

4-15-2014

# Crisis Management: A Qualitative Study of Extreme Event Leadership

Charles A. Casto  
*Kennesaw State University*

Follow this and additional works at: <http://digitalcommons.kennesaw.edu/etd>

 Part of the [Strategic Management Policy Commons](#)

---

## Recommended Citation

Casto, Charles A., "Crisis Management: A Qualitative Study of Extreme Event Leadership" (2014). *Dissertations, Theses and Capstone Projects*. Paper 626.

Crisis Management: A Qualitative Study of Extreme Event Leadership

by

Charles A. Casto

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

Degree of

Doctor of Business Administration

In the

Coles College of Business

Kennesaw State University

Kennesaw, GA

2014



**Coles College of Business  
Doctor of Business Administration**

**Dissertation Defense: April 15, 2014**

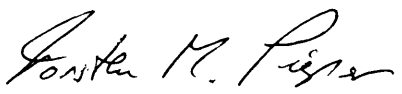
**DBA Candidate: Charles (Chuck) A. Casto**

The content and format of the dissertation are appropriate and acceptable for the awarding of the degree of Doctor of Business Administration.


Neal P. Mero, PhD  
Executive Director, KSU DBA Program  
Professor of Management  
Department of Management and Entrepreneurship  
Coles College of Business  
Kennesaw State University

Signature: 

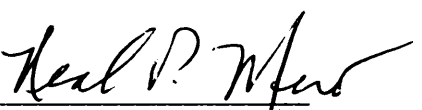
Torsten M. Pieper, PhD  
Committee Member  
DBA Dedicated Faculty  
Research Director - Cox Family Enterprise Center  
Assistant Professor of Management  
Department of Management and Entrepreneurship  
Coles College of Business  
Kennesaw State University

Signature: 

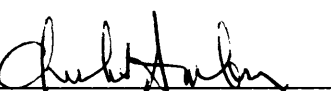
Dana Hermanson, PhD  
Reader  
Professor of Accounting  
Dinos Eminent Scholar Chair of Private Enterprise  
School of Accountancy  
Coles College of Business  
Kennesaw State University

Signature: 

Neal P. Mero, PhD  
Executive Director, KSU DBA Program  
Professor of Management  
Department of Management and Entrepreneurship  
Coles College of Business  
Kennesaw State University

Signature: 

Charles J. Amlaner, Jr., D.Phil  
Vice President for Research and  
Dean of Graduate College  
Kennesaw State University

Signature: 

© 2014  
Charles Casto  
ALL RIGHTS RESERVED



## ACKNOWLEDGEMENTS

This dissertation though inspired by the events of March 11, 2011, in Japan, is a small attempt to make sense of a variety of extreme crisis events. I am fortunate that the Coles DBA program recognized the value in the study of these events allowing me to pursue a passion of mine. Although difficult, this dissertation was an immense pleasure to create. Hopefully others will find value in its content.

Foremost I must thank Dr.'s Neal Mero and Torsten Pieper. Without their steady hands and patience, given my sometimes out of control ideas, the work would never have been completed. The Coles program is extremely fortunate to have you as members of the faculty. You are incredible. Neal, I am impressed with your focus on the student and even more so with your willingness to research the student's topic. Your concern for getting it right does not surprise me. Torsten, I inserted only one blank space before this sentence because I know how much you love that! Seriously, among a thousand pieces of advice that you provided was the courtroom analogy. That advice made an incredible difference in my writing. Also, to the many Global Scholars and members of the Coles DBA program, professors and staff, especially Susan, simply, thank you. My Cohort 3 classmates were crucial to the completion of the program. I owe each of them so much. Importantly, we gave the DBA program a legacy of Sunday morning devotion. Luv you guys!

There are many friends to thank for support throughout the DBA process. No single individual was more helpful with this program than my good friend Dr. Kenneth Amitin. Ken is an invaluable mentor, friend and advisor. He stayed with me throughout the program even during the frustrating times. Ken, thank you. I also want to thank Craig Allen for his editing work on my first papers. A special thank you to Andrea Miller who volunteered to interpret for me in Japan, and her husband, my good friend, Jeff, I could not have made it without your support. More thanks is owed to the running guys and the Saturday morning coffee group (the disorganized crime family). Each of you have asked about my progress and supported me through this program including all the time in Japan. Dr. John Crooks, thank you for your moral support and for witnessing my defenses. I owe you buddy! There are many, many friends that were supportive, too many to name each of you; nevertheless, thank you for your concern and interest in my work. You are very special and were with me throughout this process. Thank you.

Finally, to those individuals who made this dissertation possible, the interviewees (most whom I cannot explicitly name for purpose of anonymity). These leaders are exceptional and they are heroes. A special thank you to the White House Situation Room leaders, the Red Cross, Governor Thornburg, Harold Denton, Oil Rig Captain and Captain of Captains, John Konrad, national industry leaders, the New Jersey State Police, the Nation is indebted for your work as well as I am grateful for your participation. Significantly are the heroes of Fukushima that agreed to interviews. You all are confirmed heroes. I am most honored and fortunate that my Japanese friends, including, executives at Tokyo Electric Power Company (TEPCO), the operators of Fukushima, Dr. Yochi Funabashi, General Oriki, Defense Minister Kitzwawa, and the Honorable Goshi

Hosono whom without his leadership Japan would have failed, and his very special aid-de-camp, and my close friend Naoshia-san, a HUGE thank you. I am honored to know you all. I hope that this work somehow pays tribute to all of the heroes of Japan.

