University of Strathclyde Department of Business

EMPLOYEE RESPONSIBILITY AND VIRTUALITY DURING CRISIS DECISION-MAKING

by

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Signed: *Date:*

DEDICATION

This thesis is dedicated to my parents, Anastasia (Bessie) and the late Patrick Arthur Furey (Art), for instilling in me the importance of higher education and hard work.

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ABSTRACT

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Abstract

The purpose of the qualitative case study was to (a) explore crisis decision-making that occurs in a virtual environment such as the Ocean Ranger offshore oil rig by (a) assessing the official report of the incident, (b) conducting interviews with oil and gas industry workers, and based upon results, (c) developing a model for crisis decision-making in a distributed organization. The model includes a breakdown of sensemaking during a crisis, organizational structure, communication and collaboration, both virtual and face-to-face, during a crisis, as well as normalization. The model also includes definitions of responsibility and variables that can assist in determining whether or not a situation is a crisis, and the impact of this determination on the decision-making apparatus.

The collection of data was implemented with interviews of 37 oil rig workers and examination of the official report of the Royal Commission for the Ocean Ranger Disaster. Interviewees ranged from oil rig workers to management workers. A semi-structured interview protocol taking 60 to 120 minutes was implemented with open-ended questions.

Five main findings emerged. The first main finding was the higher the seriousness of the risk, the lower the clarity of the unfolding crisis situation. The second main finding was that workers alter their perception of an event after the crisis has been averted to make it seem less serious than it was. The third finding was that workers believe someone will always come along to solve an impending problem. The fourth finding was that workers who are experienced are more proactive, flexible, and less likely to be bound by rules. The fifth finding is that the rulebook is a double-edged sword.

The first recommendation was to ensure that all rigs have secondary ballast control systems. The second recommendation was to ensure that employee training provides awareness to the components of the decision-making model, specifically, those that lead to a crisis. Recommended future studies could include testing the decision-making model in a crisis situation, such as the 2010 British Petroleum oil crisis in the Gulf of Mexico, to determine its fit with other crises in other industries. Also, it was recommended that a comparative study of oil and gas workers in the North Sea offshore oil industry take place.

CHAPTER 1: INTRODUCTION

1.1 Introduction

On Valentine's Day, 1982, a storm raged off the shores of Newfoundland, Canada. One hundred and seventy nautical miles east of St. John's, Newfoundland's capital city, waves higher than 20 feet beat against the "unsinkable" OR oil rig. As the storm unfolded the rig began to tip. It later capsized, causing the entire 84-man crew to lose their lives. The study reported herein is a qualitative case study examination of the crisis decision-making through virtual mediums that occurred among oil and gas workers experiencing the oil rig disaster. Leading up to the disaster were virtual conversations between decision-makers from the shore to the oil rig, from shore to ship, oil rig to shore, shore to the Coast Guard and helicopters, shore to other oil rigs, oil rig to other oil rigs, and shore to other shore installations. Virtual mediums used included telephone, telex, radio, and Marine Satellite (MARISAT), and communication involved both one-on-one exchanges and collaboration of several personnel working together virtually on shore and on the oil rig.

The context of the study is the exploration of the process of decision-making manifested through various forms of virtual communication and collaboration by personnel involved in the Ocean Ranger disaster. The following sections trace changes in the structure of organizations from vertical decision-making to horizontal decision-making, and decision-making by collaboration as opposed to decision-making by one individual. Use of virtual communication in today's global business environment and distributed decision-making are discussed in light of the Ocean Ranger disaster that cost the lives of 84 workers.

1.2 Communication and Distributed Organizational Structure

Organizational leaders in a variety of business sectors are engaged in making basic structural changes to organizations to meet the highly competitive global business environment that exists in 2010 (Bettis & Hitt, 1995). Among them are organizations in the oil and gas industry, the focus of the present inquiry. Five factors have shifted organizations from the traditional vertical structure of decision-making to new models of leadership: (a) the emergence of flat or horizontal organizational structures; (b) organizational environments that require inter-

organizational cooperation as well as competition; (c) changes in worker expectations of organizational participation; (d) a continual shift from production to service/knowledge work environments; and (e) an increase in globalization of trade and corporate activity (Townsend et al., 1998). The oil and gas industry is currently grappling with several of these challenges.

To assist in making the changes and meeting the need for rapid communication on a global basis with distant offices, the industry is in the process of implementing a virtual environment in which teams of experts half-a-world apart can communicate in real time and make decisions. Information technology mediums are supporting the globalization of communication, and in the case of the Ocean Ranger oil rig disaster off the coast of Newfoundland, the subject of this dissertation, those mediums included telephone, telex, radio, MARISAT, and email. Townsend, DeMarie, and Hendrickson (1998) asserted:

> Until recently, when you said you worked with someone, you meant by implication that you worked in the same place for the same organization. Suddenly though, in the blink of an evolutionary eye, people no longer must be co-located - or, in the same place - in order to work together. This new workplace will be unrestrained by geography, time, and organizational boundaries; it will be a virtual workplace, where productivity, flexibility, and collaboration will reach unprecedented new levels (p. 2).

1.3 Virtual Work and Decision-Making

The emergence of a virtual work environment is an important issue regarding decision-making. Although point-to-point transmission of information has been available to the oil and gas industry for over 20 years, the speed, scale, and versatility of that communication has been changed by technology (Copeland, 2006). Copeland reported that many companies now have alliances, business partners, and employees spread around the world in many different countries. Elmuti (2003) noted that factors characterizing the manner in which the oil and gas industry was conducted in 2002 included communication, flexibility, and collaboration for decision-making. In 2010, communication and decision-making in some business areas of the oil and gas industry can be totally virtual, such as that between decision-makers on shore and those on an offshore oil rig.

Both domestic and multinational enterprises rely on the employment of virtual employees and teams (Workman, 2005). Widely dispersed employees with specialized expertise functioning in horizontally structured operations are a primary source of information that results in accurate and timely decisions (Workman); however, the decision-making process itself may be confounded by distributed leadership. Personnel who must make fast decisions in a crisis may not have a firm idea of whose responsibility it is to make the decisions. Li, Fan, Dunne, and Pedrazzoli (2005) contended technology effects decision-making either because of possible information overload, or a lack of information. Barkhi, Amiri, and James (2006) concluded communication or coordination problems are less likely in teams meeting face-to-face. Barkhi et al. asserted members of teams tend to blame remote members for unfavorable outcomes, collaborate primarily with co-located members, avoid communication links with remote members, have difficulties with coordination, and tend to shift blame for the results to others. Problems associated with communication over technology can affect clarity in meaning and understanding of requirements that can result in frustration and wasted time (Rao, Earls, & Sanchez, 2007).

As oil drilling projects grow increasingly complex, locations have become more remote with fewer oil experts co-located to manage them. Oil companies and service providers are seeking ways to bundle expertise and reduce safety costs; for instance, distributed work arrangements reduce safety costs. Taking the well to the geologist rather than the other way around has the benefit of reducing safety costs in environmentally hostile places such as the North Sea where poor decision-making resulted in a major disaster, or the 2010 Gulf of Mexico deep-water oil rig disaster, where the specifics of the decision-making that led to the disaster have yet to be determined.

Decision-making in a distributed environment, which exists in the Canadian oil and gas industry, has resulted in a heightened focus on the management of decision-making in the Provinces of Newfoundland and Labrador (NL). Decision-making is more pertinent now than at any time in history as NL is preparing the expand operations exponentially. NL is currently in the process of developing its fourth offshore well. NL is the second leading oil producing province in Canada, with a production of 340,000 barrels per day, which is 12.5% of Canada's crude oil

production.

Increased production comes at a time when many Newfoundlanders and Labradorians are leaving NL to work in Alberta and other parts of western Canada. This migration is one of the primary concerns of the government and the electorate. In the Province of NL, the western migration of workers is commonly referred to as "outmigration." Development of NL's economic interests, particularly natural resources such as oil and gas, would stem the outmigration in favor of increased opportunities for employment in the region. The province's fledgling oil and gas industry is benefiting the local economy, and four major oil drilling projects are currently being developed termed Hibernia, Terra Nova, White Rose and Hebron.

Environmental concerns abound regarding the protection of the rich fishing grounds and the abundant seabird population in the area of the projects. The Canada-Newfoundland and Labrador Offshore Petroleum Board (CNLOPB), the industry regulator, is in charge of managing the petroleum resources in NL on behalf of the federal and provincial governments. The Province of NL is seen as exemplary of the regulatory process because of the extremes the industry must deal with, particularly the water depths, iceberg hazards, and the cold-ocean environment of the North Atlantic. With these risks in the background of economic development, the manner in which decisions are made is of upmost importance as the development of problems can be sudden and unexpected and require fast and accurate decision making by leadership. The role of virtual communication in decision-making where fast response is required to avert a disaster is critical. A search of the literature failed to uncover any empirical study of the virtual environment in which the Ocean Ranger disaster occurred.

1.4 Statement of the Problem

The Ocean Ranger oil rig disaster, upon which the present case study was based, resulted in the loss of all 84 crewmembers. The disaster has implications for the efficacy of communication technology in a crisis situation, decision-making through virtual mediums, training for decision-making in a crisis situation, and leadership. The research is relevant within the global economy where there is an increase in distributed work arrangements. While there has been considerable research in the area of decision-making and crisis management, there is a paucity of research on crisis decision-making in a distributed environment, and no empirical

study of the crisis decision-making through virtual media that was taking place before, during, and after the Ocean Ranger oil rig disaster.

1.5 Purpose of the Study

The purpose of the qualitative case study was to (a) explore the decision-making that occurs in a virtual environment such as that of the Ocean Ranger offshore oil rig by (a) assessing the official report of the incident, (b) conducting interviews with oil and gas industry workers, and based upon results, (c) developing a model for crisis decision-making in a distributed organization. The model includes a breakdown of sensemaking during a crisis, organizational structure, communication and collaboration, both virtual and face-to-face, during a crisis, as well as normalization. The model also includes definitions of responsibility together with the variables that can assist in determining whether or not a situation is a crisis, and the impact of this determination on the decision-making apparatus.

While the results may be important to the oil and gas industry, they are particularly relevant for decision-makers during a crisis in a distributed environment. To develop a crisis decision-making model, the quest for data included the breakdown of socially constructed meanings during the Ocean Ranger disaster, experience of crewmembers, a repressive control culture, avoidance of responsibility due to fear of repercussions, confusion over the identity of the decision-maker, and the number of decision-makers who affected the identification of the situation as a crisis and the subsequent impact on decision-making and normalization.

1.6 Significance of the Study

The model that was developed may have use in many businesses other than the oil and gas industry. Many different dangerous and rugged environments exist where decisions must be made quickly to avert disaster, and although the offshore oil and gas industry has many decision-makers, there is nothing specific about oil rig projects that would hinder the model that has been developed from being transferable and flexible for use in other distributed environments. For instance, military organizations around the world have multiple decision-makers in different places, and some have experienced problems with decision-making in friendly fire situations, resulting in catastrophe. The model could be used by fire fighters whose structure consists of a central base, an outside group of workers, and those who are inside structures fighting fire.

In addition, some elements of the model and knowledge gained could be applied to other sectors of crisis intervention such as police and emergency medical responders. A decision-making model for employees in high-risk environments and crisis responders could reduce the risk of a bad decision. The present case study used the decision-making process during the Ocean Ranger oil rig disaster in the Province of NL, Canada as an example of how virtual decision-making can take place during a crisis situation when no model exists with the result of a catastrophic loss of human life.

1.7 Research Question and Nature of the Study

Based on the previous sections, the primary research question developed for investigation in the case study was:

Does a virtual work environment affect crisis decision-making?

The qualitative case study used the Ocean Ranger oil rig catastrophe in the province of NL as an example of a distributed work environment where decision-making intended to avert disaster was based primarily on virtual communication. The results were used to develop a crisis decision-making model to address the problems around accountability in crisis situations. In developing the model, twelve variables are identified. Impact of the variables was determined based upon the identification of a situation as crisis, or non-crisis. Regardless as to whether the situation is classified as a crisis or non-crisis situation, the normalization component of the model feeds back into the model, further complicating the breakdown of socially constructed meanings during a crisis.

The collection of data was implemented with interviews of 37 experienced oil rig workers, 11 of whom were interviewed in a pre-study review of the content of the interviews that were to follow with the remaining 26 workers. The interview process was terminated after 37 interviews because of lack of new data. Interviewees ranged from oil rig workers to management workers. Findings included content of all 37 interviews. A semi-structured interview protocol was implemented with open-ended questions to gather data and ensure all interviews were consistent in approach. The procedure and protocol is described in detail in Chapter 3, and the interview protocol is appended.

Rich data can be retrieved through careful implementation of an interview process (Denzin & Lincoln, 2005; Huberman & Miles, 2002; Miles & Huberman,

1994). The objective was to conduct semi-structured interviews lasting 60 to 120 minutes, as well as follow-up interviews for clarification if needed. The study was intended to implement the lens of a socially constructed knowledge researcher (Lincoln & Guba, 1985, 2000; Neuman, 2000; Schwandt, 2000). Creswell (2009) asserted socially constructed knowledge acknowledges that individuals "develop subjective meanings of their experiences" (p. 8) and these experiences lead researchers to "look for the complexity of views rather than narrowing meanings into a few categories or ideas" (p. 8). The study was closely focused on participant's views of the distributed work environment and use of virtual communication for decision-making, and the efficacy of both during crises. A detailed description of the methodology will be found in Chapter 3.

Ethics approval for the study was granted by the Interdisciplinary Committee on Ethics Research (ICEHR) as shown in Appendix A. Interviews of 60 to 120 minutes were conducted with people who worked or have worked on land-based or offshore oil rigs/vessels to determine whether they were communicating virtually while making decisions, and if so, if virtuality had an effect on the decisions that were made. Data was gathered using qualitative case study research techniques. Such techniques were well suited for the examination of crisis decision-making in virtual situations because they allowed for an in-depth understanding of worker experiences in the oil and gas industry.

In addition to the semi-structured interviews, a documentary analysis was undertaken to review accident reports, media interviews, and research publications associated with the Ocean Ranger disaster. Results of the interview data analysis were compared with findings from the official inquiry conducted by the Royal Commission Report on the Ocean Ranger Disaster (RCORD). The Royal Commission report is discussed in Chapter 7. Results were of assistance in identifying and categorizing the findings and developing a model for crisis decision-making.

1.8 Contribution of Research to Theory

The results of the study provided the following significant contributions to organizational theory. The major contribution of the study was to enhance the understanding and knowledge of decision-making in crisis situations in a distributed environment. This research contributes to Vaughan's (1996) normalization theory by extending the application beyond the technocentric to social practice. Social practices

are also prone to normalization. Organizational theory (Morgan, 1989) tends to exaggerate structure and neglects process (Tsoukas, 2003). Social construction erodes organizational structure in crisis situations. The conflicting organizational structure and social construction requires a process-based theory about how organizations behave that is more amenable to social construction.

With the inclusion of the two additions to theory identified above, the study culminated in the development of a model, found in later chapter, to aid workers in understanding of how people take or abdicate responsibility in crisis situations. The model consists of key variables: (a) how socially constructed meanings change during a crisis, (b) experience, (c) repressive control culture, (d) avoidance of responsibility due to fear of repercussion, (e) waiting, (f) confusion over the identity of the decision maker, (g) the number of decision makers, and (h) normalization. Based on the data from the study, the model is illustrative of how these variables impact the identification of a situation as a crisis, and the associated impact on decision-making and normalization, in particular, in a virtual communication environment.

1.9 Assumptions and Limitations

The following assumptions and limitations were inherent in the research design. Every measure reasonably possible was taken to assure objectivity and representation of the field of study. This researcher assumed all volunteers for the study were unbiased and truthful in all responses during the interviews. It was assumed that this researcher was unbiased. It was assumed that participants had a common perspective about distributed work environments and virtual decision-making. It was assumed that the interviews would reveal a common area of knowledge. Reliability of the Royal Commission evidence and assessments is assumed. Hickman may have been a judge but in his role as Commissioner he was more vulnerable. The foremost authorities on the issue of partisan political pressure reducing the independence of Canadian public inquiries are lawyers Ed Ratushny and Tamar Witelson. According to Witelson (2003) and Ratushny (2009) in their roles as judges, commissioners are non-partisan and they enjoy guarantees of judicial tenure and financial security. However both scholars draw attention to the lack of explicit legal protections guaranteeing the independence of inquiry commissioners. Independence of Commissioners is not legally protected the same way that

independence of judges is protected. The literature on Canadian public inquiries contains no allegations that lack of express protection of Commissioner independence has led to systemic Commissioner bias. This research revealed no indication that Hickman was biased. It is reasonable to assume the Royal Commission Hickman-led inquiry was reliable

Limitations may have included the changeability of the oil and gas industry environment or economic conditions, which may have had some impact on attitudes or perceptions of the participants. The possibility of personality conflicts with the researcher or other problems may have been a factor that biased participants. The relatively small sample for research was somewhat opportunistic and might have yielded a limited research result. Additional limitations are discussed in Chapter 9.

1.10 Definition of Terms

1.10.1 Collaboration

Collaboration is an interactive knowledge-based process involving multiple participants employing complementary skills to deal with collective objectives (Hartono & Holsapple, 2004).

1.10.2 Communication

Communication is defined (Lipnack & Stamps, 2002; Mattessich et al., 2001; Qureshi et al., 2006) as the process of establishing and utilizing clear and shared understanding and encompasses relationships, networking, and interactions (information processing) among people.

1.10.3 Coordination

Coordination is defined as (Arrow et al., 2000; Lipnack & Stamps, 2002; Mattessich et al., 2001; Qureshi et al., 2006) as establishment of process (goals), and understanding and task actions to achieve goals, availability, and delay. In the environment of offshore oil rigs, operations are conducted by groups or teams consisting of cross-functional members to develop and produce oil and oil byproducts for multinational organizations.

1.10.4 Distributed/Virtual Environment

The distributed/virtual organizational structure has evolved during the last decade in response to an increasingly complex and technological world. Research on distributed work is hindered by interchangeable terminology, such as *distributed* or *non-co-located* (Belanger & Collins, 1998; McCloskey & Igbaris, 1998;

Pinsonneault & Boisvert, 2001 in Belanger et al., 2003). In addition, a lack of relevant empirical literature exists about virtual teams in real working situations (Hertel, Geister &Konradt 2005; Martins, Gilson, & Maynard 2004).

1.10.5 Normalization

An abundance of research exists on normalization during a crisis, and the terms normalization and displacement are well established in the literature. Vaughan (1990) contended normalization is a psychological tendency among those responsible for identifying and responding to crises. Specifically, over time, they redefine and accept previously unexpected anomalies as expected events and, ultimately, as acceptable risks. Perrow's (1984,1999) influential 'normal crisis' theory posited that high-risk technology, tightly coupled with other organizational factors, is almost certain to lead to crisis due to systematic inability to handle the effects of human error.

1.10.6 Sensemaking

Weick is the authoritative voice on sensemaking with his seminal work contained in two volumes (Weick, 1995, 2001). Based on the work of Weick, Lamertz (2002) defined sensemaking as the means by which individuals interpret vague cues to make sense of the world in a narrative form. Pugh and Hickson (1996, p. 120) described Weick's sensemaking work as "rolling hindsight" (p. 65) because it was based upon other researchers' secondary data re-analyzed by Weick. Parry (2003) concluded that although Weick produced eloquent, intuitive, and well-referenced work, a body of critical work on the subject was not produced. For the most part, Weick reanalyzed other scholar's data, primarily from Porac et al. (1989) and Shrivastava (1987).

1.10.7 Technology

Technology encompasses a variety of synchronous and asynchronous tools that establish infrastructure for communication or collaboration (Hartono & Holsapple, 2004). Synchronous technologies include teleconferencing and other technologies that provide real time synchronous interaction between participants (Seilhemer et al., 2005). Asynchronous technology includes email and other technologies that encompass distant communication and delayed response (Seilhemer et al.).

1.10.8 Virtual Team

Lipnack and Stamp (2000) contended "A virtual team is a group of people who work interdependently with a shared purpose across space, time, and organization boundaries using technology" (p. 18). Offshore oil rig workers meet Lipnack and Stamp's definition of a virtual team as crew members frequently communicate with shore using phone and radio communication mediums to obtain assistance during the decision-making process. Instead of considering virtual teams as qualitatively distinct from conventional teams, the degree of "virtuality" of teams is often understood as a dimensional attribute (Martins et al., 2004; Hertel et al., 2005) in that virtuality is considered a matter of degree. Frequently, when virtuality is discussed in organizational studies it is used in referencing a new form of organization, the "virtual organization," or as a new form of organizing (Vakola & Wilson 2004). Several researchers have stated that the definition of virtuality should be based on the extent of geographic dispersion of the workers (Bell & Kozlowksi, 2002; Cohen & Gibson, 2003; Griffith & Neale, 2001).

Other researchers have suggested that virtuality has little to do with geographic dispersion and more to do with the extent to which electronically-mediated communication is utilized and the richness of the communication tools (Kirkman & Mathieu, 2005). In this regard, offshore oil rig workers who are non-distributed, but are communicating through non face-to-face means such as radio, are considered to be working as a virtual team. Communication among oil rig workers, as well as among oil rig and shore-based workers, are both examples of a distributed work setting with opposite degrees of virtuality based on physical proximity of communicators.

1.10.9 Virtual

The term "virtual" is used throughout this study in an interchangeable manner with "distributed." In the book *Virtual Teams: People Working Across Boundaries with Technology*, Lipnack and Jeffrey Stamp asserted that a virtual team is a group of people who work interdependently with a shared purpose across space, time, and organizational boundaries using technology" (Lipnack & Stamp 2000). Townsend et al. (1998) defined a virtual team as "geographically and/or organizationally dispersed co-workers that are assembled using a combination of telecommunications and information technologies to accomplish a task

1.11 Thesis Structure

The preceding chapter was intended to provide an overview of the research topic, including the background of the problem, the purpose of the study, ethical considerations, a definition of terms, contributions to theory, and the research questions and an overview of the methodology that was used, and which is discussed in detail in Chapter 3. The remainder of the thesis is organized in the following manner. Chapter 2 contains a review of the literature on communication and coordination, social construction/sensemaking, error in high technical organizations, an exploration of a distributed environment, and crisis management. Chapter 3 contains a rationale for the choice of a research methodology, the research methods, and procedural approach used for the study. Chapter 4 is a description of the Ocean Ranger offshore oil rig disaster drawn from official documents. Chapter 5 is an analysis of the crisis response during the oil rig disaster. Chapter 6 is a discussion of the results of the interviews with 37 members of the oil and gas industry. Chapter 7 is a discussion of the Royal Commission report. Chapter 8 reveals the process that was used to develop the model for crisis decision- making in a virtual environment. Chapter 9 contains conclusions and recommendation, followed by the Bibliography and Appendix.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter contains a review of relevant literature that establishes the context for how responsibility is handled in crisis situations, how people account for taking or avoiding responsibility, the attribution of responsibility to others, and how they make sense of written rules about responsibility. The first half of the chapter is a summary of the search strategy of the literature that was used to assess the extent of empirical literature pertaining to virtual communication and collaboration and to develop an understanding of how people make sense of the organizational workplace, and the theoretical foundations of how people tend to react in crisis situations. The second half of the chapter is a summary of the literature surrounding the human condition of making "normal" accident theory versus "highly reliable" organization theory. The second half also summarizes the empirical literature about crisis management in a distributed environment.

To gain an understanding of the environment in which responsibility for offshore platform operation is handled by distributed oil and gas workers who are making decisions during crises; the chapter also includes a review of the crisis management literature in a distributed environment. Normalization is also summarized to provide a picture of what workers do when handling close call situations. The chapter concludes with a review of safety culture literature which includes defining the term "crisis" and providing an understanding of the culture of crisis. The review of literature provides a foundation for understanding the primary research question as cited in Chapter 1, and a framework for understanding discussions with study participants who talk about close call experiences and oil rig safety culture.

2.2 Documentation

Scholarly books, seminal journal articles, and research documents were reviewed through Memorial University of Newfoundland at the Queen Elizabeth II Library**.** Additional databases searched included EBSCOhost. The online databases of Google also provided information for the search of the relevant literature. Bibliographic and reference listings were accessed from appropriate titles discovered within the review process. Approximately 200 current scholarly articles pertaining to

sensemaking, social construction, organizational structure, flexible organizational structure, organizational structure and crisis, safety culture, error in high tech organizations, normalization, crisis, crisis management, crisis communication, virtuality/non-collated, decision making, and distributed/non-collated decision, distributed decision making and crisis situations making were reviewed.

2.3 Communication and Collaboration

Widely dispersed virtual teams comprised of cross functional members performing independent tasks face challenges (Malhotra, Majchrzak, & Rosen, 2007) because mutual knowledge obtained through collaboration is precondition for cogent communication and effective performance in cooperative work (Cramton, 2001). Lipnack and Stamps (2000) asserted virtual teams require more leadership than traditional co-located teams. The distributed nature of leadership among virtual teams emphasizes the importance of the technological mediums used to communicate and coordinate.

Collaboration "is not always effective" (Mattessich, Murray-Close, & Monsey, 2001, p. 4). Collaboration per se is effected by virtual communication and limited by the understanding of technology across divergent groups (Cramton, 200; Lawrence, 2006; Qureshi et al., 2006; Walsh & Maloney, 2007). The collaborative teams within the context of the present study were comprised of people who manage and operate deep water offshore oil rigs in the ocean off Newfoundland. As such, the collaboration of dispersed teams both onshore and offshore is a critical element of task execution. Qureshi et al., 2006 and Walsh and Maloney (2007) contended the effects of technology can influence success or failure of collaboration efforts, and Malhotra et al. (2007) argued the increased use of technology requires understanding of how teams function when employing technology to achieve individual or collective goals. The Ocean Ranger oil rig venue was comprised of integrated virtual teams to provide expertise across functional areas to exchange information to meet team goals and problem solve. As a result, knowledge and shared meaning were critical during the crisis because integrated knowledge and meaning should have led to effective collaboration and communication (Cramton, 2001; Qureshi et al.).

The conditions "for communicating across space and time boundaries is intimately involved with the nature of their technology and how interactive it is" (Lipnack & Stamps, 2000, p. 198). The technology used for communication

influences effectiveness, and implements the accessibility that shapes team communication and interaction (Qureshi et al., 2006). Communication exchange is necessary to share ideas and information essential for successful multidisciplinary collaborative work (Doyle, 2008), and productivity is affected by a virtual environment where workers spend time getting work done through the use of communication technologies (Thomas, Bostrom, & Gouge, 2007). Seilheimer et al. (2005) posited a research focus on virtual team collaboration needs to occur because evolving technology is intended to enhance productivity and save costs, but has not been thoroughly examined. How people make sense of reality in a crisis situation such as that surrounding the Ocean Ranger tragedy is the subject of the next section.

2.4 Sensemaking

To gain an understanding of how people view organizations and make sense of the workplace, the following section is a discussion of theoretical lenses used to view organizations, as well as sensemaking theory as posited by Weick (1995, 2001). For instance, Miller (1956) proposed an *information processing theory* that posited, like the computer, the human mind is a system that processes information through the application of logical rules and strategies. The theory was visualized with a highly structured model consisting of a number of successive steps connected by arrows and boxes.

2.4.1 Three Theories

In contrast, the fundamental nature of the *contingency theory* model is that organizational effectiveness results from finding a fit between the organization and its contingencies (Burns & Stalker 1961; Lawrence & Lorsch, 1967; Pennings 1992; Woodward 1965) with change in movement resulting from a move from nonconformist to equilibrium. The theory recommends fitting characteristics of the organization to contingencies such as the environment (Burns & Stalker, 1961), organizational size (Child, 1975) and organizational strategy (Chandler, 1962) that reflect the circumstances of the organization. Correlations between contingency and structure have led some researchers to identify contingency theory as static in its mapping of organizational structure and design to contingencies (Galunic & Eisenhart, 1994). *Structuration theory* was proposed by Giddens (1984) who asserted that all human action is performed within the context of a pre-existing social structure which is governed by a set of norms and laws that are distinct from those of other

social structures.

The two theories theories in the preceding paragraphs are similar in their static properties, which are based on the application of rules and strategies, norms and laws, or the finding of a fit between an organization and its contingencies. Information processing theory, contingency theory, and structuration theory all indicate that human behavior is somewhat predetermined by the guidelines of the associated model. A more flexible means of viewing the world is through a lens that suggests that social reality is constructed, as opposed to partially predetermined. The *social construction theory* of Berger and Luckmann (1966) posited that individuals continually and jointly construct the social world or cognitive schemes that then become the reality to which they respond. Social construction theory is based on the proposition that social reality is constructed and embedded into the institutional material and structure of society.

2.4.2 Cognitive Schemes and Sensemaking

The development of Berger and Luckmann's (1966) cognitive schemes was guided by the sensemaking process. As proposed by Weick (1993). "The basic idea behind sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" with people trying to make things reasonably accountable to themselves and others (p. 106). Weick (2001) used the analogy of cartography to describe the sensemaking process. Maps are used to help explain reality. Individual compare their maps with those of others to "carve out a momentary stability in this continuous flow" (p. 9). Similarly, Cecez-Kecmanovic and Dalmaris (2000) stated that sensemaking involves processes of perceiving, believing, interpreting, explaining, predicting, and acting both individually and collectively in a given organizational setting.

Weick (2001) defined sensemaking within organizations as systems in which organizational members check with one another regarding the legitimacy of reality, and consequently, validate the required action. Similar to Weick's "truth" of reality, Pugh and Hickson (1996) concluded organizational members develop a "generic sensemaking" whereby individuals differ or concur, resulting in a sense of organization. Both Weick and Pugh and Hickson perceived organizations as sensemaking systems.

Weick (1995) contended there are "at least seven distinguishing

characteristics that set sensemaking apart from other explanatory processes such as understanding, interpretation and attribution" (p. 17). The seven characteristics include (a) a grounding in identity theory, (b) retrospection, (c) construction of reality, (d) a social activity, (d) ongoing, (e) focused on and by extracted cues, and (e) driven by plausibility rather than accuracy. Sensemaking is grounded in identity construction with the notion of self being constantly redefined by individual image of the self, which is formed by how individuals act and interpret the world. Individuals constantly look back at experiences to make sense of what took place at that time. Schutz (1967), Pirsig (in Winokur, 1990), and Harthorne (1962) all observed that people only know what they are doing after they have looked back at past experiences.

Another aspect of sensemaking is the enactive of sensible environments or the construction of reality. Weick (1995) used work enactment to describe this characteristic. People often produce the environment they face (Pondy & Mitroff, 1979). Weick, suggested "people or organizations act and create the materials that become the constraints and opportunities they face" (p. 3).

Yet another aspect of sensemaking is that it is considered a social activity contingent upon others. Sensemaking is also ongoing, meaning it never stops. It is focused on extracted cues that are simple familiar structures that are the seeds from which people develop a larger sense of what may be occurring. The final characteristic of sensemaking is that it is driven by plausibility rather than accuracy. Weick (1995) contended accuracy is good, but not necessary. The process of sensemaking is simply driven by a good story.

An explanation of socially constructed reality and accountability may be acceptable in a non-crisis situation (Weick, 1993); however, it is problematic in a crisis situation because of time pressures workers to assume that the problem will somehow be resolved. Consequently, crisis contingency plans are not triggered early enough and no one accepts responsibility because of the delay in recognizing reality or accountability, which was explored with the present study of the Ocean Ranger oil rig disaster where 84 workers lost their lives.

2.5 Normal Accident Theory/ Highly Reliable Organization Theory

Drawing on the Normal Accident Theory (NAT) vs. Highly Reliable Organization theory (HRO) debate, Turner (1994) acknowledged that "normal"

accidents can happen the way Perrow (1984) defined them. They cannot be prevented by improving "sloppy" management, which serves to avoid most disasters, and can only be averted by "large-scale system re-design" (Turner 1993, p. 219). Turner found sloppy management includes the following aspects of safety culture:

> [at] the first level of disaster prevention [are] the kinds of failures promoted by sloppy management: inadequate assumptions; blinkered outlooks and groupthink; communications failures of many varieties; the operation of outdated regulations; the neglect of warning signs; and the complacent attitude which assumes that 'accidents can't happen here', and which ignores the alarm signals when things do start to go wrong (p. 218).

In a redevelopment of the NAT vs. HRO debate, Bain (1999) applied the Argyris and Schon (1978) *Theory of Action* to a multinational oil company and used the defensive behavior "models of action" theory to argue for reconciliation between HRO and NAT. Action theory describes people's behavior in organizations. It is comprised of espoused theory, that is, what people say they will do in a hypothetical situation, and theory-in-use, defined as what people actually do in a real situation. Action behavior is not usually the same as espoused action theory for the same situation.

Two models of theory-in-use exist. Model I and Model II both define error as "an outcome that goes against the organization's objectives of efficient behavior" (Bain 1999, p. 131). Argyis and Schon (1974; 1978) identified Model I theory-in-use as "endemic throughout business, government and elsewhere" (in Bain p. 130). Argyis and Schon noted this theory is formed by patterns of defensive behavior at all organizational levels that encourage saving oneself and others embarrassment over an inefficiency a priority, resulting in counterproductive end results. Model I behavior is prevalent, self-perpetuating, and insidious because participants are unaware that the actions they take are counterproductive (Bain). Model II is Argyris and Schon's prescription for organizations afflicted with Model I behavior. Their prescription requires individuals to openly explain their individual positions and evaluate those of

others, diffusing defensive reactions against embarrassment by frank engagement instead of automatic face-saving.

