginal community to influence learning in the wake of a disaster

Building upon our argument that field-level learning from disaster is important, the aim of chapter three was to better understand how field-level learning from disaster takes place. This study blended the learning from disaster literature with insights from the

5

transformation perspective on knowledge sharing and communities-of-practice literature, and conceptualized field-level learning from disaster as a struggle between established and marginal community for participation in learning. The research question was: *how does a marginal community attempt to influence learning from disaster processes that are driven by established communities?*

The starting point of the analysis of this study was the Macondo blowout and oil spill. While this disaster occurred in the U.S. Gulf of Mexico, it triggered a risk governance crisis in the global offshore oil and gas industry. Hence, the Macondo disaster became a field-level crisis. Also in the North Sea region, actors responded to the disaster by initiating field-level learning. This study investigated the efforts of a relatively marginal community in the industry – the Human Factors (HF) community – to contribute to field-level learning and make sure that a similar disaster would never happen in the North Sea region. The HF community called for radical change and attempted to share its specialist knowledge about human error and incident causation with two established communities that were leading the learning response – the drilling community and senior managers from oil companies and drilling contractors. This study showed, however, that the HF community struggled to persuade the established communities to adopt their call for radical change and specialist knowledge. Based on the analysis of interviews with HF specialists, industry reports, and participant observations This chapter demonstrated that the HF communities' attempts to share HF knowledge was complicated by the presence knowledge- and political boundaries that limited mutual engagement with the established communities in the wake of Macondo. It showed that a semantic boundary – rooted in different assumptions about human error – contributed to the creation of divergent disaster accounts and calls for action. Second, It showed how political boundaries emerged as the HF community aimed to become more established in the drilling industry. They engage in strategies of discipline recognition to justify the importance of their discipline, such as '*using a generalized sales pitch to justify the relevance of HF for drilling*', '*using decontextualized, non-technical knowledge in a technically dominated environment*', and '*justifying HF as a distinct safety discipline in a efficiency-focused management environment*'. However, I demonstrated how these strategies were largely 'self-referential' – i.e. focused on strengthening the status of the HF discipline by showcasing it as a distinct safety discipline worthy of attention, rather than translating HF knowledge to the drilling context to demonstrate specifically how it could positively impact drilling practices. This self-referential approach created political boundaries that limited sharing of HF knowledge. In particular, it undermined the HF community's legitimacy, as they were unable to connect to the dominant drilling and senior

management discourses and values. Finally, the study demonstrated how the separation between the HF and drilling and senior management community practices was reinforced by the risk regime in the North Sea. The risk regime embeds institutionalized mechanisms of learning and responsibilities for risk governance that favor established communities are learning authorities and maintain community boundaries in place. Due to their justification strategies and the institutional constraints, the HF community was unable to overcome the knowledge and political boundaries and significantly influence field-level learning in the North Sea region. As such, established communities dominated field-level learning, resulting in the adaptation of established knowledge rather than radical change.

Chapter three indicated that field-level learning from disaster is a contested process in which marginal communities in a field struggle to overcome knowledge- and political boundaries to transform established knowledge and influence the learning trajectory. The study demonstrated that marginal communities need to maintain awareness of potential institutional constraints such as institutionalized values, discourses, and learning mechanisms and responsibilities. The failure of a marginal community to overcome knowledge- and political boundaries and effectively justify alternative bodies of knowledge will contribute to a learning process that revolves around refining established knowledge, practices, and goals, rather than changing deeper assumptions, values, and beliefs.

Chapter four: Field-level learning from disaster – a dynamic process of contestation following crisis spillover

The aim of this chapter was to better understand the politics of learning from disaster following spillover of a legitimacy crisis to a different organizational field. I conceptualized politics of learning as a dynamic, contested process and investigate how and why actors continuously enact their competing interests in response to opposing actors' actions. We proposed that spillover to a different region would introduce particular dynamics of contestation to the process of field-level learning from disaster. The research question was: *How do field actors contest each other's learning initiatives over time following spillover of disaster implications to a different organizational field?*

Similar to chapter three, the starting point is the risk governance crisis in the global offshore oil and gas industry that was triggered by the Macondo disaster. This study empirically examined how the risk governance crisis spilled over to Europe and triggered a political struggle between two actor groups - the European Commission versus a tripartite coalition from the North Sea region consisting of oil industry actors, national regulators, and trade

unions. Contestation between these actor groups was represented by two opposing risk governance narratives: 'responsible self-regulations' versus 'harmonized regulation and centralized control'. These narratives had competing interpretations of fundamental risk governance principles: '*who should be responsible for risk governance*?' – i.e. industry actors and national regulators as co-regulators versus a more distanced central regulator; '*at what level should risk governance be organized?*' – i.e. allow for tailoring risk governance practices to local circumstances versus uniformly prescribed practices; and '*what is the appropriate improvement philosophy?*' – i.e. aiming for gradual continuous improvement versus radical changes of the risk regime, and '*who should have control over risk governance and natural resource extraction?*' – i.e. control should be left to Member states versus the EU Commission. Furthermore, the study demonstrated how the two actor groups responded to each other's learning initiatives and strategies of contestation, adapting their own practices of learning and contestation to influence each other's initiatives. Hence, I found that the process of contestation was dynamic. The EU Commission first aimed to implement a moratorium, but when they did not succeed in persuading national governments to implement a ban of new drilling projects, they continued by formulating a proposal for new legislation. And despite contestation of the tripartite coalition, the Commission continued with its pursuit of a Regulation. Only after intense contestation did the Commission adapt their proposal to a Directive to accommodate the objections of the tripartite coalition. On the part of the tripartite coalition, I identified three core practices of contestation emerge from conflicting narratives: '*discrediting others*', '*self-idealization*', and '*proclaiming united stance*'.

Chapter four has indicated that contestation in the wake of a disaster can involve a narrative conflict that is rooted in opposing institutional discourses about risk governance. The study demonstrated how contestation is maintained over time through the dynamic interaction of discursive strategies of contestation. The study also showed that crisis spillover to a different organizational field triggers particular strategies of contestation. Actors that aim to resist crisis spillover focus on differences between institutional arrangements – e.g. the risk governance regime – in an organizational field, arguing that particular regimes are better able to avert disasters. Furthermore, the findings showed that contestation involved politics of responsibility and expertise, with which actors aimed to assume a position of authority in the learning process.

IMPLICATIONS FOR THEORY

This dissertation provides a study into the subjects of disaster causation and learning from disaster. By blending the literatures on learning from disaster, politics of learning, institutional change, and disaster causation, this dissertation makes several contributions to these respective bodies of literature.

Learning from disaster as a process of contestation following crisis spillover

I contribute to the literature on learning from disaster by conceptualizing it as a political process in which different actors in an organizational field negotiate and contest varying interpretations and suggested solutions, and strive to protect their interests. Most studies perceive learning from the perspective of effectiveness, i.e. a process aimed at improving safety performance (Lampel et al., 2009). However, this ignores the inherent political nature of learning (Coopey & Burgoyne, 2000) and learning from disaster specifically (Sagan, 1993; 1994; Smith & Elliott, 2007). The majority of studies that addressed politics of learning in the wake of a disaster or crisis have primarily investigated politics in quasi-legal settings like public hearings and public inquiries (Hardy & Maguire, 2016; see for examples Brown, 2000; 2004; Gephart 1992; Topal, 2009). Instead, this dissertation focused on dynamic processes of contestation between actors outside formally organized arenas like public inquiries following spillover to another organizational field. Previous research has largely ignored how politics of learning from disaster takes place following spillover of the legitimacy crisis from involved organizations to a different organizational field. However, as chapter four proposed, crisis spillover to a different field will affect how contestation of learning will take place. For instance, processes of contestation will not revolve around questions of culpability, but will focus on the implications of a disaster for that organizational field. As such, public inquiries – learning mechanisms that serve to assign blame (e.g. Turner, 1976) – will not play an important role in the wake of spillover. This dissertation contributes to the political perspective on learning from disasters and crises by identifying how actors in an organizational field engage in contestation following spillover. In particular, it makes the following specific contributions to the literature on politics of learning from disaster:

Learning from disaster as a process of contestation between marginal and established actors

Previous studies tend to portray politics of learning from disaster as a process dominated by powerful actors, such as corporations and government bodies, who constrain the search for causes and aim to maintain established institutions, meaning systems, and authority

relations in place (Brown, 2000; 2004; Deschamps et al., 1997; Elliott & Smith, 2006; Gephart, 1992; 1993; Hoffman & Jennings, 2011; Topal, 2009). Yet, research on disruptive events as triggers for institutional change (e.g. Hoffman, 1999; Maguire & Hardy, 2009) has indicated that marginal communities may successfully initiate radical changes to institutional practices and beliefs. This dissertation contributes to the literature on learning from disasters, as well as the political perspective on learning from disaster and crises by highlighting how learning involves marginal actors and communities that struggle to overcome defensiveness by established powerful actors. Chapter three highlighted how a relatively powerless marginal community struggled to influence learning from disaster. This study introduced the transformation perspective on knowledge sharing (e.g. Carlile, 2004) and the communities-of-practice literature (e.g. Brown & Duguid, 2001), to conceptualize learning from disaster as a process of contestation in which marginal communities aim to overcome knowledge- and political boundaries to shape the learning process. Chapter three provided new insights in how a marginal community may simultaneously aim to contribute to field-level learning from disaster, and alter established power relations in a field to occupy a more central social position. In particular, the study identified particular strategies of justification that a marginal community used to become more recognized and established in an organizational field. It showed that these strategies were largely self-referential, serving to demonstrate the relevance of the marginal community's knowledge. However, chapter three also indicated that a marginal community's political strategies for justifying new knowledge need to align with established values and institutional discourses. Self-referential strategies may be ignored by established communities and thus fail to overcome knowledge- and political boundaries with established communities in the wake of disaster.

While chapter three investigated the struggles of a relatively powerless marginal community to influence learning from disaster, chapter four zoomed in on the situation when a marginal community actually is potentially powerful enough to alter institutions and authority relations in an organizational field. In this situation, established actors cannot ignore the marginal challenger and merely pursue to their own agenda. Instead, this study confirms that if marginal actors are, in fact, powerful challenges, established actors are likely to engage in practices of contestation to avert intervention (Maguire & Hardy, 2009; Micelotta & Washington, 2013). In particular, it contributes to the political perspective on learning from disaster by teasing out established actors' practices of contestation. It demonstrated that established actors defend their authority position by engaging in identity politics, presenting themselves as superior and others as inferior

(Alcadipani, Westwood, & Rosa, 2015; Jack & Westwood, 2009). In particular, established actors engaged in politics of expertise – challenging the expertise of challengers while presenting themselves as technical experts to reassure other actors of the effectiveness of established practices (Beck, 1992; Fischer, 1990); politics of responsibility for learning– presenting themselves as preoccupied with learning; and invoking dominant institutional discourses.

Together, chapters three and four provide new insights in why learning from disaster often does not lead to deep 'cultural readjustment' (Turner & Pidgeon, 1997), but instead reinforce established beliefs and assumptions in an organizational field (Deschamps et al., 1997; Elliott & Smith, 2006; Hoffman & Jennings, 2011). If weak marginal communities are unable to convince established actors to adopt new knowledge, or if powerful marginal actors are effectively resisted by established actors, learning from disaster will remain '*paradigmatic'* (Deschamps, Lalonde, Pauchant, & Waaub, 1997) – i.e. focused on refining established knowledge, practices, and goals, while leaving deeper assumptions, values, and beliefs unchanged. As such, this study provides new insights in the mechanisms that drive paradigmatic learning in an organizational field following disaster, as opposed to radical 'cultural readjustment' (Turner & Pidgeon, 1997). As such, this study shows that even when a disaster has disrupted established practices and social positions in an organizational field, learning may eventually even reinforce the dominance of established communities and practices.