Bain (1999) agreed with NAT proponents that most complex organizations should expect normal accidents, but makes an exception for when they follow Model II patterns. Adopting Model II principles is an indicator of a positive safety culture (Bain, 1996) and provides a sophisticated way to run a high-reliability organization, avoiding serious accidents. Bain (1999) reconciled NAT and HRO by incorporating Model II behavior into an organization's safety management. Model II behavior is a crucial element of safety culture; however, a caring, respectful workplace is still dysfunctional if employee and supervisor decisions and performances are rendered counterproductive by defensiveness and face-saving (Bain). Exploring the extent of these and other behaviors in the face of the crisis aboard the Ocean Ranger was the purpose of the present study. The following section is a discussion of crisis management in a distributed environment such as existed on the Ocean Ranger.

2.6 Crisis Management in a Distributed Environment

The literature on distributed organizational structure in crisis situations, such as that extant during the Ocean Ranger disaster, is primarily founded upon two extraordinary crises. First, Weick's (1993, 1993b) analyses of the 1949 Mann Gulch fire provided a foundational discussion of actions and interactions during a crisis. Second, Weick explored the 1977 Tenerife air disaster in which two Boeing 747 airliners collided, resulting in the loss of life of everyone aboard both airliners. The subject of risk management was inherent in both tragedies.

Beck (2004) argued that acceptance of risk management as a discipline is unlikely. Beck proposed that the chance of this happening is hindered by a lack of precise legislative mandate for the subject, lack of research-based evidence regarding the value added by risk management activities, and the lack of a clear categorization of risk management as an applied discipline within business studies and management. However, health and safety legislation forces businesses to seek risk management advice when the risk is to employee health and safety. An oil rig is deemed high risk in terms of health and safety concerns, and an offshore oil rig in deep water is particularly susceptible to the issue of risk. Insufficient value-added should be less of an issue where health and safety concerns overlap with financial concerns, as they do in oil rig accidents. The benefits of avoiding the disaster are greater and more

obvious. Arguably, managing the risk of accidents that jeopardize health and safety is more likely to become an accepted academic discipline than managing financial risk.

Weick's (1993, 1993b) analysis of the Mann Gulch fire, which resulted in 13 fire fighters in Montana losing their lives, provided support for rules and structure during a crisis. Weick noted that, in the crisis the Mann Gulch, fire fighters lost the inherent organizational structure and role system and became anxious, thus finding it harder to make sense of what was happening. The fire fighters were finally unable to make sense of the one thing that could have saved their lives: an escape fire. They refused to follow organizational structure and lie in an escape fire. Similarly, the Tenerife air accident occurred on the island of Tenerife, Spain, resulting in 583 people losing their lives. Weick's (1990) analysis of the air disaster pointed to the risk team members took by not adhering to predefined structure. The captain of a KLM Royal Dutch flight "overruled the role system and caused a major disaster" (Fenema, 2004, p. 9). The captain defied organizational structure by taking off without clearance from the tower and by not keeping the First Officer involved in communication and advice. These two disasters, analyzed by Weick, form the foundational discussions of sensemaking. Another aspect of crisis management is the influence of what is termed "normalization," discussed in the following section, and applicable to the Ocean Ranger crisis.

2.6.1 Normalization

Perrow (1984) in a seminal article argued that a high potential for crisis is inherent in the characteristics of high-risk technologies. In such systems catastrophic accidents are bound to happen. Perrow coined the term "normal accidents," yet, recognized that some organizations are adept at avoiding "normal" accidents. Specifically, high-risk technologies can be characterized by "interactive complexity" and "tight coupling." Technology is seen as offering great advances in production while simultaneously creating the potential for serious destruction. "Most high-risk systems have some special characteristics, beyond their toxic or explosive or genetic dangers, that make accidents in them inevitable, even normal" (p. 4).

Vaughan (1990) applied Perrow's 1984 theory to the 1986 disintegration of the Challenger space shuttle over the Atlantic Ocean off the coast of Florida, United States. This resulted in seven people losing their lives. Vaughan observed that whenever there were abnormalities, people both in the control room and on the

Challenger found reasons for them, and thus, normalized them so they could forget about them. Vaughan (1990) termed the observed phenomenon as "normalization of error" during the study of the O-ring failures in the Challenger accident. Weick and Sutcliffe (2001) in an analysis of the same disaster, observed:

> The range of expected error grew from the judgment that it was normal to have heat on the primary O-ring, to normal to have erosion on the primary O-ring, to normal to have gas blowby, to normal to have blowby reaching the secondary O-ring, and finally to the judgment that it was normal to have erosion on the secondary O-ring. (p. 40)

Vaughan's term 'normalization' refers to the tendency to redefine and accept previously unexpected anomalies over time as *expected* events and, ultimately, as *acceptable risks*.

Perrow (1999) and Vaughan (1996) make important contributions to understanding the technological application of normalization. The authors show that normalization or displacement occurs during, not prior to, a crisis. This has the effect of a breakdown of socially constructed meanings. Vaughan's normalization theory has been applied to solely technological matters that occur prior to and during the crisis, as happened during the Ocean Ranger disaster. Given the high risk of offshore deep water oil rigs, safety culture is an important aspect of the containment of potential disasters.

2.6.2 Crisis Decision-Making

The crisis culture literature provides a point of departure for the present study of crisis decision-making in close call situations as it encompasses several different theories of workplace safety culture. This section is a discussion of a wide range of safety culture literature including personal experience prioritization, the culture of denial, cognitive dissonance, mock bureaucracy, and profit maximization. A discussion of institutional mindset of invulnerability, triggering event and warning period, learning from near misses, and Social Network Theory and the importance of crisis managers possessing the proper skills are also summarized. The entire discussion pertains directly to the Ocean Ranger environment at the time of the disaster.

2.6.3 The Role of Safety Culture

Sociologists Hopkins (1999) and Pidgeon (1997) defined safety culture as an aspect of organizational culture. Preventing disaster does not involve seeking change to individuals or improving the climate of safety (Pidgeon), but instead involves improving the way safety is managed and remedying organizational defects (Hopkins). For organizational culture to be a source of institutional resilience instead of vulnerability, Pidgeon contended it should include "senior management commitment to safety; shared care and concern for hazards and solicitude over their impacts upon people; realistic and flexible norms and rules about hazards; continual reflection upon practice through monitoring, analysis and feedback systems" (p. 7).

Hopkins (1999) theorized two sets of cultural factors prevented an appropriate response to signs of an upcoming crisis during the incubation period at the 1994 Moura Mines incident in Australia when 11 miners lost their lives in an explosion. First, there was a hierarchy of knowledge that "placed greatest value on personal experience and systematically discounted the reports of others," and second, there was a culture of denial, characterized by "an elaborate set of beliefs that 'it couldn't happen here'" (p. 141). Psychology studies have shown that "where the evidence conflicts with belief, the individual is in a state of 'cognitive dissonance,' an unpleasant state that must be resolved by adjusting either the belief or the evidence" (p. 144). At Moura Mine, the belief that spontaneous combustion was extremely unlikely had the psychological effect of stifling the relevance of evidence to the contrary. This dissonance prevented the miners from adjusting either the belief or the evidence and seeing the potential danger that was developing that could result in an explosion ripping through the mine and entombing them.

Denial of dangerous circumstances also prevented recognition of crisis warning signs at Westray Mine, Nova Scotia, in 1992, in which 26 miners lost their lives in an explosion (Hynes and Prasad, 1997). One analysis found an institutionalized 'mock bureaucracy' developed at Westray (Hynes & Prasad). Mock bureaucracy is a term coined by Gouldner (1954) to describe an environment in which rules and regulations are promoted by organizational bureaucracy in posters, memos, and so on, but are ignored in practice. Managers and workers at Westray considered official safety rules and regulations to have so little legitimacy that ignoring safety

regulations had become a systematic pattern by the time of the May 1992 explosion (Hynes and Prasad).

Westray managers may have neglected safety regulations to maximize profit (Hynes and Prasad, 1992). The workers were also equally noncompliant. This was probably because they (a) were not unionized, (b) were relatively new and less familiar with common coal mine precautions, (c) had very little training in safety regulations, (d) were socialized at the mine in ways that dulled the sense of danger underground, and (e) were affected by cultural ideas of masculinity as well as the pragmatic need to keep comparatively well-paying jobs in an area of high unemployment (Hynes and Prasad). Similarly, Beck et al. (2004) provided support for the profit-maximizing theory in an analysis of a cost-benefit ratio of safety measures. The caliber of health and safety or risk to human life can be affected by an environment of cost-cutting methods to the degree that accidents may be caused by it.

In another analysis of the Westray disaster, Wicks (2001) argued that an "institutionalized mindset of invulnerability" had formed in the mine. Although Wicks specifically decried Hynes and Prasad's mock bureaucracy analysis in favor of a micro-institutional method of analysis, Wicks conclusions substantially overlap with those of Hynes and Prasad. Wicks (2001) asserted that regulative aspects of mining, backed by strong sanctions, normative rules governing social obligations, and cognitive elements of individual miners, which affirmed their social identities as coal miners and as men, formed their 'institutionalized mindset of invulnerability.'

Other researchers have noted that a period in which warning signs go unnoticed usually precedes serious accidents. For example, Shrivastava et al. (1988) stated that industrial crises share a number of key characteristics, including a triggering event, which is often preceded by warnings that go unheeded because of beliefs that the crisis event is of low probability. The Shrivastava et al. definition of industrial crises includes extraorganizational and intra-organizational factors, but is also "the organizational environment ... [which] causes triggering events to escalate into full-blown crises" (p. 290). Organizational factors that allow such escalation include communication failures and misperceptions of the extent and nature of hazards.

In the case of the Barings bank insolvency Drummond (2008) asserted that one of the reasons why Baring's managers did not know what was going on in their

organization was because of the allowance of passive escalation of the bank's financial losses through neglecting to take action and stop them (p. 118). In most organizations disconnect exists between myth and reality. Drummond (2001) posits that making good decisions "is not about having the most information or the most sophisticated analyses but being able to sense the limits of one's data, to see them not as literal reality but as 'liars in the service of truth'" (p. 128). According to Drummond (2008) "The danger is that the language of management and in particular images such as analysis, prioritization, balanced scorecard can give a misleading impression of scientific objectivity calculated to conceal incertitude, political machinations, inflated egos and irresponsible mischief" (pp. 127-128). Drummond's (2008) practical advice to managers is that they should be aware when they make decisions that their organizations shift from day to day. They should stay on top of what is going on in their organizations (p. 124).

Another way in which safety culture is articulated by individual experience is through organizational learning. Carroll (1998) studied self-analysis of operating problems among employees at nuclear power plants and chemical process plants. Such employees are expected to learn from precursors and near-misses, rather than exclusively by trial-and-error; however, employees learn better when they can focus on "resilience and learning as well as anticipation and fixing, on abstract as well as concrete issues, and on organizational power as well as politics" (p. 30). The system or structure of the organization influences the success rate of learning from near-misses. That is, "in organizations with fragmentary, myopic and disparate understandings of how the work is accomplished, there are likely to be more failures to learn from operating experience, recurrent problems, and cyclical crises" (p. 1).

Morris and Moore's (2000) study of learning from close calls at an aviation field found that individuals were more likely to learn when they reacted to an event as a narrowly-averted collision with upward-directed, self-focused counter-factual thoughts. Upward comparisons of reality emphasize better possible alternatives, or how things could have been better, while downward comparisons of reality emphasize worse possible alternatives, or how things could have been worse. Counterfactual thoughts are also differentiated by the focus on self or what the individual could have done differently, or on what others could have done differently in a particularly close-call situation (Morris &Moore). An example of such a statement made by a pilot is: "I

feel that had I reviewed the approach better, I would have been more alert to the difference between the "cleared to" altitude and published intercept altitude" (p. 475). Organizational accountability, however, often hampers individual learning by making pilots and crewmembers defensive, and introducing a dilemma between individual and organizational learning (Morris & Moore).

Although the majority of researchers support cultures originating from the organization social network theory, Loosemore and Hughes (2001) disputed the theme of Turner's 1997 theory. At any organization, social contact among employees influences workplace culture. 'Social Network Theory' deviates from Pidgeon, and Turner (1997) by placing minor emphasis on the organizational level and positing that efficient crisis management depends on the skills of the crisis manager in designing and controlling the formal and informal social fabric that keeps the organization together. The task is complicated because, during a crisis, competing coalitions and interest groups attempt to exercise both legitimate and illegitimate power in the pursuit of relational control. Also important are the personal qualities and motives of the people embedded within the organization and the quality of information exchanged between them (Loosemore & Hughes, 2001), one of the factors under study in the present research effort about the Ocean Ranger disaster.

2.6.4 Difficulty Identifying Proper Decision Maker

Hutchins (1996) and Weick (1993a) emphasized common knowledge, knowledge redundancy, and transactive memory are the three purposes of knowledge. They identify transitive knowledge, or the ability to know each person's role in the group. Collaborators who lose this 'virtual role system' or ability to know "who does what" become less cohesive and runs the risk of group disintegration (Weick). Sillince and Mueller (2007) studied teams that reframed responsibilities as projects began to fail. In crisis situations, such re-framing would make it difficult to identify the people responsible for crucial decisions during and after the crisis, which was explored regarding the Ocean Ranger crisis.

2.6.5 Flexible Organizational Structure

Crichton et al. (2005) provided further support for structure and believed authority in a crisis originates from the Incident Management System (IMS) that is used by the team as a whole, but more specifically, by the Incident Manager. With regard to a specific incident, Crichton et al. reported the IMS "acted as a foundation

for the initial response, and described the roles and responsibilities of individuals in the Incident Management Team (IMT), a team formed to respond to the incident." The authors provided support for a rigid organizational structure in a distributed environment; however, a rigid structure may not always work for a crisis decision-making situation where flexible sense giving or influence is required. For example, the rulebook may call for a person of a certain hierarchical level to take responsibility for a situation, but that person may not be present. Similarly, the rulebook may require a supervisor to take responsibility, but the supervisor may be less knowledgeable than the subordinate regarding the events of that particular crisis situation, or may be unable to cover all crisis situations.

Supporting flexibility, Bigley and Roberts (2001) advocated support for a bottom-up structure in a distributed work environment. Bigley and Roberts believed that the Incident Commander and other supervisors should have a great deal of discretion over how much instruction they give to subordinates. Situations are often left unstructured, and subordinates have latitude to improvise. For example, an individual may not maintain appropriate operational representation because of task intensity/involvement, and the responsibility is offloaded to another team member, such as a supervisor or incident commander, who has the cognitive ability to handle it. The authors provide support for a more flexible organizational structure. The organizational structure behind the Ocean Ranger oil rig onshore-offshore operation is explored in present study, as well as the communication mediums, as discussed in the following section.

2.6.6 Communication during a Crisis

Several authors have contributed to the literature on communication in a distributed crisis decision-making environment. A distributed environment poses several limitations on communication. Physical disconnection impacts technology by limiting media richness, interactivity, and the number of people who can contribute (Weick 1993b; Vaughan 1996). Also, poor visibility associated with distance hinders the ability to see and hear. Weick's (1993b) analysis of the Tenerife air disaster found that because of the fog, the KLM crew could not see the descending PANAM Boeing. The vision of the controllers was impeded by clouds and fog, resulting in controllers having to depend on radios for runway positions as opposed to line-of-sight (Weick, 1993b).

Weick (1993) also examined the transmission and clarity of instructions between leaders and the rest of the members of a crisis management team in the Mann Gulch fire. Weick found that the Mann Gulch crew could not hear each other as they faced the raging fire. In both events, distributed crisis management contributed to the crisis because those who needed to hear and see, could not, resulting in communication gaps. In addition to communication, knowledge has a role in group unity.

In Turner's 1978 influential *man-made disaster theory*, a crisis or disaster is a sociological phenomenon, a significant "disruption or collapse of the existing cultural beliefs or norms about hazards, and for dealing with them and their impacts" (Pidgeon, 1997, p. 2). In such a collapse, organizational members realize that there is a crucial separation between their assumptions about the situation and the reality of events. Disasters occur after "incubation periods" in which small failures in the system are compounded through a chain of events, finally producing a crisis after enough failures accumulate that contradict prevailing assumptions of the system's integrity (Pidgeon). The application of the man-made disaster theory to the Ocean Ranger disaster was explored in the present study.

2.7 Conclusion

The literature presented in the preceding chapter provides a conceptual foundation for the empirical processes used in the research about the Ocean Ranger tragedy. The study is characterized by a technology-based definition of normalization, which occurs prior to the actual crisis. The main theoretical underpinning for the handling of responsibility in crisis situations, adopted for this research, was based on the social construction theory of Berger and Luckmann (1966). This theory forms the source of thinking around this explanatory decision-making framework. Berger and Luckmann proposed that individuals continually and collectively construct the social world, which then becomes the reality to which they respond. Weick's sensemaking (1995) forms the theoretical framework for the analysis. In crisis situations, reality become indistinct, and it is the breakdown of socially constructed meanings during a crisis that is a fundamental element that leads to disaster. Socially constructed responsibility may be problematic in crises; thus, a crisis decision-making model for distributed oil and gas workers, as suggested later in this dissertation, requires flexibility for moving from crisis to non-crisis situations.

A major theme of safety culture research is that workplace cultures originate from the organization and the system, not from individuals (Hopkins 1999; Pidgeon, 1997; Turner, 1978). Negative safety cultures are often characterized by deep-rooted and dangerous assumptions mutually reinforced among employees and supervisors, which gives rise to workplace cultures of denial, hierarchies of knowledge, an institutionalized mindset of invulnerability, and mock bureaucracies (Hynes & Prasad, 1997). In contrast, healthy safety cultures require frank and clear communication, a sincere emphasis on safety, and a realistic view of the dangers of the given system (Turner, 1994). This healthy culture allows organizational members to recognize warning signs of a crisis incubation period.

These crises/safety culture studies illustrate that crises are socio-technical events. Turner (1994) argued the factors contributing to disasters are primarily administrative, social, or organizational. Although the academic debate between HRO and NAT proponents has "reached a firm stalemate" (Rijpma 1997, p. 37) both schools of thought, as well as Turner's 1978) man-made disaster theory, have contributed to more recent crisis research and provided a useful framework for examining crisis culture in the context of oil and gas company operations for offshore oil rigs. Examining crisis culture in this context is particularly attractive in light of the oil industry's post-1982 embrace of "corporate social responsibility" (CSR). CSR discourse asserts that companies voluntarily protect both the environment and their employees' health and safety, tacitly implying that regulatory oversight is pointless. However opinions vary as to how much oil companies really live up to their CSR messaging. Beck and Woolfson (2005) argue that CSR represents "the deflection of questions about safety and trade union rights through a new "shared" agenda that views environmental issues and "sustainability" as preeminent" (Beck and Woolfson, p. 9). Studying how safety on the Ocean Ranger was so fatally compromised adds practical historical perspective to the CSR debate.

2.8 Summary

In Chapter 3, which follows, the methodology of the study is summarized. The discussion includes a summary of the appropriateness of the qualitative case study approach, the interview and data collection procedures. The method by which the data will be assessed is discussed, as are the internal and external validity factors, and ethical considerations relevant to those who were interviewed.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The following chapter is a presentation of the research methodology selected to address the primary research question cited in Chapter 1. Based on the research question and the review of the literature in the preceding chapter, a methodology was implemented to gather the information necessary to explore the attitudes and perceptions of workers in the oil and gas industry with which to develop a crisis decision-making model intended to focus on accountability in crisis situations in high-risk environments. The decision-making model is comprehensive and expected to be transferable, with modification, to crisis situations other than the Ocean Ranger disaster, upon which it was based.

This study was an exploration of how the breakdown of socially constructed meanings during a crisis, work experience, a repressive control culture, avoidance of responsibility due to fear of repercussion, confusion over the identity of the decision maker, and the number of decision makers effected the identification of the situation as a crisis, as well as decision- making and normalization of a close-call situation that led to the determination of a non-crisis, as was the case with the Ocean Ranger. Specifically, the study was undertaken to analyze the unfolding of the Ocean Ranger disaster in a distributed environment and to develop a decision-making model that can guide how oil and gas workers can and should take responsibility during a crisis in a virtual work environment.

3.2 Appropriateness of the Research Approach

The primary difference between a qualitative approach and a quantitative approach is extant in methodological philosophies. A qualitative approach is intended to equip researchers with data through descriptions, analysis, and the observation of social behaviors (Patton, 2002). The objective of the present study was to explore human reactions before, during, and after the Ocean Ranger disaster and develop a model for crisis decision-making based on the results; therefore, a qualitative case study method was deemed suitable. The semi-structured interview data collection process provided the researcher with the lived experiences of participants from the oil and gas industry (Abusabha & Woelfel, 2003; Billingsley, 2004; Creswell, 2009; Moustakas 1994) from which a wealth of information was gathered as described in Chapter 6. Abusabha and Woelfel argued that the perceptions of individuals who are

being interviewed allows the researcher to gather, analyze, and report accurate information in a way free of bias. Abusabha and Woelfel asserted that "qualitative researchers argue that, in the absence of close connection with the object of study, results will be distorted" (p. 1); thus, the present study was conducted with an approach incorporating face-to-face interviews to establish such a close connection. Creswell (2009) asserted that qualitative data provides a source of descriptive information that permits researchers to present results based on fact.

In contrast, quantitative methods drive individual human behavior into precise categories that can be analyzed numerically. Conversely, qualitative researchers implement flexibility to observe individuals in familiar settings and allow questions to emerge and change during the interviews. Qualitative researchers find that the best way to understand a phenomenon is to become immersed in it (Abusabha & Woelfel, 2003). The present study was an effort to understand phenomena perceived by participants during crisis-decision making events, rather than seeking to test a hypothesis with a numerical construct. Using a qualitative case study method to acquire a three-dimensional narrative inquiry that included interaction and continuity (Creswell, 2009), the results of the study were used to identify specific themes that contributed to the Ocean Ranger or similar disaster, and to develop a model for decision-making during a crisis in a virtual environment.

Creswell (2009) argued the three-dimensional narrative inquiry comprises the personal and social, the past, present, future, and the place of a phenomenon; consequently, the study was designed to utilize data collected from "persons who have experienced the phenomenon, and to develop a composite description of the essence of the experience for all of the individuals" (p. 58). A qualitative case study method was deemed appropriate for the present study because "phenomenology is focused less on the interpretations of the researcher and more on a description of the experiences of participants (Moustakas, 1994). Researchers utilizing a case study method are provided with the opportunity to understand and present the lived experiences of the participants (Mack, Woodsong, MacQueen, Guest, & Name, 2005). Interviews are an appealing and rewarding technique for researchers conducting a case study in the social sciences as they allow researcher to report the lived experiences of the participants (Creswell); thus, the rationale for the study was based upon a three-dimensional narrative inquiry, which includes interaction, continuity,

and situation. Finally, the semi-structured interview process with open-ended questions was appropriate for the study because a lived experience of an interviewee provides a deep understanding of the phenomenon being studied (Silverman, 2005).

3.3 Critical Case Selection

Case studies are the preferred strategy when "how" and "why" questions are being posed, when the investigator has little control over events, and when the focus is on contemporary phenomenon within a real-life context (Yin, 1994). A unique strong point of the case study is the ability of the researcher to deal with a wide variety of evidence ranging from documents, artifacts, interviews, and observations. The Ocean Ranger disaster was selected for this study using critical-case selection. Chiles (2001) determined the Ocean Ranger disaster is known to be very important "in demonstrating how difficult it is for people to sort out problems from the control room, on the fly, as failure starts to spread through a complex system" (p. 2).

The oil and gas industry is an appropriate context for both crisis decision-making and virtuality because of the criticality of the decision-making within a virtual environment, and the distribution of personnel and responsibility. Consequently, the present case study is indicative that distributed virtual decision-making was a key element that made the crisis decision-making process more complex - it was not just crisis management that added to the complexity of the situation.

A case study was beneficial for the development of a crisis decision-making model based on the needs of oil and gas workers in a high-risk virtual environment. It was an appropriate technique for the present research problem given the paucity of research investigating crisis decision-making in a distributed environment. The selected research approach provided a mechanism to understand the meaning that oil and gas workers attribute to various crisis situations. It also enabled the exploration of new ideas by developing and testing propositions that included the process-based theory of how organizations behave in crisis situations that is amenable to social construction, the extension of the technocentrism of normalization to social practice, and normalization as both a crisis and non-crisis response. Thus, the resulting new ideas can contribute to the evolution of new theories (McCracken, 1988). The wider issues pertaining to decision- making in close-call situations were explored through semi-structured interviews with oil and gas workers. The research included a documentary analysis of the Ocean Ranger oil rig disaster (Chapter 4) to contextualize

the findings from the interviews and literature reviews by identifying commonalities.

The data collection had two components: (1) a documentary review of the Ocean Ranger oil rig disaster and (2) a series of semi-structured interviews. The documentary review was an examination of accident reports, media interviews, and research publications of the Ocean Ranger oil rig disaster. The semi-structured interviews were comprised of open-ended questions asked of oil and gas workers from a range of occupations in the industry. This multiple data collection approach aided in the systematic collection of comprehensive information about work situations and decision-making in the offshore oil and gas industry.

3.4 Setting and Participants

3.4.1 Setting

The province of Newfoundland and Labrador is a northern jurisdiction in the North Atlantic, and the most easterly of the 13 jurisdictions in Canada. The province has a massive geographical area of 405,720 km2. It is almost two times larger than the size of Great Britain, and has a population of 508,000, over 300,000 of whom live in the capital region of St. John's. Corner Brook (referred to as the Second City), and Mount Pearl (an extension of St. John's) are the other two cities. The province has a significant offshore oil and gas industry; indeed, oil revenue accounts for about one-third of the provincial government's total revenues of nearly $7 billion US in 2010. The Hibernia oil field is located about 200 miles east of St. John's, which is where the Ocean Ranger was located. St. John's, identified thusly by Mobil Oil, was the operations center for the Ocean Ranger, although the oil rig itself was American-owned Ocean Drilling and Exploration Company (ODESCO); therefore, some of the decision-making power was with the head office of the corporation in New Orleans. Of the 84 men aboard the oil rig, 46 were employed by ODESCO, and 69 were Canadian, of which 56 were Newfoundlanders and Labradorians. All crewmembers were men.

3.4.2 Participants

Potential interview participants were identified using the snowball selection method, an informal way of reaching the appropriate oil and gas workers. A primary concern of snowball sampling research is the quality of the data, in particular, a selection bias that might limit the validity of the sample (Kaplan et al., 1987; Van Meter, 1990) restricting researchers from generalizing from the particular sample

(Griffiths et al., 1993). Snowball samples may over-emphasize cohesiveness in social networks (Griffiths) and will miss those not connected to any network that the researcher has accessed (Van Meter, 1990). If the aim of a study is primarily explorative, qualitative and descriptive, then snowball sampling offers practical advantages (Hendricks, Blanken & Adriaans, 1992), as was the case with the present study. The technique was implemented in this study as an economically feasible, efficient, and effective means of reaching onshore and offshore oil and gas workers from different levels of the organizational hierarchy of more than one company in the oil and gas industry.

Names of the specific companies will remain confidential due to the sensitive nature of discussions that might have legal repercussions. Names of the participants shall remain anonymous because all of those interviewed expressed concern about the publication of their remarks referent to their future employment. Participants, therefore, are not identified as individuals. No demographic data was retrieved except current position in the organizational hierarchy of the companies where they worked.

The disadvantage associated with selection bias was compensated for in this study by using a sample size of 37 interviewees. The researcher was active in the referral process and asked interviewees to nominate people they knew well or knew by name, but only who might have important information about the effect of distributed decision-making in a virtual environment. Increased control over referrals also increased the chance of finding interviewees with diverse opinions. While the case study approach assumes that the researcher is independent and non-judgmental, researchers recognize that the interviewer's attitudes and perceptions may influence views about the respondents (Jobber, 1991).

The snowball method used in the study was initiated with several people from different positions and different companies in the oil and gas industry, increasing the likelihood that the interviewees were from different social groups. Participants were comprised of union, non-union, management, and non-management personnel from both offshore and land locations. Given that the majority of respondents did not agree to the use of their name in the study, details about the respondents who participated in this study cannot be revealed for fear of inadvertently identifying the company and/or the associated employee.

Thirty-seven respondents were interviewed using semi-structured interviews with open-ended questions. Eleven interviewees were randomly selected from the pool of referrals to participate in a pilot study of the interview protocol, after which the interview protocol was modified to include clarification issues. The remaining 26 were interviewed using the modified protocol. Results from all 36 interviews were included in the analysis in Chapter 6. Only two referrals contacted did not agree to be interviewed. The high level of participation (two refusals) may be attributed to the fact that workers could remain anonymous by checking the appropriate item on the consent form prior to the interview

3.5 Data Collection Procedure

Potential participants were contacted by phone and asked if they would be interested in contributing to the study. If the response was positive, they were presented with a letter of invitation and consent form (Appendix B). Eleven were randomly selected to participate in a pilot study of the interview protocol. The 11 participants were contacted to ascertain an interview time and place that was convenient. The consent form was reviewed with each participant prior to the implementation of the interview protocol, and the objectives of the study were summarized. Interview sites were in public places such as libraries or other places not connected with the oil and gas industry to ensure confidentiality. After information had been gathered from the 11 participants in the pilot study, the Interview Protocol (Appendix C) was modified based on the information gathered from the pilot study participants and applied to the remaining 26 participants following the same procedure as outlined above for the pilot study participants. A thank you letter (Appendix D) was sent to all participants after the interviews and any follow-up clarification issues were resolved.

3.5.1 Review of Documentation

One component of this research is an extensive archival review of the Ocean Ranger oil rig disaster covering the time period from Sunday, February 14, 1982, 6:00 a.m., when the Ocean Ranger issued its morning report, up to and including February 15, 1982, 8:35 a.m., when Mobil Oil received the first visual confirmation of the tragedy. The documentary review comprises the Royal Commission Report on the Ocean Ranger disaster, media releases and interviews and research publications on the disaster. All of the documents were publicly accessible. The official Royal

Commission Report is extrapolated in Chapter 4.

3.5.2 Interview Protocol

The case study methodology is best suited for the stated objectives of the present study. Yin (1994) defined case studies as a multi-faceted research strategy which typically involves an in-depth examination of one organization, situation or community. The case study approach facilitated in-depth interviews with oil and gas workers in the present study, with the commonality being the industry.

3.5.2.1 Exploratory interviews. Initially, face-to-face exploratory interviews using an interview protocol with open-ended questions were conducted with 11 oil and gas workers, some of whom were from management. This approach provided a comprehensive understanding of worker experiences in the oil and gas industry, particularly with reference to high risk environments and close-call situations. The first interviewee was selected for the exploratory interviews based on expected knowledge level of the offshore work environment. This choice was supported by Creswell (2009) who suggested that qualitative researchers should purposefully select those informants who will best answer the research questions.

The exploratory interviews proved invaluable. As each interview was conducted and new issues emerged, subsequent interviews were enriched. The information gathered from the exploratory interviews was used, along with information derived from the literature review and from the documentary review, to modify the semi-structured Interview Protocol (Appendix C). This process led to a deeper and richer data about oil and gas worker issues, thereby allowing the researcher to develop a comprehensive set of semi-structured interview questions.

Emerging themes that surfaced during the 11 interviews were (a) virtual communication, (b) hierarchy concerns, (c) decision-making, (d) teams, (e) an invulnerability mindset, (f) training, (g) safety culture, and (h) sensemaking. Workers were asked to talk about near-miss situations, perhaps a close call that could have resulted in an incident. In the discussion around the near-miss situations, a number of differences in decision styles, and concerns about the identity of the appropriate decision-maker emerged from the data.

3.5.2.2 Primary interviews. The remaining 26 participants were identified using Goodman's (1961) snowball selection method in which one subject gives the researcher the name of another subject, who in turn provides the name of a third, and

so on (Vogt, 1999) until no new viewpoints were evident. The 37 interviewees included radio operators, operations advisors, laborers, engineers, technicians, electricians, control operators, production leads, and managers. Sixty to 120 minute interviews were conducted at field site locations such as libraries or homes of the interviewees. The researcher took notes and also recorded the interviews. Interview participants were notified that they had been referred; however, the person who referred them was not identified. This notification process, as well as the option of the interviewee to remain anonymous assisted in building a degree of trust between the researcher and the respondents, further contributing to the success of the snowball selection technique in producing in-depth results relatively quickly.

The lack of rigorous controls typically associated with case studies, as well as the possible reflexivity of the researcher and the potential influence of active listening, (McCracken, 1988) were partially mitigated through taping the interviews. By taping the interview, responses were captured accurately. While not all the disadvantages can be mitigated, an interview and case study methodology was the most appropriate approach due to the complex nature of the main research question cited in Chapter 1, and the need to solicit feedback from a number of oil and gas workers who worked onshore, on land rigs, or on ships.