Power dynamics in learning from disaster

Furthermore, this dissertation also provides insights into the role of different types of power dynamics involved in learning from disaster. As the previous paragraph already indicated, this dissertation confirmed that actors do not have equal opportunities to influence learning. (Bunderson & Reagans, 2011; Contu, 2014; Contu & Willmott, 2003; Coopey, 1995; Lawrence et al., 2005). In particular, by investigating the dynamics between established actors and marginal communities this dissertation provides new insights in the workings of two different forms of power in learning from disaster: episodic power and systemic power (Hardy & Clegg, 1996; Lawrence et al., 2005). Episodic power refers to deliberate political strategies initiated by self-interested actors. I showed that marginal actors invoke in episodic power in order to disrupt established authority relations in an organizational field. While chapters three and four showed that weak- and powerful marginal communities invoked different political strategies – respectively through justifications of alternative knowledge and organizing a political intervention – both

types of episodic power aimed to induce an institutional change. This confirms Lawrence et al.'s (2005) argument that episodic forms of power will facilitate the interpretation and integration of new ideas. However, chapter four also showed that established actors have to engage in episodic forms of power to resist powerful challengers. This confirms studies of defensive institutional work (Desai, 2011; Maguire & Hardy, 2009) that show that established actors engage in defensive practices to resist institutional change driven by challenging actors. This dissertation also provides examples of systematic forms of power, which involves unconscious domination through routine, ongoing organizing practices (Brint & Karabel, 1991; Hardy, 1996; Lawrence, Malhotra, & Morris, 2012; Lawrence et al. 2005). From a systemic power perspective, institutional beliefs, practices and positions in an organizational field are manifestations of power relations (Brint & Karabel, 1991; Suddaby & Greenwood, 2010). Privileged actors are better able to impose practices and beliefs, which become institutionalized over time. As such, hegemonic forms of domination and inequalities become taken-for-granted. Institutionalized assumptions, beliefs and practices exercise systemic power over actors in an organizational field, subtly but strongly influencing learning processes (Lawrence et al., 2005). Especially when marginal challengers are relatively weak and are not particularly noticed by established actors, it is more likely that systematic power shapes learning processes than episodic power. As Chapters Two and Three demonstrated, the technical paradigm and the associated dominant position of technical experts and communities are deeply taken-for-granted in the offshore oil sector. In Chapter Two showed that dominant technical conceptualizations of risk were reinforced through institutionalized training practices, at the expense on non-technical decision-making skills. Chapter Three showed how the technical paradigm shaped the learning process in a subtle fashion by implicitly assigning technical experts as learning authority. Instead, non-technical communities were not seriously taken into account in the learning process. This confirms that *technical* expertise, represented by technical experts like engineers and scientists, tends to dominate decision-making in high-hazard industries (Beck, 1992; Carroll, 1995; Dekker, 2014; Elliott & Smith, 2006; Fisher, 1990; Perin, 1995).

Blending learning from disaster literature with institutional theory

Introducing the notion field-level learning and studying its processes
By building on insights from institutional theory I make contributions to the learning from disaster literature, as well as the organizational learning literature in general. The learning from disaster literature (Lampel et al., 2009) and the organizational learning literature (Chandler & Hwong, 2015; Haunschild & Chandler, 2008; Miner & Mezias, 1996) have tended to focus at the organizational level of analysis. Yet, some scholars have

conceptualized learning as a process that also takes place at higher levels of analysis (Shrivastava, 1983; Wenger, 2000). Also, quantitative studies on vicarious learning from disasters and accidents have shown that other organizations in an industry can improve their safety performance following accident experience of their peers (Baum & Dahlin, 2007; Haunschild & Sullivan, 2002; Madsen, 2009; Madsen & Desai, 2010). However, these quantitative studies were not able to ascertain whether any higher-level learning did take place, or whether each organization learned individually (Kim & Miner, 2007). Building on the concept of organizational field (e.g. Hoffman, 1999) – a central concept in institutional theory – and the concepts of population-level learning (Miner & Haunschild, 1995; Miner & Anderson, 1999; Miner, Kim, Holzinger, & Haunschild, 1999), network learning (Knight, 2002; Knight & Pye, 2004), and institutional learning (Haunschild & Chandler, 2008) I introduced the notion of field-level learning from disaster, which I defined as a collective process of ongoing interactions between field actors with different interests, knowledge, and positions in the social hierarchy, in the wake of a disaster, aimed at improving disaster prevention and response by working towards a sustained change in the nature and mix of institutionalized risk management practices enacted in an organizational field. Field-level learning from disaster therefore represents a *macro*-perspective on learning, and conceptualizes learning as *punctuated, non-routine* change triggered by rare events (Haunschild & Chandler, 2008; Lampel et al., 2009; Miner & Mezias, 1996). It differs from dominant conceptualizations of organizational learning in terms of the level of analysis (organizational field vs. organization) and the process of change (radical vs. incremental). By addressing collective learning in an organizational field following a disaster as a contested process, this dissertation also contributes to the literature on vicarious learning from disaster and crisis (Kim & Miner, 2007; Lampel et al., 2009).

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Understanding how institutions in an organizational field affect learning from disaster
Research has indicated that effective learning will lead to the institutionalization of new practices (e.g. Crossan, White, & Lane, 1999). However, learning is also *constrained* by institutions (Coopey & Burgoyne, 2000). The concepts of organizational field and institutions inform the literature of learning from disaster as it they point to how learning is shaped or even initiated by institutional pressures from the organizational field (Lampel et al., 2009; Perrow 1999b). Yet, few studies of learning from disasters and crises have empirically investigated how institutions affect learning in an organizational field (for two exceptions see Elliott, 2009; Elliott & Smith, 2006). This dissertation addressed this gap. It was demonstrated how marginal actors' attempts for knowledge transformation and sharing in the wake of a disaster are constrained by institutionalized responsibilities and

learning mechanisms in a risk governance regime. In particular, institutional arrangements of social relations and practices privilege established communities, leaving little learning agency to marginal communities. Furthermore, this dissertation showed how the contested process of learning from disaster involves conflicting narratives that have their origins in different institutional discourses about risk governance. Based on these insights, I argued that the concepts of 'organizational field' and 'institutions' help to understand how learning from disaster is constrained by institutionalized practices, discourses, and social relations.

Developing a holistic understanding of why institutionalized practices change

By blending the literature of learning from disaster and institutional theory, this dissertation creates a more complete understanding of the reasons for inducing change processes in an organizational field. Traditionally, learning (from disaster) theories emphasize 'technical' reasons for change, such as concerns for operational efficiency and the need to prevent disaster recurrence, whereas institutional theory emphasizes "institutional" reasons, such as concerns for legitimacy (Haunschild & Chandler, 2008; Suddaby, 2010). I argue that the separation of legitimacy and effectiveness as motivations for institutional change and learning may be understandable for academic purposes, but for professionals these notions are fundamentally intertwined. Professionals that were interviewed for this dissertation were genuinely concerned about improving offshore safety, but at the same time aimed to defend the credibility of the profession. In line with other authors, I therefore argue a blend of learning- and institutional theory creates a more complete perspective on how institutionalized practices change (see also Chandler & Hwang, 2015; Greenwood et al., 2008; Haunschild & Chandler, 2008; Suddaby, 2010; Suddaby & Greenwood, 2010). This dissertation confirms other studies that indicated that learning initiatives in the wake of disasters perform a double function of restoring legitimacy of established actors involved in risk governance, while also improving the prevention, containment, and response to disasters (See also Brown, 2004; Bundy, Pfarrer, Short, and Coombs, 2016; Gephart, 1984). Still, few studies on organizational disasters and crises have investigated how processes of learning and restoring legitimacy are related (Bundy et al., 2016; Lampel et al., 2009). This dissertation has contributed to this gap by showning that industry actors may engage in coalition building with other stakeholders to create broadly supported learning initiatives to improve practices of disaster prevention and response following disasters. By strategically demonstrating engagement in learning, established actors in the field may aim to reassure public stakeholders and avert policy interventions. It also showed another link between learning and legitimacy, namely that marginal communities in a field need to be granted legitimacy by established actors in order to participate in field-level

learning efforts. Hence this dissertation shows that learning in the wake of a disaster is not an objective process in which the most effective solution is chosen among alternative initiatives on the basis of a rational evaluation of merit. Instead, only those solutions that are effectively legitimized will feature in field-level learning initiatives. Hence, learning from disaster involves struggles for legitimacy and authority over the learning process.

Contribution to institutional change literature

I argue that insights from the learning from disaster literature also contribute to institutional theory. The literature on institutional change has emphasized how disruptive events act as triggers for change as they destabilize established institutional arrangements (e.g. Hoffman, 1999). Different types of disruptions – such as technological innovations (Munir, 2005), new regulations (Nigam & Ocasio, 2010), book publications (Maguire & Hardy, 2009), conferences (Hardy & Maguire, 2010), and disasters (Turner, 1976) have been shown to shatter institutionalized beliefs, and trigger changes in practices and the social hierarchy in an organizational field. While each of these events has the potential to disrupt established institutional arrangements and beliefs, there is substantial variation in event characteristics – e.g. deliberately organized vs accidental; type of impact (social, competitive, physical, emotional); type of actor responsible for the event (corporations, government body, scientists) – as well as characteristics of the learning process – e.g. which actors are involved (industry insiders, governmental bodies, social movements); type of learning (policy change, technological change). We argue that the literature on institutional change may benefit from the learning from disaster and crisis literature, which has addressed the variety within the category disruptive crisis events, both in terms of their different characteristics and responses to the different events (Buchanan & Denyer, 2013). For instance, Marcus and Goodman (1991) distinguished between different types of crises – accidents, scandals, and product safety and health incidents – on the basis of the effect on victims, and whether its causation was accidental or the result of misdeeds and faults. Similarly, the concept 'extreme event' (Buchanan, 2011; Hallgren et al., 2018, p. 112; Hannah et al., 2009) was coined to differentiate between catastrophic events with could threaten "life and limb" and other types of organizational crises, such as hostile take-overs. I argue that disasters are a unique type of institutional disruption, which may trigger particular institutional change processes in organizational fields. First, disasters have specific immediate and long-term consequences that distinguish it from other disruptive events, such as technological innovations or book publications. For example, disasters are particularly harmful and emotional events that may inflict physical damage on people, the natural environment, organizational assets, and communities and create social

5

and political turmoil in society (Hallgren et al., 2018; Perrow, 1999; Vaughan, 1999). As this dissertation has shown, the catastrophic impact of a disaster may shock industry actors and government bodies alike. This shock may drive long term contestation, spreading from the initial phase of identifying the causes of a disaster and lessons to learn, to drafting and implementing solutions. Second, learning from disaster is triggered by a single, high profile extreme event and is particularly directed towards *preventing recurrence* of that incident (Buchanan, 2011; Hardy & Maguire, 2016). In contrast, change following other types of disruptions may be *progressive* rather than *defensive*, i.e. focused on "making things happen", such as business development (Buchanan, 2011, p. 282). As such, disaster trigger specific learning processes as compared to other disruptive events. While all sorts of disruptive events will trigger actors to reflect on the implications of the event for themselves – i.e. vicarious inferential learning to answer the question 'what does this mean for us?' – disasters will also trigger investigations into the *causation* of the disaster – to answer the question 'what happened?' and 'why did it happen?' (Pfarrer, DeCelles, Smith, & Taylor, 2008) – to deduce lessons and decide on preventive measures to implement to avoid recurrence. This may be done by the organizations involved in the event (e.g. Carroll, 1995) or other actors in the organizational field – particularly regulators and government bodies (e.g. Gephart, 1984). This dissertation has shown that the varying inferences in a field about the causes of a disaster and necessary solutions are an important source for contestation.

Contribution to disaster causation literature

This dissertation contributes to the literature on disaster causation by developing an institutional perspective on disaster development (Chapter Two). An institutional perspective on disaster development sensitizes disaster researchers to the influence of the institutional environment on disaster development. The vast majority of studies on disaster causation study how internal organizational factors – technical, human, and organizational – contribute to the occurrence of organizational disasters (e.g. Reason, 1997). The role of an organization's external environment on disaster development in organizations receives far less scholarly attention (Dyhrberg & Jensen, 2004). When an organization's external environment is taken into account, it is mostly conceptualized as a competitive or regulatory environment (e.g. Dekker, 2011; Reason, 1997). Only few studies that investigated disaster causation in organizations have conceptualized the organizations' external environment as an institutional environment, which shapes organizational practices by imposing norms, values, and taken-for-granted beliefs (Dyhrberg & Jensen, 2004; see Elliott & Smith, 2006 and Wicks, 2001 as two exceptions in the management literature). I contribute to the

institutional perspective on disaster development by studying how taken-for-granted beliefs and institutionalized practices may become dysfunctional when they remain stable while the task environment becomes increasingly complex, thereby contributing to the development of disasters and near-miss events.