The interview questions were based on crisis decision making issues derived from the literature review and the documentary review. The questions were mainly unstructured to allow interviewees ample opportunity to discuss experiences. Each interview was initiated with an open-ended question where workers were asked to talk about a near-miss situation, a close-call that could have resulted in an incident. During the interview, if the interviewee did not discuss virtual teams, decision-making, and information and systems accessible to them in their positions, they were asked direct questions about the identified topics. The questions were only utilized if the topics did not emerge from the recollection of a close-call situation.

3.6 Development of the Model

The research addressed by this study included development of a crisis decision- making model. To develop this model, it was necessary to identify the explanatory variables that determine whether an event is identified as a crisis, which impacts the ability of an organization to adequately deal with the crisis situation, or a non-crisis. It has been determined from the literature review in Chapter 2 that

Weick's (1988) sensemaking forms the theoretical frame for the analysis and best reflects the nature of oil and gas worker thinking in crisis situations where issues become fuzzy and a breakdown of socially constructed meanings often occurs. Through the case study, views regarding the workers taking of responsibility was explored and preferred decision making approaches were examined in the context of the Ocean Ranger oil rig disaster.

3.7 Role of the Researcher

The National Science Foundation (1993) observed "the most fundamental distinction between various observational strategies concerns the extent to which the observer will be a participant in the setting being studied" (p. 33). Hence, the role of the researcher is a key aspect of the validity of the results. Mahoney (1997) contended that the person who conducts the interview should be engaged in the environment of the research while trying to understand that environment through "personal experience, observations, and interactions and discussions with other participants" (p. 20). Similarly, Creswell (2009) contended that qualitative results are dependent upon the experience of the researcher and the researcher's ability to draw conclusions from verbose interview data.

The researcher for the proposed study is an Assistant Professor with 20 years of professional work experience in the technology area. During this time, she gained valuable experience in all major fields of the information systems discipline in both technical and managerial areas. Her present position is Assistant Professor at the Faculty of Business Administration at Memorial University of Newfoundland. She received a Bachelor's degree in Computer Science, Bachelor's degree in Education, and a Master's degree in Business Administration from Memorial University of Newfoundland. She is presently enrolled in the doctoral program at the University of Strathclyde, Glasgow for a doctoral degree in Business Management. She has been a faculty member at Memorial University since 1998, teaching part-time for the Computer Science department and full time for the Faculty of Business Administration in the Information Systems and Strategy area.

3.8 Informed Consent and Ethical Assurances

Informed consent was achieved when the consent form was included in the letter of invitation and reiterated at the beginning of each interview with the participants. The form required by the University of Strathclyde was signed by each

participant before the interview. The informed consent form, as well as all tape recordings and hard copy data relevant to the study will be kept in a secure location by the researcher for 3 years and subsequently destroyed. The research approach presented minimal risk to participants, and involved no experiential treatments of the subjects, either physically or mentally. The study was intended to collect data about participant perceptions regarding decision-making in high-risk virtual environments, and publically available data about the Ocean Ranger oil rig disaster.

Data relevant to the interviews and interviewees was sensitive regarding employment; thus, participant responses will be kept confidential indefinitely. A numeric identifier was assigned to participants to ensure the anonymity of responses throughout the research process as the letter of invitation and consent form indicated the researcher would maintain participant in perpetuity. Care was taken to ensure that all participants understood the nature of the study, and that participation was voluntary. No sanctions were applied if participants declined or withdrew from the study, but none did. No information regarding participation of any individual will be communicated to anyone where participants work or have worked in the past or may work in the future. These conditions were communicated to all participants prior to the start of the interviews

3.9 Analysis of the Data

The data analysis method was theme analysis, and was appropriate to answer the questions "who says what, to whom, why, how, and with what effect" (Babbie, 2003, p. 309). Participant responses were separated into categories to search for themes and patterns. Patton (2002) suggested data collection should be followed by inductive reasoning, which is the process of developing conclusions and generalizations. Farber (2006) asserted phenomenological data requires interpretation and organization into categories to enable construction of a picture by using open coding where themes, patterns, concepts, jokes or similar features can be identified. Babbie contended a critical step in assessing the meaning of themes and content is to determine the unit of analysis. The researcher performed the data analysis using intuition and judgment. Categories and themes were extracted from the semi-structured interviews.

The audio recordings were transcribed, after which replaying the recordings and comparing them to the notes verified transcript accuracy. Before

reading the transcripts, an initial list of core topics was compiled, based on the questions posed. The transcripts were read a second time and additional topics identified. The coded topics may prove beneficial as coding structures for future researchers examining crisis decision-making frameworks.

The researcher then coded passages under key topics using a different color-coding scheme for each interviewee's transcript details. An electronic file contained a merge of all passages coded to each topic for all respondents, thus ensuring that all respondents' views on each topic were considered in the analysis. This coding process facilitated the grouping and sorting of responses.

Once the interviews were transcribed, the researcher replayed the audio recording to verify the accuracy of the transcripts. Finally, after the first five interviews had been completed, the transcripts were analyzed and the data was coded to identify core topics. Coding involved looking for common words or phrases mentioned by the interviewees. The highlighting function in the Microsoft Word Processing package was used to highlight the relevant text, with a different color for each interviewee. Then the words or phrases were consolidated in an electronic file.

In spite of the disadvantages associated with face-to-face interviews, the technique has benefits. The main strength of the face-to-face questionnaire was the researcher's ability to cover complex issues (Jobber, 1991; Singleton & Straits in Gubrium & Holstein 2002). According to Singleton and Straits, face-to-face surveys allow a maximum degree of probing, yield a better response rate than interviews conducted through virtual mediums, provide flexibility over question content, and facilitate clarification of questions and terminology. Personal interviews are useful when a large amount of information is needed. Questions can be complex. The study involved the evaluation of visual materials and observation of a respondent attitude and perceptions (Public Opinion Research, 2002).

The majority of the open-ended questions were conducted before the respondents were asked specific questions. At the onset of the interview, storytelling was used as a way of accessing the data, and respondents were asked to tell a story about a close-call on an oil rig. Weick (1995) provided support for storytelling when he has stated:

> If accuracy is nice but not necessary in sensemaking, then what is necessary? The answer is, something that preserves plausibility and

> coherence, something that is reasonable and memorable that embodies past experience and expectations, something that resonates with other people, something that can be constructed retrospectively but also can be used prospectively, something that captures both feeling and thought, something that allows for embellishment to fit current oddities, something that is fun to construct. In short, what is necessary in sensemaking is a good story (p. 60).

The rationale for the interview process was to ensure that respondents were not rushed in their responses to the open-ended questions, thus not providing the depth and breadth of information needed. The process encouraged respondents to speak freely by simply telling the interviewee a story. The same Interview Protocol was administered to management, non-management, offshore, and onshore workers to ensure continuity and consistency across all interviews. In the majority of cases, the Interview Protocol was marginally required as the interviewee covered all issues when telling a several-hour story about a close-call situation. The following issues were examined through the semi-structured interviews: (a) responsibility: how is it handled in crisis situations; (b) decision-maker identification and number of decisions; (c) socially constructed meanings during a crisis; (d) work experience; (e) repressive control culture; (f) avoidance of responsibility due to fear of repercussion; (g) confusion over the identity of the decision maker; (h) number of decision-makers and impact on the identification of a situation as a crisis; and (i) decision making and normalization of a close-call situation as non-crisis.

Triangulation is the use of multiple methods since the strengths of one method offset the weaknesses of the other methods (Tashakkori & Teddlie, 1998). Triangulation is the extent to which research findings can be confirmed by the simultaneous application of multiple methods, multiple investigators, multiple data sets or multiple theories. This study's literature review, documentary review, and semi-structured interviews with open-ended questions ensure that data triangulation was achieved.

3.10 Internal and External Validity

The criteria for validity are intended to measure how effective the design of the study was in employing measurement methods that captured the data that addressed the purpose of the study (Salkind, 2003). Two types of validity are extant:

internal, and external. Internal validity is the certainty that study results were produced by the research process, and not by other factors. Neuman (2007) contended internal validity was confirmation of the correctness of the study approach. Creswell (2009) asserted the goal of an interview protocol is to be both reliable and valid. The questions in the Interview Protocol in Appendix C were based on the primary research question in Chapter 1 and development of the review of literature. Internal validity was further assured with pilot testing of the proposed Interview Protocol to ensure the instrument was unambiguous after modification. Creswell noted pilot testing of an instrument is a procedure to enable the researcher to make modifications to an instrument based on feedback from a small set of individuals prior to the main interviews taking place.

External validity is the extent to which the results of the study can reflect similar outcomes in other populations, and can be generalized to other populations (Salkind, 2003). The population of the present study fit the target population with regard to distribution among oil and gas workers from a range of occupations in the hierarchy of companies in the industry. The study was conducted in natural setting that can be applied to other settings (Salkind); thus, the study approach was appropriate and demonstrated validity.

Case studies are time consuming and costly, their findings may not be easily generalized, and they can lack rigorous control, which can compromise validity (Bennett, 1991; Hill, 1993). These disadvantages were minimized and mitigated in the present study. While interviews can provide rich information and enable respondents to provide general feedback, they risk increasing the amount of material to be analyzed, thereby increasing the amount of time required to analyze and code the responses. This disadvantage was largely mitigated in the present study by audio-taping the interviews. The researcher's ease of access to respondents (two refusals) reduced the time and costs usually associated with securing access to interviewees. The only cash expenditures were transportation costs to interview sites in the St. John's, Newfoundland region, and the purchase of a digital recorder.

Although this case study cannot be generalized in the same manner as that achieved through a statistical test, in a Chapter 9 discussion of limitations, the methodology and resultant decision-making model are transferable to other occupational areas such as the police forces, fire fighting units, and the military.

3.11 Conclusion

The approach used in this case study utilized information derived from the literature review, a documentary review, and exploratory interviews to identify the open-ended questions for the semi-structured interviews, thereby adding scope and depth to the research. The following chapter is a report extrapolated from the Royal Commission about the Ocean Ranger disaster, followed by a table containing a time line of the disaster and the communication and activities that occurred. The report includes the basic demographics of the Ocean Ranger oil rig, and the report.

CHAPTER 4: THE OCEAN RANGER OIL RIG DISASTER

4.1 Introduction

Following is the official report of the Ocean Ranger disaster which was extrapolated from the official examination by the Royal Commission of the Ocean Ranger Disaster (RCORD) report, published by the governments of Canada and Newfoundland. Section 4.2 is a summary of the demographics involved in the official investigation of the disaster. Section 4.3 is a researcher-generated table of the personnel who were communicating virtually during the disaster. Section 4.4 is a summary of the events as noted by the RCORD. Table 2 was created by the researcher summarizing the events by timeline and action.

4.2 Demographics

Rig Manufacturer: Ocean Drilling & Exploration (ODECO)

OCEAN RANGER Leasing Company: Mobil Oil

Rigs: OCEAN RANGER (OR) SEDCO 706 ZAPATA UGLAND (ZU)

Supply Vessels: Seaforth Highlander and Boltentor Nordertor

Personnel Who Testified: Jim Counts, ODECO's shore-based drilling superintendent (onshore). James Davidson, BOLENTOR, later gave testimony of the events and overheard communications. Domenic Dyke, Junior Ballast Control Operator on the Ocean Ranger. Rick Flynn, radio operator, of Mobil's shore based weather operation in St. John's. Rod Fraser, Mobil's drilling foreman on the SEDCO 706. Merv Graham, Mobil's area drilling superintendent in St. John's. Fred Hatcher, control room operator SEDCO 706, later gave testimony of events and overheard conversations. Jack Jacobson, Mobil's senior drilling foreman on the OR. Peter Kapral, Mobil's shore based drilling foreman. Baxter King, radio operator of the SEDCO 706. Bob Madden, Mobil drilling foreman on the OR. Donald Rathbun, Senior Ballast Control Operator on the OR. Steve Romansky, Mobil's east coast operations manager (onshore). Keith Senoke, SEDCO 706. Kent Thompson, toolpusher on the OR. William John Ursulak, SEDCO 706, later gave testimony of the events and overheard communications.

4.3 Decision-Makers Involved in the Disaster

Table 4.1 lists the personnel who were interacting virtually before, during, or after the Ocean Ranger disaster.

Table 4.1

Personnel Communicating Virtually During the Ocean Ranger Disaster

Name	Position	Location
Jim Counts	ODECO's drilling superintendent	Shore (St. John's)
Merv Graham	Mobil's area drilling superintendent	Shore
Peter Kapral	Mobil drilling foreman	Shore
Bob Madden	Mobil drilling foreman	Ocean Ranger Rig
Jack Jacobsen	Mobil's senior drilling foreman	Ocean Ranger Rig
Ken Thompson	Tool pusher	Ocean Ranger Rig
Keith Senoke		SEDCO 706 Rig
Steve Romansky	Mobil's east coast operations manager	Shore
Fred Hatcher	Control room operator	SEDCO 706
Domenic Dyke	Junior ballast control operator	Ocean Ranger Rig
Donald Rathbun	Senior ballast control operator	Ocean Ranger Rig
Rick Flynn	Radio operator	Mobil's shore based weather office St. John's
Baxter King	Radio operator	SEDCO 706 Rig
Rod Fraser	Mobil's drilling foreman	SEDCO 706 Rig
Mike Clarke	SAR pilot	
Clarence Hauss	Ballast control operator	Ocean Ranger Rig
William John Ursulak		SEDCO 706 Rig

4.4 Summary of Events

When the Ocean Ranger sank to the bottom of the Canadian North Atlantic on February 15, 1982, it was the largest self-propelled semi-submersible offshore drilling unit in the world. The oil rig's manufacturers, the Ocean Drilling & Exploration Company (ODECO) were leasing the Ocean Ranger to Mobil Oil when the oil rig capsized off the Grand Banks, 170 nautical miles east of St. John's, Newfoundland. The 84-man crew lost their lives. Of 69 crewmembers who were Canadian, 56 were Newfoundlanders and Labradorians.

During the disaster, all communications between the oil rig and the St. John's

shore base office were through the MARISTAT satellite telephone system, while communications between oil rigs, oil rigs and supply ships, and crew abroad the Ocean Ranger were through VHF radio. The time period covered ranges from Sunday, February 14, 1982, 6:00 a.m., when the Ocean Ranger issued its morning report, up to and including February 15, 1982, 8:35 a.m., when Mobil Oil received the first visual confirmation of the tragedy.

Several calls ensued between the Ocean Ranger crew members and the onshore Mobil office staff regarding regular drilling operations. The February 14, 1982 weather forecast of 1:30 pm predicted stormy weather as a deep low center approached the sea. There were conflicting accounts by Merv Graham and Peter Kapral of Mobil's shore based office and Senoke of the Sedco 706 regarding what transpired between 4:00 pm and 6:52 pm. The Royal Commission's conclusion was that at 4:30 pm the oil rig was still drilling, but the process of hanging off started soon afterward and was completed by 6:47 pm.

At 6:52 pm an abnormally large wave hit the three oil rigs that were drilling off the Grand Banks of Newfoundland and Labrador. Two of the oil rigs, the Zapata Ugland and the Sedco 706, rode out the wave. However, around 7:00 pm, a porthole on the Ocean Ranger broke, possibly from debris carried by the large wave. The broken porthole resulted in flooding and electronic malfunctioning in the ballast control room. Kent Thompson, the toolpusher on the Ocean Ranger, contacted Jim Counts, ODECO's shore-based drilling superintendent, and informed him of the damage to the oil rig at 6:58 pm. As for what was happening onboard the oil rig, Hatcher, a control room operator of the Zedco 706, overheard someone on the Ocean Ranger state that valves were opening and closing by themselves. Later, he heard the same voice state that the valves were operational again. As well, between 7:25 pm and 7:30 pm, radio conversations were overheard between two Ocean Ranger workers discussing a wet panel with a cover off for repairs and giving off electrical shocks. A further conversation was overheard between 7:35 pm and 7:40 pm in which the two workers confirmed that everything was working properly and that the cleanup of glass and water had begun.

At 8:45 pm a 14-minute conversation ensued between Jack Jacobson, senior drilling foreman on the oil rig, and Merv Graham, Mobil Oil's onshore drilling superintendent in St. John's. At that time, the St. John's office was advised the Ocean

Ranger was experiencing high seas/winds. The broken porthole was also mentioned, but Jacobson stated that everything was normal on the oil rig. Jacobsen's report that everything was fine conflicted with overheard conversations about the malfunctioning ballast control room panel, and conflicted with evidence later gathered from the oil rig by underwater teams. However, the possibility exists that things were not normal, that the panel had no power, and that other lights were suggesting valves opening and closing on their own. It is also possible that the men assumed that cleaning the panel would restore normal functioning, and that possibly, though unlikely, the men would be able to fully restore the panel. Then, a second porthole broke.

There is very little conclusive evidence to determine exactly what happened between 10:00 pm February 14, 1982 and 1:00 am February 15, 1982. Between 10:00 pm and 11:30 pm several conversations took place between oil rig and shore personnel regarding the status of the oil rigs. No problems were identified at that time. The 10:30 pm report did identify the broken portlight, but all ballast control equipment was functioning properly and all was fine. There was no indication of alarm from the Ocean Ranger during this period, and from 11:30 pm until 1:00 am there was no further conversation between the Ocean Ranger and Mobil Oil's shore based office. The first distress call was received from the Ocean Ranger at 1:00 am.

The RCORD suggested four possible courses of action that could have been followed between 7:30 pm and 10:30 pm on board the oil rig. The report concluded that regardless of the course of action, the following time scale would be required for activities to be reasonable and realistic: at 11:45 pm the control panel was activated by restoring power; at 12:05 am on February 15, 1982, the ingress of water from the sea into the port pontoon was complete or the gravitational transfer of water was complete; at 12:15 am action commenced to remedy the list; and at approximately 12:55 am Jacobsen was informed that such actions were not effective. At 1:00 AM Jacobsen informed Graham of an 8-10 foot list in the platform, and that they were attempting to isolate the problem. Graham alerted the Canadian Coast Guard of the situation.

It is assumed that the crew did not perceive the situation as an emergency because there was still no communication heard from the Ocean Ranger. At 1:00 am Merv Graham received a call from Jacobsen informing him of the list. Sometime around

1:00 am manual control rods were inserted in an attempt to correct the list. There are conflicting reports as to when the SEDCO 706 received the mayday from the Ocean Ranger. The commission investigation stated that Baxter King, radio operator of the SEDCO 706, received the mayday at 1:10 am. Between 1:05 and 1:11 the Ocean Ranger sent out several maydays and the SEDCO 706 sent out maydays on behalf of the Ocean Ranger. At 1:15 am Jacobsen, Graham and SAREC (Search and Rescue Emergency Center) were in radio communication. At this time, Jacobsen reported that "the wind was 75 to 80 mph," that they were listing badly and needed to get people off the oil rig, that they just had a critical blast of wind and might not be able to hold the oil rig, and that they had three boats on location." At 1:17 am Jacobsen discontinued transmitting.

At 1:21 pm the SEDCO 706 directed the Bollentor to proceed to the Ocean Ranger, and at 1:22 pm the Zapata's vessel, the Nordertor, was directed to proceed to the Ocean Ranger. SAREC contacted the Rescue Coordination Center in Halifax. At 1:30 pm the SEDCO 706 picked up a message from the Ocean Ranger stating that the crew were going to lifeboats and requested that another mayday be issued. Rick Flynn of Mobil's shore base office updated SAREC. Shortly after, communication with the Ocean Ranger was lost despite efforts to reconnect.

At 1:31 pm Canadian Coastguard in Halifax contacted 103 Rescue unit and advised them of the emergency. At 1:36 am the RCC Halifax asked SAREC in St. John's to have Coast Guard issue an All Ships Broadcast on behalf of the Ocean Ranger. This broadcast did not occur until 2:04 am. At 2:11 am the supply vessel Seaforth Highlander made visual contact with the Ocean Ranger and at 2:14 am distress flare was seen off the starboard quarter. At 2:21 am the Seaforth Highlander reported to the SEDCO 706 oil rig that it had spotted a lifeboat and was proceeding to the location.

The Seaforth Highlander positioned itself to help the men in the lifeboat. At 2:32 pm the Highlander made rescue attempts, but these were unsuccessful because of stormy seas, inadequate retrieval equipment, and the immobility of the men on the lifeboat. The lifeboat capsized, throwing the men into the icy North Atlantic while the lines holding the lifeboat to the Highlander snapped. At 2:45 am the Boltentor arrived at the accident scene. At 3:38 am the Ocean Ranger disappeared off the Nordertor radar. At 4:35 am Universal Helicopters, on contract to Mobil Oil, arrived,

but the helicopters were not equipped with retrieval equipment. At 6:42 am Mobil issued its first press release regarding the disaster. At 8:35 am two Universal Helicopters arrived in St. John's, and their crew gave the first visual confirmation to Mobil Oil and the SAR personnel at St. John's Airport that the Ocean Ranger had sunk. All crewmembers had been lost. Table 2 below is a reconstruction of the timeline of the disaster.

Table 4.2

Timeline of the Ocean Ranger Disaster

	Sunday, February 14, 1982
Time	Event
6:00 AM	OR issues morning report
11:00 AM	Jim Counts, ODECO's shore-based drilling superintendent (onshore) leaves for home, maintains contact on MARISAT
1:30 PM	Regularly scheduled weather forecast predicts stormy weather
2:00 PM	Graham receives a call from OR stating the rig is drilling at 18 ft/hr
Conflicting Accounts:	
According to Graham	Mobil's area drilling superintendent in St. John's (onshore)
4:00 PM	Received a call from the OR stating bad weather forced drill stoppage. No record of this call.
4:30 PM	Graham reviews status reports; Kapral tells him that all rigs have hung off successfully.
6:47 PM	Graham receives MARISAT call from Jacobsen stating that the rig has hung off successfully
According to Kapral	Mobil's shore based drilling foreman
4:30 PM	Kapral advises Madden to cease drilling
4:42 PM	Madden reports to Kapral that the OR is in the process of hanging off, Kapral relays to Graham
According to Senkoe	SEDCO 706 crew member
7:00 PM	Jacobsen calls to say that the OR is trying to hang off but is being impeded by entangled hoses
Record Conclusion	The rig was still drilling at 4:30 PM. The process of hanging off was started soon afterward and completed by 6:47 PM
6:52 PM	Abnormally large wave hits OR, breaking a porthole and resulting in

	flooding and electronic malfunctioning
6:58 PM	Thompson calls Counts via MARISAT informing him of OR's damage
7:00 PM	Jacobsen mentions broken porthole to Senkoe. Graham calls Romansky and tells him all three rigs have hung off
7:00 PM	SEDCO 706 is also hit by an abnormally large wave; the rig rode out the storm
7:00 PM	ZAPATA UGLAND was also struck by a large wave. No serious damage, but it was jarred severely
7:05 PM	Hatcher hears someone state that the valves on the port side were opening by themselves
7:07 PM	Hatcher hears the same voice state that the valves are okay again
~ 7:07 PM	Ballast control starts short circuiting
7:25-7:30 PM	Radio conversation heard of Rathbun telling Thompson that the BC panel was wet; he had the cover off for repairs and was receiving shocks
7:35-7:40 PM	Radio Conversation heard of Rathbun telling Thompson that everything was working properly and cleanup of glass and water had started
Conflicting Accounts:	
	Sometime between 8:00 PM & 9:30 PM, the following was heard by crew aboard SEDCO 706 and/or ZAPATA UGLAND 1) unidentified voice: "all valves on the port side were opening by themselves" 2) Dyke said the PA system and gas detection were not working; they were getting shocks off other equipment and valves were opening and closing by themselves 3) A BCR man (probably Rathbun) heard calling for "an electrician" because of shocks while attempting repairs Communications are also being heard from United States as an American voice is heard recommending cleanup of glass/water Later reference is made to large powered cables, possibly in the BCR, and "don't get anybody injured…"
8:45 PM	14min MARISAT between Jacobsen & Graham - Jacobsen advised of high seas/winds, mentioned the broken porthole but stated that everything was normal at the rig
Conflicting Evidence RE: Jacobsen Report & Panel Functioning	
8:45 PM	Difficult to reconcile the report with overheard radio conversations regarding porthole & panel. Simple repairs would take 1-2 hours; shortcircuiting repairs would take much longer. Likely Jacobsen was optimistic and the panel did in fact short circuit

Conflicting Evidence RE: Time of Porthole Break	
	Graham's handwritten and typewritten notes show he was informed of the broken porthole during the 8:45 conversation. Yet, he testified he and Romansky had discussed the porthole shortly after 7:00 PM. Romansky was unable to pinpoint the time as 7:00 or 10:30 PM
	Based on all evidence, the porthole broke around 7:00 PM, February 14th, 1982
9:00 PM	Jacobsen called other two rigs to check status; reports the broken porthole but no other problems. Mentioned that he has hung off by shearing the drill strong
~9:00 PM	OR talked to SEAFORTH HIGHLANDER to check their status - they were uncomfortable but okay. OR asked how far away the vessel was from the rig.
Conflicting Reports RE: The BCR Panel	
	Sometime between 9:30-10:00 PM Hatcher heard Dyke say that an electrician was there, that everything was cleaned up and normal
10:00 PM	Jacobsen called Graham to report status; stated that there were no problems
	Hatcher hears Dyke say that everything is back to normal
	However, Davidson reports hearing a conversation that there was broken glass and water
10:05 PM	Davidson overhears remarks that valves are opening and closing by themselves
10:30 PM	Graham reported to Romansky accordingly. Rick Flynn receives a routine, normal, weather report. There was nothing worthy of note in this call and the sender's tone of voice was calm.
Record Conclusion	
	Evidence of functioning "normally" is dubious. It is possible that the panel had no power and other lights were suggesting valves opening/closing on their own. Possible that the men assumed cleaning the panel would restore normal functioning. Also possible, but unlikely, that the men were able to fully restore the panel but then a second porthole breakage occurred.
	10:00 PM February 14th – 1:00 AM February 15th
	No indication of alarm from OR
	After 11:30 PM there was no further conversation between OR & Mobil. Very little conclusive evidence to indicate what transpired in this time frame.
	No distress call until 1:00 AM

	Synopsis of four possible courses of action are attached: Routes A – D
Record Conclusion	
	Regardless of which route they followed, the following time line would be required:
11:45 PM	panel activated
12:05 AM	transfer complete or ingress complete
12:15 AM	remedial action commenced
12:55 AM	Jacobsen told that such action were not effective
1:00 AM	Jacobsen calls Graham (not speculative)
	Monday, February 15th, 1982
Time	Event
12:15 AM	Remedial action ongoing/commenced. Assumption that crew did not perceive an emergency because no communications heard.
~12:55 AM	Jacobsen told that actions taken to remedy the panel are not working
1:00 AM	Graham receives MARISAT call from Jacobsen informing him of listing 8-10 ft. Graham alerts the Coast Guard.
~1:00 AM	Manual control rods were inserted
Conflicting Reports of Communication Timing	
12:52 AM	King's handwritten notes and verbal testimony state he received a mayday from OR According to Commission investigations, King actually received the call at 1:10 AM
1:05 AM	OR contacts Seaforth Highland and requested it to come to "close standby" because they were listing badly
1:06 AM	Graham contacted Search and Rescue Emergency Centre in St. John's
1:10 AM	A distressed telex from OR was received by a MARISAT operation in Connecticut, stating severe list
1:10 AM	Night operator and Jacobsen contact Flynn to transmit a mayday for the OR
1:10 AM	Jacobsen called SEDCO 706 indicating that a mayday was required
~1:10 AM	SEDCO 706 put out a mayday on 2182kHZ
~1:10 AM	Jacobsen asks King to continue putting out Mayday messages
1:11 AM	Jacobsen called Senkoe on the SEDCO 706 and indicated that the OR was not coming back for them; rescue vessels would be required
1:15 AM	Jacobsen, Graham, and SAREC were in radio communication, Jacobsen reported: - wind was 75-80mph - they were listing badly - they need to get people off the rig - they just had a critical blast of wind, may not be able to hold the rig - they had three boats on location
1:17 AM	Jacobsen discontinued transmission
1:20 AM	Graham contacted Fraser and appointed him Mobil's on site

	coordinator - advised Fraser that helicopters were alerted and told him to dispatch the two standby vessels - told Fraser to monitor all radio communications and relay immediately to shore
1:21 AM	SEDCO 706 directed Boltentor to proceed to the OR
1:22 AM	Nordertor was directed to proceed to the OR
~1:22 AM	SAREC contacted Rescue Coordination Centre in Halifax regarding OR; Halifax had already heard from RCC in New York
1:30 AM	crew of the OR take to lifeboats, requested another mayday be issued Flynn updates SAREC MARISAT connection with OR is lost; unable to reconnect SEDCO 706 contacted Boltentor and advised them of the seriousness
1:31 AM	RCC Halifax contacted 103 Rescue unit and advised them of the emergency Mobil alerted Universal Helicopter Crews RCMP were contact to arrange ground transportation due to severe snow conditions
1:36 AM	RCC Halifax asked SAREC in St. John's to have Coast Guard radio issue an All Ships Broadcast on behalf of the OR. This didn't happen until 2:04 AM
1:46 AM	103 Rescue Unit were proceeding to airport but were grounded by weather. All three standby vessels en route to OR
2:11 AM	Seaforth Highlander makes visual contact with OR
2:14 AM	Distress flare was seen off starboard quarter
2:21 AM	Seaforth Highlander reported to SEDCO 706 that it had spotted a lifeboat and was proceeding to it Graham testified that he ordered each Master not to secure lines to lifeboats. Fraser said that the instructions were relayed to the vessels, but the vessels say it was not received -Seaforth Highlander positioned itself to help the men in the lifeboat
2:24 AM	Rescue unit Summerside PEI was alerted and informed that aircraft would be required. Buffalo aircraft was tasked.
2:32 AM	Rescue attempts made. Two life ring lines were thrown and caught by two men, the other 7 or 8 men stood up
2:35AM	Buffalo aircraft depart
2:38 AM	Lifeboat capsized, throwing the men. The lines snapped. Reported stormy seas, inadequate retrieval equipment and immobility of the men made rescue futile Some men hung on to the capsized lifeboat. Seaforth Highlander shut down propellers for safety, but men had drifted by the time they got back to them.
2:45 AM	Boltentor arrived, no sign of life anywhere
3:00 AM	Nordertor lost radar contact with OR. RCC Halifax tasked Voyager helicopter to proceed from Summerside to St. John's
3:05 AM	Nordertor checked with the Boltentor and the Seaforth Highlander to find out if they still had radar with contact with the OR. Neither had

	contact.
3:38 AM	Nordertor reported to SEDCO 706 and the OR disappeared from radar; relayed to Graham and Mobil was tasked to advise SAREC. SAREC was not informed until 7:35 AM - Boltentor and Seaforth rescue attempts were futile
3:40 AM	Nordertor arrives and joins the rescue mission
4:15 AM	Voyager departs
4:35 AM	Universal Helicopters arrived but were not equipped with retrieval equipment; directed supply vessels to lifeboats, rafts, and bodies
4:40 AM	Additional air support tasked
6:00 AM	Universal returns to St. John's
6:15 AM	Buffalo aircraft arrives in St. John's
6:30-6:50 AM	SAR helicopters departed for St. John's; they were advised by Universal that the rig could not be detected by radar
6:42 AM	Mobil issues first press release regarding the disaster
7:14 AM	The Aurora departed for the scene.
7:30 AM	SAR helicopters land in St. John's to refuel and get updates on rescue effort - Capt. Clarke (SAR pilot) testified that Mobil personnel at the airport had little knowledge of activities
8:30 AM	Clarke departs St. John's without any knowledge of the OR
8:35 AM	Two Universal helicopters arrived in St. John's and reported that the OR had sunk. This was the first visual confirmation

Route A

1	draft 79 after hang off
2	possibly deballast 71 or 72 ft
3	porthole breakage
4	manual sea chest valves shut
5	valve runaway due to switches short-circuiting but without any water ingress
6	restoration work on panel
7	all power back on panel - trim runaway close to 12 degrees by bow, no water ingress
8	Start correcting by filling the DW & FO tanks with water
9	water begins seeping into port chain locker (PCL) - counteracts remedial action
10	misled by kings gauges, inserts manual control rods (MCR) as a result - counteracts remedial action
11	full chain locker flooding (FCLF)

Route B

1	draft 79 after hang off
2	do not deballast
3	porthole breakage
4	air pressure taken off panel and MSCV's shut
5	switches, lights, etc. malfunction but no effect
6	restoration work on panel
7	all power back on panel - valve runaway
8	internal transfer in trim close to 12 degrees - no heel or draft damage

9	begin correcting by putting water into DW & FO tanks
10	trim excessive for control and CL flooding starts
11	MCR's inserted
12	FCLF
	Route C
1	Draft 79 after hang off
2	do not deballast
3	porthole breakage
4	air pressure taken off panel and MSCV's shut
5	switches, lights, etc. malfunction but no effect
6	restoration work on panel
7	all power back on panel - valve runaway
8	water ingress and transfer - change in heel/draft plus an appreciable trim
9	close to MSCV's and commence correcting by:
10	pumping out overboard and putting water in the drill water(DW) and fuel oil (FO) tanks
11	Trim excessive for control and CL flooding starts
12	MCR's inserted
13	FCLF
	Route D
1	Draft 79 after hang off
2	do not deballast
3	porthole breakage
4	electrical malfunction - water ingress and transfer
5	MSCV's shut - power off in panel
6	Draft close to 89ft, plus almost 2-3 degree trim/heel
7	restoration work on panel but decided to wait until complete before restoring draft/trim/heel due to difficulty of full manual operation
8	events require all power back on panel - MSCV's still shut
9	Trim runaway to 10-12 degrees, draft still about 89 ft, heel still 2-3 degrees
10	pumping out overboard and putting water in the DW and FO tanks
11	Trim excessive for control and CL flooding starts
12	MCR's inserted
13	FCLF

CHAPTER 5: ANALYSIS OF THE CRISIS RESPONSE

5.1 Introduction

This chapter is an analysis of the findings of the Royal Commission on the Ocean Ranger Disaster (RCOED). The Ocean Ranger oil rig disaster provides a clear example of the problem associated with how people take responsibility during a crisis in a distributed work environment. The oil and gas industry provides an appropriate context for both crisis decision-making and virtuality because of the distribution of co-workers.

Five rhetorical questions were developed from the three themes that emerged from the analysis of 37 semi-structured interviews that were applied as discussed in Chapter 3. Two questions were developed from theme one; both examined the lack of structure for responsibility in terms of avoidance, lack of clarity, and location of the decision-maker. Two questions were also developed from theme two, both of which explored normalization of an event as a non-crisis. The final question was developed from theme three, which provided support for a link between the lack of structure and the resulting action. The following section discusses each of the five questions and provides validation from the RCORD report.

5.2 Clarity

Question 1: Does the higher the seriousness of the crisis situation, or more risk, imply less clarity of the unfolding crisis situation?

The first main finding from Chapter 4 is the higher the seriousness of the crisis situation (or the greater the risk) the less clear the crisis situation. One possible explanation for this is that more serious incidents are associated with a faster pace, less information and greater confusion. In addition to this information deficit, there are other factors in such crises. These include workers being unclear about when to get shore management or personnel involved in the decision-making process. There is a step change when workers move from distributed to non-distributed crisis situations; this causes workers to wait before making decisions, often resulting in confusion over who should take responsibility. In addition, distributed crisis situations may also contribute to decreased clarity around the crisis situation.

5.3 Altered Perceptions

Question 2: Did workers alter the event to make it seem less serious than it was?

There was a virtual component to the decision-making in the OR example because the oil rig and shore based office staff communicated. According to RCORD, during the crisis, communication by telex and MARISTAT was minimal. On February 14, 1982, several telephone conversations took place between the oil rig and land personnel. The land-based superintendent reviewed the situation in an attempt to help with decision-making regarding ceasing operations as a result of the storm. He gave orders at 4:30 pm to cease drilling (RCORD, Vo. 1, p. 59). However, it seemed as though the decision-making was made in isolation by the oil rig crew because there was very little communication with shore as the crisis was unfolding.

The Commission expressed concerns about the decision-making process during the emergency and provided support for flexibility in the decision-making process. The report stated that lack of flexibility could jeopardize the safety of an oil rig and crewmembers.

> One area of concern is the decision making process during an emergency. The person or group of people best equipped in terms of information and expertise to make vital decisions and take leading action are, for example in evacuation, those on board the oil rig. Retaining the authority for these decisions on shore may in certain circumstances jeopardize the safety of the offshore installation and crew (RCORD, Vol. 2, p. 66).

Although the Commission indicated that flexibility was necessary, and that the person on the oil rig with the expertise should make the decision, this type of self-selection and flexibility may result in uncertainty of who should decide, and could result in the avoidance of responsibility. The Royal Commission further recognized the importance of flexibility in decision-making and taking of responsibility in discussing the importance of training. They stated:

> They would also provide experience and training to key personnel for the responsibilities that, in the event of an emergency, would be thrust upon them and to persons with the understudy roles who may be called on to take charge of particular situations (RCORD, Vol. 2, p. 66).

RCORD recognized that responsibility is often thrust upon individuals in crisis situations, and that any worker at any level of an organization could be called

upon to take charge. Due to this possibility, they recognized the importance of experience and training.

On February 14, 1982 the distributed environment may have limited the discussion and level of communication regarding the taking of responsibility at the time when the oil rig was listing. Time pressures to solve the unfolding crisis, the impending storm, and associated communication problems may have been factors impacting the level of dialogue that ensued.

5.4 Displaced Responsibility

Question 3: Do employees believe that someone will always come along to solve an impending problem?

Distributed communication on the night of the OR oil rig disaster may have contributed to information being relayed but not received, low levels of communication, receipt of inaccurate and at times delayed information. Evidence of communication failure was presented in the testimony of Mobil's Merv Graham, area drilling superintendent in St. John's. He testified that on February 15 at 2:21 a.m. he issued instructions to Rod Fraser, Mobil's drilling foreman on the SEDCO, to advise the masters of supply vessels not to secure lines to lifeboats (RCORD, Vol. 1, p.108). During the OR crisis a temporary communication channel was put in place whereby one member of the SEDCO 706, Fraser (Mobil's drilling foreman on the SEDCO 706), was appointed Mobil's on-site co-coordinator. Fraser's role was to monitor all radio communication and report events immediately to shore. He said that the instructions to not secure lines to lifeboats were relayed to supply vessels, although the vessels indicated that they did not receive the information. This communication breakdown may have been the result of virtuality, the panic hypothesis, or the lack of crisis management preparation.

There was a further lack of communication between the toolpusher (rig staff) on the OR and shore-based ODECO personnel regarding the broken portlight on February 14, 1982. The broken portlight was not reported until the next day. It is possible that this communication was the result of the virtual nature of the communication. It was also determined that communications originating from Mobil shore base were neither accurate nor prompt; instead, there was constant confusion and delay (RCORD, Vol. 1, p. 123). For example, as late as 5:27 a.m. on February 15, 1982, a senior shore-based Mobil employee told SAREC that there was no change

in the oil rig status. This happened despite the fact that at 3:38 a.m. the Nordertor reported that the OR had disappeared from radar. This discrepancy may have been due to the distributed nature of the communication, poor crisis management, or Mobil's deliberate delay in releasing the horrific news. This delayed communication is similar to how the families found out about the crisis, through the news media. Mobil may have been trying to buy confidence. It is also possible that Mobil staff did not believe that such a horrendous crisis had occurred, or they had no plan for dealing with it.

Another example of communication failure was evident among Search and Rescue (SAR) personnel. At 6:30 a.m. and 6:50 a.m. on February 15 SAR helicopters departed for St. John's (RCORD, Vol. 1, page 113). Prior to their departure the pilots received very little information on the accident. Since Universal Helicopter's dispatcher advised SAR before 6:30 a.m. that the oil rig could not be detected on the radar, this was likely because of limited relevant information due to virtuality, in combination with panic hypothesis

5.5 Experience

Question 4: Are more experienced workers more proactive, flexible, and less likely to be bound by the rules than less experienced workers?

The OR design meant that, in a crisis, if the power from the mimic panel was lost, the ballast valves and pumps could be operated manually from the pump rooms. A manual ballasting operation using this method would have to be coordinated from the ballast control room, but the PA system was the only method of internal communication available to the pump rooms. A PA system failure would have made manual ballast control operations from the pump room difficult (RCORD, Vol. 1, p. 20). An effective backup communication channel was not in place for this area of the oil rig, even though the ability to communicate to land from here could be critical in a crisis.

The Royal Commission recognized the importance of communications systems during crises when they stated, "the dependability of communication systems in adverse conditions, the adequacy of preventative maintenance programs, and the quality of supervision and service contractors are among the variables to be managed in a manner that ensures safety of the personnel and equipment employed in a drilling program" (RCORD, Vol. 2, p. 68). It is possible that lack of a backup communication

system added to problems aboard the OR by impacting the clarity of communication on the night of the disaster.

5.6 Rules

Question 5 Is the rulebook a double-edged sword and not necessarily appropriate in every crisis situation:

Accountability aboard the OR was divided among marine and drill tasks. RCORD provides several examples of confusion over the responsibility for marine versus drilling operations and responsibilities. Rig operations were the responsibility of Ocean Drilling & Exploration Company (ODECO). In general, the operations that affected the well were the responsibility of Mobil Oil Canada (MOCAN**)**. Rig and well operations frequently overlapped, and almost all decisions by one party within their sphere of responsibility required close consultation and coordination with the other party. This was especially true in emergency situations (RCORD, Vol. 2, p. 62). The senior representative of ODECO Canada onboard the OR on February 14, 1982, was Mr. Ken Thompson. His position of toolpusher at the time of the disaster was senior to all other ODECO positions on the oil rig, including the vessel master.

This decision-making anomaly is also permitted by the U.S. Coast Guard. The OR booklet of operation conditions specified that "while underway the person in charge shall be the Master, but while anchored on location for the purpose of drilling the person in charge should be the toolpusher, as permitted by the U.S. Coast Guard" (RCORD, Vol. 1, p. 29). The position of toolpusher did not specify any minimal training or experience requirements by the U.S. Coast Guard. On the other hand, the position of master did have specific experience and knowledge requirements imposed upon it. Therefore, individuals filling the position of toolpusher, or person in charge, varied markedly in their background and training (RCORD, Vol. 1, p.29).

As established by the testimony, it was ODECO Canada's policy on the OR to employ marine personnel, aside from the master. The marine crew consisted of individuals from within the industrial personnel force who held the Merchant Mariner's Documents (MMD), which is a Merchant Marine Credential, issued by the U.S. Coast Guard. In other words, individuals were primarily employed on board the OR from specific industrial capacities such as toolpusher, driller, roustabout, and electrician. It was only by coincidence that any of those individuals held MMD. This operational reality created some confusing and curious hierarchical anomalies aboard

the OR. While it was anchored and drilling, all marine personnel were the responsibility of the master. The rig mechanic and crane operator would normally be accountable to the toolpusher, but as they were also ordinary seamen, they were accountable to the master. The Royal Commission emphasized the conflict in roles of crew members aboard the OR when they developed recommendation 132 (a). This recommendation addresses the person in charge in emergencies. In respect to recommendation 132 (a), the commission states,

> What is essential is that, when emergencies occur, all members of the crew should know in advance from whom they are to take direction. When lives are at stake there should be no question regarding who is in charge. One person should be clearly in charge of the rig at all times. The solution to be desired, and the one to be implemented as soon as it is feasible to do so, is to place in charge of the submersible one who has knowledge and experience in both the marine and drilling aspects of the operation and who has the necessary leadership qualities (RCORD, Vol. 2, p. 167).

At the time of the crisis on February 15, 1982, the OR marine crew consisted of one master and two ordinary seamen. The rig was actually short two able seamen and one lifeboat man at the time. Confusing hierarchical structures existed aboard the OR while it was anchored and drilling. The confusion over roles and tasks likely impacted the decision-making process.

This chapter has set out the rationale for and the articulation of the research methodology employed in this study to develop a decision-making framework to address the research questions. The following chapter presents the findings from the data analysis of 37 semi-structured interviews. Remarks by participants are quote word-for word unless otherwise indicated.

CHAPTER 6: DATA ANALYSIS FROM INTERVIEWS

6.1 Introduction

This chapter presents an analysis of 37 semi-structured interviews with management and non-management oil and gas workers from oil rigs and ships and from different companies in Newfoundland. In particular, the interview data establishes the context how responsibility is handled in crisis situations. As discussed in Chapter 3, all interviews were conducted in a face-to-face format, taped, transcribed and coded. A question mark (?) is utilized to indicate uncertainty around a particular word; a caret symbol (^) is used to indicate that the interviewer was unable to transcribe the interviewee's language; and square brackets ([]) are used to indicate the interviewer's language. Text relating to a particular theme is differentiated from the remaining text with the underline format feature.

6.2 Lack of Structure for Responsibility

This chapter is a discussion of the lack of structure for responsibility among oil and gas workers, which is supported by data that indicates an avoidance of taking, or giving, of responsibility. The organization of this section reflects the analysis of the theme through the three lenses: avoidance, lack of clarity, and location of the decision maker in terms of being on the rig or on shore.

6.2.1 Avoidance

Participants 2, 5 and 8 (P2, P5 and P8) provided examples of situations where they did not accept responsibility because of inexperience and fear of repercussions. One worker explained a near miss situation with a gas leak that resulted when backing off a piece of pipe. The worker explaining the close call situation said that a co-worker was afraid that he was going to be fired. He stated, "He figured he was fired, right…' (Interview 8, page 9). This co-worker avoided taking responsibility and ran away from the incident because he feared repercussions from what had happened.

Participant 5 felt that inexperience, resulting in a lack of knowledge, prevented decision -making. He said, "but the biggest thing I find with decision-making… I've seen a lot of it is, like I said, is the inexperienced guys. And he came over but yet I've got to make all the decisions for him. Now I came in a couple of months ago and left him there and I wasn't there, and the boys told me he was lost because he had no one to make the decisions for him. Now if that was crisis and, God forbid, the other guy happened to be involved in it or hurt or something, how is he going to make the

decisions, and that's the inexperience coming into play. He doesn't know" (Interview 5, page 4).

Participant 5 continued his discussion, stating that he had concerns about several inexperienced workers, a control operator, and an OIM with limited experience having to make joint decisions during one shift. He said, "So, like I say, if I'm not there, he has to make the decision. We have an OIM that has no process experience whatsoever and we've got this guy that came from maintenance experience. So two of them were on the platform together. There's one other production supervisor there that has… now he has experience but if anything happened to him, who's making the decisions…who's making the decisions; and this is the decision-making process. Like I said, the biggest problem that is [there] is bringing inexperienced guys in there that don't understand the plant and being put in supervisory role in charge" (Interview 5, page 5).

The same worker also expressed concerns with inexperienced control room workers stating, "And another control guy – he was there one night… there was something went on. I don't know if they had a gas leak or something – maybe on the (main)? compressor, actually. And that's the two people that were there in the control room – was the OIM and this guy - neither one with process experience – and everything fell to the control room operator for making the decisions. Neither one of them could tell him what to do, and he turned around and he said – will I ^ the plant, and the two of them looked at each other and neither one of them could make a decision, and finally he said – I'm going to ^ the plant"(Interview 5, page 7). This worker expressed concern that the decision maker's lack of experience could result in indecisiveness.

Participant 2 cited inexperience and fear of the repercussions for making the wrong decision for inhibiting workers' decision making and for their waiting for someone else to make the decision. Participant 2 who has been on the Hibernia platform for nine years felt that while inexperience at the Hibernia site prevents decision making and taking responsibility for authority today, this was not an issue in the past because the startup phase of the project had lots of experienced personnel.

He said, "a change now on Hibernia platform compared with early days in decision making when we first started out there, we had experience from… yes, there's different people from all over the world that start up and they're at this for a

long time, so you can tell the atmosphere, the decisions. He also believed that making a wrong decision was a concern that hindered the decision making process. "You know, they'll make a decision to shut it down, that's it. You know, we'll find out the problem. But now it's no decisions in a way. It's, you know, wait and make someone else make the decision. I can't make this decision. I don't want to make this decision unless it… you know, if it's the wrong one…."(Interview 2, page 6).

The preceding paragraphs show examples of worker avoidance of responsibility in near miss situations. Avoidance is an understandable response to a situation that may cause workers to "get it in the neck," by being punished or criticized. These workers have learned to work using an avoidance strategy driven by fear and centered on not taking risks to remain comfortable. The following table provides a summary of the preceding section that includes reasons for avoidance of responsibility in close call situations.

Table 6.1

Reasons for Avoidance of Responsibility in Close Call Situations

Interview #	**REASONS**	**SITUATION**	**ACTION TAKEN OUTCOME (PROBLEM SOLVED)**
8, Page 9	Fear of repercussion of being fired caused him to run	Several people present	Inappropriate
5, Page 4	Does not understand the role or the situation he /she is in because of both his lack of experience and the supervisors lack of experience (unclear regarding roles and lack of experience)	Not identified	Not clear
2, Page 6	Fear of repercussions of getting in trouble caused the worker to wait for someone else to make the decision	Several people present	Inappropriate
5, Page 7	Does not understand the role or the situation he /she is in because of both his lack of experience and the supervisors lack of experience (unclear regarding roles and lack of experience)	Several people present at the time of the decision making	Inappropriate Worker made a guess decision with no support from his two co-workers, one who was superior

The following subsection provides additional evidence of the lack of structure for responsibility resulting from a lack of clarity around the decision-maker in a close call situation.

6.2.2 Lack of Clarity

A further lack of structure for responsibility was supported by data indicating conflict or a lack of clarity regarding the location and the identity of the decision maker. The location of the decision-making process was either on the oil rig, on shore, or a combination of both. The decision-maker list was long and varied with possible personnel from land and offshore including the OIM (offshore installation manager), the oil company president, and the oil rig worker. Indeed, the decision-making process might include a combination of input from both shore and rig workers. Within this context different workers had varying perceptions of the

importance of the identity and location of the decision maker in a crisis and were unclear about how responsibility would be handled in a crisis.

6.2.2.1 Location: decision-making on the oil rig. Conflicting views were presented regarding the identity of the offshore decision maker. Participants 1, 2, 15, 20, 34 – 38 and 40 felt that all decisions were made on the rig. When talking about where decisions were made, Participant 2 said, "the decision is on the rig. Everything is on the rig and it filters through all the information. We don't direct contact with town unless somebody in the shore base contacts you and they want specific" (Interview 2, page 2).

Participant 15 believed that the Offshore Installation Manager (OIM), the most senior manager of the oil and gas rig responsible for the health, welfare and safety of the personnel on board, had ultimate say. That worker stated, "They make all the decisions in the offshore. So the OIM has ultimate say or he is… you know, he's the commander in chief in what's happening offshore, and he's got his leads that he leans upon, and they kind of give direction to the rest of the workforce, depending on what's happening offshore" (Interview 15, page 3).

Participant 36 felt that while the OIM was the decision maker, this could change depending on whether the situation was a marine or non-marine situation (at sea or drilling). He said, "but now if this comes to… like that's another thing – he (OIM) makes the decision, but then you got a barge captain; he's on the marine side, and the stability of the rig – he's going to make a call on it…. Like in a marine case emergency, I'd sooner have a barge captain – that fellow with his sea tickets and everything – controlling that rig, rather than a fellow that came up through drilling rigs" (Interview 36, page 25). This worker supported the view that the decision-making process occurred on the rig, but the decision maker was identified as either the OIM or the barge captain, depending on the type of emergency that was unfolding.

Participants 1, 35, 36 and 38 cited instances of the OIM as the person in charge. Participant 38 described how a decision was made by the OIM on the spot not to allow a helicopter to land on the rig. The worker said, "…one situation we had a helicopter about ten minutes from the installation, and usually about ten minutes back they request for deck clearance, which gives them the right to land on the facility that they're approaching. About five minutes before they landed on the rig there was a GPA – a general platform alarm; and in that situation, no one is allowed to land on the

rig until you have the consent from the OIM, or the operating installation manager. …. In this situation, I called the operating installation manager and asked if we could issue deck clearance even though we had a GPA and he said, no, not until further investigation was uncovered to see what was actually the cause of the GPA; and it's normally just sensors. It could be heat sensors; it could be fumes, or whatnot. There are so many different things that can actually set the GPA into full alarm. So many times, like I said, it is false but he would not.… he made a decision on the spot not to issue that clearance; and because of that, the helicopter was rerouted back to St. John's and they were unable to land on the installation." Because of the number of false alarm situations it would be very easy for a case such as this to be defined as a non-crisis situation, but in this situation the OIM declined the request to land and rerouted the helicopter back to St. John's, shore base (Interview 38, page 1).

When discussing a near miss with a gas leak and the resulting decision-making, one Participant 1 spoke of the OIM taking responsibility and deciding on a course of action. He said, "in a situation like that, a decision has to come from the installation manager on… and he's going to assess the risk and see whether we have to partially abandon, fully abandon or what ... (all)? the determinants are. So in that instance, when there's an emergency like that, he's making that decision; but now in St. John's they have an emergency control room, and all the, I guess, management or leadership team in St. John's, will… when there's muster on the rig, well, we call it a GPA – General Platform Alarm. When that sounded, the first… one of the first things they do – they call the on duty person in town and notify him to activate the (CR)? in St. John's. So they're communicating back and forth together, and they're basically telling them what the requirements are and discussing decisions with them on the [beach]" (Interview 1, page 3).

Participant 36 explaining a close call with a BOP (blow out preventative) indicated that the OIM made the decision to rectify the problem stating, "But now if this comes to… like that's another thing – he makes the decision…" (Interview 36, page 25).

When interviewed, Participant 35, an OIM stated that he was in charge of the decision-making on the rig, and shore was contacted for longer events. He said, "Most of it I would say the OIM – he certainly makes the majority of the decisions. For some events which are very long and drawn out, he may consult with people on

the beach, but it's still his decision" (Interview 35, page 3).

Decisions have also been made in the control room of the rig. Participant 1 and 2 provided examples of situations where the decision was made in the control room without indicating the identity of the decision maker. Participant 1 talked about a quick decision made in the control room in poor weather to allow a helicopter to land. He said, "well, we made the decision that we had to bring the helicopter on deck. That was made in the radio room just in a split second …control room wasn't activated that night because they came up… and this was an issue with the radio room and the halo-deck, and it was just focused there and the operation was controlled from there. The installation manager was up in the radio room keeping an eye on things should he be required to make a decision of any kind, you know" (Interview 1, page 19). The decision was quickly made from the radio room.

When describing another near miss situation Participant 2 discussed a decision by the control room and the resulting action. The worker explained, "we had a very close call. A diesel line… …Anyway, when they started it up and it was running, one of the operators looked in through the viewing window and he seen diesel leaking out of this line. You can go up… like the jet engine is suspended and the lines going into it and he could see just diesel leaking out of it, but it was shut down right away. That was a decision from the control room" (Interview 2, page 5).

The rig decision maker appears to vary depending on what the task accomplishes the need for immediate intervention, and the seriousness of the task. Participant 37 explained a close call situation with a broken hose to describe how decisions to rectify or normalize are made on the rig. Explaining the situation he said, "We were moving the (racking)? arm. The (racking)? arm is an outfit that's up on the drill floor that we use to… it's almost like a robot but you're controlling it. Its arms that go out and grab that pipe and move it into place, and you got to use these ^ arms because they (rack)? the pipe – stick the pipes up in their slots, right? So one night we were coming around the side and we looked on the deck there and you could see like oil on the deck, right; and when we looked up, the oil was pissing out of the hydraulics for the racking arm. But, anyway, yeah, a guy seen that leak in there before I had got there and said that oil was leaking out ^ the last pipe and shut her down. Number one – it could've been a serious environment spill if the guy hadn't shut the pump down (because of lag)?; and number two – it could've been a potential

hazard if someone looked at it and didn't bother or didn't run or didn't act immediately because the system could've ran out of oil just at the time that they were going to grab that pipe and lay it somewhere – then all of a sudden the hydraulics is gone and now the pipe could've let go of the racking arm and fell down and hit someone, right? So that's just a situation where a hose is bust.

That decision was made by that young fellow right away. You know, he had to go to the drill floor. He couldn't shut the system down immediately because you ^ (crawled in across)? ^ (moving something)?. … decisions to rectify stuff on the rig are made on the rig if it's only a temporary fix then it usually goes higher and see what… you know, everybody puts their input into it, and then they'll come up with a decision, right; but, usually, on the rig the chief… usually on the rig the chief" [comes up] (Interview 37, page 9). The discussion by the worker indicates that decisions that are temporary or that cannot normalize the situation are discussed further with higher management. On the other hand quick fix decisions are made on the rig at the time of the incident.

Mechanical problems are dealt with by the mechanical department. As Participant 37 explains, "anything in the mechanical department…usually, it all comes to our… comes to us, right? Anything on the drill floor happens… it's all mechanical gear anyway, and that usually falls back on the engineering department and we make the decisions – me and the chief mechanic – and then we'll pass it on to (OIM)? of what we done"… usually what decision we make they'll say, okay, that's fine and dandy, right?" (Interview 37, page 10). The worker provides support for the decision making required on the drill floor being handled by the mechanical department and the OIM being updated later.

Participant 40 addressed decision-making location. He said, "Depending on like… and with ^ it's slightly different because it depends on the scenario because if you're going to disconnect… then the power then transfers from the OIM to the master" (Interview 40, page 3). This worker provided support for a change in decision maker depending on the situation and type of problem.

Participants 15, 20 and 38 provided support for the involvement of shore personnel in the decision making process in more complex situations. Participant 20 felt that minor decision-making was handled by the rig and more serious situations involved communication with shore. He said, " So if it's something fairly major, the

control room gets involved and talking back and forth - that's what I'm hearing from you – to town and stuff like that; but I guess if it's something minor… I don't know, someone chopped their finger off or hurt themselves – not that that's minor – but it's handled on the rig and then probably reported to shore after. You kind of do what you have to do" (Interview 20, page 16). The worker's acceptance of "doing what you have to do" reinforces the belief that decision making is not straight forward and workers do what is necessary, particularly when an immediate intervention is necessary.

In addressing this issue, Participant 15 said, "Normally, like there's different tiers of incidences or the ^ of the incident and, like I said, it can grow from… no matter what happens offshore, they have a GPA because somebody pushed the manual call button by mistake. We know ^ here it would be communicated back to us immediately. May not need any response from us because that'll be a level one that they can handle on their own. We'll be informed of it and it'll be discussed so that we understand it, but we don't have to have any direct involvement in it; and it'll… it solely depends on like, I guess, offshore – the OIM – if he feels he needs support or that it could escalate or they're not going (to control it)?, he may activate the ICC immediately, and he may never need us onshore" (Interview 15, page 10). The classification of decisions into tiers, or levels of seriousness, determines who makes the decision.

Similarly, Participant 38 talked about a decision by the supply boat captain to move an anchor in poor weather, a complex maneuver. The decision impacted the rig and oil personnel and had to be done under the right circumstances. The worker said, "So they're moving the rig, say, a few miles every few days because they're doing completions on each well, and replacing valves and specific work on each area. So last time I was out we were involved with a rig move, and rig moves are pretty complex. There are twelve anchors on the Henry Goodridge. So each anchor has to be picked up by a supply boat. So normally they pick up on each corner and they kind of continue going around until they're down to the four primary anchors.

So we were down to the last four and we were just about ready to move, and it was so foggy that the boat couldn't actually see the pendants on the anchor from the wheelhouse, which is about 100 feet. There was no visibility. It looked like we're in the thick of fog for the next few days, and the oil personnel would come up and say –

have we moved yet?; have we moved yet? – putting quite a bit of pressure on the marine crew, which is actually hired by Trans Ocean. And they would say – no, no, things are going slower than we anticipated because the fog is… the visibility is actually slowing down the anchor move. And this decision to move anchor was actually made by the ship [captain] and they said – no sir, we're not moving any more anchors until visibility is improved. So that decision actually came from the boat. It wasn't anything to do with our rig. Our rig kind of put pressure on them – would feel it out every half an hour… if they saw any slight change in the visibility, they would say, oh, do you feel comfortable in doing it now? Do you feel comfortable in doing it now and then, of course, the oil personnel were continuing on the marine personnel about – oh, it looks a bit better; it looks a bit better. … the rig doesn't pull the anchors up themselves.

We run a boat to the end of the anchor and they actually pull the anchor up at the end. So because the visibility was so bad they didn't want men working out on the deck, and they actually… but that decision was outright made by the captain [of the supply boat]; and even if the oil company and Trans Ocean were unhappy with it, they had to respect this decision but they certainly put pressure on them to continue (Interview 38, page 3). The decision to move the anchor is made by the marine captain of the supply boat, but there is significant interest from the oil personnel because the decision not to move slows down the operations. Oil personnel certainly have input into the decision and make their views known to the weather and ice personnel, as well as mariners and rig workers. The worker's comments provide support for involvement of shore-based personnel in more complex situations, such as rig movement.

Participant 34 felt that shore personnel were contacted only in emergency situations. He explained a close call situation involving a piece of pipe that fell and narrowly missed the gas lines. This situation was normalized by shutting down the rig and without a need to contact shore. The worker said, "There was no need of contacting town as such because there wasn't an emergency but, you know, we took the protocol – speaking to me and speaking to the right supervisors and got out in the field and investigated. The team started to investigate the situation and, you know, we just took it from there and…(Interview 34, page 1). The following subsection provides support for viewing the decision making process as occurring on land.

6.2.2.2 Location: decision-making on shore/in-town. A second group of workers, Participants 1, 20, 22, 24 and 25, identified the decision making location as St. John's, which is known as shore base and is often referred to by workers as shore, land or beach. Participant 1, an offshore worker, who had also worked in the offshore in the Ocean Ranger (OR) days, felt that more decision-making today takes place in St. John's [shore base]. He stated that, "back in those days, the decisions were made on the rig. It's the complete opposite now. Nothing… no decisions are made on the rig anymore" unless management on the rig ignores the official rule (Interview 1, page 2). This worker discussed the night of the OR disaster when he was working on the SEDCO 706 as a radio operator. He explained how the company man or the oil company's employee went to the radio room, where the decision-making took place. He felt that some management still does this type of thing, using logic and dealing with the situation in the radio room. Discussing the decision making aboard his vessel then, and comparing with decision making today, the former worker stated,

...a prime example is the night when the Ocean Ranger went down – the company man came right there and he stood behind me, and all the decisions were made right there in the radio room as to what was going to happen, what boats were going anywhere, what helicopters were flying. Everything was done right there in the one spot. And now… …some management people out there offshore, if they got a situation dealing with the marine side of it, they may not muster and bring the leadership team into the ECC [Emergency Control Centre]. They may come up to the radio room and say, "Alright, let's deal with this here." It depends on the management too and now some people won't do that because the book says not to do that, but some people would rather… you know, they'll use a bit of logic and say, "Well, hey, this is the right thing to do" (Interview 1, page 6).

This worker supports attempts by the oil industry to try to bring onshore people physically together with offshore people to make decisions. The 1985 Royal Commission Report on the Ocean Ranger disaster indicated that they should come together and not operate as separate entities as they had operated in the past.

Participant 22 felt that the decision-making was centralized and that shore made the decisions. He noted, "regardless to if they got to get materials or they got a problem with a unit or anything else, we'll go to our boss. He'll check with the supervisor; the supervisor usually checks (with them)? onshore. If we got a problem

or whatever, they make the decision onshore and we basically just concentrate with the people offshore…." (Interview 22, page 12). Similarly Participant 24 also felt that shore made the decisions. When talking about a friend who is an OIM he said, **"**He's been a master mariner for years. He's very good with people. But the problem is that they're puppets for one or two that's running the show in town, and they know that themselves. Like this guy from Southern Shore, the ^ talk to and so on and he said to me, "I'm in a position of authority with no authority." That's his phrase, and that's too bad because we've had guys that's come over from Norway – (Norsk Hydro)? – and work with us and so on, and specialist vendors and so on, right, and they can't believe that like I've been in a meeting when a guy walked out and said, "I can't believe this," he said, when the OIM turns around and tells me I got to check with town before I can approve this …" (Interview 24, page 9) The discussion by this worker suggests that since the Ocean Ranger there has been a tightening of control with much more centralization onshore.

Similarly, Participant 25 stated that the president can get involved in the decision making if the decision is high risk, thus supporting the case for shore personnel involvement in the decision making process. He stated, "There's certain levels here that the president would have to sign off too. It depends on the level of risk." (Interview 25, page 19)

Participant 20 felt that decision-making regarding expenditure of money on equipment meant going to the employer and asking for approval. He stated, "we talked about money like that but we have to go to people who's paying for this equipment …?" (Interview 20, page 19). This worker provides support for a case where money is the determining factor for when shore personnel make the decision. In other words, if significant dollars are involved rig personnel defer to St. John's for decision-making.

6.2.2.3 Decision making in a distributed environment. A third group of workers, Participants 5, 6, 20, 23 and 25, felt that shore was involved in the decision making process. Participant 5 felt that while quick and crisis decisions were made on the rig, operational decisions often involved shore. He said, "the bang-bang decision-making in an emergency situation or in a… the initial decision-making has to be from the platform. Now when they're deciding on the repairs on a piece of equipment or something like this, there's (consults)? with town and the experts are brought in, so to

speak, on the equipment and, you know, what are we going… how are we going to do it and that; but for the decisions… when a decision has got to be made fast, they… you know, it's the people there on the platform that's got to make them - you know, if it's a decision in a crisis (Interview 5, page 11).

Participant 25 felt that offshore is involved in decision making from an operations perspective, and thus the decision making was distributed. He said, '…or if offshore is involved – we usually involve offshore in those decisions as well, because we support the offshore. Offshore executes work from a maintenance perspective. The offshore runs the platform from an operations perspective (Interview 25, page 11). Similarly, he said, "a lot of times they'll want to have folks involved from onshore to get, you know, better understanding rather than them making the decision that's going to affect production or affect, in their minds, safety. They draw upon onshore support to give them some guidance.". (Interview 25, page 19).