IMPLICATIONS AND RECOMMENDATIONS FOR PRACTICE

Besides contributing to theory, this dissertation has practical implications. Disasters have a catastrophic impact on people, the natural environment, local communities, and organizational assets, as well as indirect negative consequences – economic, psychological - on people, households, communities, organizations, industries. This dissertation contributes to a better understanding of how disasters are caused and how learning occurs following a disaster. Hence, it provides new knowledge on how disasters may be prevented.

Chapter two indicated that risk management and occupational training in the offshore industry need to be professionalized to co-evolve with the increasing complexity of offshore operations. I argued that a broader conceptualization of worker competence – including technical and non-technical skills – will better equip the offshore workforce for dealing with this complexity, while some degree of standardization will resolve harmful variability in training and career progression across organizations. I argued standardized training should address non-technical skills and system risk management. While it takes effort and perseverance to change institutionalized practices, I argue that it can be achieved through professionalizing these practices by means of standardization of worker training and career progression, and through balancing technical and non-technical skills training.

Chapter two also indicated that an institutional perspective on disaster causations has important implications for learning. Most disaster investigations focus on technical, human, and organizational contributing causes of the organizations involved in the disaster, as well as the influence of regulatory factors (e.g. National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, 2011). Chapter two demonstrated, however, that organizational disasters partly have institutional origins that are not specific to the involved organizations, but may be more widespread in an industry. These institutional factors go beyond explicit regulatory factors to include tacit, taken-for-granted beliefs and practices. These may drive the recurrence of similar disaster development patterns within and across organizations in an industry. These findings have implications for learning from incidents

5

and disasters, particularly regarding the *search scope* of investigations. Investigations teams – either in the organization(s) involved in a disaster or organized by the regulator - should aim to identify institutional contributing causes beyond the organizational setting in which a disaster, accident, or incident occurred. This could be achieved by comparing the causation pattern with other investigated incidents and disasters, either within or outside the organization. For regulators this could mean to contact other regulators for information on other investigations, while organizational investigation teams may reach out to other organizations or industry associations. Naturally, an extended search scope has implications for managers. While extending the search scope of investigations may take more time and resources in the short term, identifying harmful taken-for-granted beliefs and practices will strengthen organizational resilience and help to prevent costly incidents in the future. Furthermore, I hope these insights will motivate managers and safety professionals to perceive disasters in other organizations as opportunities for improving safety practices in their own organization, even if the incident happened in a distant part of their own organization, or in a different organization in another geographic region. A common response in the wake of a disaster is 'it could not happen here'. Chapter two shows that such remarks ignore the role of the institutional environment in disaster development. Recent incidents in the North Sea region have indicated that disasters similar to the Macondo blowout could definitely happen here as well. In 2009, Transocean and Shell experienced an incident with similar beginnings as the Macondo blowout in the Bardolino oil field in the North Sea, which fortunately could be averted last-minute. The analysis in chapter two indicated that both this incident and the Macondo disaster were characterized by similar institutional factors. Similarly, in 2011 Total experienced a significant gas blowout in the Elgin-Franklin field, which, according to anectodal evidence, bore great similarities with the beginnings of the Piper Alpha disaster that occurred in 1988, but fortunately the gas did not find an ignition source. While in both cases a large-scale disaster was prevented, these were serious near-misses that could have triggered an organizational disaster. This contrasts sharply with the statements made by many professionals and executives in the North Sea offshore industry that the North Sea had not experienced a blowout since the Piper Alpha disaster, and that a Macondo-like disaster could not happen here. I argue that these claims are clear illustrations of dangerous "myths of infallibility" (Sagan, 1994).

This dissertation also has implications for how actors learn from disaster. It posits that learning from disaster *per definition* is characterized by competing interests and perspectives. Consequently, this implies that actors should acknowledge that learning is

inherently a political activity (Coopey, 1995; Coopey & Burgoyne, 2000). By conceptualizing field-level learning as a contested process in which actors strive to protect their interests, this dissertation demonstrated that learning is not a neutral and objective process, but shaped by particular – especially privileged – actor groups. This has important implications for what is being learned, and what is not. This dissertation showed that the technically oriented drilling community had a strong influence on field-level learning from the Macondo disaster. As such, the majority of lessons learned in the North Sea region focused primarily on *technical* improvements: of preventive, containment, and response equipment; improved technical procedures; and strengthened technical training. Instead, marginal actors had less opportunity to influence the field-level learning process, even though their knowledge may be very useful (Bunderson & Reagans, 2011; Coopey & Burgoyne, 2000). For instance, the Human Factors community was not able to make HF a central issue for learning and risk management. As a consequence, few changes were implement to address human and organizational factors, despite convincing evidence in accident research that these factors play a fundamental role in creating safe and resilient organizations (e.g. Reason, 1997). The European Commission was resisted in its efforts to set up policy learning initiatives to improve standardization in risk governance regimes across Member states, even though arguments for standardization make sense in an high hazard setting where disasters may affect other Member states. While the technical lessons learned by the drilling community are definitely important improvements, learning was predominantly *'paradigmatic'* (Deschamps et al., 1997) – refining existing knowledge, practices, and goals, while leaving deeper assumptions, values, and beliefs intact. Hence learning in the wake of the Macondo disaster primarily reinforced the technical paradigm (e.g. Carroll, 1995). In doing so they missed out on the opportunity to enrich their own perspective with new insights from other communities and actors- i.e. more radical learning.

This dissertation makes a case for more participative learning processes and risk governance in general (Beck, 1992; Coopey, 1995; Coopey & Burgoyne, 2000; Renn, 2008; Rosa, Renn, & McCright, 2014). A more participative perspective on learning as opposed by a technocratic 'expert' notion of learning may provide voice to alternative perspectives and knowledge, which may create more robust learning New knowledge may 'stress test' established knowledge when it challenges dominant, taken-for-granted assumptions, thereby contributing to more robust learning in the wake of incidents. Disasters are complex phenomena (e.g. Perrow, 1999), hence, diverse bodies of knowledge from diverse epistemic disciplines – engineering, psychology, sociology, economics, political sciences etc – are necessary for understanding how disasters develop and may be prevented. I propose

5

that established communities – in our case oil industry actors - should stimulate an open discussion with other field members, providing marginal communities with the opportunity to voice their perspective, and actively seek out new insights and knowledge (Coopey, 1995; Coopey & Burgoyne, 2000). A core objective of risk governance in the offshore oil and gas industry is to develop increasingly *robust* risk regime, i.e. a regime that is increasingly effective at drawing on industrial expertise and improving the safety of offshore operations (Baram, Lindoe, & Renn, 2014). This dissertation has shown that dominant expertise may be invoked to exclude other actors from learning processes. Hence, I argue that established actors, like managers, technical experts, and regulations, should foster a more pluralistic learning process, resulting in more diverse lessons learned and potentially more robust improvements to disaster prevention, containment, and response.

The previous argument for pluralistic learning in the wake of disaster was rooted in appeals for greater efficiency. However, there are also *normative* arguments for stimulating the involvement of a more diverse group of actors in learning processes. A technocratic perspective on risk proposes that technical experts should be decision-makers on risk assessment and management given their rational understanding of risk (Beck, 1992; Renn, 2008). However, this ignores that risk management also has an important normative foundation, which addresses the question: 'what level of risk is deemed acceptable' (Renn, 2008). These questions cannot be answered through rational calculations, but should be the subject of democratic learning and risk governance processes (Beck, 1992; Renn, 2008). Coopey and Burgoyne (2000, p. 878) promote multiple advocacy as a means to achieve democratic learning discussions: "norms of multiple advocacy require that parties to decision-making have every facility to put forward positions that oppose those of a dominant group". The EU Commission promotes multiple advocacy in learning through mechanisms like public consultation, however, I argue that from a democratic perspective on risk, industry actors should also adopt the principle of multiple advocacy. This may become increasingly important if the oil industry wants to prolong their viability in a society that is increasingly focused on sustainable energy and hostile towards fossil fuels like oil and gas.

This dissertation also provided practical insights for overcoming opposition and conflict in learning from disaster. Chapter four of this dissertation showed that narrative conflicts between actors with opposing perspectives and interests are rooted in different institutional discourses, values, and responsibilities. As such, I argue that a core aspect of learning from disaster should revolve not just around identifying causes and solutions,

but also identifying the interests and institutional roots of opposing viewpoints. From the interviews conducted for this dissertation it emerged that all actors were motivated to learn lessons from disasters. Furthermore, if the call for more pluralistic participation in learning seems to be too ambitious at this point in time, this dissertation provides practical insights for marginal communities to overcome potential resistance or neglect by established communities. Chapter three indicated that marginal communities might have difficulties with participating in learning from disaster because of the presence of knowledge- and political boundaries. Established actors are privileged as learning authorities and may not perceive marginal communities as legitimate learning agents. For marginal communities to transform established knowledge in an organizational field, they have to become aware of the discourses and values that are enacted by established communities. As such, they have to strategically translate their knowledge and learning proposals to explicitly link them to dominant discourses and values.

BOUNDARY CONDITIONS

Due to methodological- and conceptual choices made during the research process, the generalizability of findings from this dissertation to other contexts is limited. Most obviously, this dissertation is based on qualitative data and case studies. This approach was relevant for this dissertation, because the objective was to better understand *how* and *why* actors in and organizational field initiate and maintain contested processes of field-level learning from disaster. As such, I was particularly interested in the examining in-depth the processes and practices of contestation (Denzin & Lincoln, 2000; Yin, 2008). Extreme events and contexts are useful for this purpose as they "may provide particularly rich insights into organizational processes" (Hallgren et al., 2018, p. 112; Hannah et al., 2009). While we acknowledge that the use of qualitative case studies into extreme events brings about limitations in generalizability, I argue that the findings in this dissertation are nevertheless relevant for other research settings. Below, I discuss the most important boundary conditions of this dissertation that affect generalizability of the findings.

First, I focused on a particular type of learning experience: an organizational disaster that inflicted damage on people, assets, the natural environment, and local communities (Hallgren, Rouleau, & De Rond, 2018; Perrow, 1999; Turner, 1974). Disasters are non-routine trigger events that confront organizations with a unique and dramatic experience, and which presents complications for organizational learning (Lampel et al., 2009; March et al, 1991; Vaughan, 1999). For instance, disasters are likely to capture the attention of societal

5

stakeholders like the public, the media, or government bodies and trigger a legitimacy crisis (Smith & Elliott, 2007). This is in contrast to other forms of organizational learning, especially incremental learning, in which actors continuously accrue experience through routine conduct (cf. Haunschild & Chandler, 2008; Lampel et al. 2009; Miner & Mezias, 1996). As such, we first of all argue that our findings are generalizable to other high hazard- or extreme contexts (Beck, 1992; Hallgren et al., 2018; Hannah et al., 2009, p. 898), i.e. "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 consequences to—or in close physical or psychosocial proximity to—organization members". Examples of such extreme contexts in which organizational disasters may occur are the (petro-)chemical industry (Hopkins, 2008; Jasanoff, 1994; Shrivastava, 1987), the civil aviation industry (Weick, 1988), and the nuclear industry (Perrow, 1999).

Furthermore, while disasters "pose a direct risk to life and limb" (Hallgren et al., 2018, p. 112), and therefore differ from other organizational crises, such as hostile take-overs, we argue that our findings are also generalizable to other organizational crisis situations. In particular, I argue that the findings are generalizable to other organizational crisis situations when the following conditions are met: 1) the organizational crisis has to be initiated by a clear trigger event, 2) the crisis has to create socio-political turmoil in society, particularly about the causes, implications and solutions 3) field-level learning from crisis needs to be characterized by the presence of potentially conflicting learning initiatives aimed at preventing potential recurrences in the future, but also serving to protect or further interests.