Similarly, Participant 23 discussed shore's involvement with the decision making process and felt that operational decisions were made on the rig by the OIM and toolpusher but in consultation with shore. He said, "Then if it comes down to a major decision where we need to shut this piece down and we're going to be running on limited power and we're not going to be able to drill to full capacity, then you ^ the tool pusher and the OIM – the senior tool pusher – and they'll discuss it between them, if need be ……So, basically, the decision is made between people on the rig, the representatives for the company you're working for, and the town itself, because we call our boss in town; he calls his boss in town (Interview 23, page 6). This example identifies all possible decision makers as being involved and suggests that the decision making process is distributed, very disorganized, and contingent on those involved, the type of issue etc. Participant 6 provided support for determining structure based on how far the event has escalated. That worker felt that situations that can be handled on the rig are handled offshore, but shore was always contacted so that they would be aware that a problem existed. The level of emergency determined the extent of involvement with the Coast Guard and other emergency response team members. He said, "It depends on the, I guess, the level of emergency. Normally, they're always called. If we have an emergency, they call the on-scene… or the onshore emergency response team. They also have to call like the marine… the Coast Guard and those people – Transport Canada – and as a part of that protocol when we

have an emergency just to make sure that if things do escalate to the point where we have to leave, that there's people that are aware that something is going on and that are… they can be ready to dispatch people ^ or have choppers or resources (Interview 6, page 4). ….so, definitely, the shore would… like, normally, they're always called. How far they get involved into it depends on the… how far it's after escalating.

So, I mean, if they need to get resources from shore, then they're the people that would do that so… but other than that, if it's something that we can go out and say, yeah, this is what the issue is and we can correct it, other than we notifying them… but now if we had a major… oh, let's say, if we had a major oil spill or something like that, they're always… it goes by classes of emergencies whether… how much involvement is… if it's… it can be offshore and then, of course, they're notified onshore in town and if it gets to a higher class than that, then it'll probably… and get the corporate emergency response team in Calgary as part of that whole scenario to be a part of coordination too so" (Interview 6, page 5).

While describing what happens in a crisis situation, Participant 20 referenced distributed decision making with both on-shore and offshore involvement in the decision-making. He explained that, "the OIM is in charge" and "he's probably the only one that… in his control room while the rest of us are all called to our muster station where a head count is done, all the people are accounted for and he's there contacting people in town, making P.A. [public address system] announcements to us letting us know what's on the go. Now where this control room is, I don't know. He's like God" (Interview 20, page 16).

The following table provides a summary of the preceding section that includes the identity and location of the decision maker as well as the type of decision made.

Table 6.2

Inconsistency/Conflict in the Decision Making Structure

Interview (I) # Event (E) #	**Location of decision maker**	**Identity of the decision maker**	**Type of decision**	**Identify of conflict**
I(2), page 2 E(1) gas leak	Rig	Not identified	"everything is on the rig"	Regarding identity of decision maker M-H degree of seriousness
I(15), page 3 E(1) gas leak	Rig	OIM	"ultimate say…commander and chief in …offshore"	
I(36), page 25 E(1) gas leak	Rig	OIM or Barge Captain/Master	Non-Marine or Marine Decision	
I(38), page 1 E(1) helicopter landing	Rig	OIM	"quick decision to deny helicopter landing on rig"	
I(1), page 3 E(1) gas leak	Rig (Shore in Emergency)	OIM	Emergency/Distri buted	
I(36), page 25 E(2) blow out preventive	Rig	OIM	rectify problem with BOP (blow out preventative)	
Interview (I) # Event (E) #	**Location of decision maker**	**Identity of the decision maker**	**Type of decision**	**Identify of conflict**
I(35), page 3 E(1) no specific problem	Rig & (Shore if longer to resolve)	OIM	Longer to resolve	
I(1), page 19 E(2) helicopter landing	Rig (Radio Room)	OIM & Radio Room People	"Quick" re helicopter landing	
I(2), page 5 E(2) gas line break	Rig (Control Room)	Someone in the Control Room	Problem with a gas line requiring "Quick" decision making	
I(37), page 9	Rig	Worker &	Specific	

E(1) oil leak		Management	temporary	
I(37), page 10	Rig	Worker with	Operational/mec h	
E(2) decision not identified		OIM updated later	anical decisions on the drill floor	
I(40), page 3	Rig	OIM or Master	Marine or Non	
I(1) decision to disconnect			Marine	
I(20), page 16	Rig (Control	Someone in	"Major"	
E(1) decision not identified	Room) & Shore Rig & (Shore updated)	control room & someone at shore	"Minor"	
Interview (I) # Event (E) #	**Location of decision maker**	**Identity of the decision maker**	**Type of decision**	**Identify of conflict**
I(15), page 10	Rig (and	OIM	Escalating	
E(E2) decision not identified	shore)		problem may involve shore otherwise shore is updated by the OIM(depends on the level of risk/tier)	
I(38), page 3	Rig and	Marine person	Decision to move	
E(2) decision to move the rig	Shore	in conjunction with Oil Management (shore)	rig	
I(34), page 1	Rig &	Not identified		
E(1) piece of equipment fell	(Shore for emergencies			
I(1), page 2	Mainly shore	Not identified	All decision	
E(3) decision not identified			making takes place with shore's involvement	
I(22), page 12	Shore	Supervisor	Materials,	
E(1) decision not identified		checks with Shore for approval	problems, and anything else	

Interview (I) # Event (E) #	Location of decision maker	Identity of the decision maker	Type of decision	Identify of conflict
I(24), page 9 E(1) decision not identified	Shore & (OIM "puppet")	Someone from shore & OIM	Not identified	
I(25), page 19 E(1) decision not identified	Shore & or Rig	Hierarchy of workers from shore & rig, e.g. shore president	Different levels of risk	
I(20), page 19 E(2) problem not identified	Hiring Company	Not identified	Involves Money	
I(5), page 11 E(1) problem not identified	Rig Rig & Shore	Not identified	Decision making from an operations perspective	
I(25), page 11 E(2) problem not identified	Rig and Shore	Not identified	Decisions regarding operations	
I(25), page 19 E(3) problem not identified	Rig and Shore	Not identified	Guidance regarding production and safety	

Interview (I) # Event (E) #	Location of decision maker	Identity of the decision maker	Type of decision	Identify of conflict
I(23), page 6 E(1) problem not identified	Rig in consultation with shore Rig, shore and company	OIM Senior Toolpusher, OIL and possibly shore	Operational Major decisions (shut down equipment or run on limited power)	
I(6), page 5 E(1) oil leak	Rig with shore updated Rig and shore	Not identified	Low level emergencies Higher level emergencies (Escalating situations)	Location of decision maker M-H degree of seriousness

As illustrated in the preceding table, there are conflicting views among informants regarding decision making responsibility. In the examples cited, the majority of the decisions were made on the rig, and several possible rig decision makers were identified. Alternatives included the OIM, the OIM in consultation with the leads, barge captain/master, someone in the control room, and a rig worker. The OIM was identified as the key rig decision maker for operational and quick crisis prevention decisions, such as mustering of employees. Several workers, in addition to the OIM were identified as rig decision makers. Someone in the control room also made quick "right away" type decisions. Specific decisions to rectify problems were made by personnel master and rig worker positions.

The next significant decisions were distributed in the sense that there were discussions between onshore and offshore personnel. Two distributed groups of decision makers were identified: rig and shore personnel and rig and supply boat personnel. In the majority of cases, decision makers were not identified by position; however, they were referenced as personnel or someone from shore and someone from land. This indicates that participants can identify when a decision requires distributed-type communication, but they are unclear about who actually makes the decision. Several cases referenced the distributed decision maker's identity as the marine captain in consultation with oil, weather, and ice personnel; a hierarchy of workers from shore and rig which could include the shore president if necessary; and the OIM/Toolpush, in consultation with shore personnel. A number of distributed decisions were identified: decisions around work from an operational perspective, decisions requiring guidance from shore regarding production, and work decisions around production in terms of drilling to full capacity. One specific distributed decision was cited: the decision to move anchor, made by supply boat and rig personnel. Some participants differentiated between distributed decisions and rig decisions.

Several participants labeled distributed decisions as being more serious/fairly major or high risk. Another worker identified quick and crisis decisions as those made on the rig and decisions for repairs as distributed type decisions. A worker identified decisions to rectify a problem as being handled by the rig and temporary decisions as requiring involvement from higher management. Similarly, another worker indicated that longer events involved consultation with town. It is evident that time is a

determining factor in the separation of distributed decisions and those made solely by rig personnel. Time pressures push the decision making process to the rig.

A minority of decisions were made on shore with "all" and operational type decisions being identified as decision types. The shore decision makers were identified as individuals from "town". The highest level of the hierarchy was where the OIM had to seek approval, suggesting centralized decision making for significant decisions. Further support for centralized decision making was provided by one participant's reference to the OIM as a "puppet" for shore.

Given the disparity in participants' comments, there is a lack of clarity around the identification, location and type of decision, all of which determines the decision maker. There is no transparency. The OIM was identified as a key decision maker for all locations, but it is clear that different workers have different theories on how the decision making process occurs. Operational type decisions, including decisions regarding repairs, were identified as rig, distributed and shore type decisions. The lack of clarity around the decision making process is understandable given the complex process which includes several different decision locations, decision makers, and types of decisions. The structure of decision making on the rig is further complicated when the decision type changes from non-marine to marine, at which point the master/barge captain takes responsibility for the decision making process.

6.3 Rules and Procedures

A further lack of clarity and structure was evident in workers' understanding of decision-making rules and procedures. For example, workers reference rules and procedures that could not always be followed, thus supporting subjectivity in the decision making process, reducing clarity or indicating a lack of structure for responsibility. The following section provides evidence of the workers' understanding of the rulebook and its' application.

Participant 40 described rules as, "… it's the guide; it's the books … basically, there's a set of books that kind of give you guide for operation for scenarios or incidents that may occur, and I'm pretty sure that is part of the safety plan and which is supplied to the board, right? So, basically, the board reviews this and says, you know, we're fine. We think that our processes and procedures are suitable for most scenarios that you most likely to encounter, you know, from an oil spill and to a

helicopter crash to a mass casualty. You know, you pretty much… you know, the scenarios are listed there and, like I say, it's just a guideline but it gives a lot of good information and a lot of direction on who to call, who's responsible for this. So the timelines are a lot shorter when it comes to reacting to a crisis situation, right, you know." (Interview 40, page 4). This worker indicated that referring to the rules would save time. He was confident in the fact that a board reviewed the rules.

Participant 35, an OIM, indicated that some rules and procedures were in place to help him with the decision making process. He said, "For some events which are very long and drawn out, I may consult with people on the beach but it's still his decision; and some of our procedures are written in such a way to prevent the OIM from questioning himself too much. … he has a lot of decisions to make and some of the bigger ones are written in the procedures where he doesn't have to make them" (Interview 35, page 3). The OIM felt that the rules and procedures were there to help him avoid the actual decision making process. He noted that rules were in place for some of the more serious situations, thus preventing flexibility in the crisis decision making process. The OIM also noted that shore was contacted in cases where the situation took longer to resolve or to normalize.

Similarly, participant 9 referenced what needs to be done in a close call situation. That worker stated that all close calls or significant events were handled the same way and described a series of steps that detailed what needed to be done. He described an emergency situation as a series of smaller steps whereby people responded but no one person took responsibility. Explaining what needs to be done in an emergency situation, he said, "But they were significant events, but they're almost repetitious. You handle them in the same way and we have very good, fixed detection equipment and equipment to fight a fire with tremendous fixed equipment firefighting systems that, you know, you can turn on and off from the control room and you don't have to… you don't have to go outside.

We call the supply boat right away to come over and have a look, and he's just another important source of information to try and determine the next course of action" (Interview 9, page 1). … right away, that's one of the calls that gets made is to the onshore emergency response – you know, depending what it is…. …..They all have specific jobs to do but, generally, for just a GPA you wouldn't do that; but you also notify the Coast Guard right away too … but they're always contacted - just

a matter of course. You know, that would be one of the first things you do" (Interview 9, page 2). The worker provides support for following a predefined set of rules in emergency situations.

Participant 6 and 40 did not discuss specific close call situations but talked about what should happen in an emergency situation, providing a better understanding of the decision making structure. They referenced the routine or the regulations that should be followed in crisis situations.

Participant 40, A senior worker, stated that decisions were made based on rules and, depending on the level of the crisis, the response would change. The worker explained, "There's a response… there's a tiered response for what you need to do and who you need to involve, right? Depending on the severity, the response will vary, right; but there is a very strong onshore aspect there as well, right…I don't think the full (amount)? of safety is not laid out here, if we need to readjust and that's widely accepted whereas back, you know, say 20… 25 years ago I don't know if that was the same concept, right? …But there are… it's a lot of procedures and protocol now and things are not done, in my mind, haphazardly, right?"(Interview 40, page 3). This worker provides support for following the rules when making decisions and referenced a tiered response, which varies according to the severity of the situation.

Similarly, Participant 6 described how rig workers followed a routine, completing a series of steps during a near miss situation with a gas leak. He said, "We put on our BA's and took our gas detectors and proceeded down the deck and we found we had a passing PRV, and then we basically reset it and, of course, that's pretty much the rule" (Interview 6, page 1). The worker references rulebook procedures.

Workers' comments show varying opinions on the meaning and usage of rules and procedures. Their quotes reveal that the rules are guides indicating possible incident scenarios and the associated decisions. Some crisis situations are handled in a routine manner, while others are handled according to the level of crisis. In more serious situations, the rules prevent or protect the worker from having to make the decision.

6.3.1 Subjectivity in the decision-making process.

Participant 1, 4, 7, 21 and 39 provided support for subjectivity in the decision making process and not always following the protocols as outlined in the rulebook.

For example, Participant 1 felt that the decision making process was dependent on the decision maker and that there was subjectivity in the decision making process. The individual said, "it depends on the management too and now some people won't do that because the book says not to do that, but some people would rather… you know, they'll use a bit of logic" (Interview 1, page 6). The worker recalled a situation in the 1980s, the OR days, where a quick decision was made by the captain of a ship regarding letting the cargo go into the ocean to save the ship. He said, "I know one of the captains – he had to make a decision. One night the load broke loose on him, and he had a few containers on the back. It was… yeah, that was… broke free of the chain. He had to turn the ship around and let the seas wash it over the back of the boat and let the stuff go. You know, it's a loss to whoever… whatever was in the containers, but you had to… you know, the integrity of the ship and the crew are his priority then" (Interview 1, page 8). In this particular case the leadership role of captain gave him the right to be flexible in the decision making process.

Participant 4 described subjectivity in the decision making process and contended that in the offshore work environment there is always a scenario where the workers may need to modify the rules. When talking about a particular decision by the OIM to shut down the plant, this worker felt that there was no predetermined or right answer from a rule book. He said, "and the first thing the OIM says – okay, shut down the plant and depressurize – and all we got is a man who has his leg stuck. You know, the plant is in no danger. Shutting it down may even cause more problems if something starts leaking or a valve doesn't close or whatever, you know. There's a lot of things got to happen when you push the shut plant down button that's got to happen automatically. So sometimes you could be just introducing more hazard by shutting the place down and not… so I've questioned that and he said, yeah, it's just one more thing I don't want to have to worry about. So I don't question him much anymore (like)? that. If I'm ever in that position, I might not make that call, but he's there so I can't… I can't give him too much grief over… because I might be wrong too, you know, so I don't want to feel like he's made the wrong decision or…answer… (Interview 4, page 14) …It's a bit extreme sometimes … so it depends on the situation. A different decision could be made every time. You know, there's always a bit of something else, right" (Interview 4, page 15).

Similarly, Participant 7 provided an example of situations where the desired

outcome changed the action required and dictated taking responsibility. This worker talked about how the decision to fly in poor weather depends on the situation. He said, "Depending on who's going home or who needs to get out or there's a part they have to really shut down and they need to get that part out or whatever, then things change" (Interview 7, page 18). This worker is hesitant to point a finger or pass blame to a co-worker regarding faulty decision making because there is no predefined structure. The worker is cognizant that in another situation he could be the one making a wrong decision and, for fear of being blamed himself, he avoids passing blame to others.

Participant 39 suggested that circumstances sometimes warranted not following the rules, and instead applying common sense to deal with the situation at hand. One worker discussed that although there were some rules, there was flexibility in the decision making process when it came to moving the rig. The worker said**, "**but it is in terms of something that you want a sea state for or a rig move. …I mean the sea states that they demand for the jack-ups, you know, are small and they're under three metres and three metres on the Grand Banks is your average – you know, minimal average, you know. So you have to wait until you get under these three metres and you have to wait until, like I said, you get this period. So it can be a game because , you know, here you are – you have this… oh yeah, you get this forecast in from another (service)? company. It says, okay, well, you're going to see the sea states dropping but will this period be enough time. So then you're running into…anyway, it's a really interesting time to be in because, like I said, you have communications between them but also they're very secretive among themselves because, like I said, <u>they have different objectives</u>. Like I said, one is the rig and the safety of the rig; and the other one is the money and, well, also the safety of the rig - don't get me wrong – but also they have a lot of other things that are… so it can be pretty intense…. and then the oil company is saying, okay, well no, I think this is right. We can, you know, <u>based on the science we've done and money we've put into research</u>" (Interview 39, page 1). The worker provides research as an example of a reason for stepping outside the rules.

The oil company would likely say well the wave height may be x but research has shown y. Although there is a rule to follow in terms of average wave height, there is flexibility with the rules that the workers follow in terms of when to move the rig.

"The final decision is made… okay, this is where it gets really interesting. So you're talking about communication back to land. Well, it's ongoing, continuous. Like I said, it's all together but you also have the rig side and the oil side. So the oil side is (constantly)? back to land; the rig side is (constantly)? back to land trying to make this decision on their own and then we like get everyone together, including myself. This is where usually I come in. And everyone is together and you kind of try and make a decision as a group. Well, this is why they hire another consultant on top of all this, and the consultant is… it's purely liability and insurance and whatever, and they hire one person to finalize, basically – to say this is the right time to do it" (Interview 39, page 2). This situation also shows the lack of clarity around who the decision makers are when it comes to moving the rig. There is some guidance provided to workers around average sea height, but there is also flexibility and pressure from those who have differing agendas and opinions on what indicates safe conditions. The situation is further complicated by a third party final decision maker who receives input from a distributed group.

According to another interviewee, there is a division of responsibilities between the marine and non-marine workers, and that rules were not always followed regarding this division of responsibilities. Participant 1 who had worked in the offshore in the OR days discussed the flexibility in decision making in those days. He feels that there is some flexibility today. He said, "…And now… even it's even saying now… some management people out there offshore, if they got a situation dealing with the marine side of it, they may not muster and get… bring the leadership team into the ECC. They may come up to the radio and say, "Alright, let's deal with this here" (Interview 1, page 6).

Similarly, Participant 21 felt that following policies and procedures was not always practical. He said flexibility was necessary because the situation is real, not simulated, and one often does not know the response until the situation unfolds. He stated, "There's procedures laid down today on everything, but you don't always follow the procedures because a lot of times you just can't. Like it's hard and fast and they'll say like you shouldn't work if the weather is ^ the rig – in other words, ^ side of the rig – and ^ but it might be the side of the rig that… that's the only side that that rig can handle the pipe on or there might be something wrong with (the other)? crane" (Interview 21, page 3). He described emergency situations as often preventing

adherence to rules. He explained, "Well, you'd try to plan in advance, but you can't in an emergency figure out that you're going to have a meeting and plan the event….Because in an emergency it don't work that way and you don't have time for it. It's like when we go to launch the FRC. It's training but it's just as real, because you're putting a crew in the boat to go over the side of the ship as if they were going to go to rescue people that are in the water, because it's real" (Interview 21, page 18).

Participant 1 described a close call situation whereby a worker on the night of the OR disaster took responsibility and passed over the decision making to someone else. This was a big step and an indication of the taking of responsibility. Some people will not do this because the rules say not to. This example shows that the decision-making process is individual. The worker discussed the night of the OR disaster when he was working on the SEDCO 706 as a radio operator. He explained how the company man went to the radio room, and that the decision-making took place at that location. He felt that some management still do this type of thing, using logic and dealing with the situation in the radio room. Discussing the decision making aboard his vessel at that time and comparing with decision making today, the former worker stated,

...a prime example is the night when the Ocean Ranger went down – the company man came right there and he stood behind me, and all the decisions were made right there in the radio room as to what was going to happen, what boats were going anywhere, what helicopters were flying. Everything was done right there in the one spot.

And now… …some management people out there offshore, if they got a situation dealing with the marine side of it, they may not muster and bring the leadership team into the ECC [Emergency Control Centre]. They may come up to the radio and say, "Alright, let's deal with this here." It depends on the management too and now some people won't do that because the book says not to do that, but some people would rather… you know, they'll use a bit of logic and say, "Well, hey, this is the right thing to do" (Interview 1, page 6). This shows that even after the Ocean Ranger, there is a difference between what the book says to do and the judgment and flexibility exercised by some people.

The following table summarizes the reasons identified in the preceding section for oil and gas decision makers not following rules. Justification for not following the

rules include management style, the desired outcome dictating a particular course of action, pressures from those with differing agendas, time pressures, and an unfolding crisis requiring action or activities not included in the rulebook. This data provides support for the rulebook not having all of the answers or not matching the particular crisis at hand. Table 6.3 provides two contradictory possibilities regarding the rule book. There are several examples of the rule book being inappropriate and people being creative. In other cases people are arrogant, taking inappropriate risks without severe consequences. This reinforces the behavior and causes the situation to be normalized. Such actions could possibility have negative outcomes.

Table 6.3

Decisions Compared to the Extant Rules

INTERVIEW	**DECISION**	**RULES FOLLOWED (YES/NO)**	**REASONS**
4, Page 15	Decision to shut down the plant	NO	Depends on the situation at hand and is the OIMs call. Some OIM's prefer not to shut down the plant without strong reason because shutting down the plant can cause problems such as pipes leaking or, pressure troubles etc.
7, Page 18	Decision to fly in poor weather	NO	Depends on the situation (who needs to get to shore or if a critical part is needed)
39, Page 2	Decision to move the rig	NO	Different decision makers with different objectives
1, Page 6	Division of responsibilities – marine/non-marine	NO	Different leadership may decide against the division of responsibilities
21, Page 3	Decision to work in poor weather	NO	Situation is real, not simulated, with many factors to consider
	Rules are a guide and the rules do not	NO	Rules are normally the result of close calls or

	fit the situation		incidents.
1, Page 6	Operation of Radio Room on night of OR disaster	NO	Company man exercised discretion in deciding all decision making would take place in radio room of the ship

6.3.2 Responsibility and Experience

Oil and gas companies rely on experienced workers. More experienced workers tend to rely less on rules so experience is an important moderator. Experience increases the worker's confidence and ability to stick his/her neck out and increases preparedness to take responsibility. There is a link between experience and reliance upon rules because workers who are experienced are more proactive and flexible. In short, they are less likely to be bound by the rules.

Participants 10, 20 and 37 provided examples of situations where workers took responsibility because of confidence gained from work experience. Participant 10 felt that his experience enabled him to make a decision to shut down the plant although all the indicators of a problem were not present. His experience gave him the confidence and insight to enable him to make the decision. He said … I said, if I saw gas in the intake system, I'm shutting her down. You know, if it's just a spike – you know, detection goes up and comes down – that's fine….we just see gas there. She (take the mold)? ^ the number for the ^ and I went up and I said, jeez, she's going up – 14 – I said that's 20 – I said – and she's ^ she's 22. We weren't seeing it on anything else which wouldn't cause the place to shut down. Likes to get it on two but I looked at the (YM)? – I said, that's it; I'm shutting her down, and I just pushed the button. I didn't wait for an answer (but let him)? know that different parts were being shut down and regroup and find the problem so… and that's what we did, and that was the case that we knew we had a problem" (Interview 5, page 3). The worker is referencing the fact that he was confident enough to make the decision using one dial, which is at 22, as opposed to two dials. This worker provides an example of experience being a forerunner to taking responsibility; an inexperienced worker would be unlikely to take such decisive action.

The same respondent explained a close call with gas coming back into the hole and mud coming out of the well as the workers were drilling (called a kick) and how he and the workers knew what to do. Explaining the activities that took place he said, "I knew what I had to do, and I was… I happened to be in the right place at the right time. It was lucky. And I knew what I had to do. As soon as it started doing it, I did what I had to do without thinking about it. The guys down in the floor – they knew... they realized what was going on, and they told me right away. I remember the drillers saying -, pack the fucking thing off – he said – or else, he said, I'm closing the

(ramps)? and then… you know, so everybody was aware of what was going on" (Interview 10, page 7). In this case too, it was experience that enabled the decision-maker to go beyond the rulebook.

Participant 20 described how he took responsibility because he was the only one able to stomach heights. He said, "You know, all this talk about safety… this is … I said, all this talk about safety, I said, and you got me up there 36 hours, right. What's the big rush? You know, if I'm the only fellow that's not afraid of heights, why couldn't you wait until you found someone else as well, so there's someone there to do… to relieve me. Thirty-six hours, 75 feet up in the air, tied with a belt– I mean, you know, if I had to fall out and swing and hit my head or something off a piece of steel pipe or, you know, it was a safety concern to me, right, and all they thought about was getting the job done" (Interview 20, page 11). He was forced to do it because of his experience and because there was no other worker willing to come forward to take the task on.

Participant 37 explained a close call situation which was prevented because of experience among some workers with the OR disaster. The workers experienced a loss of control of the ballast valve because the valve stuck in the open position and there was no secondary means of ballasting the rig. Responsibility was taken, resulting in more action because some of the workers were familiar with the Ocean Ranger rig disaster and figured that this close call situation was the exact same problem that the crew of the OR experienced on the night of the disaster.

Explaining the close call situation the worker said, "They had no control of this valve that had sheared off. So in an emergency situation, I mean you could open that valve and water could come in and cause that valve to even close some because now that's like freezing cold down there now because there's no… you got no control arm on top of it. …So the coastguard, the DMV, Transport Canada – they all come onboard the rig. This is the exact same situation that the Ocean Ranger rig experienced. You mean to tell me, after the Ocean Ranger disaster, there's no secondary means of getting water in this rig if that valve were to go shut and not be able to open. …get into stormy conditions – now we can't ballast the rig back down because that valve… there's no control of that valve. That's the most important valve on the rig… it could've been serious. If it was overlooked, it could've been real serious. If the controls… if the controllers in the control room wasn't monitoring the

gauges like they do, right… what happens is that on the side of the rig we've got what they call (shift skin)? valve. … Then I was on the Internet finding companies in Calgary ….of ways to tap into the sea chest without bringing that rig in and lifting her up over in Rotterdam on dry dock out of the water, which would cost like $200,000 a day. So we had to come up with a plan to get that rig… because even people onboard didn't feel comfortable going to bed. …we did get a team together and got parts come from Mississippi. …Like this was a big issue" (Interview 37, page 1). Table 4 shows that the more experienced people are prepared to take responsibility. This is especially true for more serious situations.

Table 6.4

Experience and Crisis Decision Making

Interview	**Seriousness of Event High/Medium/Low**	**Responsibility Taken Yes/No**	**Experience**
5, page 3	High	Yes	Yes
10, page 7	High	Yes	Yes
20, page 11	Medium	Yes	Yes
37, page 1	High	Yes	Yes

This example is significant in that it shows how responsibility and experience are very closely linked. In this case responsibility was taken and, as a result, the problem was corrected for the entire fleet of rigs owned by one particular company. Had the crew not had the experience of the Ocean Ranger rig disaster to draw upon, it is likely that the list would simply have been corrected and the situation would have been normalized. It is clear from this worker's comment that the problem with the ballast control valves had not been resolved. It is likely that this particular case verified what indeed happened during the night of the Ocean Ranger rig disaster. In this close call situation, experience may have played a part in saving lives and preventing tragedy on others in the fleet. This example is also relevant in showing a linkage between experience and normalization. In this case experienced prevented the worker from normalizing the situation as a non crisis.

The participants interviewed present no consistent account of who takes responsibility under certain crisis conditions. Their comments suggest that the company operates by pushing people into taking responsibility in crisis situations, just

hoping for the best. Having experienced personnel, then, is critical to decision making when the rule book itself is insufficient. Structure and responsibility are rethought with normalization or displacement activities, as discussed in the next section.

6.4 Normalizing the Situation and Avoiding the Crisis

The second theme of this chapter is normalizing, which is the solving of a problem and belief that all similar problems can be solved in this same way. When normalizing, people are being creative and often doing dangerous things in close call situations. However, circumstances work out in that crises are averted. In the case of offshore rig personnel, the ability to normalize a close call situation determines the response and interaction with management on shore.

The workers appear to have a system in place for monitoring and reacting to near misses. First and foremost, they try to prevent them from happening. When recalling a near miss situation that involved an iceberg, Participant 1 said that they managed to avoid a situation or normalize the event. Reflecting on the situation, he said of the men involved in the event, "they're wondering now what about if that hits us and what kind of damage will that do and, you know, what speed is it going, and there was a lot of unknowns there and they were really nervous and apprehensive, but, you know, we managed to avoid a situation" (Interview 1, page 2). Although the workers have anxious and panic stricken moments of uncertainty in a crisis, they are left with a feeling of confidence after the near miss situation.

Another worker explained a close call situation that was normalized and labeled as a near hit as opposed to a serious hit. The labeling of the situation and indication that it could have been worse is indicative of a move by workers to normalize situations early on. This happens mainly because of the desire to prevent the crisis but also because of the need to decrease the number of serious hits, which are "closer calls."

Participant 36 spoke of a close call with a piece of scaffolding that collapsed. The situation was initially labeled a serious hit but later as a near hit, making the occurrence seem more normal. He said, "We had a bit of scaffold fall out of our ^ (crane)? – fall about 30 feet. There was no one in the area. They logged it as a serious near hit first, but then logged it back to a near hit because no one was around," (Interview 36, page 2). The worker is referencing the fact that

there were no workers around, which allowed the incident to be downgraded to a close call situation. This particular example illustrates normalization because the worker downgrades the situation and indicates that it did not turn out to be disastrous after all.

Similarly, Participant 36 explained a close call with a BOP that would have resulted in a worse situation if the hatch had been off. The worker explained, "they do a test (manual)? and it's a ^ pipe about 35 feet high to about 40 feet and they send it down to BOP to test (her)? on deck before it goes to the sea bottom ^ tested, and they put it in and they never had it set properly; and when they pressured up to 5000 psi, it blew it out of the stack. They called it a near hit because of where it went, but we put it in and there's a hatch up there – probably a 5 x 5 hatch. Well, if we had to have that off, then it would've been a lot more serious. It would've blown out, but the hatch saved it from blowing out. You're talking probably three or four ton in the test manager, we call it. …they went back and checked again and here it was – they had the wrong (ram)? closed. If you should get a blow out, if the (ram)? is closed in, you can't get no gas out of the well.)….if it's coming up through the pipe, then you put on, say, a plug and close the valve and then the well is shut in.

So they figured out they had the wrong (ram)? closed. They said the one for the 9 5/8 they had the 6 5/8 closed and that's (only)? closed on the pipe, but it was serious." (Interview 36, page 1). This is clearly an example of human error resulting in closing the wrong ram. The situation was downgraded because of where the pipe landed.

Participants 1, 2, 10, 15, 16 and 27 provided examples of non-crisis events that appeared to be escalating. The situation intensified so rapidly that quick action was required to normalize. Participant 15 did not talk about a specific close call situation but explained that because of the close quarters associated with rig life, decision-making had to be quicker. He described the need to think quickly and bring the situation under control. He said, 'You're dealing with the same guys you deal with every day in an emergency. You're in close quarters and you're in direct contact with whatever it is and, I mean, the stress levels can be very high. Decision-making has got to be much more – I don't know if direct is the right word it's got to be quicker. You've got to make decisions on your feet with the information that you got at the time. You know, a lot of times you don't have fifteen or twenty minutes or an hour to

step back from it and analyze it more to see, you know, so sometimes you got to make quicker decisions" (Interview 15, page 5).

When describing a close call with an iceberg, Participant 10 said that the decision was made quickly and, consequently, the crisis was normalized. When describing another close call he explained the decision to stop drilling in stormy weather was often left to the last minute but then the decision to stop and the following actions were taken quickly. He explained, "a lot of decisions seem to have been made, when it comes to storms and things like that, on… not on the ship itself but in town, you know. I think sometimes there's been times when we… when the rig has been drilling where you think, gee, they shouldn't be drilling, you know, and then they wait for the last minute" (Interview 10, page 5).

Participant 2 described a situation with an oil leak. It was seen as an event that happened quickly and was normalized by shutting down the platform. Once recognized as a quick event, it received quick response. Explaining the oil leak he said, "A line broke and oil was just pouring out, but no one was there to check until later diesel leaking out of it, but it was shut down right away (Interview 2, page 4).

Similarly, Participant 1 spoke about being busy problem solving and running around on the night of a close call with an iceberg. This allowed little time to think about how he actually felt about the situation. He did not think about the main event that could lead to an eventual crisis but instead started to normalize the situation. He said, "I don't think any would've spent too much time… because you were that busy figuring a way to solve this problem that you weren't really thinking about the iceberg too much (Interview 1, page 7). …but everybody was just running around (Interview 1, page 7) and there was an awful lot of stuff happening."

Participant 15 described a close call with a big wheel that almost crushed a worker but was avoided because of one quick action. He stated, "So, of course, he was in a major panic because his life is at risk. So one of the operators (that was in)? ^ heard him crying out for help. So he ran to ^. Had enough foresight to go and get hacksaw to cut off his harness and then his peer – the guy who was in dire straits there – his peer ran back to their shack and put the brake on the coil (tubing)? wheel (Interview 15, page 16).

Similarly, Participant 16 described a close call with a helicopter that had lost an engine and needed to land on the platform. The worker said, "So he made a hard

starboard turn and came straight for us, and we had him on the deck in less than four minutes, and that means… at the time, we were offloading a supply boat. So the crane operator had to stop what he was doing, get down out of the crane and get his fire gear on. So it's a big deal. He could've came in and lost that engine because the critical point is landing and taking off. So that was close" (Interview 16, page 1).

sounded the alarm on the rig – not to abandon but to get ready" (Interview 27, page 1). The worker provides support for the OIM gaining control of the close call situation by sending boats out to confirm the sighting. Table 6.5 summarizes the evidence of workers normalizing problem situations.

Table 6.5

Crisis, the Solution, and Evidence of Normalizing

THE PROBLEM	**THE SOLUTION**	**EVIDENCE OF NORMALIZING**
Iceberg heading for the rig and anchor chain was stuck	Lowered a welder down to water level to cut the chain	"but, you know we managed to avoid a situation" (Interview 1, page 2) "and the iceberg came on through and we were just gone" (Interview 1, page 1)
A kick/gas coming…as workers were drilling	Worker packed off the pipe/closed the ramp	"so everybody was aware of what was going on" (Interview 10, page 7)
Gas leak	Had a passing PRV and reset it	" and of course that's pretty much the rule" (Interview 10, page 7)
Helicopter lost an engine and needed to land on the rig		"He could've come in and lost that engine because…(Interview 16, page 1)
Piece of scaffolding about 30 feet	N/A	"They labeled it a…" (Interview 36, page 2)
Close call with a BOP (blow out preventative)	N/A	"Well if we had to have that off then it

		would have been a lot more serious" (Interview 36, page 1)
Motor caught on fire	Shut the plant down	"like they could've …if it had escalated" (Interview 15, page 11)

After describing close call situations, workers minimize them. Excerpts from the data indicate that the workers felt that the close call situations described really were not crises. In the above section the workers cited support for normalizing a close call situation or avoiding a bad situation. They downgrade close call situations as less serious, while at the same time commenting that the situation could have been worse. Escalating situations require quick actions to normalize, but in many cases workers wait until the last minute before taking corrective action. Waiting is risky because there is little time to think about how to handle an impending crisis and the associated decision-making. In all these cases a crisis is averted, which builds confidence in their abilities to handle all similar crisis situations.

6.5 Displacement

Participants 2 and 6 describe close call situations where attempts were made to normalize situations with displacement activities or activities not geared to solving the problem. The examples include activities whereby people are doing lesser tasks, which often involve running around aimlessly. Participant 6 discussed the OR disaster and how the workers on the rig were doing smaller things like trying to close valves to normalize the crisis. He said, "… didn't have any idea what they were doing and they probably… you know… and, obviously, that's what happened. When they thought they were opening valves, they were closing valves. So that's bad." (Interview 6, page 9). The worker was suggesting that the Ocean Ranger workers reacted like headless chickens who at some point were trying just about anything to normalize the situation in the same way they had done in the past.

After a close call situation one worker, Participant 2, felt that a decision to move safety glass from one area to another was senseless and perhaps just an attempt to normalize the situation. It appears that an attempt was made after a close call with

broken glass to normalize the situation by moving glass. The worker, explaining what had unfolded after the close call, said, "you know, you need experienced people to install this glass. It's safety glass. And it was hard to convince them that, you know… you know, we weren't experienced enough, or I wouldn't take the responsibility of trying to move it over, and it was just so out of whack because like, you know, it was so retarded. I mean, that's what it sounded like. You know, I mean, a guy talking to you, you know, and here you are in the pouring rain and, you know, they're talking about doing this" (Interview 2, page 13).

The preceding paragraphs provide examples of displacement activities and their use in normalizing of situations as non-crises. Workers solve the problem at hand, thereby reducing pressure for more fundamental preventative reassessment. As a result, preventative action is not undertaken. The common element in all of the close call examples is that the situation is prevented from becoming a full-blown crisis. Workers' actions may stop or prevent the situation from advancing, but there are no guarantees that the problem will not start again or reoccur at another time.

6.6 Link between Responsibility and Normalizing

If people take responsibility in crisis situations then it would be expected that the scale of priority would increase in terms of taking more action. Participants 1, 2, 4 – 10, 15 – 17, 19, 20 21, 23, 27, 34 and 37 provided examples of situations where taking responsibility resulted in more action being taken by the workers. The majority of close call examples reveal that this does not happen; this gives support to the counterfactual thought that the situation was not really a crisis. This section identifies text that supports a link between the structure of responsibility and the normalization of the event as a non-crisis event. It is suggested that not taking responsibility is a form of normalization.

6.6.1 Unclear Responsibility

Participants 1, 2, 4, 6 – 10, 16, 17, 19 and 20 provide examples of near miss situations that could have been worse, thus indicating a serious situation that warranted someone taking responsibility. However, in these examples there is no indication of anyone taking responsibility. Most of the close calls involve equipment problems as opposed to human error, although in this environment it is possible that workers would not admit to human error.

Participant 8 discussed two near miss situations that could have been worse and yet ended without incident. The worker described a near miss situation with a leak in a gas line that was in the process of being backed off. This was an example of a lack of responsibility resulting in no action; in retrospect, the situation was seen as serious so it did warrant someone taking responsibility. In explaining the near miss situation, the worker stated that the situation could have been worse, " But you're talking a very high pressure of gas coming out and one of the two things that happened – if they had to back off more with the pressure, it could've shot out and hit him… and if it had to get all the way out, it would've been a high pressure gas coming out into an atmosphere where there was potential of an explosion" (Interview 8, page 1). Participant 1, who had worked in the offshore in the OR days, discussed a near miss with a supply boat that had the stern torn off. He felt that in retrospect things could have been worse because of the bad weather and the hectic pace of events. He said, "They recovered the men but the way it was… ^ (had to have)?... then another two or three hours later they would've lost a few of - could have been bad situation, you know, because they were going downhill pretty quick" (Interview 1, page 8). It is not clear who took control in this situation, so perhaps the outcome was attributed to luck.

A close call incident with a plane could have been worse because the pilot could have crashed into the rig. Instead, responsibility was taken for the problem and the crisis was avoided. Participant 19, explaining the close call situation said, "He got up so far and had trouble and came back and he couldn't make it all the way back to St. John's. So he… they contacted the rigs or… - I guess, Hibernia was out there then, yes – and whoever they talked to, and they set up a row of ships for him to sort of try to stay in touch with – like 20 miles apart. So they did come ^ as close to the rig so we could get hold to him. That happened there seven or eight years ago. That went really well. Like I wasn't near where he went down; but where he did go down, he got the wing of his plane and they went over and got him. So that went really good, but that was something that could've… well, a man losing his life" (Interview 19, page 1). This worker provides support for the actions taken in a close call situation that could have ended with a fatality, if not for the actions of the pilot.

Participant 4 discussed a near miss situation with a broken water pipe that could have been more serious because of the location of electrical equipment. This

event was similar to the OR disaster in that electrical equipment actually short-circuited due to water damage. He said, "could've been a lot more serious, right? There was electrical equipment in the room and there's, you know, this much water in the room – cold sea water and it's…" (Interview 4, page 1).

Similarly, Participant 7 talked about a near miss with a person on a supply boat getting tossed around, as opposed to being killed, when a hose was lowered down to the boat. He said, "it could've been very easily over the side or ribs crushed or squat between containers and stuff so that was a near miss. I mean, he got beat up a little bit, but he could've been easily killed" (Interview 7, page 1). There is no account here of anyone taking responsibility.

Participant 4 discussed a power outage aboard the platform and the inability to know what was going on in the plant because the control system that makes the plant safe was not working. He said, "It could've been serious" I guess, because nobody would know for a long period of time that you were in trouble but since then, they've made the upgrades to the power management system and ...has it such that there's like triple redundancy now in the devices that failed on Hibernia, so I can't see it happening again" (Interview 4, page 18). The worker continued to explain stating, "Automatic sprinklers and detector systems didn't work basically the system that puts out fires wasn't working. The worker said, "So that was what came out of the debrief after that exercise was it would've been very, very serious had there been a gas leak because there was no way for us to automatically put it out, and there was no way for us to communicate with the fire teams if we had to send them out there because the radio system was down" (Interview 4, page 19).

Participant 6 discussed a near miss situation where some hot glycol got dumped on the deck. If somebody had been walking under the area of the spill, it could have been a bad situation. He said, "we ended up dumping some hot (glycol)? onto the deck, and it was just a bad engineering thing that when… that came down onto the deck, which could've… you know, if somebody had been walking underneath there, then we could've had a serious injury" (Interview 6, page 3).

Participant 7 described a close call with a piece of pipe that fell in close proximity to a gas line. If the pipe had hit the gas line, the situation would have been dangerous. The worker said, "where it hit was about four inches away from a high pressure line. The boys said you could go down and see the mark in the concrete and

they could see the line; and they said, if that hit the line and created a spark when it hit it or something like that, game over "(Interview 7, page 12).

Participant 16 described a close call when a piece of equipment dropped into the ocean during drilling. He noted that the situation could have been worse if the equipment had gone to one side or the other because it would have caused a list. "Well, it's just a piece of pipe that's hooked onto the top of this blower preventer which weighs 180 tons – like a monster piece of equipment, you know, right, and they were pulling it up through the (moon)? pull and a big wave went by and snapped the tool off and they dropped it. So it reeled all the wire off the tuggers and went straight to the bottom, you know, in 140-odd feet of water more or less. That was… you know, that's a big deal" (Interview 16, page 17).

Participant 17 described a close call with a lifeboat being lowered into the water when its' valves were not properly set. This caused the prods to start cracking and the lifeboat to swing in mid air for approximately ten minutes, just missing the drill rig. The worker said, "They weren't after finishing the job or whatever, and the prod started to crack, crack, crack, crack. Here the prod cracked off. That cracked off. It missed the boat by inches and the boat kept swinging in mid-air just like a circus ride. Like the thing busted and like the boat started to swing, swing for, I'd say, ten minutes solid…" (Interview 17, page 1). Though no one took responsibility, an accident was averted.

Participant 2 described a close call situation where a roughneck got his finger caught and he couldn't pull it out. The worker describing the situation said, "he got it pinched in… (during roughnecking)? …and his finger caught and he couldn't pull it out, and he ended up losing his finger… So they called a medic to get him up and they couldn't release the hydraulics on it to get it back because his finger was pinched in there." Responsibility was taken when a co-worker quickly pulled him/his hand out of the situation (Interview 2, page 17).

Participant 9 described a close call with a fire in a crane. The worker said, "but they had a fire in the crane. Now fire in the crane is… the crane is kind of separate from everything else, but it is a fire so the… you know, the guys shut down the whole production thing and dealt with the emergency at hand" (Interview 9, page 14). Responsibility was taken when the workers quickly shut down the platform and dealt with the emergency.

Participant 10 described two low serious close call situations where responsibility was taken. The worker described a close call situation resulting in a small explosion because the worker broke the drill tool at the wrong place. He said, "Now the tool was on the deck and had to be bled off. I bled the tool off in the wrong place and actually blew the tool and it acted like a projectile. It went through a 45-gallon drum – in one side and protruded out the other side" (Interview 10, page 24). Explaining the second incident which involved a supply vessel losing power and hitting the rig he said, "the captain or the person who was in charge of the boat at the time, gave it full throttle away from the rig; but, unfortunately, they had their… they had her… they had the boat cut to the right, which is port, I guess – anyway, I think it's port… no, that's starboard – and the boat lost its power. When it lost its power, it lost its ability to back up, stop or turn and it came right back around and ran into the rig. There was no abandon ship or anything like that because it all happened so quickly" (Interview 10, page 25).

Participant 19 explained a low serious, close call situation with an iceberg. The worker said, "You just try to change the current or change the drift of it right. That's what we normally do and, you know, hang onto that for three or four days; and once then they'll… got a plot on it, because there's ice observers on the rigs, and they can plot it then that it's going to go away from them, … like say, we're towing it; and if they're nervous or anything, they'll stop drilling and get three or four boats in and haul the rig out of the way" (Interview 19, page 13). The worker explained that a clear plan of action was in place to deal with icebergs.

Participant 20 explained a close call situation in which a co-worker experienced an attack of appendicitis. He said, "So he made the call to the supervisor – the rig manager –and said to him… he said, this guy (is here)? and he wants ^ and I think it's his appendix. Get him a chopper right now. They sent him a chopper right away. ^ taking any chances or whatever" (Interview 20, page 16). Responsibility was taken and the worker was transported to shore.

Responsibility is taken with small scrapes and although low serious in nature workers are encouraged to report such an injury. Explaining how small crapes are handled the worker said, "Any little scrape at all ^ or anything like that. So you go down there, get a little scrape – I know ^ he goes to the medic ^ (done with that)? and then you're liable be there for your last week or last two weeks or whatever… So he

goes to the doctor about it and the doctor says, “Did you do this at work?” He’ll say, “Yes, I done it at work.” “Well, how come you didn’t report it?” (Interview 20, page 17). The worker indicates that responsibility in taken immediately for low serious events such as minor injuries.

Table 6.6 provides examples indicating that the more serious the situation, the less likely it is for a clear line of responsibility to be taken. The data indicates that the taking of responsibility becomes fuzzy as the seriousness of the situation increases. The degree of seriousness is indicated by the potentially catastrophic nature of outcomes and the amount of time workers have to respond before the situation escalates. For example, a situation where a worker only has seconds or minutes before something falls/collapses/explodes/breaks apart is identified as a very serious situation.

Table 6.6

Comparison of Events versus Responsibility Taken

INTERVIEW #	**EVENT**	**SERIOUSNESS (low medium, high serious)**	**RESPONSIBILITY TAKEN How much Responsibility How Fuzzy**
7, Page 1	Supply boat tossed around	High serious	Not clear/no account of anyone taking responsibility
16, Page 17	Piece of equipment 180 tons accidentally dropped into the ocean during drilling	High serous	Not clear
6, Page 3	Hot glycol dumped on the deck	High serious	Not clear
19. Page 1	Helicopter weighed down with ice and pilot needed to land quickly	High serious	Not clear
7, Page 12	Piece of pipe fell in close proximity to a gas line	High serious	Not clear
8, Page 1	Gas leak in a pipe that was being worked on/backed off	High serious	Not clear
17, Page 1	Lifeboat being lowered into the water and the valves were not properly set causing the prods to start cracking	High serious	Responsibility was taken but not clear who made the decision to intervene
2, Page 17	Roughneck got his finger caught and he couldn't pull it out	Low serious	Responsibility was taken when co-worker quickly pulled him/his hand out of the situation
9, Page 14	Fire in a crane in a self contained area	Low serious	Responsibility was taken when workers quickly shut down production and dealt with the emergency
10, Page 24	Small explosion resulting from worker breaking the drilling tool at the wrong	Low serous	Responsibility was taken by worker using the tool

	location		
10, Page 25	Supply vessel lost its power and hit the rig	Low serious	Responsibility was taken

INTERVIEW #	**EVENT**	**SERIOUSNESS (low medium, high serious)**	**RESPONSIBILITY TAKEN How much Responsibility How Fuzzy**
19, Page 13	Iceberg's in the area of the rig	Low	Responsibility taken with a clear plan of action in place
20, Page 16	Gallbladder/appendicit is attack	Low-Medium	Responsibility was taken and the worker was transported to shore
20, Page 17	Minor scrape	Low	Responsibility was taken and worker encouraged to report the injury
4, Page 1	Water pipe broke in close proximity to the electrical cables	High	Not clear
4, Page 19	Power outage	High	Not clear

6.6.2 Proactivity: Acceptance of Responsibility

When talking about who was in charge in an emergency situation, Participant 9 demonstrated a link between the taking of responsibility and an increase in action. This worker, who had moved into a management position, stated that the OIM was in charge in an emergency situation where the ECC was activated. The worker was referencing the activation of the Emergency Control Room and the resultant increase in activity from taking the responsibility to activate the room. The OIM depends on information from all of the members of the team, demonstrating a link between taking responsibility and an increase in the action/activities that took place. He said, "clearly he is the guy who will make a decision, but he (depends on) all those people" (Interview 9, page 18).

Participant 1 described a series of tasks to take care of during a close call situation where a lot was happening and people were running around. He described it

as a busy time with little time to think things through. As he explained, "there was an awful lot of stuff happening at the one time and, you know, in order to put a man down over the side you got to run a line right in the middle of the rig, gone out through… back out in the corner which is… you know, you're talking putting a line down a couple a hundred feet with a man on it and then, not only did you have to do that, you had to run an oxygen and acetylene torch down there and, you know, so you had to go and gather up all that hose, connect it all together – and there was a bunch of people running around doing all this. And then, you know, to turn around… and then we had to change the (valves)? to the rig in order… so he could get at it and cut it off" (Interview 1, page 7). The worker described a situation where responsibility was taken, resulting in more action. It is not clear who took responsibility.

Similarly, Participant 23 described a situation where responsibility was taken, but where the actions did not normalize the situation. Instead, the situation normalized itself with time. The worker explained that when a lifeboat was being tested and the boom bent, the boat swung uncontrollably and narrowly missed the side of the rig. Explaining the situation he said, "The (boom)? started to bend a bit. …. boom is still bending. ^ fixed ^. Just going to turn it back, and something is telling me to stop but at the same time, he beat it up – grabbed the brake ^ from up on the rig and the boom started ^ and the next thing you know – bang! – it broke off and the (hook)? started spinning back and forth there… she was down enough below the deck that she didn't swing in and hit the deck. She wasn't down too low to hit the (cross)? members between the legs. She swung in between and she just kept going back and forth and then she slowed down… until this swinging stopped" (Interview 23, page 13).

Yet another worker took action and prevented what could have been a bad situation. The worker, Participant 23, was referencing a situation where a piece of equipment had fallen from the drill rig, causing the piece to malfunction. The driller hit the brakes, which prevented the machine from hitting some workers who, luckily had moved out of the line of fire. He said, "It could have been fatal, but the major reaction when he hit it – he just automatically hit the brakes and got the locks…So this was after moving out approximately four to six inches, which he didn't notice when he was coming down and the blocks tagged it and knocked it out of the track, and this came down. So, basically, these guys were just after moving out of there.

That was a near miss that could've been fatal." This action normalized the situation, allowing the worker who was operating the drill rig to be rescued (Interview 23, page 1).

Participant 34 explained a close call situation where the production supervisor was in charge of the rig when a drill pipe broke free and fell. The worker explained that the production supervisor called the OIM to get out of bed and make a decision on what to do. He said, "…we have a supervisor on nights and have an OIM, who's the manager of the rig; and on the drilling side, we have a… (same)? place – they have their own supervisor, right?….And this happened on night shift and the night shift production supervisor, who is responsible for the rig at the time when the OIM is in bed – he got called up… or he called him up out of bed and he came down and assessed the situation and, you know, he called… you know, he just sort of looked at what happened there and shut down the rig and sat back and he waited until the next morning, right, and contacted town" The production supervisor simply passed responsibility over to the OIM who took action and shut down the plant, which normalized the situation. The worker explained, "…we had a close call, I guess, there back a few years ago - I don't recall a year – but it was during the… one of the rigs were putting their ^ together. This is their (drill plate)?, … actually, a drill pipe backed off, right, and it came down through and came down through the well bed where all our wells are to and, as luck should have it, it hit nothing but landed right down in between and hit the frame of the rig, right, and it was called… you know, the pipe just fall off one side and that was it" (Interview 34, page 1).

Participant 4 provided an example of a situation where taking responsibility meant taking major action by the OIM. The worker explaining the close call said, "and the (installation)? manager shut the place down because of that – because we were without fire and gas detection in the certain area of the vessel. That was, in his mind, critical, you know. So he just shut the whole place down. Stopped producing oil until we got the part replaced and back up to full production again" (Interview 4, page 6).

Participant 4 talked about the decision by the OIM to shut down the plant on the rig, which resulted in major action. He said, "and the first thing the OIM says – okay, shut down the plant and depressurize – and all we got is a man who has his leg stuck. You know, the plant is in no danger. Shutting it down may even cause more

problems if something starts leaking or a valve doesn't close or whatever, you know. There are a lot of things got to happen when you push the shut plant down button that's got to happen automatically (Interview 4, page 14).

Participant 27 described a close call with a motor burning out, causing fire and smoke. The OIM took responsibility and sent people to the lifeboats. This may not have been the right move because they did not de-man the platform but the OIM did take responsibility. The worker said, "… on the (Bill Shoemaker)?, there was… I believe it was a ballast pump (down the)? pontoons, and the only way to get the pontoons down to the legs, right… and what happened – a bearing for the motor itself… an electric motor itself overheated and smoke going everywhere, right? Kept running and running and running and burnt out the motor and there was smoke everywhere (and went down to)?... fire alarms went off and he had to send people down into the leg - the fire teams – to check it out and, after an hour or so - …- through all the smoke and everything and figured out what it was, and cleared the area and stuff like that, but there was no damage or nothing like that. And when people went to the …I was on deck at the time – there was people showing up to the lifeboat ^ in their underwear" (Interview 27, page 1). In this example the worker voiced a difference of opinion from the OIM in terms of what constituted a crisis. This also provides support for the existence of subjectivity in the decision making process.

Participant 21 talked about a close call with a leak in a cement line, which required major repairs at a cost of $25,000.00. The captain of the ship took responsibility and took the necessary action to fix the lines and normalize the event. He said, "We had a (load of)? ^ onboard and we were sailing with it and we found out that there was a leak in one of the cement lines that went through a water tank, and cement had gotten in there and hardened up – (set up)? in the pipes, right? So we couldn't pump it off to the platform. And we tried… that was one of the only times that we tried to get hold of the owners…we went ahead and had the work done. Had a contractor come aboard and start cutting and burning and replacing pipe and it cost about $25,000; but you explain to them what you did it for and why you did it and that's all that was ever said about it. They just paid the bill…" (Interview 21, page 11). The captain's acceptance of responsibility in this case resulted in more action.

Similarly, Participant 26 explained a situation with a gas leak and an OIM who took control and took action. He said, "The offshore installation manager took control

and he ran with the situation and made sure that everybody was calm and collected and everybody in the room where I was to had their own parts to do, and everybody did their parts" (Interview 26, page 6).

Participant 35 described a close call situation in which human error resulted in a chemical accidentally spraying in a co-worker's face. The worker explaining the situation said, "The chemical would be a part of what the galley normally uses to do their disinfecting… of the galley. It wasn't approved for use in what he was going to use it for. He used the chemical. It ended up spraying on his face and so he got some chemical burns on his face. So the general platform alarm was sounded and the medical response teams were summoned." In this case the medical team accepted responsibility and took the appropriate action.

Participant 15 explained a close call with a fire aboard a crane. In this example, taking responsibility meant more action to avert a bad situation. Explaining the close call and the resulting responsibility he said, "Like offshore – I was in the control room one time when we had a fire on the diesel engine on the crane. I was a control operator at the time. … and I said, shut down the plant, depressurize and I'll take of the communications. Get the OIM out here. Within a couple of minutes, the fire team was up. They had it under control. The fire was removed from the process. Like they could've missed... if it had escalated" (Interview 15, page 11).

One management worker, Participant 8, explained a near miss situation where no one was left in charge because the OIM left his station to go and investigate a gas leak. In this case the workers knew who was in charge, and consequently, a structure of responsibility for authority existed and was activated. Although the OIM did take major action in leaving his post and de-manning the platform, he took the wrong kind of responsibility and did what a subordinate should do. The worker indicated that this could have been a bad situation, which indicates that he recognized the situation as serious and warranting someone taking responsibility. The worker explaining the situation said, "The OIM went down to investigate ^, …and he's the head guy on the rig. He went down to investigate without any (stop)? hat on or anything. One of the rescue people had to go get it. So that wasn't handled real good. Anyway, they managed to get it stopped; but in the meantime, they were evacuating everybody off the rig. So that one wasn't a very good one, as in handled right. …." (Interview 8, page 2).

A management worker, Participant 5, explaining the same situation noted that action was taken as a result of fear. It also caused superiors to start to de-man the platform. He stated that, "They kind of wanted to get directly involved and leaving to go to go down to see what was going on and their place was really in the control room as the person in charge to direct people instead of trying to become directly involved with it" (Interview 5, page 1). The worker said, "things got a little bit hairy, I guess – that some of the people in charge – they… I think they probably overreacted at first and they were being… started to de-man a platform and send people to the other rigs that were there – the other drill rigs. There was… I think there was one for… drilling for Terra Nova at the time, and they sent a lot of personnel over to that one…"(Interview 5, page 1). This management worker also felt that the wrong type of response was taken. The workers do more than take initiative; they actually take responsibility to make things happen. They look at alternatives and consider other approaches but sometimes the appropriate course of action is not taken. Participant 37 discussed a problem with ballasting the rig he was working on. Explaining the situation he said, "That's the most important valve on the rig. Ballasting that rig is most important to that rig. So now that valve was… you couldn't function that valve anymore. So then what they had to do was come up with a plan between the chief engineer, the tool pusher, myself and the office…. So I was like, (really)?, the superintendent in the office ^ rig manager. Then I was on the Internet finding companies in Calgary" (Interview 37, page 21).

It is clear from this worker's comments that the problem with the ballast control valves had not been resolved. The worker took responsibility, used the Internet to find a company, and purchased the required part. This action may improve the safety of all rigs in the same fleet. This example provides support for the taking of responsibility resulting in more action.

Structure and responsibility are rethought with normalization or displacement activities. The participants interviewed present no coherent or consistent account of who takes responsibility under certain crisis conditions. The company tries to get along by expecting people will take responsibility in crisis situations, and hopes for the best in the process. The company is fortunate in that a crisis never occurs.

Participant 16 described a close call involving a helicopter weighed down by ice and a pilot who just made it back. He said, "…I was at the heliport passing out

suits. He left and went to the Ranger. I think they had, again, fourteen people or something on board, and they ran into heavy icing – freezing rain – heavy icing and they had to turn around and come back and they just made it back and he had to come in just above the water there right on the surface, and there was a big pile of ice as big as this table all over the front of the helicopter when he landed, you know. ..He almost ran out of fuel and he almost got too heavy that he could not fly. So that was very close" (Interview 16, page 18). In this case responsibility was taken, and a decision was made which avoided a crisis.

Of the 37 interviews completed, 4 respondents identified avoidance of responsibility because of fear of repercussions and inexperience; 21 workers identified lack of clarity around roles; four workers identified their interpretations of rules and procedures; 5 workers identified subjectivity in the decision making process as the reasons for avoidance of responsibility in close call situations. Four workers provided examples of where workers took responsibility because of confidence gained from previous work experience. In all cases, the problem is addressed, regardless of the action taken.

6.7 Conclusion

This qualitative data demonstrates that responsibility, rules, conditions, and crisis definitions are continually evolving through everyday application. Five main findings emerge from the data analysis. The first main finding is the higher the seriousness of the risk, the lower the clarity of the unfolding crisis situation. One possible explanation is that the more serious the incident, the less time and information one has to act; thus, the greater the confusion. In addition to the information deficit in crisis situations, there are complicating factors such as workers being unclear about when to get shore management or personnel involved in the decision making process. There is a step change when the workers move from distributed to non-distributed crisis situations, which causes them to wait, and to be confused over who should take responsibility.

The second main finding that the workers alter their perception of the event after the crisis has been averted to make it seem less serious than it actually was. The situation is prevented from becoming a full-blown crisis, but there is no guarantee that the situation will not reoccur at another time. One possible reason for the workers' action is justification in the eyes of their co-workers for the action they have taken.

Another possible explanation is peace of mind for the decision maker. This is similar to a decision rule to themselves to not look back but to look forward. Such a rule would make them more resolute and focused and allow them to continue to work in such a dynamic environment.

The third finding is that someone always comes along to solve an impending problem. Workers have an intuitive feeling that they should not take the decision, and they let someone else make it. This suggests that a negotiated order is more adaptive for a crisis than an organizational chart like a rulebook, which states that under certain conditions certain responsibilities apply.

The fourth finding is that workers who are experienced are more proactive, flexible and less likely to be bound by rules. Experience provides workers the confidence needed to take responsibility and, if necessary, adjust the rules outlined in the rulebook. Through experience the workers may have learned that the rulebook does not always cover all contingencies.

The fifth finding is that the rulebook is a double-edged sword, making it inappropriate for all crisis situations. In many cases the rulebook causes individuals to be creative. In other cases the rulebook causes individuals to take inappropriate risks, get away with it and be reinforced by normalization. This could possibly have a bad outcome.

The five findings and their interrelationships illustrate that, over time and with experience, workers interactively construct a form of consciousness of what is happening during any close call situation. The findings also demonstrate that responsibility is socially constructed rather than rigidly steered by a set of prewritten rules. Instead of using formal rules and procedures, workers are more inclined to deal with crisis circumstances through actions such as avoidance, displacement and normalization. Structure and responsibility are rethought with these actions. While socially constructed responsibility is acceptable in non-crisis situations, it is problematic in crises. Often crisis contingency plans are not triggered early enough and, consequently, no one has to take responsibility.

Fortunately, a real crisis involving substantial loss of life, significant monetary loss or damage to company image rarely occurs. Consequently, workers have not constructed a strategy for dealing with real crises. The workers justify these strategies because they are repeated so often, and, as such, that they have been proven

successful in preventing “real” crisis. Such behaviors have become routine over time, and in that respect, they are engaging. The following chapter presents the findings from a documentary review of the Ocean Ranger rig disaster. This presentation provides a point of departure for comparison of the disaster in light of the findings presented in the current chapter.

CHAPTER 7: FINDINGS OF THE ROYAL COMMISSION

7.1 Introduction

The following chapter is divided into sections representing the five major findings discussed in Chapter 6, identified herein as (a) clarity, (b) altered perceptions, (c) displaced responsibility, (d) experience, and (e) rules.

7.2 Clarity

The RCORD provides strong support for the finding about clarity by showing that in more serious situations, there is less transparency around the unfolding crisis situation. Distributed communication on the rig, with the outside world, as well as between vessels and, as well as confusion over the identity of the decision maker, compounded the level of confusion aboard the OR. A highly serious situation increased the need for distributed communication as well as the requirement for a clearly identified decision maker. It is clear that the OR rig disaster was the result of a serious situation and that confusion and lack of clarity existed around the crisis events.

7.3 Altered Perceptions

The second main finding from the data analysis is the workers altered the event to make it seem less serious than it actually was. The event is prevented from becoming a full-blown crisis, but there is no guarantee that the situation will not reoccur at another time. One possible reason for the workers' actions is justification to their co-workers for actions taken. Another possible explanation is peace of mind for the workers. This concept is similar to a decision rule among workers not to look back but to look forward. Such a rule would make them more resolute, focused and able to continue to work in a rugged, dangerous environment. Workers downplay problems as a means of buoying confidence. The ballast control operators were told to record that all anchor tensions were within the 235-250 kips, even when this was not the case (RCORD, Vol. 1, p. 47). On the night of February 14, 1982, Jacobsen, Mobil's senior drilling man on the rig reported that all anchor tensions were within the 249 kips range. This was impossible under the environmental conditions prevailing that night. It is likely that the figures were deliberately misstated to comply with the directive to cover up any further damage to the organization's image, and thus buoy confidence from stakeholders. The RCORD indicated that "evidence was given that commencing in January, 1982, the anchor tensions listed in reports

were fabricated" (RCORD, Vol. 1, p. 47). Another possibility for the inaccurate recording of the data could be evasive answering from the company regarding safety conditions aboard the rig. Throughout the night the crew repeatedly reported that all was functioning normally. Perhaps this misstatement had become normal for the crew. However, the hiding or changing of various operating figures suggests there was a data error that likely compounded crisis planning.

It appears that neither the onsite crew nor on-shore management saw the OR list as a crisis on February 14, 1982. The second last OR rig transmission was stated in a calm voice. At 1:14 a.m. February 15, 1982 Jacobsen stated, "The rig was listing and not coming back for us" (RCORD, Vol. 1, p. 64). The crew may have framed the crisis inaccurately because their practice had been to focus and continue to try to solve the problem.

The RCORD provides support for finding 2, which proposes that workers alter events to make them seem less serious than they actually are. Whether workers intentionally or unintentionally downplay crisis events is unclear; however, misreporting activities and lists had become normal occurrences aboard the OR rig. Prior to the rig disaster, workers had altered severe events to make them appear less serious. Consequently, a truly serious event had become a ticking time bomb embedded in what was deemed normal rig culture.

7.4 Displaced Responsibility

The third finding is that someone always comes along to solve a pending problem. Workers have an intuitive feeling that they should not make crisis decisions, so they let someone else make the decision. This suggests that a negotiated order is more adaptive for a crisis than an organizational chart or a rulebook, which would outline that under certain conditions, certain responsibilities apply.

In terms of these findings the RCORD provided no evidence for the above finding. However, as indicated in Appendix 1, the timeline for the OR crisis indicates there was actually sufficient time for the OR crew to evacuate the rig and escape to safety. The captain had an opportunity to evacuate the crew to a vessel that was in close proximity to the rig. It is possible that the crew were waiting and anticipating that someone would solve the problems they were encountering, as had happened with the list and close call on February 6, 1982. In addition, the crew had experienced similar weather conditions on January 16, 1982.

Since there were no survivors from the OR disaster, it is implausible that someone will always come along to solve a pending problem. However, past problem- solving experiences aboard the OR support the belief that someone always comes along to solve a pending problem. The OR disaster timeline in Appendix 1 provides indirect validation for this finding because the crew did have time to solve their problems, and perhaps they were waiting for a resolution.