Third, this dissertation has indicated that a 'technical paradigm' shaped learning processes in the wake of a disaster. The dominance of technical expertise played an important role in the contestation of alternative learning initiatives, trumping other types of non-technical expertise from more marginal communities like the HF community (Chapter three) and the EU Commission (Chapter four). According to Carroll's (1998) study on learning from incidents, occupations with a technical background versus a social science background use different 'logics' for understanding reality. Technical occupations like design engineers and operators deal with *concrete* problems with physical objects, while occupations with a social science background, like human factors experts, are focused on more *abstract* problems, such as learning. This distinction in abstract- and concrete logics may have been an important boundary for mutual engagement between the drilling community and the

HF community, and oil industry actors in general and the EU Commission. Chapter three indicated that one of the main problems with knowledge sharing between the HF- and drilling communities was that human factors remained an abstract issue. Instead, Bechky's (2003) study on knowledge sharing between design engineers and operators from the assembly line in a product innovation setting showed that successful knowledge sharing with technical communities requires concretizing a problem by using concrete boundary objects. I therefore argue that the findings of this dissertation are especially generalizable to other settings characterized by conflicts between dominant technical communities and marginal, non-technical communities that challenge this dominance. To learn more about these mechanisms and of contestation between dominant technical- and marginal non-technical communities in the wake of disaster, it would be worthwhile to study how HF knowledge is shared in other technically dominated hazardous industries, such as the nuclear industry (Carroll, 1995; 1998; Perin, 1995).

Fourth, this dissertation focuses on politics of learning from disaster that emerged when a legitimacy crisis, resulting from the disaster, spilled over from the organizations involved in the disaster to a different geographical region. Chapter four indicated that spillover triggers particular political dynamics, as discussions about culpability will shift to negotiations about disaster implications and appropriate solutions. However, Elliott (2014) has argued that events with such far-reaching effects are rare. Hence, the Macondo case may be understood as a particularly extreme case with little comparison. Yet, there have been other disasters that had similar effects, like the Bhopal chemical gas leak (Nathan & Kovoor-Misra, 2002; Bowman & Kunreuther, 1988; Shrivastava, 1987; Jasanoff 1994) and Fukushima nuclear incident (Wittneben, 2012). Furthermore, scholars have observed an increase in major crises (Perrow, 1999), or at least an increase in the perception thereof (Buchanan & Denyer, 2013). Hence, I argue that the findings are generalizable to other high-hazard may become increasingly relevant in the future.

Furthermore, I investigated attempts for learning from disaster in a particular institutional setting, namely a co-regulatory risk governance regime. In a co-regulatory regime, risk governance responsibilities are shared between industry actors and regulators (e.g. Baram & Lindøe, 2014). However, organizational fields are characterized by different institutional arrangements (e.g. DiMaggio & Powell, 1983), hence, processes of learning and contestation are likely to differ in organizational fields with different risk regimes. For instance, learning is more likely to occur in participatory co-regulatory regimes than antagonistic regimes (Elliott & Smith, 2006). Furthermore, we illustrated that in a co-regulatory regime, it is

5

unlikely that a regulator will impose new knowledge on the industry. While the setting of a co-regulatory regime is an important boundary condition for generalizability of the findings, co-regulation becomes increasingly prevalent in Western societies (Power, 2007; Short & Toffel, 2008). Therefore, he findings are relevant to other industries with such regulatory regimes.

Finally, while I showed that processes of contestation between field actors, such as industry associations and (trans)national regulators, shaped field-level learning from disaster, we were not able to observe to what extent individual organizations actually adopted and implemented the lessons learned. The literature on learning from disaster has indicated that learning goes beyond the identification of lessons learned, hence, it has been argued that studies should also focus on how lessons are implemented in organizations (Elliott, 2009; Toft & Reynolds, 2005). As such, I argue that future research could investigate the extent to which organizations implemented the field-level lessons that were learned in the wake of the Macondo disaster.

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APPENDICES

Appendix A – Codebook chapter three

Aggregated constructs	Strategies of knowledge transformation	Explanation	Tension	Illustrative quotes
Developing different call for more radical action	Providing different disaster account and solutions	The drilling community interpreted the Macondo disaster as caused by the lack of competence of personnel. As such, they recommended to strengthen personnel competence through improved technical training. On the other hand, the HF community emphasized how dysfunctional team dynamics and organizational influences caused the disaster.	The disaster accounts and recommended solutions are rooted in different assumptions about human error The HF community's situated understanding of human error caused them to develop a different disaster account and set of recommended solutions than the drilling community, who understood human error as a root cause of accidents therefore recommended more personnel training.	"The Macondo reports don't overtly talk about Human Factors. There are Human Factor elements, if you are familiar with those, when you read the reports. But it is not an overt reaction." (HSE director in small company).
	Portraying HF knowledge as superior to 'engineering perspective' on human behavior	The HF community portrayed HF knowledge as evident and straightforward, while ridiculing the drilling community's supposed attempt to proceduralize human behavior.	-	"For some people , the intangible HF concept can make them uncomfortable. 'engineers like to think that you put things together in a system, and that the system works, whether it is people or drill bits" [HSE director in small company] said. 'Unfortunately, human beings operate in a much more complex way.'" (Hsieh, 2014).

Aggregated constructs	Strategies of knowledge transformation	Explanation	Tension	Illustrative quotes
Struggling for discipline recognition by using self-referential strategies	Using generalized sales pitch to justify relevance of HF for drilling	The HF community's justifications focused on making references to the positive influence of HF in other industries, like aviation, and implicitly claiming generalizability to the drilling industry.	While the HF community emphasized generalizability, the drilling community operates from a deep belief that drilling is a unique industry. Even individual drilling operations are perceived to be unique.	*"The issue with HF is that it is not operationalized for drilling. It is basically copied from aviation and pasted on drilling."* (Drilling consultant). *"These rigs are like football teams. They are like Arsenal and Tottenham. One rig will tell you that everything about them is different to the other one. [Yet], as an outsider you will know that an Arsenal and Tottenham fan have 99% of everything they do in common. Except the team they support."* (HF consultant #1).
	Using decontextualized, non-technical knowledge in technically dominated environment	The HF community attempted to share abstract HF knowledge with the drilling community, for instance, using a specialist vocabulary.	The HF community implicitly assumed that having specialist HF knowledge is sufficient for making a positive contribution in the drilling industry. However, a lack of technical understanding of drilling and knowledge of worksite culture undermines the legitimacy of HF specialists.	*"I have become a little bit disillusioned, going into a major operator, being able to be the human factors person there, I though very naive that people would listen to me. But it is very frustrating, it is really not taken seriously"* (HF specialist in major oil company #3). *"If you use a bunch of jargon, you don't impress anyone when you are in a group of engineers or operations personnel. [HF specialists] think that moving in with that approach puts them at a position of authority. It doesn't, it just excludes them from the discussion."* (HF specialist in major oil company #1).

Aggregated constructs	Strategies of knowledge transformation	Explanation	Tension	Illustrative quotes
	Justifying HF as a distinct safety discipline in an efficiency-focused management environment	The HF community justified the HF discipline to the senior management constituency as a distinct safety discipline that is worthy of investment.	Justifying HF as a distinct safe discipline exposes it to budgeting pressures from senior management and the need to demonstrate the financial value of HF. However, it is difficult to place a numerical value on human factors interventions because it is impossible to show the causal relationship between an intervention and the non-occurrence of an incident.	*"it comes down to cost issues. [HF assessments] are very time consuming and therefore expensive. And many of the managers in the oil and gas industry are not trained in HF techniques. So, why should they invest the money in it?"* (HF consultant #3). *"The measurement and management of HF is really difficult."* (HF consultant #3).
Institutionalized learning mechanisms and responsibilities maintain knowledge boundaries			Institutional responsibilities for and practices of learning and risk management privilege the drilling community as the designated learning authority. Marginal communities like the HF community have less opportunities and resources to engage in learning initiatives and thereby shape field-level learning processes.	*"I think the problem is, if you look at what [industry association] OGP did, they are a bunch of self-appointed people. Because you have to remember how these committees occur. OGP got member companies, so it is 'who has an idle moment and who is interested?' It does not mean that they are knowledgeable."* (Drilling consultant). *"I was invited to a meeting of the Oil & Gas UK human factors and competency workgroup. I basically sat around the table with these engineers and the twenty members couldn't get their head around what non-technical skills were [...] I think I was the first person to go along and speak to them who had any type of HF background."* (HF consultant #2).

Aggregated constructs	Strategies of knowledge transformation	Explanation	Tension	Illustrative quotes
			The field-wide adoption of HF guidelines is limited by the principle of voluntary adoption and the lack of regulatory pressure for adoption.	*because they're guidelines rather than standards, the [HF] reports will never receive universal buy-in from everybody."* (Director of training center). *I had a meeting with the senior management of [UK regulator] recently, looking at their ongoing strategy and I am pretty sure human factors wasn't actually mentioned."* (Regulatory inspector #2).

Appendix B – Codebook chapter four

Underlying concepts	Second-order strategies	First-order codes: strategies used	Exemplary quote
Self-idealization	Justifying regime	Presenting regime as example	"This is an ideal opportunity for the European Commission, and Member States, to learn from the offshore oil and regulatory practice adopted by experienced national regulators." (UK regulator consultation).
		Highlight positive track record	"This dynamic, goal setting safety regime has served us well for over twenty years of operations during which time nearly 7,000 wells have been successfully drilled in the UK continental shelf." (Chevron public consultation).
		Emphasize improvements since Piper Alpha	"The UK offshore oil and gas industry has a proactive, flexible and responsive approach to managing risks, borne out of the lessons learnt from Piper Alpha as well as the evolving nature of the offshore oil and gas business itself." (UK association position paper).
	Showcasing response	Anticipatory mobilization	"The UK offshore oil and gas industry has a proactive, flexible and responsive approach to managing risks, borne out of the lessons learnt from Piper Alpha as well as the evolving nature of the offshore oil and gas business itself."
		Portraying learning initiative as comprehensive	"Following the Macondo accident in the Gulf of Mexico, the TOTAL Group has carried out a thorough internal review, setting up three internal working groups, focussing on Prevention, Intervention and Spill Response, to ensure that we learn all relevant lessons from this accident." (Total public consultation).
		Setting ultimatum	"We will work together, we will work with the EC, bring us in to the discussion, let us participate, let us bring our expertise and our knowledge to you. Let us improve safety, that is what we are committed to. Do not shut us out. But if you do that, then we will work, and we will shout and we will spread the word that what you do will put peoples' life at risk." (Interview UK unionist).
		Showcasing tangible learning outcomes	"A visible example of this perpetual drive for continual improvement in practice is the work of OSPRAG which reviewed the UK regulatory regime following the Macondo incident, and took the necessary steps required to improve UKCS oil spill prevention through a requirement for demonstrable competency schemes and response capability by development of the capping device." (Position paper UK association).