7.5 Experience

The fourth finding is that experienced workers are more proactive and flexible and less likely to be bound by the rules. Experience provides workers with the confidence needed to take responsibility and, if necessary, adjust the rules outlined in the rulebook. Through experience the workers may learn that the rulebook does not always work.

The RCORD provided no evidence for the above finding as most of the discussions were around the lack of experienced workers. Workers' ignorance of the workings of the ballast control equipment (and its danger to the rig) was, in all probability, the reason for the crew's failure to report the damage to shore.

The training provided to the crew should have minimized risk, but it "did not provide an understanding of the electrical and mechanical operations of the ballast control system nor the effects of ballast gravitation. A thorough knowledge and understanding of what might go wrong as well as how to detect and remedy the situation were also lacking" (RCORD, Vol. 1, pp. 33-34). Such knowledge and understanding could only be gained by experience.

February 6, 1982, was a prelude to the OR rig disaster. That accident resulted in the ballast control operator, Captain Hauss, being "severely criticized for causing the list and told to be sure it did not happen again". In response, Hauss "agreed not to operate the ballast controls again". Both Thompson, and Jim Counts, ODECO's shore based drilling superintendent, "had lost confidence in Captain Hauss" (RCORD, Vol. 1, p. 50).

The Royal Commission recognized the importance of instilling self-confidence among crew members when they stated, "In the final analysis, the critical factors in safety are….the level of confidence and teamwork promoted in everyone aboard" (RCORD, Vol. 2, p. 68). The worker "who had not been trained in the operation of the ballast control system" (RCORD, Vol. 1, page 51) was criticized

and told to stay away from the ballast controls further causing him to lose confidence. Confidence can only be enhanced with training and encouragement.

The Royal Commission report recognized the poor planning aboard the rig in general and consequently indicated that, "disaster could have been prevented by relatively minor modifications to the design of the rig and its systems and it should have been prevented by competent and informed action by those on board" (RCORD, Vol. 1, p. 100).

There is lack of sufficient data to support the proposition that more experienced workers are more proactive and flexible, and less likely to be bound by the rules. The RCORD focused on the lack of experience of OR workers, as opposed to indications of experience leading to proactivity. While the Commission inquiry into the disaster did not include adequate data to make the link between experience and rule following, there is evidence to support the repressive control structure aboard the rig, which impacts the taking of responsibility.

7.6 Rules

The fifth finding is that the rulebook is a double-edged sword, which cannot adequately address every crisis situation. In many cases the rulebook is reason for individuals to become creative. In other cases, the rulebook causes individuals to take inappropriate risks, get away with them, and be reinforced by normalization. This could possibly have a bad outcome, as evidenced in the OR disaster. "Testimony indicated that the OR had never followed the accepted deballasting practice, and the rig had a history of continued drilling in weather conditions too severe to permit other rigs to do so. The OR disconnected due to weather conditions only once in its five-year operating history: January 16, 1982. However, the rig did not deballast at that time, and weather conditions were similar to those that occurred again on February 15, 1982" (RCORD, Vol. 1, p.87). In fact, "prelude to the loss of the OR occurred eight days prior to the disaster. On February 6, 1982, the rig developed a sudden list port heel of six degrees while taking on liquid cargo from a supply vessel. This was a ballast control error by the master"(RCORD, Vol. 1, p. 43). This list was "serious enough to result in the crew preparing to go to lifeboat stations" (RCORD, Vol. 1, p. 50). Such lists appeared as an acceptable and common problem aboard the rig.

There appeared to be a general lack of concern among workers on the night of the OR rig disaster. Merv Graham, Mobil's shore based area drilling superintendent, was advised at 8:45 p.m. on February 14, 1982 that the portlight had broken. However, he did not regard it as important because Jack Jacobsen, Mobil's senior drilling foreman, showed no concern. At 10:00 p.m. Jacobsen again reassured Graham that all was fine. However, the crew's analysis of the rig's stability was inaccurate. The reason for the difference in perception can be attributed to inaccurate assessments of the situation by the crew and lack of appreciation of the potential danger based on their environment, which they deemed to be "normal."

Workers assumed that because crises were avoided on January 16th and February 13, 1982 incorrect courses of action would somehow make things right. Perhaps neither the crew nor management saw the February 14, 1982, list as a crisis. The second last transmission from the rig was issued in a calm voice. At 1:14 a.m. on February 15, 1982, Jack Jacobsen stated, the OR "was not coming back for us" [RCORD, Vol. 1, p. 64]. Perhaps he framed the crisis issue inaccurately. On the other hand, it was difficult to tell virtually how Jack Jacobsen really felt. While the rig's list was serious enough to result in the crew preparing to go to lifeboat stations, there was a general lack of concern by the crew. The reason for the lack of concern could be attributed to the virtual nature of the communication that was heard by shore or overheard by other vessels and rigs. Perhaps there was no accurate indicator of the "true" concern of crewmembers. It may be the case that normalization and distributed communication led to decreased clarity of the crisis situation. Waiting rather than taking responsibility is a form of normalization. The decision as to whether to cease drilling and hang off because of deteriorating weather was likely made on intuition that a decision should not be taken. A decision was made to wait, which is also a form of normalization.

During the OR rig life, the ballast control operator paid little attention to mathematical calculation of stability. He preferred to use the inclinometers in the ballast control room to check whether the rig was level. The ballast control report was sent to the master and to the toolpusher for approval, then to the shore base in St. John's, and then forwarded to New Orleans. Actual reports and testimony of former ballast control operators show that errors in calculation were not uncommon and rarely picked up by supervisors on board or on shore. Thus the lack of mathematical

calculation was also part of what was considered normal on the rig.

The (RCORD Vol. 1, p. 23) referenced the Ocean Ranger disaster and compared the loss to the supposedly unsinkable Titanic loss. The belief that the OR was unsinkable, coupled with unfamiliarity of the operations manual and poor training, was a clear indicator that management believed that the OR was all powerful. Consequently, the crew was unprepared for the crisis.

RCORD clearly indicated that the rulebook was not always helpful and in fact could prove harmful. It stated that, "Advanced technology or elaborate response plans serve little purpose without competent human control. In fact complex systems or strategies may prove harmful if uninformed use is made of them, or if people are lulled into complacency by their presence. An ice alert plan may well designate safety zones and prescribe appropriate response, but recent events have shown that these plans are not fallible and that there remains a number of key points in that process where action taken by rig management may stand between safety and potential rig disaster" [RCORD, Vol. 2. p. 57].

The NORDCO forecasts were updated every 6 hours and transmitted to the rigs via the Mobile shore base. However:

> "Confusion existed on the rig and shore base over the meaning of certain forecast parameters. Mobil and ODECO misinterpreted the definition of maximum wind speed. Michael Hewson of NORDCO testified that the forecast maximum wind speed referred to a sustained wind, not a gusting wind. Mobil and NORDCO personnel interpreted it as gusts. This was an important difference because the Ocean Ranger's Booklet of Operating Conditions prescribed that the rig be deballasted when sustained winds exceeding 70 knots were forecast. If the crew had properly interpreted NORDCO's forecast, and adhered to the procedures outlined in the Omanual, the rig would have been deballasted on the afternoon of February 14, 1982, when sustained winds of 90 knots were forecast. Consequently, the portholes would have been less susceptible to the wave damage" (RCORD, Vol. 1, p. 44).

In addition, contingency plans were not in place. There was a "lack of proper procedures for emergencies, manuals and technical information relating to the ballast control…" (RCORD, Vol. 1, p.99). The crew made a decision to insert 18 manual

control rods. The Royal Commission believed the rods were inserted in an effort to close the valves that the crew thought were stuck open. They made an effort to either leave open only those valves necessary to pump out the port side or "as a precautionary measure to ensure the valves stayed closed. The crew wrongly believed that insertion of a rod would close a valve; in fact, the reverse was true" (RCORD, Vol. 1, p. 95). "There were no diagrams or instructions regarding this use of this method of manually controlling the valves" (RCORD, Vol. 1, p.20). The erroneous decision on valve operation could have been the result of a lack of sense making, a lack of training or a lack of knowledge by the crew. It is likely that the crew made a last attempt to close all valves. It is not likely that the crew were carrying out a planned operation. It is highly unlikely that the crew was logical at this point (RCORD, Vol. 1, p. 96). In addition, the crew was never trained to use the rods. Poor planning, in combination with lack of sense making, explained the insertion of 18 manual control rods and the resultant increase in the rate of trim.

"Canada Oil and Gas Lands Administration (COGLA) regulations require that each operator develop a contingency plan for an unforeseeable emergency that might develop during the drilling program" (RCORD, Vol. 1, p.47). However, Mobil's contingency plan and emergency procedures manual did not provide procedures for rig evacuation. There was no copy of the plan on board the OR and no evidence to indicate that ODECO personnel, either on shore or on the rig, were familiar with its contents. The emergency procedures manual's significance is uncertain because, one toolpusher testified, "he had never seen it" (RCORD, Vol. 1, p.48). ODECO had no emergency procedures manual for onshore personnel. There was no basic plan in place, so there was no room for improvising.

The RCORD provides several examples of the rulebook leading to normalization- supported risk taking thus representing one side of the double-edged sword. The OR listed twice prior to the fatal list of February 14, 1988. However, there appeared to be a general lack of concern on the night of the OR rig disaster. As an alternative to ceasing drilling and hanging off, the decision was made to wait. This was another example of normalization, as was the lack of mathematical calculation of stability. Such behavior was considered normal on the rig. Creative and risky activities that had worked in the past became a normal part of rig culture.

On the other hand, the RCORD also provides several examples of following rules. On the night of the disaster, the crew wrongly interpreted the forecast parameters. In addition, there was no instruction manual for the operation of the ballast controls. No evacuation plan existed, but such a plan would have been helpful for the crew. Overall, the RCORD identified lack of procedures for emergencies, manuals and technical information relating to the ballast control.

7.7 Conclusions

This chapter was a presentation of the OR disaster in light of the findings presented in the data analysis chapter. It offers insight to help further explain what happened to the OR with reference to virtual reality and crisis decision-making. The RCORD provides strong support for findings about (a) Clarity. Higher serious situations imply less clarity of the unfolding crisis situation. It is clear that the OR disaster was characterized by confusion and that a lack of clarity existed around the crisis events. Strong support is also provided for findings (e) Rules. A rulebook is a double-edged sword, inappropriate for all crisis situations.

Some support is provided for finding (b) Altered Perceptions that workers alter events to make them seem less serious than they actually were which a form of normalization. The workers justify the strategies they have utilized because they have been proven successful repeatedly in preventing “real” crisis. Such actions have become routine over time, and, in that respect, the strategies are reinforced.

There were no survivors from the OR disaster. Therefore, finding c about displaced responsibility was not supported. The finding that someone always comes along to solve a pending problem was not validated. The OR disaster timeline in Chapter 4 provides indirect validation for this finding because the crew did have time to solve their problems, and it is possible that they were waiting for someone to find a

resolution. No direct support was found for finding (d) Experience that more experienced workers are more proactive and flexible, and less likely to be bound by the rules. The RCORD focused on the lack of experience of OR workers, as opposed to indications of experience leading to proactivity. The findings and their interrelationships, in the OR context, show that, over time, and with experience, workers interactively assess what is happening during any close call situation and socially construct responsibility. They are not steered by a set of prewritten rules.

The RCORD provides support for Finding 1, which sustains that higher serious events are associated with less clarity in crisis situations. Prior to the OR disaster, confusion existed as to the structure for responsibility. In particular there was uncertainty around the identity and location of the decision maker. During the night leading up to sinking of the rig, communication was minimal, inaccurate and slow. A distributed work environment impacted the level, clarity and speed of communication. In addition, an unusual structure for taking responsibility became further strained and confused. Figure 8.1 provides an explanatory framework that has been enhanced with the addition of a component called distributed environment. This directly impacts two components of the framework: confusion over the identity of the decision maker and the number of decision makers.

The RCORD also provided support for finding 2, which proposes that workers alter events to make them seem less serious than they actually are. Downplaying and misreporting of activities aboard the rig, as well as the acceptance of lists as natural, support the normalization component of the framework. There is no direct support from the RCORD for finding 3: someone will always come along to solve an impending crisis, another form of normalization. Similarly, there is no evidence from the RCORD to support finding 4 which indicates that more experienced workers are more proactive and flexible, and less likely to be bound by the rules. However, there is evidence to support the OR as having a repressive control structure, causing workers to avoid taking responsibility in near crisis situations. Thus the *repressive control culture component* of Figure 8.1 is supported by findings from the OR disaster. This component has a direct impact on the avoidance of responsibility, as depicted by the Figure 8.1. In the OR case, the structure for responsibility is inhibited by the repressive control structure, which causes workers to decrease their actions and avoid taking responsibility. Consequently, a link is created between the lack of

structure for responsibility and the resulting inaction aboard the OR rig on the night of February 14, 1982.

The RCORD provides support for finding 5, which states: the rulebook is a double-edged sword, not applicable in every crisis situation. Similar to finding 2, this case provides support for the rulebook causing workers to normalize crisis situations. Lists had become an acceptable risk and normal aboard the OR rig. On the night of the OR disaster, the crew continued to do what had been done in the past, which ended up being an incorrect and high-risk action regarding the list. The lack of mathematical calculation was also normal on the OR. Thus, this finding provides further support for the *normalization* component of the framework.

The rulebook is necessary in some crisis situations; as such, the RCORD provides support for the utilization of the rulebook. The OR crew wrongly believed that the insertion of rods would close a valve. The action actually resulted in increasing the rate of trim. Consequently, support is provided for the *breakdown in socially constructed meanings during a crisis*. The workers also decided to wait on the decision to cease drilling and hang off. This provides support for the *they wait* component of the framework.

Based on the RCORD, several components of Figure 8.1 are supported and have implications for helping better explain the factors affecting the acceptance of responsibility in crisis situations. These components are: *distributed environment, confusion over the identity of the decision maker, the number of decision makers, repressive control culture component, normalization, breakdown in socially constructed meanings during a crisis* and the component *they wait.*

CHAPTER 8: DEVELOPMENT OF THE MODEL

8.1 Introduction

This chapter provides a discussion of the findings from the analysis presented in Chapter 6, their relationship to the existing body of literature as presented in Chapter 2, as well as how they relate to the OR disaster inquiry discussed in Chapters 4 and 5. Patterns, relationships, and generalizations as well as trends among the results are identified in addition to their exceptions. Normalization is discussed. The most likely causes of the results and whether they agree with or contradict previous work is also discussed. In addition, evidence and reasoning is presented to support each interpretation.

The chapter is divided into two sections. Section 8.2 (Literature) relates the findings to the literature review. This section also provides a critique of the theories, links the findings to current theories, and provides new insights and suggestions for evolving theories. Section 8.3 (Decision Model) identifies and describes a crisis decision making model, which has emerged from the findings. The framework will help decision makers better explain factors affecting the taking of responsibility in crisis situations. A conclusions section finalizes the chapter with a general summary of the principal results.

8.2 Literature

Five main findings emerged from the data analysis, identified briefly as (a) clarity, (b) altered perceptions, (c) displaced responsibility, (d) experience, and (e) rules. The following paragraphs relate these findings to the literature. The first main finding is the higher the seriousness or the level of criticality of the unfolding crisis situation, the less the clarity or the understanding of the situation. For example, a close call with a lifeboat being lowered into the water when the valves were not properly set caused the prods to start cracking and the lifeboat to swing in mid air for approximately ten minutes, just missing the drill rig. This situation would generally be more confusing and cause more difficulty for a worker to understand than a less critical situation such as a power outage, which poses a potentially critical situation. Without immediate attention, a highly critical situation could lead to a loss of life. The second main finding is that workers reinterpreted the event to diminish its seriousness. The third main finding is the perception that someone will always come forward to solve a pending problem. Despite conventional thinking on habitualization,

the fourth finding describes experienced workers as more proactive, flexible and less likely to be bound by the rules.

The fifth finding depicts the rulebook as a double-edged sword, which is unable to address every crisis situation, and causes individuals to be creative in order to deal with extraordinary events. In other cases, the rulebook forces individuals to take inappropriate risks, risks they get away with, then have such behavior reinforced by normalization. There is a consistent pattern explaining that normalization always occurs. Workers appear to have a system in place for monitoring and reacting to near misses. Initially, they try to prevent them from happening. When normalizing, people are being creative and often doing dangerous things in close call situations. Similarly, when workers are creative they are reinforced by normalization.

The first main finding indicated *that the higher the seriousness of the crisis event, the less the clarity of the event.* In crisis situations, issues become fuzzy; this leads to the collapse of socially constructed meanings or a breakdown in the sensemaking process, causing workers to become confused over who should take responsibility. The two theories that provide a partial understanding and inform a lack of responsibility or acknowledgement of the seriousness of the situation due to confusion and lack of clarity over the identity of the decision maker are the Social Construction Theory of Berger and Luckmann (1966) and Weick's (1988) Sensemaking Theory. According to Weick (1993), the basic idea behind sensemaking is that "reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" (Weick, 1993, p. 8). This happens when people try to make things reasonably apparent to themselves and others. Theoretical support was also found for the inverse relationship between the seriousness of a crisis and the understanding of the impending crisis. The Social Construction Theory and Sensemaking literature inform the social construction component of the relationship.

Socially constructed responsibility may be acceptable in a non-crisis situation (Weick, 1993). However, it is problematic in a crisis because often the crisis contingency plans are not triggered early enough and, consequently, no one takes responsibility. In addition, crises involving substantial loss of life, significant monetary loss, or damage to a company's image occurs so infrequently that organizational members have not constructed a strategy for dealing with such crises.

A lack of sensemaking in a crisis situation was further supported through

findings from the OR case study. On the night of the OR rig disaster, the crew were contending with a wet control panel. Turning off the power to the ballast control panel was an effective and successful alternative for rig safety, but the crew were not comfortable with this alternative and decided to restore electrical supply to the panel. Disconnecting the power would have prevented further electrical shortages and would have prevented the more severe list. The crew stabilized the rig but later decided to start the engine. This action demonstrated a lack of sensemaking, which was a contributing factor to the sinking of the rig.

The second main finding indicated that *workers reinterpreted the event to diminish its seriousness.* In the case of the OR, the normalization hypothesis was supported by the normal practice of not deballasting the rig. Testimony indicated that the OR crew had historically not adhered to accepted deballasting practice, the rig demonstrated a capability to continue drilling in weather conditions too severe for other rigs. This left the workers with a false sense of security. The OR disconnected due to weather conditions only once in its five-year operating history. This happened on January 16, 1982, but the rig did not deballast at that time. In addition, the rig had a close call prelude event on February 6, 1982. It developed a sudden port heel of six degrees while taking on liquid cargo from a supply vessel. In the February 14, 1982 crisis, the crew did not follow the deballasting rules; this eventually led to the catastrophic result of sinking the rig. The crew's deballasting practice had become an acceptable and common practice aboard the rig and, in that sense, was considered normal. It was not until the model failed that the practice was shown to be flawed and representative of a serious threat.

Interviews with oil and gas workers indicate the majority of fleets today have no secondary means of ballasting their rigs. It is somewhat astonishing that after the OR rig disaster and Royal Commission inquiry, steps were not taken to ensure all rigs addressed the problem with secondary ballasting. It is alarming that the oil and gas industry has normalized list situations. This normalization of the ballasting process has acted as a security blanket by becoming embedded in practice and feeding back into the breakdown in socially constructed meanings during a crisis. Therefore, the contribution of this research to the normalization literature is twofold. It provides a variable in the crisis decision making framework and a feedback mechanism as depicted in Figure 8.1.

8.3 Development of the Model

The RCORD resulted in several implications for the explanatory model presented in Figure 8.1. Six components of the model supported by the RCORD report are: (a) *confusion over the identity of the decision maker, (b) the number of decision makers, (c) repressive control culture component, (d) normalization, (e) breakdown in socially constructed meanings during a crisis,* and the component *(f) they wait.* In addition one new component, (g) *distributed environment,* was added to the model. The seven components of the model are differentiated from the other components via a dashed outside border. Figure 8.1 is an illustration of the model.

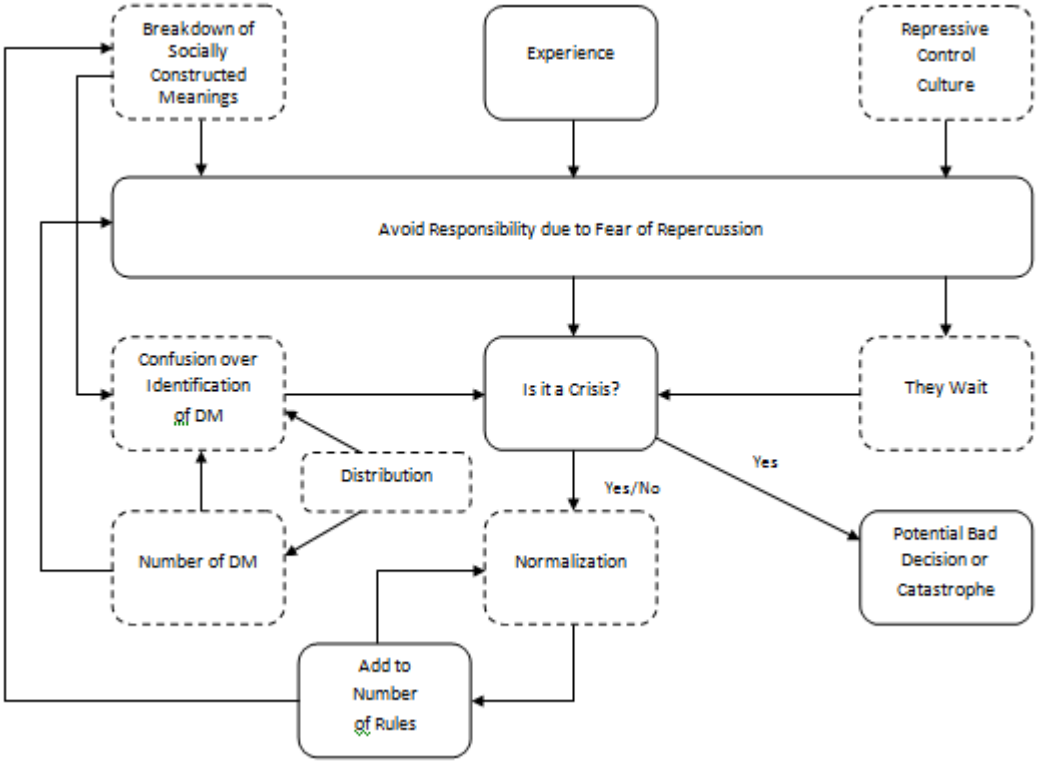

Figure 8.1 Crisis decision making model.

The model presented in Figure 8.1 is designed to better explain the taking of responsibility in crisis situations. Each element of the framework is introduced, explained and supported with evidence from the analysis chapter. The arrows in the diagram indicate the effect of the element on an associated component. The section uses the OR case study in the province of NL as a distributed work environment example with the aim of understanding how the OR informs the integration of the data analysis and literature.

As depicted in Figure 8.1, eight variables are identified along with their impact on the identification of a situation as crisis or non-crisis. The eight variables include: how socially constructed meanings change during a crisis, experience, repressive control culture, avoidance of responsibility due to fear of repercussion, waiting, confusion over the identity of the decision maker, the number of decision makers and normalization. Based on the data from this research study, Figure 8.1 shows how these variables impact the identification of a situation as a crisis and the associated impact on decision-making and normalization. Three of the most important variables, to be further discussed, are (a) *avoidance of responsibility due to fear of repercussions*, *(b) is it a crisis or a crisis confirmation*, and (c) *confusion over the identity of the decision maker*.

8.3.1 Clarity

The most important variable is *avoidance of responsibility due to fear of repercussions*. This variable is central within the behavioral space and has four variables that impact it: *breakdown of socially constructed meanings during a crisis, experience, repressive control culture and number of decision makers*. Several possible decision makers were on the OR including marine, non-marine, and company personnel (Mobil); as well, there were land based decision makers. Discussions with some interviewees who are former rig workers indicate a repressive control structure.

The threat of being fired was a common fear aboard the OR rig as a culture of ’we versus they’ among senior and junior employees. Sillince and Mueller (2006) also provided support for failing courses of action causing workers to minimize their personal responsibility. Accountability is managed by talking down or reducing the expectations of others over a project’s lifecycle. “Once “failure” of the team’s work became obvious the team leader and members reacted to their problematic situation

by adopting situations which minimized their personal responsibility" (Sillince & Muller, 2006, p. 23).

Prevarication: The variables they wait and is it a crisis are consequences of the *avoidance of responsibility due to fear of repercussions* variable, which are outputs from the component. In many cases workers wait until the last minute before taking corrective action and viewing the situation as a crisis situation. Delays are common in organizational decision-making and may be inherent in the process or introduced deliberately by decision makers (Cray et al., 1988; Mintzberg et al., 1976). If the group questions itself, the result may be a group that is paralyzed by uncertainty and indecision (Eisenhardt, 1989). Eisenhardt established that the most effective firms in high-velocity environments make strategic decisions quickly and have a shorter time frame in which the decisions are made.

(Turner (1978; p. 87) indicated that warnings of approaching danger are ignored because of "the well documented human reluctance to fear the worst". Alternatively, workers could be suffering from cognitive dissonance, which is a theory developed by Leon Festinger (1957). The theory states that individuals strive to achieve a consonance or consistency among their related cognitions (opinions, knowledge, or beliefs) where they strive to reduce the dissonance and achieve consonance. It is possible that workers downplay the information regarding the impending crisis. It is also plausible that workers wait until the impact of avoiding responsibility is known. As indicated in Table 4.2, Chapter 4, the timeline for the OR crisis events indicates that on February 14, 1982, the OR crew had adequate time to evacuate the rig and escape to safety. The captain had the opportunity to order the evacuation of the rig and transport personnel to a vessel that was in close proximity. It is possible that the crew were waiting and anticipating that someone would solve the problems they were encountering, as had happened with previous lists.

8.3.2 Altered Perceptions

The second most important variable is: *is it a crisis*. In all close call situations, when a crisis is averted it builds confidence in the personnel's abilities to handle future similar crisis situations, even in time sensitive cases. Whether a situation is defined as a crisis is impacted by the variables *they wait*, *confusion over the identity* and the *avoidance of responsibility due to fear of repercussions*. It is likely that neither the rig crew nor management saw the OR list as a crisis. The second last

transmission from the OR rig was stated in a calm voice. At 1:14 a.m. Jacobsen, Mobil's senior drilling man on the rig, stated, "The rig was listing and not coming back for us." The crew may have framed the crisis inaccurately because their practice had been to focus and continue trying to solve or normalize the problem.

8.3.3 Displaced Responsibility

The third most important variable is confusion over the identity of the decision maker. There are two variables impacting these*: breakdown of socially constructed meanings during a crisis* and *the number of decision makers.* Weick (1993) analyzed the Mann Gulch Disaster as the interactive breakdown of role structure. There were two main threats to the role system. Initially, the crew was left for a crucial period of time with poorly structured and unacknowledged orders. The second threat to the role system occurred when the foreman told the crew to throw away their tools, something which led to loss of identity. As the identity of the crew became less distinct, it was not surprising that the final command from the former leader to jump into an escape fire was not heard as a serious command. It appeared that the crew had discarded their organizational structure along with their tools. It is possible that environmental factors such as noise may have added to the confusion, presenting a link between the breakdown of socially constructed meanings during a crisis and environmental factors.

The second factor impacting the confusion over the identity of the decision maker is the number of decision makers. Hutchins (1996) and Weick (1993a) emphasize the importance of knowledge for distributed collaboration. They identify transitive knowledge or the ability to know each person's role in the group as bringing stability to group functioning (Wegner 1987; Hollingshead 1998; Moreland 1999). Collaborators who lose this "virtual role system" or ability to know "who does what*"* become less cohesive and run the risk of the group structure disintegrating (Weick 1993a).

The OR rig disaster appears to have had several decision makers with unclear roles. Accountability aboard the OR was divided among marine and drill tasks. RCORD provides several examples of confusion over the responsibility for marine versus drilling operations and responsibilities. The US Coast Guard also permits anomalous situations. The OR booklet of Operation Conditions specified that while underway the person in charge was the Master, but while anchored on location for the

purpose of drilling, the person in charge was the toolpusher, as permitted by the US Coast Guard (RCORD, Vol. 1, p. 29). The position of toolpusher did not specify any minimal training or experience by the US Coast Guard. The position of Master did have specific credentials, experience and knowledge requirements imposed upon it. Individuals assuming the duties of person in charge varied markedly in their background and training.

Individuals employed on board the OR had specific occupational capacities such as toolpusher, driller, roustabout, and electrician. It was only by coincidence that any of those individuals held Nautical Science credentials. This practice created some confusing and curious hierarchical anomalies aboard the OR while it was anchored and drilling because all marine personnel are the responsibility of the Master. The rig mechanic and crane operator would normally be accountable to the toolpusher, but as they were also ordinary seamen they were accountable to the Master. In addition, at the time of the disaster on February 15, 1982, the OR marine crew consisted of one Master and two Ordinary Seamen. The OR was also short two able seamen and one lifeboat man at the time of the casualty. The dichotomy of roles and responsibilities aboard the OR likely impacted decision-making.

8.3.4 Experience

Experience plays an important part in the model by acting as a moderating variable. Oil and gas companies rely on workers' experience. Findings indicated that the more experienced workers tend to rely less on rules, thus making experience an important moderator. Experience increases the workers' confidence or ability to make independent decisions and increases preparedness to take responsibility.
The RCORD provided discussions around the lack of experienced workers. Workers' ignorance of the operation of the ballast control equipment and their danger to the rig was, in all probability, the reason for the failure to report the damage to shore. Key personnel had a thorough knowledge and understanding of what might go wrong as well as how to detect and remedy the situation. Such knowledge and understanding could only be gained by experience.

There is a link between experience and rules because workers who are experienced are more proactive and flexible, and less likely to be bound by the rules. Conventional theory supports experienced workers as more rigid and more likely to follow rules. This finding conflicts with conventional thinking. This is likely because

of the repressive nature of the work environment experienced workers are less fearful of their supervisors and of making a mistake in the offshore work culture. In addition the rugged and dangerous nature of the offshore work environment calls for flexibility. The experienced workers are veterans who have experienced the plight of this environment first hand.

8.3.5 Rules

The *number of rules* is a self-stabilizing subsystem as it feeds into and out of the normalization variable. For example, several workers discuss a recurring power outage aboard a rig. The workers downgrade the close call situation as less serious, while at the same time commenting that the situation could have been worse. Although the workers indicate that they are unsure as to whether the problem has been rectified, they have avoided a crisis with what now has become a new rule. The next time a similar situation occurs, the workers will draw on what is now normal in determining whether the situation is a crisis.

Workers aboard the OR rig provided support for the normalization hypothesis by the normal practice of not deballasting the rig. Testimony indicated that although the OR crew had historically not adhered to accepted deballasting practice, the rig demonstrated a capability to continue drilling in weather conditions too severe for other rigs. This practice added to the number of rules and left the workers with a false sense of security. The crew's deballasting practice was considered normal. In all cases when a crisis is averted, confidence increases in their ability to handle all similar crisis situations. Thus, *normalizatio*n is both impacted by and impacts on the number of rules variable. The number of rules increase when workers normalize a situation as non-crisis.

Whether the situation is classified as a crisis or non-crisis, the normalization component of the model adds to the number of existing rules and feeds back into the model, further complicating the breakdown of socially constructed meanings during a crisis. For example, a participant who indicated a near crisis event with a power outage aboard the platform noted their inability to know what was going on in the plant because the control system, which is a key to plant safety, was not working. He said, "<u>It could've been serious"</u> …..I can't see it happening again" (Interview 4, page 18). The worker expresses confidence in what has been done to rectify the situation

and indicates that a recurrence is unlikely. His construction of the next similar crisis situation will be impacted by what he now deems normal.

The existing problem with the ballast control valves, identified at the time of the OR disaster in 1982, was not rectified by one particular platform until 2007. It provided a clear indication of crisis events becoming normalized, thus feeding back into the social construction of what then became the workers' reality. Following the OR disaster, the problem with the ballast controls, once again became normal.

A circulatory link exists between the *normalization* variable and the *breakdown of socially constructed meanings during a crisis* variable. The connection between the two variables is considered circulatory because the variables feed on themselves and are in constant motion. The normalization of an event as non-crisis impacts the social construction of meaning during subsequent close call or crisis events. Normalization aids in the application of the comfort blanket or the embeddedness in practice of situations that are not normal, thus eliminating further complication in the breakdown of socially constructed meanings.

Overall, this model provides a way to analyze close call situations in order to prevent a potential bad decision or catastrophe, and the normalization of close call situations. At the very least, the model can help make workers aware of the components of crisis decision-making. Perhaps it can prevent the application of the comfort blanket or the embeddedness in practice of situations that are not normal, thus reducing further complication in the breakdown of socially constructed meanings. While this crisis decision making model is developed for the oil and gas industry, it is transferable to other occupational areas such as police forces, fire fighting units and the military.