Underlying concepts	Second-order strategies	First-order codes: strategies used	Exemplary quote
Proclaiming united stance	Aligning coalition members	Aligning goals	*"Malcolm Webb, Oil & Gas UK's chief executive, said: "The safety of the workforce is the UK oil and gas industry's top priority. When considering how this would be affected by the proposed EU regulation, exactly the same conclusion is reached by oil and gas companies and trade unions representing the workforce alike." (Press release UK association).*
		Reinforcing unitedness	*"I have to say that the UK is strongly opposed to the regulation and in that regard we have very strong alliance, not only across the industry, and I say the industry here and across Europe as well, but also politically in the UK as well. There is complete political alliance on this, the government and the opposition partners are all firmly against it." (Speech UK association).*
	Showcasing united stance	Backing up coalition partners	*"The supervision of offshore operators needs to be conducted primarily by the national regulators with responsibility for offshore safety and well design/operations. It is important that offshore installations are not inspected by duplicate parties seeking to verify similar processes." (BG Group public consultation).*
		Emphasizing single purpose	*"We are actually more united under this safety banner than we probably have been for many years and probably since Piper Alpha. I see this very much as we few, we happy few, we band of brothers gathered together before the European Union fortress." (Speech HSE director industry association).*
Discrediting others	Problem framing	Constructing alternative problem frame	*"Based on the industry's experience, OGP believes it is essential to recognise the effectiveness of, and the need to continuously improve, the currently robust national regulatory regimes. The priority should be to focus on enhancing safety in Member States with emerging upstream industries." (International association position paper).*
		Distancing from other regimes	*"Policy and practice in the UK are substantially different to those employed in the US Gulf of Mexico and there is no cause for public concern that the industry standards and regulatory practices and procedures employed in the UK are not fully fit for purpose. They are, and they militate strongly against anything like Macondo ever happening here." (Press release UK association).*

Underlying concepts	Second-order strategies	First-order codes: strategies used	Exemplary quote
		Appealing to proportionality	"Only a handful of EU Member States have significant offshore oil production, with the majority of EU Member States having none at all. It follows therefore that any action to alter the offshore regulatory regime at the EU level will affect only a small minority of EU Member States, with the UK experiencing by far the biggest impact." (E.On public consultation).
		Challenging irrational intervention	"We are deeply concerned by the Energy Commissioner's comments, which seem to be pointing towards a wholly unjustifiable, knee-jerk reaction to the events in the Gulf of Mexico. In the UK, our regime for safety is clearly more advanced than that applying in the United States. Furthermore, given that the cause of the incident in the US is still unclear, the rush to judgement and the suggestion of a moratorium on drilling in UK waters is, in my view, wholly unwarranted." (Press release UK association).
	Safety framing	Invoking frame of regression	"In our opinion, this will undermine the effective and proven approach of the current regulatory goal setting system. Moreover, it disturbs the present coherence of the present safety systems and –plans resulting in uncertainties and duplication of work without any contribution to enhancing safety and the protection of the environment." (Position paper NL association).
		Invoking frame of collapse	"You know, to be brutal about it. If it had gone to EU legislation rather than the directive, I think it would have been the death nail for the oil and gas industry in the UK, when it came." (Interview HSE professional).
	Control framing	Accusing the Commission of control agenda	"You should always remember that the proposal is actually part of a different agenda, in which the commission is looking for Europeanization of energy powers." (Speech UK association).
		Appealing to principle of subsidiarity	"Respect the general principle of subsidiarity regarding regulation of individual Member States' offshore oil and gas activities and, therefore, the right of individual Member States to control their respective energy resources." (E.On public consultation).

ENGLISH SUMMARY

On April 20, 2010, offshore drilling rig Deepwater Horizon was engaged in deepwater drilling operations in the US Gulf of Mexico when it lost pressure control over the Macondo well (Read, 2011). Oil and gas violently blew out of the well, found an ignition source, and exploded. Eleven workers on the platform got killed in the explosion, which set off the largest accidental offshore oil spill in worldwide history. An estimated 4 million barrels (636 million liters) of oil spilled into the Gulf of Mexico during 87 days before the well got capped. The oil spill had devastating effects on ecosystems, local communities, and coastal industries.

The Macondo disaster illustrates that the very organizational processes that produce benefits for society – e.g. energy production and -security – may also trigger industrial disasters with serious consequences (Beck, 1992). When disasters occur, organizations have the responsibility to learn from the experience with the purpose to avoid similar disasters in the future (Lampel et al., 2009; Smith & Elliott, 2007). Given the apparent increase in amount and impact of disasters (Perrow, 1999), learning from disasters has become an increasingly important topic in organizational research (Lampel et al., 2009).

Still, more research is needed to better understand the phenomenon (e.g. Buchanan & Denyer, 2013). Most research on learning from disaster addresses learning by the organizations involved in the accident, but fails to investigate learning mechanisms in higher-level collectives, such as populations of organizations or industries (Lampel et al., 2009). This is unfortunate, because higher-level learning is important for organizations in high-risk industries. Disasters have universally applicable lessons, which are relevant for organizations beyond those involved in the disaster (Elliott & Smith, 2006). This allows organizations to learn without being affected by a disaster's catastrophic impact (Sagan, 1994).

In this dissertation I address this gap by investigating learning from disaster at the level of an organizational field. An organizational field is defined as a community of organizations with disparate interests – including competitors, suppliers, consumers, regulatory agencies, special interest groups, and associations – that interact frequently with each other about a central issue of interest (DiMaggio & Powell, 1983; Hoffman, 1999). The concept of organizational field places organizations from an industry in a wider context of social relations and institutions (McAdam & Scott, 2005). *The objective of this doctoral thesis is to better understand how actors in an organizational field collectively attempt to learn from disaster*. I aim to shed light on the processes of field-level learning from disaster, to better

understand *how* it unfolds, and explain *why* it unfolds in a particular direction. I focus on the organizational field of offshore drilling following the Macondo disaster, in which organizations with different interests debated the issue of offshore safety.

My definition of organizational fields draws attention to political processes (Hoffman, 1999). This is relevant for research on disasters. Different actors – because of their specific interests, knowledge, and identity – create different accounts of what happened, and propose different solutions to improve risk and safety management (Brown, 2004). Field-level discourses about disasters may thus be characterized by contestation between opposing actors and interpretations (Hoffman, 1999). I specifically investigate the political processes in field-level learning from disaster. This is important, because struggles between conflicting interests are frequently overlooked in learning research (Lampel et al., 2009; Sagan, 1994). Learning tends to be perceived as a rational process to improve organizational effectiveness, rather than a political process to protect or further parochial interests. This dissertation thus provides an alternative perspective on how learning from disasters takes place. The main research question for this dissertation is: *How and why do actors in an organizational field initiate and maintain the contested process of field-level learning from disaster?*

RESEARCH CONTEXT, DESIGN, AND METHODS

The Macondo disaster did not just trigger a crisis for the involved companies – BP, Transocean, and Halliburton – it was a shock throughout the US and even the global offshore industry. Also in Europe did actors perceive the need to re-evaluate established risk management practices and regimes to assess their appropriateness (European Commisison, 2011). As such, it seemed that the crisis spilled over to the European offshore industry, causing European actors to establish learning initiatives. My inquiry focused on field-level learning processes and dynamics in the North Sea region following April 20, 2010.

In this dissertation I take a qualitative research approach. Qualitative research is particularly useful for the research objective of this dissertation as it explains the *how* and *why* of complex social phenomena (Denzin & Lincoln, 2000). A qualitative approach emphasizes actors' interpretations of the Macondo disaster, why they develop particular accounts and learning solutions, and why different actors contested each other (Gephart, 1984). I collected a variety of data sources from diverse actors playing a key role in the field-

level learning dynamics. I focused particularly on nationally operating actors from the Netherlands and the United Kingdom, as well as actors operating on the transnational level.

The main data source in my dissertation is publicly available, secondary data sources, such as accident investigation reports, industry reports, and regulatory documents. Furthermore, I conducted 43 semi-structured interviews with safety professionals working for the European Commission, national regulators, national governments, oil companies, consultancies, associations, training providers, and unions. The third body of data consisted of notes taken during various industry conferences – in London, Aberdeen, Esbjerg, and Amsterdam - in which I focused on industry responses to the Macondo disaster, and observations at a well control training center in the Netherlands to experience how offshore crews are trained and learn how training practices changed in the wake of Macondo.

EMPIRICAL STUDIES

Chapter Two – How many blowouts does it take to learn the lessons? An institutional perspective on disaster development.

Chapter two presents evidence why field-level learning is important in high-hazard industries. The Macondo disaster showed many similarities with other accidents and near-misses in the offshore drilling industry (Read, 2011). The research objective was to better understand how disasters develop and why similar disasters keep recurring across organizations in high hazards industries. So far, explanations of disaster causation have primarily emphasized the role of *intra*-organizational causes (Reason, 1997). However, I argue that these perspectives do not adequately capture the influence of the external institutional environment that often affects an entire industry. This chapter proposes new institutional theory as a new perspective on disaster causation.

Institutions are socially accepted rules, norms, values, and beliefs, which define appropriate ways of behavior in a society or industry (Scott, 2008). When organizations integrate institutions in their practices, stakeholders - e.g. regulators, politicians, and customers - grant them a 'public license to operate'. This improves an organizations ability to survive. In turn, this will drive similar behavior across organizations in an industry (Meyer & Rowan, 1977; Scott, 2008). Institutions are relatively resistant to change (Jepperson, 1991). As such, when operational conditions change quickly, for instance through technological innovations, a mismatch may emerge between institutionalized practices and operational

requirements. In this situation, institutionalized practices become dysfunctional (DiMaggio & Powell, 1991). In high-hazard industries, dysfunctional institutionalized practices can undermine organizational safety and contribute to the persistent recurrence of similar disasters in different organizations or plants, even after they have been identified and targeted in recommendations before (Elliott & Smith, 2006).

My qualitative institutional analysis of a multitude of offshore drilling accidents identified a mismatch between the complexity of offshore drilling operations and extant risk management and training practices. This study showed that risk management practices depict a static, fragmented, and solely technical conceptualization of risk. I argued that this conceptualization is inadequate for a hazardous, complex, and dynamic setting as offshore drilling and increases the risk for accidents. Furthermore, this study traced back these harmful conceptualizations of risk to persistent institutionalized training practices in the industry, which have not co-evolved with the increasing complexity of offshore operations. It was found that training practices reinforce these inappropriate conceptualizations of risk in the industry by focusing predominantly on technical-procedural competence. I argue that this has lead to systemic shortcomings in risk management in the entire offshore drilling sector. This points to the need for field-level learning to solve these industry-wide shortcomings. I recommend professionalizing occupational training by standardizing non-technical skills- and systems risk management training. This way, workers will be better equipped for dealing with the complexities of offshore drilling.

Chapter Three: Justifying superior knowledge from the periphery – struggles of a marginal community to influence learning in the wake of disaster.

Building upon the insight that field-level learning from disaster is important, the following chapters shed more light on the political processes of field-level learning from disaster. Chapter three conceptualizes field-level learning as a struggle between powerful, established actors and less powerful, marginal actors in an organizational field. Previous research has found that established actors in an organizational field attempt to maintain the status quo following a disaster by imposing their own disaster account and proposed solutions on other actors (Brown, 2000). This seems to suggest that less powerful, marginal actors cannot influence the learning process. Yet, other research streams have indicated that marginal actors are not powerless. They may drive institutional change in a field by using political strategies (Fligstein & McAdam, 2012; Maguire & Hardy, 2009). They have to overcome knowledge- and political boundaries to transform established practices (Carlile,

2002; 2004). The research question is: *how does a marginal community attempt to influence learning from disaster processes that are driven by established communities?*

I analysed the activities of the marginal Human Factors (HF) community to initiate in a radical change in the North Sea offshore oil and gas industry following the Macondo disaster. Being convinced of their superior knowledge, they attempted to persuade two established communities– the drilling community and senior managers from oil companies – to adopt their expertise about the psychology of decision-making. However, this study showed that persuasion of the established communities was complicated by the presence of knowledge sharing boundaries. First, I found that institutionalized mechanisms and responsibilities for learning favored the drilling- and senior management communities as principal learning agents. The HF community therefore had less opportunities to influence field-level learning. Finally, this study showed that a semantic boundary emerged between the communities that was rooted in different assumptions about human error and incident causation. This led to divergent disaster accounts and calls for action, complicating efforts to convince the established communities of the need for radical change. Also, I showed how political boundaries emerged as the HF community aimed to become more established in the drilling industry. They engaged in strategies of discipline recognition, but these persuasive strategies were largely 'self-referential', such as emphasizing the success of HF in other hazardous industries. They did not contextualize their specialist knowledge and language to the dominant discourse and values of the drilling and management communities. Hence, it undermined the HF community's legitimacy in the eyes of the established communities.

This study indicates the need for marginal communities to engage in strategic political actions to influence learning from disaster, while also maintaining awareness of potential institutional constraints such as institutionalized values, discourses, and learning mechanisms and responsibilities. The failure of marginal communities to overcome knowledge and political boundaries between themselves and established communities may contribute to field-level learning that reinforces established knowledge and practices, rather than change deeper assumption, values, and beliefs. Technical expertise seemed to dominate the learning proces, at the expense of the psychological expertise of HF specialists. Hence, I claim that learning was shaped by and reinforced the dominant technical paradigm in the drilling industry.