The model helps explain the factors affecting the taking of responsibility in crisis situations. Theories of determining if a situation is a crisis or the taking of responsibility in a crisis situation are highly structured and less process oriented. The best-known model of crisis and the one that has influenced recent thinking is Hermann's (1969) model. He proposed a foundational three variable crisis management model: surprise, short decision time, and threat to valued goal. All three attributes must be present for a crisis to occur. Billings et al. based their crisis management model on Herman's (1969) foundational model and made an original contribution of their own. They suggested that the degree of crisis depended on the

value of possible loss perceived by stakeholders, the perceived probability of loss, and the perceived time pressure. Their model added the role of a triggering event arguing that effective crisis management should begin in the period before the crisis, namely by minimizing potential risk in anticipation of an event that could trigger a crisis (triggering event).

In effect, Billings et al.'s revision of Hermann's model added a new nuance to the concept of crisis. They suggested that reducing the perception of the variables underlying crisis could reduce the stress associated with crisis and perhaps reduce awareness that there was a crisis situation at all. The decision making model developed from this research study is more process-based providing a guide for taking responsibility that encompasses whether or not a situation is a crisis as one component of the model. Unlike other decision making models the model presented in this research is based on close call situations, sensemaking, normalization, and organizational theory.

Figure 8.1 provides a visual representation of the association between normalization and social construction. This model may be used by crisis decision makers to demonstrate how normalization is a variable in the decision-making process and feeds back into the model, further complicating the process.

These research findings support the abundance of research on normalization during a crisis. Accounts by Vaughan (1996) and Perrow (1999) show that normalization or displacement commonly occurs during a crisis, and not prior to a crisis. In Vaughan's application of Perrow's theory to the Challenger disaster, she observed that whenever abnormalities existed, people found reasons for them and thus normalized them so that they could forget about them. In the Challenger accident, "the range of expected error grew from the judgment that it was normal to have heat on the primary O-ring…and finally to the judgment that it was normal to have erosion on the secondary O-ring" (Weick & Sutcliffe, (2001), p. 40).

In comparison, this research provides support for normalization or displacement activities of social systems. Similar to Perrow and Vaughan's research this research offers an understanding of how workers respond to close call situations based on their working knowledge of similar situations. It also indicates workers' inclination to deal with circumstances they are confronted with through actions such as normalization. However, both scholars' work deals with technocentric systems

whose workings are complex and tightly connected. This research deals with social systems because it addresses how personnel behave in terms of social construction/sensemaking. The research extends Perrow's (1984) normalization theory to social systems rather than solely technological matters that occur during the crisis.

Technical causes of accidents vary but organizational failures that accident analyses reveal are similar (Hopkins, 2000). Social systems analysis provides a means of generalization and learning that can be transferred among crisis situations. This normalization process is not only a component of the decision making process and model, but it adds to the number of rules, thus becoming embedded in practice, and acting as a comfort blanket. This occurs at the onset of the crisis decision making process further complicating the breakdown of socially constructed meanings during a crisis. Normalization has an effect on the breakdown of socially constructed meanings.

8.4 Displaced Responsibility

The third main finding is the perception that someone will a*lways come along to solve a pending problem*. All interviewees indicated that the problems discussed had been solved. However, similar to the third finding, there was no direct support from the case study to support these findings.

8.5 Experience

The fourth main finding is that *experienced workers are more proactive and flexible, and less likely to be bound by the rules*. Several workers provided examples of situations where workers took responsibility because of confidence gained from work experience. One worker felt that his experience enabled him to make a decision to shut down the plant although all the indicators of a problem were not present. I didn't wait for an answer (but let him)? know that different parts were being shut down and regroup and find the problem so… and that's what we did, and that was the case that we knew we had a problem" (Interview 5, page 3). The worker is referencing the fact that he was confident enough to make the decision using one dial, which is at 22 as opposed to two dials. This worker provides an example of experience being a forerunner to taking responsibility; an inexperienced worker would be unlikely to take such decisive action.

There was no direct support from the Ocean Ranger case study to support this

finding because all crew members were lost in the disaster. Only one interviewee had worked on the OR, so he was the only one who could comment on the culture and norms around crisis situations on the rig. That respondent provided support for the belief that experienced workers are more proactive and flexible, and less likely to be bound by the rules. Research findings suggest a potential link between experience and flexibility and experience and repressive control culture.

8.6 Rules

The fifth main finding is that *the rulebook is a double-edged sword.* Two contradictory themes emerged from the research findings regarding rules. There is a need for rules in the offshore industry as well as a need for flexibility when solving problems. While rules provide guidance, there is a possibility that in a crisis employees may place an undue level of reliance on them, without considering other potential solutions. Because it is impossible to cover all anticipated decision making processes, the rule book does not always match the crisis. This could lead to flawed decision making, resulting in a crisis.

This reasoning portrays the rule book as a dangerous, rigid guide which limits creativity under crisis conditions. However, these research findings indicate that through normalization people are flexible and engage in risky actions that most often result in acceptable and non-catastrophic endings. For example, the practice of not deballasting in stormy weather conditions had only once resulted in a crisis for the crew. Instead of being bound by formal rules and procedures, workers are more inclined to respond with actions such as avoidance, displacement and normalization. This provides reinforcement for dangerous habits that could lead eventually to a major crisis, as was the case in the OR rig disaster.

Although studies by Perrow and Vaughan provide support for bad normalization as leading to crisis situations, this research provides support for good and bad normalization as not all normalization activities result in crisis. This research has revealed a new dichotomy of good and bad normalization.

There are three possible explanations for the linking theme or the effect of rules on crisis behavior: that rules are necessary, the threat rigidity hypothesis, and illusion of control. In crisis situations, rules are often required. The utilization of a rulebook and standard crisis procedures are essential training for oil company employees who are to collaborate and work as a team to solve common problems.

Weick (1993), and Crichton et al (2005) provide support for a rigid organizational structure in a distributed environment. Weick (1993) noted that when the Mann Gulch fire fighters lost their organizational structure, they became anxious and found it difficult to make sense of what was happening. The crew rejected their leader's command to join him in an escape fire and instead continued to do what they knew best which was fighting fires. They were unable to make sense of the one thing that could save their lives: an escape fire. In crisis situations like the Mann Gulch example, the crew were too tightly bound by rules.

In the case of the OR rig disaster, several examples provide support for emergency procedures and rules. The ballast valves could be operated manually; the rods were prepared for this purpose. However, no instructions/manual was available. The crew made a decision to insert 18 manual control rods. The Royal Commission believed the rods were inserted in an effort to close the valves that the crew thought were stuck open. This was an effort to either leave open only those valves necessary to pump out the port side or as a precautionary measure to ensure the valves stayed closed. The crew incorrectly believed that insertion of a rod would close a valve; in fact, the reverse was true. Similarly, Mobil's contingency plan and emergency procedures manual did not provide contingency procedures for evacuation of the rig. ODECO did not provide an emergency procedures manual for onshore personnel. In these two cases, rules would have assisted in the manual operation of the ballast valves and in overall emergency management of the impending crisis.

Further support for rules is provided by the Commission inquiry into the Esso Gas Plant Explosion at Longford. The Commission's view regarding rules in a crisis indicated that, "the absence of start up and shutdown procedures was contrary to Exxon policy. The Commission concluded the lack of proper operating procedures, therefore, contributed to the occurrence" (Dawson, p. 236). Operators at Longford had developed their own informal worker procedures, which differed from the formal requirements (Hopkins, 2000, p. 43). It was clear that there existed a lack of appropriate procedures in which operators might have been trained. Similarly, the recommendation of the Commission of inquiry into the Moura mine disaster was to structure their decision making (Hopkins, 1999, p. 147) and to develop a safety management plan for every major hazard they face.

Rules often lead to normalization. At Longford over time it became normal for the workers to operate the plant in alarm mode in order to deal with the impossible alarm overload situations that the workers faced. In many cases workers were following rules that they had improvised for themselves (Wynne, 1988, p. 149). According to (Hopkins, 2000) there are several reasons for this type of behavior. One possible reason for this type of conduct is that the informal rules diverge from the formal, abnormality can be normalized. Another reason is because workers modify the system to achieve goals that are different that those intended by the system designers. A final reason is when workers encounter events unforeseen by the designer of the formal rules requiring adjustment of the rules to get the job done.

Similarly, Reason (1999. p. 73) references "necessary violations" where non-compliance is "essential in order to get the job done." (Wynne 1988, p. 158) states that technology is essentially "unruly" in the sense that its rules of operation cannot be prescribed beforehand but emerge from practice." Bourrier supports this logic and not only affirms that violations are necessary to get the job done, but have become almost a sociological law (Bourrier in Hopkins 2000, p. 47).

Threat rigidity is the second possible explanation for how rules affect crisis behavior. The threat-rigidity effect often presents itself in the form of decision limitations, such as a failure to consider new alternatives (Staw, Sandelands & Dutton, 1981). This occurs when people feel extreme fear or threat, making them become more rigid rather than becoming more flexible. Staw et al (1982) posit that in response to crises, communication complexity is reduced, power and influence become centralized, and concern for efficiency heightens. This leads to conservation of resources and greater behavioral rigidity in organizations. Pfeffer (1978, p. 54) also provided support for centralization as a likely outcome of threats and crisis. When a company is going through difficult times, decision makers are expected to become more flexible (Bigley and Roberts 2001; Brown and Eisenhardt, 1998); instead they adhere to existing practices and procedures. Although they should adapt, certain types of decision makers or companies become more inflexible in their responses. Flexible leadership is better for emergency response than the traditional, hierarchical structure in which one person is in charge most of the time (Comfort 1990, Weick 1993).

Another type of pathological response to crisis occurs when people become overconfident because they have an "illusion of control", a term coined by Langer (1975) which relates to personal success probability exceeding the probability of the outcome. Larwood and Whittaker (1977) found that successful decision makers overestimated the degree to which outcome-events had been submitted to their personal control. This overestimation is encouraged by overconfidence. Tversky and Kahneman (1974) identify illusion of control as a cognitive process that may affect selection of alternative plans because decision makers overestimate the extent to which the outcome of a strategy is under their control. Decision makers feel that the outcome will not be an adverse one because everything is covered by the rules; consequently, they become overconfident. This phenomenon provides additional support for flexibility in the decision-making process and a relationship between rules and overconfidence.

The OR case study provides several examples of employees not following the rulebook, leading to normalization-supported risk taking. If the crew had properly interpreted NORDCO's forecast and adhered to the procedures outlined in the operations manual, the rig would have been deballasted on the afternoon of February 14, 1982, when sustained winds of 90 knots were forecast. At that time, portholes would have been less susceptible to the wave damage. Instead, the crew ignored the high wind signal to close the porthole window, a risky decision that had successful outcomes several times prior to the night of the disaster. Similarly, during the OR rig life the ballast control operator paid little attention to the mathematical calculation of stability. According to interviewees, he preferred to use the inclinometers in the ballast control room to check whether the rig was level. This lack of mathematical calculation became part of normal rig operation. While these examples show flexibility in the decision making process, going by the rulebook may have resulted in a more positive outcome. As such, the OR disaster does not provide support for flexibility in the decision making process. There is a link between non rule following and normalization. Several workers provided examples where not following the rules resulted in normalization.

Several researchers support the need for a more human, flexible dimension to decision making in crisis situations. Weick's (1993) analysis of the Mann Gulch fire identified that the collapse of role systems need not have resulted in disaster had

people developed skills in improvisation (Janowitz, 1959, p. 481). Similarly, Bigley and Roberts (2001) provide support for a more flexible bottom-up organizational structure in a distributed work environment. In particular, they provide support for unstructured situations where subordinates had latitude to improvise.

Hart et al.'s (1993) research also provides support for a more flexible model of organization and decision-making. Their research, which builds on the model of Billings et al. (1980), demonstrated that the severe threat, time pressure, and high uncertainty that characterized a crisis conflicted with formal, time-consuming policy procedures (Bronner, 1982) found in bureaucratic recommendations of multi-layered and highly distinguished patterns of decision making. They argued that conflict between bureaucracy and the fast-paced pragmatism necessary to deal with crises made it difficult for an organization to manage crisis. As a result of such conflict, crisis decision-making required ad hoc adaptation to bureaucratic structure and culture.

The themes of rules are necessary, threat rigidity hypothesis and illusion of control add value to the analysis of crisis decision-making by providing explanations about the linking theme or the effect of rules on crisis behavior. The themes.provide support for and against rule following resulting in a model for understanding the connection between structure and behavior. However, data from this study revealed that it is impossible to outline all the potential scenarios in terms of rules and procedure. Many of the rules are the result of accidents that have not yet occurred. Given the complex nature of the offshore decision making structure, it is impossible for oil and gas workers to have all possible scenarios referenced in the rules and procedures. These research findings address the link between rules and behavior or structure and action.

The following two statements have evolved from the integration of the data analysis and theory:

1. It is possible to consider aspects of organizations relevant to crisis that can be formulated in a process model.
2. The normalization hypothesis can be applied to social rather than technological matters.

8.7 Conclusions

Findings from an analysis of the close call situation data support the rulebook as a double edged sword. The OR case study did not support the flexible side of the rulebook, and flexibility in the decision making process. Limited data exists on decision making at the moment of the rig disaster crisis. Several respondents who had worked on the OR rig and in the industry during the 1980's provided support for a controlled, rigid work culture, supporting the less flexible side of the rulebook. It is possible that in many cases the rulebook causes individuals to be creative in order to deal with extraordinary events. In other cases, the rulebook causes individuals to take inappropriate risks, get away with them and have such behavior reinforced by normalization. This normalization had a tragic outcome, the sinking of the OR rig. There is a link between rules and bad normalization. The rulebook caused the workers to be creative and start the power to the rig resulting in the sinking of the rig.

In summary, the decision-making or structure and responsibility in the offshore is rethought with normalization or displacement theory. Responsibility, rules, conditions, and the definition of what constitutes a crisis are continually evolving through everyday application.

A model is provided to explain how people account for their taking or avoiding of responsibility, their attribution of responsibility to others, and how they make sense of previously written rules about responsibility which may be inappropriate to the crisis situation in one way or another.

In crisis situations, sensemaking conflicts with organizational structure, resulting in erosion and undermining of the hierarchy. Organizational theory exaggerates structure and neglects process. Organizational theory is very static and thus falls short in crisis decision-making situations, leading to a lack of clarity around responsibility. A process-based theory of how organizations behave in crisis situations is more amenable to social construction.

This research study makes three important contributions. It provides a better understanding of how responsibility is taken during crisis decision-making; in fact, it is revealed that there is a lack of responsibility due to confusion over the identity of the decision maker.

The second contribution of this study is the development of a crisis decision making model that is founded in process oriented organizational structure. This

model deals with how organizations behave in crisis situations that are more amenable to social construction and sensemaking. Both of these contributions are implicit in the model and are transferable to other organizations.

The third contribution of the research is the potential for a better understanding of why safety managers are not aware of models for decision-making. It is the secrecy around accidents and fear about inquiry that contributes to this lack of learning. In addition, a crisis often leads to more rules, and thus the situation becomes normalized, as was the case with the OR rig disaster. This phenomenon suggests that normalization is both a crisis and a non-crisis response.

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This chapter is a summary of the contributions of this research to organizational and normalization literature. The content is also an examination of the limitations associated with this study and how they may have been minimized or mitigated the results. Application of the model to other organizations is discussed before drawing overall conclusions, and stating recommendations for change or further study.

The study was an exploration of how workers in the oil and gas industry take or obviate responsibility in a virtual environment, culminating in development of a model for decision-making in crisis situations. The first major aspect of the research encompassed the communication and coordination in a virtual environment, and sensemaking. In crisis situations, sensemaking is affected by distributed organizational structures, which results in erosion and undermining of the decision-making hierarchy. Organizational theory exaggerates structure and neglects process. It is possible to consider aspects of organizations relevant to crisis that can be formulated in a process model.

The second aspect of this research centered on normalization. The model provides for the definition of normalization to be extended and applied to social rather than technological matters. Accounts by Perrow (1994) and Vaughan (1996) show that normalization or displacement for responsibility occurs during a crisis, rather than prior to a crisis. The suggested model provides support for normalization or displacement activities prior to an actual crisis and as a feedback variable, and unravels complicating socially constructed meanings during a crisis.

The findings from the Royal Commission inquiry into the Ocean Ranger disaster are utilized as an example of how crisis events are normalized. For example, interviews with oil and gas workers indicated the majority of fleets have no secondary means of ballasting offshore oil rigs. It is somewhat surprising that after the Ocean Ranger oil rig disaster and Royal Commission inquiry, steps were not taken to ensure all rigs addressed the problem that caused the Ocean Ranger to sink. It is alarming that the oil and gas industry has normalized list situations. Normalizing is used like a security blanket by becoming embedded in practice and feeding back into the initial step in the model, which is the breakdown in socially constructed meanings during a

crisis. Therefore, the contribution to the normalization literature is twofold: a variable in the model, and a feedback mechanism. The model may be used by other crisis decision-makers to demonstrate how normalization is a variable in the decision-making process.

9.2 Contributions

This research provides an explanatory model to show how responsibility is taken or negated in crisis situations. Through these research findings, decision-makers and those charged with the responsibility of decision-making should be able to draw on the experience of others. Since there is a paucity of research in the area of crisis decision-making in a distributed environment, this study contributes toward an understanding of the issues. This is particularly timely in the context of increased globalization in a borderless world. The proposed model is not only relevant for NL oil and gas workers, but may be used by workers in similar occupations in other provinces and countries. In addition, some aspects in the model would be relevant for less crisis prone and less virtual situations. With some modification, the model could be extended. For example, the model could be adapted for the military, fire fighters and police forces.

This research study makes three important contributions. By first providing a better understanding of how responsibility is taken during crisis decision-making, it is revealed that there is a lack of responsibility due to confusion over the identity of the decision maker. Two findings emerge: the more experience people have, the more they are prepared to take responsibility and the more serious the situation is, the less prepared people are to take responsibility. The second contribution of this study is the development of a crisis decision making model that is founded in process oriented organizational structure. This model deals with how organizations behave in crisis situations that are more amenable to social construction and sensemaking. Both of these contributions are implicit in the model and are transferable to other organizations. The third contribution of the research is the potential for a better understanding as to why safety managers are not aware of models for decision-making.

9.2.1. First Contribution

Secrecy exists around accidents and fear of inquiry that contributes to this lack of learning. In addition, a crisis often leads to more rules and the situation

becomes normalized, as was the case with the Ocean Ranger rig disaster. This phenomenon suggests that normalization is both a crisis and a non-crisis response. A further lack of clarity and structure was evident in workers' references to rules that could not always be followed and to subjectivity in the decision making process. Several workers suggest the rules and procedures could not always be followed; this exacerbated the lack of structure for responsibility.

In summary, the decision-making or structure and responsibility in the offshore is rethought with normalization or displacement. Responsibility, rules, conditions, and crisis definition are continually evolving through everyday applications. A model is provided to explain how people account for their taking or avoiding of responsibility and their attribution of responsibility to others as well as how they make sense of previously written rules about responsibility, rules which are often inappropriate to the crisis situation. The themes and the relationships between them show that over time and with experience, workers interactively construct a form of consciousness of what is happening during any close call situation. This research illustrates how responsibility is socially constructed rather than steered by a set of prewritten rules. Workers are more inclined to deal with crisis circumstances through behaviours such as avoidance, displacement and normalization.

9.2.2 Second Contribution

The second contribution of this research is the development of an explanatory model for explaining responsibility in distributed crisis situations. The model is comprised of twelve variables: breakdown of socially constructed meanings during a crisis, experience, repressive control culture, avoidance of responsibility due to fear of repercussion, waiting, crisis confirmation, confusion over the identity of the decision maker, the number of decision makers, distribution, normalization, potentially bad decision or catastrophe and increase in the number of rules.

9.2.3 Third Contribution

The third contribution of this research is its potential for workers to gain a better understanding of why organizations do not learn from the crisis literature and why the model is not a warning against normalization. The research shows that inexperience and a repressive control structure prevent workers from taking responsibility. As opposed to responding to the situation, it appears that workers tend to wait.

The model provides an approach that is transferable to other organizations. As indicated in Chapter 5, military and fire fighting personnel have organizational structures that are virtually identical to the oil and gas organizational structure. In these work environments some decision makers are located at a central base, whereas others are remotely located. These examples are subject to an organizational structure that neglects process.

The only change needed to adapt the proposed model to different organizational structures is the number of decision makers. The oil and gas industry would be expected to have multiple decision makers working toward the one goal, and this may lead to confusion over the identity of the decision maker. Conversely, since the number of decision makers is expected to be lower among the military, fire fighters and police, less confusion over the identity of the decision maker would be expected.

As a prerequisite to application of this model to other organizations, it is suggested that semi-structured interviews with employees be held to inform and confirm the selection of variables. Participants for the semi-structured interviews could be selected through an advertised call for expressions of interest or by the snowball selection criteria method. Overall, the model for the taking of responsibility remains the same, but modifications and additions to the model may be necessary for the particular organization.

9.3 Limitations

While this study makes several contributions to organizational theory, it is acknowledged that there are a number of limitations. For example, close call situations were used as opposed to real crisis situations. An optimal design would gather data during the event. The next best approach would be to collect data shortly after the event. Neither the optimal design nor next best approach were feasible alternatives because it could take years for an actual crisis to occur and gaining access to data on a close call immediately after it happened would be difficult, if not impossible, to arrange.

A second limitation of this research is the assumption that people were not constrained by concerns that information may get back to the company. This was a concern for the majority of the respondents. Consequently most chose to remain anonymous for the interview and provided uninhibited accounts of close call

situations.

A third limitation is that when people rely on their memories, distortions may occur. However, since this research is about close calls it is expected that such information would be vivid in people's memory. Indeed, respondents appeared to have little difficulty recollecting the events of the close call situations, as evidenced by the detailed accounts which they provided.

A fourth limitation of the research is the presence of diverging opinions. The work culture that these men and women are familiar with may mean that certain things are not being expressed. In fact, there could be a macho man type culture prohibiting the men from expressing concern over danger and discussing emotions. The majority of the interviewees feel the situation could have been worse, indicating that the workers were concerned over what could have been. In addition, the majority of the workers did not identify themselves but chose to remain anonymous. However they appeared satisfied to have an opportunity to share their close call experiences.

A final limitation of this model is its generalizability. Parts of the model would be applicable to less crisis prone and less virtual situations. To be a true fit for this model, the workers must meet the criteria of being virtual and be dealing with a crisis situation. Consequently, the model is more transferable to such areas as the military, fire service and police service.

9.4 Recommendations

Recommendations for change and future research follow. Interviews with oil and gas workers indicated that the majority of fleets have no secondary means of ballasting oil rigs. It is somewhat surprising that after the Ocean Ranger oil rig disaster and Royal Commission inquiry that steps were not taken to ensure all rigs addressed the problem that caused the oil rig to sink. It is alarming that the oil and gas industry has normalized list situations; hence, the first recommendation for change is to ensure that all oil rigs have secondary ballast control systems. The second recommendation is that oil and gas executive should ensure that employee training provides awareness to the components of the decision-making model, specifically, those that impact the identification of a situation as a crisis and the associated impact on decision-making and normalization. Three of the most important variables are (a) *avoidance of responsibility due to fear of repercussions, (b) is it a crisis or a crisis confirmation*, and (c) *confusion over the identity of the decision maker*.

Several recommendations emerged for future research. The first recommendation for future studies is that testing of the decision-making model on a crisis situation such as British Petroleum oil crisis should take place. A second recommendation for future research is that the testing of the model should take place to determine its fit with other crises in other industries that have non-virtual and less critical situations. A final recommendation for future research would be to do a comparative study by interviewing oil and gas workers in the North Sea offshore oil industry and comparing their distributed close-call decision-making to that of oil and gas workers in the Newfoundland and Labrador offshore oil industry. The research model would then be modified to reflect the research findings from this study.

9.5 Summary

A theoretical model of crisis decision-making is developed and utilized as a model to analyze the Ocean Ranger rig disaster. The objective of this research was the development of a model to explain how responsibility is taken in distributed crisis decision-making. The model will be presented to the Corporate Executive Officer and senior executives of various companies within the oil and gas industry. It is expected that the industry will take the findings of this research into account and provide a clearer indication of who is responsible when making distributed decisions. In addition, the pending crisis and problem with the ballast control system will be brought to the attention of the CNLOPB.

Although the model was developed for the oil and gas industry offshore Newfoundland, the variables are applicable to oil and gas industries in other countries and the model is applicable to other organizations. This model can also be applied to other non-virtual and less critical situations. The model would be of particular benefit for organizations such as the military, police and fire fighting. Although the discussion of the model's application to organizations is based on Newfoundland organizations, it could be utilized across Canada since each province has similarly structured police and fire fighting organizations.

This study into the taking of responsibility in the oil and gas industry is timely due to the heightened awareness of wsorker safety and environmental disasters. The proposed decision making model suggests mechanisms to effectively improve decision-making. In addition to the provision of the variables that encompass and

complicate the model, it calls for involvement and collaboration with workers in an effort to identify their needs and concerns around responsibility.

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APPENDIX A: ETHICS APPLICATION AND APPROVAL LETTERS

Memorial
University of Newfoundland

Office of Research

April 24, 2006

ICEHR No. 2005/06-073-BA

Ms. Mary A. Furey
Faculty of Business Administration
Memorial University of Newfoundland

Dear Ms. Furey:

Thank you for your submission to the Interdisciplinary Committee on Ethics in Human Research (ICEHR) entitled *"Does virtuality impact critical decision making?"*. The ICEHR is appreciative of the efforts of researchers in attending to ethics in research.

The Committee has reviewed the proposal and would like to call our attention to some issues that need to be addressed.

1. The demise of the Ocean Ranger is still an emotional event for the people of Newfoundland and Labrador, and researchers should constantly bear that in mind. The title of the project submitted to ICEHR does not indicate that the project is specifically concerned with the Ocean Ranger, but the titles of the Information Letter and Consent Form do. As the project proceeds, it is important that the title reflect the fact that the topic of investigation is the Ocean Ranger, and it is important to keep in mind that, for many people, recalling the details of the incident will be emotional.

2. The issues pertaining to anonymity (identity) and confidentiality (information provided) need to be clarified. On the one hand, it is stated (in the Information Letter) that participation is not anonymous. On the other hand, it states that information collected will be confidential. This suggests that while we will know who the informants were, we will not know what they said. Is this what was intended? Normally, research participants are given the option of consenting to be identified, and consenting to have quotes from their interview published. While these options appear in the Consent Form checklist, it is not consistent with earlier statements. This will need to be clarified.

3. It is stated that the tapes will be destroyed after five years. This is not necessary if they can be securely stored in an archive.

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4. It is recommended that the wording of the Letter of Information be altered to be easier to read. The terms "virtual" and "virtuality" may not be readily understood by potential participants, and they may misconstrue what the project is about. Likewise, the Letter begins with a sentence whose topic is the fact that they were employees on the Ocean Ranger when it sank. It would be prudent to reword this paragraph to start with an introduction of yourself and your project, then proceed to state why they are receiving this letter.

Subject to the changes noted above and in accordance with Tri-Council Policy Statement (TCPS), the project has been granted full approval for one year from the date of this letter.

If you intend to make changes during the course of the project which may give rise to ethical concerns, please forward a description of these changes to ICEHR for consideration.

If you have any questions concerning this review, you may contact Dr. Katherine Gallagher at kgallagh@mun.ca. We wish you success with your research.

The TCPS requires that you submit an annual status report to ICEHR on your project, should the research carry on beyond April 2007. Also, to comply with the TCPS, please notify ICEHR when research on this project concludes.

Yours sincerely,

T. Seifert, Ph.D.
Chair, Interdisciplinary Committee on
Ethics in Human Research

TS/en

cc: Dr. K. Gallagher
Supervisors

APPENDIX B: LETTER OF INVITATION AND CONSENT FORM

You have been identified as someone who has worked in the oil industry (oil rig/vessel or shore). Consequently, you are invited to participate in a research project investigating the effects of virtuality on crisis decision-making. I am from Memorial University in St. John's Newfoundland, the primary researcher for this project. In order to find out about communication aboard the Ocean Ranger rig, I will be conducting interviews with people who have worked on oil rigs/vessels. I am trying to find out whether or not the fact that the employees of the rig were virtual (working at a distance) had an effect on the decisions that they made.

Your participation will involve an interview, which will take between 1-2 hours of your time. I will be asking you if you give your permission for this interview to be audio-taped. The purpose of the audiotape is to allow for more accurate transcription of your responses. Your comments will be kept confidential unless you give me permission to identify you as an interviewee. There will be no identifying information on the audio-tape.
Participation in this interview is voluntary and you are free to withdraw at any time. You are not obliged to answer any questions that you feel are objectionable or which make you uncomfortable. Completing the attached consent form will indicate your consent to participate in this study. There are no known physical, economic or social risks to you participating in this study. If you experience feelings of stress or depression from discussions about the Ocean Ranger disaster then you may contact John Murphy of Atlantic Consulting and Counselling Associates at 579-2276.

I hope that the information gained in this study will provide some practical suggestions for how organizations can make use of virtual teams in decision-making. As such, I plan to use the analyzed data in my doctoral thesis and publish papers reporting the findings in academic journals. The audiotapes will be kept for 5 years in a secure file and then will be destroyed. Your identity will be protected in all publications. Should I use any direct quotations, individuals' names, as well as company names and locations will be disguised in order to protect your identity if you wish.

Should you wish to receive a report with the full details of this study please inform me and fill out a copy of the form attached. You may also address any concerns to the supervisors of this research project, Dr. John Sillince or Dr. Duncan Shaw. Dr. John Sillince is a professor in the Operations and Information Management Group at Aston Business School, Aston University and he may be reached at 0-44-11-121-204-3239, or by email at j.a.a.silence@aston.ac.uk. Dr. Duncan Shaw is a senior lecturer in the Operations and Information Management Group, Aston Business School, Aston University and he may be reached at 0-11-44121-204-3231, or by email at d.a.shaw@aston.ac.uk

The proposal for this research has been approved by the Interdisciplinary Committee on Ethics in Human Research at Memorial University. If you have ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the Chairperson of the ICEHR at icehr@mun.ca or by telephone at 737-8368.

Thank you very much for your assistance with my study.

Mary Furey Memorial University of Newfoundland St. John's NL mfurey@mun.ca
(709) 737-7651 (office)
(709) 727-4595 (cell

APPENDIX C: INTERVIEW PROTOCOL

Part I: Notes for the Interviewer

Overview

1. Tape-record the interviews if permission is granted
2. Interview in a neutral setting.
3. Each interview lasted 60 to 120 minutes, and some were more.

Interview Methodology

Interviews were implemented with a customized approach allowing for an in-depth investigation. Follow-up questions were used to stimulate interviewee memory. The interviewer used a semi-structured question design (Part III). The interview contained:

1. A review of the consent form.

2. A predetermined set of questions

3. All predetermined questions were the same for respondents

What was your position aboard the oil rig/vessel? _____

How long did you work on the rig?
_____

Designation of Interviewee:

_____

Location of Interview:

_____

Date: _____

Part II: Components of the Interview

1. **Components of the Interview**

a. Introduction (5-10 minutes)

b. Review confidentiality and consent form.

c. Create a relaxed environment

d. Dialogue

Question: Have you received my introductory correspondence explaining my research and the format that will be used?

Question: Are there any questions?

2. Explain the purpose of the interview

During the time we have together I would like to get an understanding of your experiences and observations pertinent to the subject matter of the study.

3. Ask permission to record interview

With your authorization, I would like to tape-record our discussion to get an inclusive record of what is said, since the notes I take will not be as comprehensive as I will require. No one other than I will listen to anything you say to me. Only I will have access to the records. The research results will describe what you and others have said predominantly in summation. No responses will be ascribed to you by name.

The open-ended questions are intended to obtain your personal experience and perceptions. The interview time may take about 2 hours. If you agree to volunteer and participate in the research process, please sign the informed consent page and confidentially agreement.

Would you give me permission to tape the interview?

Do you have any questions before we begin?

Part III: Interview Questions

Primary Research Question from Chapter 1*: Does a virtual work environment affect crisis decision-making?*

1. Interview Question about Responsibility

a. Tell me a story about a close call or a near miss; something that could have been a catastrophe if it had been handled differently? Can or will you tell me about a close call or a near miss on a rig/ship?

b. How do you think people felt during the close call situation? Were they nervous, hot, cold, anxious, flustered, etc?

2. Interview Questions about Types of Information Provided

a. What information is available to help you do your job?

b. Which computer systems are in place to help you do your job?

c. Do you leave notes/logs for the person in the following shift?

3. Interview Questions about Experience

a. What other sources of information do you use?

4. Interview Questions about Distribution and Decision-Making

a. When you were making the decision around the close call did you consult with anyone onshore?

5. Interview Questions about Virtual Teams

a. Do you work in teams?

b. What type of teams do you work in?

6. Interview Question about Hierarchy

a. Are you comfortable with expressing your concerns about

problems/issues at work?

APPENDIX D: THANK-YOU LETTER

Mary Furey

Faculty of Business Administration

Memorial University of Newfoundland

St. John's, NL

A1B 3X5

Dear participant,

Thank you participating in this study. Your feedback will be extremely valuable to my research. Once the study is complete I will provide a summary of the findings upon request (see contact information below).

If you have any questions please feel free to contact me via e-mail: mfurey@mun.ca, or by phone at 709-737-7651 (office) or 709-727-4595 (cell).

Sincerely,

Mary Furey