Chapter four – Field-level learning from disaster - a dynamic process of contestation following crisis spillover

The aim of this chapter was to better understand the politics of learning from disaster following spillover of a legitimacy crisis to a different organizational field. I argue that field-level learning becomes especially urgent and political when a disaster triggers a legitimacy crisis that spills over to an industry as a whole. In this chapter, I conceptualize field-level learning following crisis spillover as a dynamic, contested process in which opposing actors continuously enact their competing interests in response to opposing actors' actions. When learning from disaster takes place in an extremely politicized environment, this affects how disaster prevention and response measures are changed. It was proposed that spillover to a different region introduces particular dynamics of contestation to the process of field-level learning from disaster. The research question is: *How do field actors contest each other's learning initiatives over time following spillover of disaster implications to a different organizational field?*

Similar to chapter three, the starting point is the risk governance crisis in Europe that was triggered by the Macondo disaster. I investigate how a new actor in the field challenged established safety practices and called for radical change in safety legislation. While chapter three illustrated political processes between established communities and a less powerful marginal community, in chapter four I investigate political dynamics in the context when the challenging actor – in this case the European Commission – was particularly powerful and motivated to make a change in offshore safety legislation in the European Union. This study empirically examined the political struggle between two actor groups: the European Commission versus a tripartite coalition from the North Sea region consisting of oil industry actors, national regulators, and trade unions. Using a longitudinal research design I illustrate how two actor groups organized different field-level initiatives following the Macondo disaster and how they contested each other's initiatives over time. This study indicates how contestation involved a narrative conflict that was rooted in opposing institutional discourses about risk governance. The contestation revolved around core issues of risk governance, like: '*Who should be responsible for risk governance?*'; '*At what level should risk governance be organized?*'; '*What is the appropriate improvement philosophy?*'; and '*who should have control over risk governance and natural resource extraction?*'

This conflict was sustained over time through the dynamic interaction of discursive strategies. In particular, this study identifies three core practices of contestation that the coalition used to limit the intervention of the European Commission: *discrediting others*,

self-idealization, and *proclaiming a united stance*. These discursive strategies served to claim sole learning authority at the expense of the European Commission. I found that after a period of intense contestation the Commission adapted their proposal for new offshore safety legislation to accommodate the objections of the tripartite coalition.

IMPLICATIONS FOR THEORY

Contributing to disaster causation literature

This dissertation contributes to the literature on disaster causation by developing an institutional perspective on disaster development (Chapter Two). An institutional perspective on disaster development sensitizes researchers to go beyond *intra*-organizational factors and investigate the influence of the institutional environment. I showed how taken-for-granted beliefs about risk and institutionalized training practices in high hazard industries become harmful when they remain stable while the task environment becomes increasingly complex.

Contributing to learning from disaster research

This dissertation contributes to the literature on learning from disaster in multiple ways. The emphasis on concepts like 'organizational field' and 'institutions' helps to understand how learning from disaster is constrained by institutionalized practices, discourses, and power relations. I introduced the notion of 'field-level learning from disaster', which recognizes these factors and relates to a higher level of analysis than the common organizational perspective on disasters. Also, this dissertation contributes to the political perspective of learning from disaster by investigating how established and marginal actors in an organizational field contest each others' interpretations and suggested solutions and strive to protect their interests. Previous studies tend to portray politics of learning from disaster as a process dominated by powerful actors, such as corporations and government bodies. These actors constrain the search for causes and aim to maintain established institutions and authority relations in place (e.g. Brown, 2000; Elliott & Smith, 2006). This dissertation highlights how learning involves marginal actors and communities struggling to initiate radical changes and overcome defensiveness by established powerful actors. However, if marginal communities are unable to convince established actors to adopt new knowledge, learning from disaster will likely be *'paradigmatic'* (Deschamps et al., 1997) – i.e. focused on refining established knowledge, practices, and goals, while leaving deeper assumptions, values, and beliefs unchanged. As such, this study provides new insights in

the mechanisms that prevent deep 'cultural readjustment' in the wake of a disaster (Turner & Pidgeon, 1997).

IMPLICATIONS AND RECOMMENDATIONS FOR PRACTICE

This dissertation also has practical implications. It contributes to a better understanding of how disasters are caused and how learning occurs following a disaster. Hence, it provides new knowledge on how disasters may be prevented.

As mentioned in Chapter two, I argue for the need for professionalization in occupational training in the offshore drilling industry to improve risk management. I claim that the *nature* of training needs to change to better equip the offshore workforce for increasingly complex operations. A broader conceptualization of worker competence is necessary, including both technical and non-technical skills, as well as an understanding of complex system dynamics. Also, some degree of standardization will resolve harmful variability in training across organizations. I argued standardized training should address at least non-technical skills and system risk management.

Chapter two also indicated that an institutional perspective on disaster causations has important implications for learning in practice. Industrial disasters partly have institutional origins that are not specific to the involved organizations, but may be more widespread in an industry. These may drive the recurrence of similar disaster development patterns within and across organizations in an industry. These findings imply that investigations teams should aim to identify institutional contributing causes beyond the organizational setting in which a disaster occurred. This could be achieved by comparing the causation pattern with other investigated incidents and disasters, either within or outside the organization. Furthermore, I hope these insights will motivate managers and safety professionals to perceive disasters in other organizations as opportunities for improving safety practices in their own organization. A common response in the wake of a disaster is 'it could not happen here' (Smith & Elliott, 2007). Chapter two shows that such claims ignore the role of the institutional environment in disaster development, and are clear illustrations of a dangerous "myth of infallibility" (Sagan, 1994). Recent incidents in the North Sea region, like the Bardolino near-miss and Elgin gas blowout have indicated that disasters similar to the Macondo blowout could definitely happen in the North Sea as well.

This dissertation also has implications for how actors learn from disaster. It posits that learning from disaster *per definition* is not a neutral process but characterized by struggles between competing interests and perspectives (Coopey, 1995). Learning tends to be shaped privileged actor groups. This has important implications for what is being learned, and what is not. This dissertation showed that the technically oriented drilling community had a strong influence on field-level learning from the Macondo disaster. As such, the majority of lessons learned in the North Sea region focused primarily on *technical* improvements: of preventive, containment, and response equipment; technical procedures; and technical training. Instead, the non-technical HF community had less opportunity to influence the field-level learning process. As a consequence, few changes were implement to address human and organizational factors, despite convincing evidence in accident research that these factors play a fundamental role in creating safe and resilient organizations (e.g. Reason, 1997). Hence, the drilling industry missed out on the opportunity to 'stress test' established knowledge and enrich their techinal perspective with new insights from other communities and actors to drive more robust learning. I discovered that for marginal communities to contribute to field-level learning, they have to strategically translate their knowledge and learning proposals to explicitly link them to dominant discourses and values.

A more participative perspective on learning as opposed to a technocratic 'expert' notion of learning may provide voice to alternative insights and knowledge. Disasters are complex phenomena (e.g. Perrow, 1999), hence, diverse bodies of knowledge from diverse epistemic disciplines – engineering, psychology, sociology, anthropology, economics, political sciences etc – are necessary for understanding how disasters develop and may be prevented. I propose that oil companies and associations should stimulate an open discussion with other field members, providing marginal communities with the opportunity to voice their perspective, and actively seek out new insights and knowledge. Pluralistic discussions are fundamentally important in the context of risk. The central question 'what level of risk is deemed acceptable' cannot be answered from a technocratic approach of rational calculations. Such ethical questions should be the subject of democratic learning and risk governance processes (Beck, 1992; Renn, 2008).

NEDERLANDSE SAMENVATTING

Op 20 april 2010 boorde offshore boorinstallatie Deepwater Horizon de Macondo put in de diepe wateren van de Golf van Mexico toen het controle over de druk verloor (Read, 2011). Olie en gas spuwde uit de put op de boorinstallatie, vond een ontstekingsbron, en ontplofte. Elf mensen op het platform werden gedood in de ontploffing, welke vervolgens de grootste onopzettelijke olieramp op zee veroorzaakte in de wereldwijde geschiedenis. Een geschatte hoeveelheid van 4 miljoen vaten (636 miljoen liter) olie lekte in de Golf van Mexico gedurende 87 dagen voordat de put gedicht werd. De olieramp had een verwoestend effect op ecosystemen, lokale gemeenschappen, en lokale industrieën.

De Macondo ramp illustreert dat de organisatieprocessen die voordelen creëren voor de maatschappij – zoals energieproductie en –zekerheid – ook industriële rampen kunnen veroorzaken met ernstige gevolgen (Beck, 1992). Als industriële rampen plaatsvinden hebben organisaties de verantwoordelijkheid om te leren van deze catastrofale ervaring, met als doel vergelijkbare rampen te voorkomen in de toekomst (Lampel et al., 2009; Smith & Elliott, 2007). Gegeven de schijnbare toename in de hoeveelheid en impact van industriële rampen (Perrow, 1999) is het onderwerp 'leren van rampen' van toenemend belang voor organisatieonderzoek (Lampel et al., 2009).

Er is echter meer onderzoek nodig om dit fenomeen beter te begrijpen (Buchanan & Denyer, 2013). De meeste onderzoeken over leren van industriële rampen bestuderen leerprocessen die in gang zijn gezet door de organisaties die betrokken waren bij het ongeluk, maar vergeten om leerprocessen in grotere collectieven te onderzoeken, zoals populaties van organisaties of industrieën (Lampel et al., 2009). Dit is zonde, want leerprocessen in grotere collectieven zijn belangrijk voor organisaties in risicovolle industrieën. Industriële rampen verschaffen universeel toepasbare lessen, welke ook relevant zijn voor organisaties die niet direct betrokken waren bij een ramp (Elliott & Smith, 2006). Dit geeft organisaties de mogelijkheid om de leren zonder dat ze de directe schadelijke effecten van een ramp ondervinden (Sagan, 1994).

In dit proefschrift adresseer ik dit hiaat door te onderzoeken hoe leren van rampen plaatsvindt in een organisatieveld. Ik definieer een organisatieveld als een gemeenschap van organisaties met verschillende belangen – zoals concurrerende bedrijven, toeleveranciers, consumenten, toezichthouders, belangengroepen, en associaties – die regelmatig interacteren met elkaar over kwesties die hen allemaal aangaan (DiMaggio & Powell, 1983; Hoffman, 1999). Het concept organisatieveld plaatst bedrijven uit een industrie in een bredere context van sociale relaties en instituties (McAdam & Scott, 2005).

Het doel van dit proefschrift is om beter te begrijpen hoe actoren in een organisatieveld collectief proberen te leren van een industriële ramp. Ik streef ernaar om nieuw licht te schijnen op de processen van leren van rampen op veld-niveau, teneinde beter te begrijpen *hoe* dit plaatsvindt, en te verklaren *waarom* dit op deze manier gebeurt. In dit proefschrift richt ik mij op het organisatieveld van offshore olieboringen na de Macondo ramp, waarin organisaties met verschillende belangen discussieerden over de kwestie industriële veiligheid.

Mijn definitie van organisatievelden vestigt de aandacht op politieke processen (Hoffman, 1999). Dit is een relevante focus voor onderzoek naar industriële rampen. Verschillende actoren – vanwege hun specifieke belangen, kennis, en identiteiten – ontwikkelen verschillende verklaringen van wat er fout is gegaan, en stellen op basis daarvan verschillende oplossingen voor met betrekking tot risico- en veiligheidsmanagement (Brown, 2004). Discoursen over rampen op veld-niveau worden daarom gekenmerkt door strijd en betwisting tussen tegenpartijen en interpretaties. Ik onderzoek specifiek deze politieke processen. Dit is belangrijk, want de strijd tussen conflicterende belangen worden vaak over het hoofd gezien in onderzoek over leren (Lampel et al., 2009; Sagan, 1994). Leren wordt vaak beschouwd als een rationeel proces om de effectiviteit van organisaties te verbeteren, in plaats van een politiek proces om belangen te beschermen of te bevorderen. Dit proefschrift biedt daarom een alternatief perspectief op hoe leren van ongelukken plaatsvindt. De hoofdonderzoeksvraag is: *Hoe en waarom dragen actoren in een organisatieveld bij aan het conflictueuze proces van gemeenschappelijk leren van een industriële ramp?*

ONDERZOEK CONTEXT, ONTWERP, EN METHODEN

De Macondo ramp veroorzaakte niet alleen een crisis voor de betrokken bedrijven – BP, Transocean, en Halliburton – het was een schok voor de Amerikaanse industrie en zelfs de wereldwijde offshore boorindustrie. Ook in Europa zagen belanghebbenden de noodzaak om gevestigde risicomanagement praktijken en –regimes opnieuw te evalueren op hun geschiktheid (Europese Commissie, 2011). Vandaar kun je stellen dat de risicomanagement crisis zich verspreidde naar de Europese offshore boorindustrie, waar Europese belanghebbenden verschillende leerinitiatieven opzetten. Mijn onderzoek richt zich op leerprocessen en dynamieken in het organisatieveld in de Noordzeeregio vanaf 20 april 2010.

In dit proefschrift hanteer ik een kwalitatieve onderzoekaanpak. Kwalitatief onderzoek is bijzonder nuttig voor mijn onderzoeksdoel, omdat het zich richt op het verklaren van het *hoe* en *waarom* van complexe sociale fenomenen (Denzin & Lincoln, 2000). Kwalitatieve methoden benadrukken de interpretaties van actoren van de Macondo ramp, waarom ze bepaalde verklaringen en oplossingen ontwikkelen, en waarom verschillende actoren strijden met elkaar (Gephart, 1984). Ik verzamelde een variëteit aan databronnen van verschillende actoren die een centrale rol speelden in de leerdynamieken op veldniveau. Ik focuste voornamelijk op actoren uit Nederland en het Verenigd Koninkrijk, en daarnaast op actoren die op transnationaal niveau actief zijn.

De voornaamste databron in mijn proefschrift in publiekelijk toegankelijk materiaal, zoals onderzoeksrapporten van incidenten, industrierapporten, en wetgevingsdocumenten. Daarnaast heb ik 43 semigestructureerd interviews gehoudenmet veiligheidsprofessionals die werkten voor de Europese Commissie, nationale toezichthouders, nationale overheden, oliebedrijven, adviesbureaus, associaties, training organisaties, en vakbonden. De derde groep data omvatte notities geschreven tijdens verschillende industriecongressen – in London, Aberdeen, Esbjerg, en Amsterdam – waar ik mij richtte op reacties uit de industrie op de Macondo ramp. Tevens heb ik non-participatieve observaties gedaan in een well control trainingcentrum in Nederland om te ervaren hoe bemanning van offshore installaties wordt getraind en om uit te zoeken hoe training praktijken zijn veranderd vanwege de Macondo ramp.

EMPIRISCHE STUDIES

Hoofdstuk twee – Hoeveel blow-outs zijn er nodig om lessen te leren? Een institutioneel perspectief op de veroorzaking van rampen.

Hoofdstuk twee presenteert empirisch bewijs waarom leren op veldniveau belangrijk is voor risicovolle industrieën. De Macondo ramp had veel overeenkomsten met andere ongelukken en near-misses in de offshore boorindustrie (Read, 2011). Het onderzoeksdoel was om beter te begrijpen hoe rampen veroorzaakt worden en waarom vergelijkbare rampen en incidenten blijven terugkomen over de hele linie van organisaties in risicovolle industrieën. Tot nu toe hebben verklaringen van de oorzaken van rampen hoofdzakelijk de *intra*-organisationele factoren benadrukt (Reason, 1997). Ik beargumenteer echter dat deze perspectieven niet voldoende de invloed van de externe institutionele omgeving adresseren, welke vaak invloed heeft op een hele industrie. Dit hoofdstuk stelt de institutionele theorie voor als nieuw perspectief op de veroorzaking van rampen.

Instituties zijn algemeen geaccepteerde regels, normen, waarden, en overtuigingen, die voorschrijven wat passend gedrag is in een maatschappij of een industrie (Scott, 2008). Als organisaties instituties integreren in hun praktijken zullen belanghebbenden – zoals toezichthouders, politici, en consumenten – hen een "publieke vergunning voor bestaansrecht" verlenen. Dit verbetert het vermogen van organisaties om te overleven. Tevens zal het vergelijkbaar gedrag stimuleren in een industrie (Meyer & Rowan, 1977; Scott, 2008). Instituties zijn bestand tegen verandering (Jepperson, 1991). Als operationele omstandigheden snel veranderen, bijvoorbeeld door technologische innovaties, kan een mismatch ontstaan tussen geïnstitutionaliseerde praktijken en operationele vereisten. In een dergelijke situatie worden deze praktijken dysfunctioneel (DiMaggio & Powell, 1991). In risicovolle industrieën kunnen dysfunctionele geïnstitutionaliseerde praktijken de veiligheid in organisaties ondermijnen. Door hun hardnekkige karakter kunnen deze praktijken vergelijkbare rampen en incidenten veroorzaken in verschillende organisaties of fabrieken, zelfs als ze al eerder zijn geïdentificeerd en geadresseerd in aanbevelingen (Elliott & Smith, 2006).

Mijn kwalitatieve institutionele analyse van meerdere offshore boorincidenten heeft een mismatch geïdentificeerd tussen de complexiteit van offshore booroperaties en bestaande risicomanagement- en trainingspraktijken. Ik ontdekte dat risicomanagementpraktijken de notie 'risico' voorstellen als een statisch, gefragmenteerd, en hoofdzakelijk technisch concept. Ik betoogde dat een dergelijke conceptualisering ontoereikend is voor een risicovolle, complexe, en dynamische setting zoals offshore booroperaties, omdat het risico op ongelukken op deze manier vergroot wordt. Deze studie herleidde dit ontoereikende geïnstitutionaliseerde concept naar hardnekkige geïnstitutionaliseerde trainingspraktijken in de industrie, welke niet voldoende mee ontwikkeld zijn met de toenemende complexiteit van offshore booractiviteiten. Ik ontdekte dat trainingspraktijken het ontoereikende concept van risico dieper verankerde in de industrie door hoofdzakelijk te focussen op technisch-procedurele competenties. Ik betoog dat dit heeft geleid tot systematische tekortkomingen in risicomanagement in de gehele offshore boorindustrie. Dit benadrukt de noodzaak voor leren op veldniveau om deze tekortkomingen op te lossen. Ik adviseer dat trainingspraktijken voor offshore bemanning worden geprofessionaliseerd door 'non-technical skills' en systeem risicomanagement training te standaardiseren. Op deze manier wordt bemanning beter uitgerust om om te gaan met de complexiteiten van offshore booractiviteiten.

Hoofdstuk drie: het rechtvaardigen van superieure kennis vanuit de periferie – de strijd van een marginale gemeenschap om leerprocessen in een veld te beïnvloeden in de nasleep van een ramp.

Voortbouwend op het inzicht dat het belangrijk is om op veldniveau te leren van een ramp zullen de volgende hoofdstukken meer licht schijnen op de politieke processen van leren in een veld. Hoofdstuk drie conceptualiseert 'leren op veldniveau' als een strijd tussen machtige, gevestigde actoren en minder machtige, marginale actoren in een veld. Eerder onderzoek heeft gevonden dat gevestigde actoren na een ramp zullen proberen om de status quo in een veld te behouden door hun eigen verklaring en voorstellen voor verbetering op te leggen aan andere actoren (Brown, 2004). Dit lijkt te suggereren dat marginale actoren geen invloed kunnen uitoefenen op het leerproces in een veld. Andere onderzoekstromingen hebben echter aangeduid dat marginale actoren niet machteloos zijn. Zij kunnen institutionele veranderingen aandrijven door politieke strategieën te hanteren (Fligstein & McAdam, 2012; Maguire & Hardy, 2009). Zij dienen kennis- en politieke barrières tussen henzelf en gevestigde actoren te overwinnen om gevestigde praktijken te kunnen transformeren (Carlile, 2000; 2004). De onderzoeksvraag is: *hoe probeert een marginale professionele gemeenschap om leerprocessen in de nasleep van een ramp te beïnvloeden die worden vormgegeven door gevestigde gemeenschappen?*

Ik analyseerde de activiteiten van de marginale Human Factors (HF) gemeenschap om een radicale verandering te bewerkstelligen in de offshore industrie in de Noordzeeregio in de nasleep van de Macondo ramp. Overtuigd zijnde van hun superieure kennis probeerde de HF gemeenschap om twee gevestigde professionele gemeenschappen – booringenieurs en senior managers van oliebedrijven – over te halen om hun kennis van de psychologie van besluitvorming over te nemen. Ik ontdekte echter dat hun poging bemoeilijkt werd door de aanwezigheid van verschillende kennis- en politieke barrières. Allereerst stelde ik vast dat de gevestigde gemeenschappen bevoorrecht werden door geïnstitutionaliseerde leermechanismen en –verantwoordelijkheden. De HF gemeenschap had daardoor minder mogelijkheden om leerprocessen in het veld vorm te beïnvloeden. Tevens legde het een semantische barrière bloot tussen de gemeenschappen die was geworteld in verschillende aannames en overtuigingen over menselijke fouten en oorzaken van incidenten. Dit leidde tot uiteenlopende verklaringen en oproepen tot actie. Dit bemoeilijkte vervolgens de pogingen om de gevestigde gemeenschappen te overtuigen van de noodzaak voor een radicale verandering. Daarnaast ontdekte ik hoe politieke barrières ontstonden toen de HF gemeenschap probeerde om meer gevestigd te worden in de boorindustrie. Zij gebruikten strategieën voor erkenning van hun discipline, maar deze persuasieve strategieën waren

voornamelijk 'zelf-referentieel'. Zij benadrukten bijvoorbeeld het succes van de HF discipline in andere risicovolle industrieën. Echter pasten zij hun specialistische kennis en taalgebruik niet effectief aan aan de dominante discourse en waarden van de booringenieurs en senior managers. Dit ondermijnde de legitimiteit van de HF gemeenschap in de ogen van de gevestigde gemeenschappen.

Deze studie geeft de noodzaak aan voor marginale gemeenschappen om strategische politieke acties te gebruiken om in de nasleep van een ramp leerprocessen te beïnvloeden. Tegelijkertijd is het belangrijk dat zij zich bewust zijn van potentiele institutionele beperkingen, zoals geïnstitutionaliseerde waarden, discoursen, en leermechanismen en –verantwoordelijkheden. Als marginale gemeenschappen falen om kennis- en politieke barrières voor kennisdeling tussen henzelf en gevestigde gemeenschappen te overwinnen, zullen leerprocessen in een organisatieveld de gevestigde kennis en praktijken aanscherpen en daarmee dieper verankeren. Radicale verandering van diepere aannames, overtuigingen, en waarden zal dan onwaarschijnlijk zijn. Technische expertise leek het leerproces te domineren ten koste van psychologische expertise van HF specialisten. Vandaar dat ik betoog dat het dominante technische paradigma de leerprocessen gevormd heeft, en hier vervolgens dieper door verankerd werd in de industrie.

Hoofdstuk vier – Leren van rampen op veldniveau – een dynamisch proces van betwisting na spillover van een crisis

Het doel van dit hoofdstuk was om het politieke karakter van leren van rampen beter te begrijpen in de context van spillover van een legitimiteitscrisis naar een ander organisatieveld. Ik beargumenteer dat leren op veldniveau bijzonder urgent en politiek wordt als een ramp een legitimiteitscrisis genereerd die zich verspreid over een hele industrie. In dit hoofdstuk conceptualiseer ik leren op veldniveau na spillover van een crisis als een dynamisch proces van betwisting waarin tegenpartijen continu hun belangen proberen te bekrachtigen in reactie op elkaars acties. Als leren van rampen plaatsvindt in een extreem gepolitiseerde omgeving beïnvloedt dit hoe ramppreventie- en herstelmaatregelen aangepast worden. Ik heb voorgesteld dat spillover naar een andere regio specifieke dynamieken van betwisting introduceert in leerprocessen op veldniveau. De onderzoeksvraag is: *Hoe betwisten veld actoren elkaars' leerinitiatieven in het geval van spillover van een legitimiteitscrisis na een ramp naar een ander organisatieveld?*

Net als in hoofdstuk drie is het startpunt de risicomanagement crisis in Europa die ontstond na de Macondo ramp. Ik onderzocht hoe een nieuwe actor in het veld in opstand kwam tegen gevestigde veiligheidspraktijken en radicale verandering in veiligheidswetgeving wilde bewerkstelligen. In tegenstelling tot hoofdstuk drie, welke liet zien hoe een relatief zwakke gemeenschap streed om een radicale verandering door te voeren, focuste ik in hoofdstuk vier juist op een bijzonder machtig actor: de Europese Commissie. Ik bestudeerde de politieke strijd tussen: de Europese Commissie versus een driedelige coalitie uit de Noordzeeregio bestaande uit actoren uit de olie industrie, nationale toezichthouders, en vakbonden. Met een longitudinaal onderzoek ontwerp illustreerde ik hoe de twee actorgroepen verschillende leerinitiatieven organiseerden in de nasleep van de Macondo ramp en hoe zij elkaars' initiatieven betwistten. Deze studie liet zien hoe deze strijd de vorm aannam van een conflict tussen narratieven, welke geworteld waren in tegenstrijdige institutionele discoursen over risico governance. De betwisting draaide om essentiële kwesties zoals: *'Wie zou er verantwoordelijk moeten zijn voor risico governance?';* *'Op welk niveau moet risico governance georganiseerd worden?'; 'Wat is de juiste verbeter filosofie?';* en *'Wie zou er controle moeten hebben over risico governance en de extractie van natuurlijke bronnen?'*

Het conflict hield aan gedurende meerdere jaren door de dynamische interactie van discursieve strategieën. Deze studie identificeerde drie kern praktijken van betwisting die de coalitie gebruikte om de beoogde interventie van de Europese Commissie te beperken: *de Commissie in diskrediet brengen; zelf-idealisering;* en *het verkondigen van een verenigd standpunt tegen de Commissie.* Deze discursieve strategieën dienden om gezag over de leerprocessen in het veld op de eisen, ten koste van de Europese Commissie. Ik zag dat de Europese Commissie na een periode van intense betwisting hun voorstel voor nieuwe offshore veiligheidswetgeving aanpaste om tegemoet te komen aan de bezwaren van de coalitie.

IMPLICATIES VOOR THEORIE

Bijdragen aan de literatuur over het veroorzaken van rampen

Dit proefschrift draagt bij aan de literatuur over industriële rampen door een institutioneel perspectief te ontwikkelen over hoe rampen ontstaan (hoofdstuk twee). Een institutioneel perspectief op ramp ontwikkeling wijst onderzoekers erop om voorbij *intra*-organisationele oorzaken te gaan en de invloed van de institutionele omgeving te onderzoeken. Ik liet zien dat overtuigingen over risico en training die als vanzelfsprekend worden beschouwd een

gevaar kunnen vormen voor veiligheid als ze niet veranderen terwijl de werkomgeving steeds complexer wordt.

Bijdragen aan onderzoek over leren van rampen

Dit proefschrift draagt op meerdere manieren bij aan de literatuur over leren van rampen. Het benadrukken van concepten als 'organisatieveld' en 'instituties' helpt om te begrijpen hoe leerprocessen in de nasleep van een ramp beperkt worden door geïnstitutionaliseerde praktijken, discoursen, en machtsrelaties. Ik introduceerde de notie van 'leren van rampen op veldniveau', wat deze factoren erkent en de aandacht richt op een hoger analyse niveau dan het dominante organisatieperspectief in de rampliteratuur. Daarnaast draagt dit proefschrift bij aan een politiek perspectief op leren van rampen door te onderzoeken hoe gevestigde- en marginale actoren in een veld elkaars' verklaringen en voorgestelde oplossingen betwisten, alsmede hun belangen proberen te beschermen. Eerder onderzoek lijkt de politieke aspecten van leren van rampen af te schilderen als een proces dat gedomineerd wordt door machtige en gevestigde actoren, zoals bedrijven en overheidslichamen. Deze actoren beperken de zoektocht naar oorzaken en zullen proberen om gevestigde instituties en machtsrelaties in stand te houden (Brown, 2000; Elliott & Smith, 2006). Dit proefschrift benadrukt hoe marginale actoren en gemeenschappen strijden om radicale leerinitiatieven te organiseren en de verdedigende houding van gevestigde gemeenschappen te overwinnen. Echter, als marginale actoren niet in staat zijn om gevestigde actoren te overtuigen om nieuwe kennis over te nemen, zullen leerprocessen waarschijnlijk '*paradigmatisch*' zijn (Deschamps et al., 1997) – oftewel gefocust op het aanscherpen van gevestigde kennis, praktijken, en doelen, terwijl dieperliggende aannames, waarden, en overtuigingen onveranderd blijven. Hierdoor biedt dit proefschrift nieuwe inzichten in de mechanismen die een culturele verandering voorkomen na een ramp (Turner & Pidgeon, 1997).

IMPLICATIES EN AANBEVELINGEN VOOR DE PRAKTIJK

Dit proefschrift heeft ook praktische implicaties. Het draagt bij aan een beter begrip van hoe rampen ontstaan en hoe leren plaatsvindt na een ramp. Het verschaft dus nieuwe kennis over hoe rampen kunnen worden voorkomen.

Zoals genoemd in hoofdstuk twee betoog ik de noodzaak voor het professionaliseren van training van bemanning in de offshore boorindustrie om risicomanagement te verbeteren. Ik beargumenteer dat de aard van training dient te veranderen om offshore

bemanning beter voor te bereiden op de toenemende complexiteit van booractiviteiten. Een breder begrip van competentie is nodig, welke zowel technische als niet-technische vaardigheden omvat, alsmede begrip van dynamieken in complexe systemen. Daarnaast is standaardisering van training op het gebied van niet-technische vaardigheden en systeemrisico kennis nodig om variabiliteit in de industrie te verhelpen.

Hoofdstuk twee gaf ook aan dat een institutioneel perspectief op het ontstaan van rampen belangrijke implicaties heeft voor leren in de praktijk. Industriële rampen hebben deels institutionele wortels. Deze institutionele factoren zijn niet uniek voor de bedrijven die betrokken zijn bij een ramp, maar zijn wijdverspreid over de linie van organisaties in een industrie. Deze institutionele factoren kunnen bijdragen aan een herhaling van vergelijkbare rampen en incidenten bij organisaties in een industrie. Deze bevinding impliceert dat onderzoeksteams, naast het identificeren van intra-organisatiefactoren, zich moeten richten op institutionele factoren. Dit kan gerealiseerd worden door de oorzaken van een bepaalde ramp te vergelijken met andere onderzochte rampen en incidenten, zowel binnen als buiten de betreffende organisatie. Daarnaast hoop ik dat deze inzichten managers en veiligheidsprofessionals zullen motiveren om rampen in andere organisaties te zien als mogelijkheden om veiligheid te verbeteren in hun eigen organisatie. Een gebruikelijke reactie na een ramp is 'het zou bij ons nooit kunnen gebeuren' (Smith & Elliott, 2007). Hoofdstuk twee laat zien dat zulke beweringen de invloed van de institutionele omgeving onderschat, en zijn duidelijke illustraties van een gevaarlijke 'mythe van onfeilbaarheid' (Sagan, 1994). Recente incidenten in de Noordzee regio, zoals de Bardolino near-miss en de Elgin gas blow-out hebben aangeduid dat rampen zoals de Macondo blow-out ook plaats kunnen vinden in de Noordzee.

Dit proefschrift heeft ook implicaties voor hoe actoren leren van rampen. Ik stel dat leren van rampen *per definitie* geen neutraal proces is maar gekenmerkt door een strijd tussen tegengestelde belangen en perspectieven (Coopey, 1995). Leren wordt vaak vormgegeven door bevoorrechte actoren. Dit heeft belangrijke consequenties voor wat er uiteindelijk wordt geleerd, en wat niet. Dit proefschrift laat zien dat de technisch georiënteerde boorgemeenschap een sterke invloed had op leerprocessen in het veld naar aanleiding van de Macondo ramp. Vandaar dat de meerderheid van geleerde lessen in de Noordzee zich richtten op *technische* verbeteringen: van preventie en beheersingsuitrusting; technische procedures; en technische training. Echter, de marginale HF gemeenschap had minder mogelijkheden om leerprocessen te beïnvloeden. Als gevolg zijn er weinig veranderingen geïmplementeerd die menselijke en organisatiefactoren van veiligheid

adresseren, ondanks overtuigend bewijs dat deze factoren een fundamentele rol spelen in het creëren van veilige en veerkrachtige organisaties (e.g. Reason, 1997). Vandaar dat de boorindustrie een belangrijke mogelijkheid hebben laten schieten om hun gevestigde kennis te testen en hun eigen technische perspectief te verrijken met nieuwe inzichten. Op deze manier hadden robuustere lessen geleerd kunnen worden. Ik ontdekte dat marginale kennisgemeenschappen kunnen bijdragen aan leerprocessen in een veld als zij hun kennis en leervoorstellen vertalen om ze te linken aan dominante discoursen en waarden.

Een meer participatief perspectief op leren, in tegenstelling tot een technocratisch 'expert' perspectief, kan een stem geven aan alternatieve inzichten en kennis (Beck, 1992). Rampen zijn complexe fenomenen (Perrow, 1999), dus is kennis nodig uit verschillende kennisdomeinen – zoals techniek, psychologie, sociologie, economie, antropologie, politieke wetenschappen, et cetera – om te begrijpen hoe rampen ontstaan en voorkomen kunnen worden. Ik beveel aan dat bedrijven en associaties uit de olie industrie een open discussie moeten stimuleren met andere actoren uit het veld, en actief op zoek moeten naar nieuwe kennis. Naast het feit dat dit kan helpen bij het vinden van blinde vlekken en het verbeteren van veiligheid, is er ook een ethisch argument voor pluralistische discussies over risico. De vraag 'welke niveau van risico is acceptabel' kan niet beantwoord worden met een technocratische aanpak van rationele berekeningen. Dit is bij uitstek een ethisch vraagstuk, welke uitsluitend beantwoord kan worden in democratische leer en risico governance processen (Beck, 1992; Renn, 2008)

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Phew! Here we are! It is hard to believe that I am actually writing the final sentences of my thesis. It has been a long journey, a period of five years that actually feels more like ten. But the perseverance has paid off! Many of my friends, colleagues, family, and other acquaintances outside academia will probably think (at least that is what I expect them to think ;-)): "What? have you really worked that long on this quite cool-looking, but nevertheless fairly short book?" Yes, I have! A great deal of thinking, considering, contemplating, then some more rethinking, adapting, reshaping, and writing, writing and especially endless rewriting (yuck!) has materialized in this thesis and I am very proud of it! Besides a tremendous intellectual challenge that has both been very satisfying and sometimes very exhausting, for me this thesis represents even more so a personal journey. I feel that the many ups-and-downs, feelings of happiness and frustration, growing confidence and persistent self-doubt have contributed a great deal to my growth as a person. Of course, these academic and personal accomplishments aren't solely the result of my own efforts. Many people have in some way or another helped me on this journey; cheering me on, supporting me, brainstorming with me. So I would like to use these pages to express my gratitude to these people.

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ABOUT THE AUTHOR

Bruno Verweijen was born on July 23, 1988 in Culemborg, the Netherlands. He received his high school diploma (VWO, Natuur & Gezondheid) from the Koningin Wilhelmina College in Culemborg in 2006. Being interested in environmental issues, he went on to pursue a Bachelor's degree in Earth Sciences from Utrecht University, which he completed in 2009. After finishing, he decided to change his major to business administration to better understand how organizations contribute to environmental problems, as well as how they may contribute to findings solutions for these issues. After completing a schakeljaar in business administration at the Radboud University, he pursued a Master's degree in Business administration from the same university, with the specialization International Management. He wrote a Master thesis on the subject risk governance in the offshore oil and gas industry. During his Master, he also studied at Montpellier Universite 2 in France for five months as part of the Erasmus exchange programme.

In 2012, Bruno started his PhD research at the Institute of Management Research. His PhD project was a continuation of the topic of his Master thesis, focusing specifically on the issue learning from disaster in the offshore oil industry. During his project, he presented several studies at international academic conferences, like the *European Group of Organization Studies (EGOS)* colloquium and the *Process Research in Organization Studies (PROS)* conference. Furthermore, he contributed to the practitioner conference 'Getting Grips on Human Factors in Drilling' in London in 2014. This conference led to a publication together with several co-authors in the practitioner outlet *Journal of Petroleum Technology*. One chapter, co-authored by his supervisor, was accepted for publication in the academic journal *Safety Science*.

Besides working on his research, Bruno acted as PhD representative in Works Council of the Faculty of Management Sciences. Also, he was coach for PhD candidates for the university's human resources department. In this function he assisted PhD candidates with diverse career questions. Finally, he was lecturer for the department of Business administration in the Bachelor course *Systems Theory* and the Master course *Organizations and Society*. He also supervised Bachelor's and Master's theses.

Currently he has got a job as an industrial safety consultant for an international engineering- and consultancy firm.