For my family, Bev, my children, Jessica and Matthew and nephew Dan, you guys are awesome. Thank you for being the best family possible. Love you.



## ABSTRACT

Several extreme events are examined in this dissertation to better understand the implications of such events for expanding the existing knowledge of crisis leadership. Through interviews with leaders that had direct leadership roles in extreme events such as the Fukushima nuclear reactor explosions, Deepwater Horizon oilrig explosion, and Super Storm Sandy, in addition to national leadership, e.g. White House Situation Room, an in-depth, cross-case analysis of leadership in extreme crises is presented. Previous literature concludes that the abilities of leaders are second only to the cause of the event itself in determining the outcome of a disaster but due to the rarity of these events, there has been limited scholarly consideration of the implications of these events for leadership research and practice. Using an inductive, qualitative approach to analyze the interviews, the results lead to several conclusions. First, there is a need for this and additional research to clarify the meaning or unique challenges that define the characteristics of an extreme event crisis especially in the most extreme cases. Second, the importance of the effects of felt emotions including mortality salience on extreme leadership is profound on the thinking and actions of leaders in these events. Third, classic crisis management and leadership theories are insufficient for explaining the needed actions in responding to extreme events.

These conclusions were integrated with prior research to develop a model of crisis leadership based on a continuum of crisis events from routine to extreme. This model is developed around six leadership concepts either identified in prior research or developed based on the findings of this study. The model also identifies threshold points where routine crisis events become more extreme. At these threshold points the demands on all actors in the event, especially the leaders, become more non-linear and can result in great emotional influences on sensemaking and subsequent decision making. This dissertation concludes that leadership in this context can almost exclusively be focused on life-saving, and instinctual or emotional responses. Further the differences between leadership in dangerous military and non-military domains are examined. The implication of these findings for practitioners and future researchers is also discussed.

## TABLE OF CONTENTS

Title page.....	i
Copyright page.....	ii
Signature page.....	iii
Acknowledgements.....	iv
Abstract.....	vii
Table of Contents.....	ix
List of tables.....	xiii
List of figures.....	xiv
Chapter 1: Introduction.....	15
A Qualitative Study of Extreme Event Leadership .....	15
Research Threads.....	17
Research Directions.....	19
Chapter 2: Extreme Event Literature.....	22
Characteristics of Extreme Events.....	24
Extreme Event Context.....	28
Theories used in Extreme Event Research.....	29
Consolidation of Extreme Event Theoretical Concepts.....	32
Readiness Theory.....	33
Complexity Theory .....	35
Failure Theory.....	38
Sensemaking Theory .....	43
Sensemaking Diverges.....	46
Fallacy of Optimism.....	47
Establishing a Shared Understanding.....	48
Institutional Effects .....	50
Role of “Felt” Emotions .....	50
Retrospective Sensemaking Research.....	51
In Search of Common Characteristics.....	51
Transboundary Effects.....	55

Extreme Event Context as related to Transboundary Crisis.....	58
Administrative Theories.....	61
Leadership.....	61
Sensemaking, Surprise Management and non-linear Leadership...	63
Leadership Lessons from Hurricane Katrina.....	67
The Role of Trust in Leadership.....	68
Tension of Adaptive and Administrative Leadership Styles.....	69
Decision-Making.....	70
Extreme Event Decision-making.....	70
Decision-making Accuracy.....	70
Tools for Decision-making.....	71
Use of Expertise in Decision-making.....	72
Escalation of Commitment.....	72
Social Amplification and its Impact on Crisis Leadership	
Decision-making.....	74
Why Crisis Leaders should consider Social Justice.....	75
The Risk-Perception Link.....	76
Amplification.....	76
Consequences of Amplification.....	77
Ripples.....	78
Leadership in Dangerous Contexts.....	80
Areas for Research.....	83
 Chapter 3: Methods - Qualitative Research Design – Grounded Theory Approach	 87
The Qualitative Debate.....	89
Qualitative Research on Leadership.....	96
Grounded Theory and the Social Process of Leadership.....	100
Qualitative Research in Extreme Contexts.....	102
Building Theory from Cases – Suggestions for Qualitative Research.....	104
Data Collection – Doing the Dirty Work – Organizing Chaos.....	105
Coding and Memoing.....	109
Sample.....	112
Interviews.....	117
Theoretical Saturation.....	118
Analysis.....	118
Data Collection Results.....	122
Management of Coding.....	123
Sampling.....	125
Interview Process.....	129
Theoretical Saturation.....	130
Interviewer Bias.....	131
 Chapter 4: Results and Model Development.....	 133
Preview of Results.....	133
Approaches to Qualitative Analysis.....	134

Code Linking.....	137
Code Network.....	139
Code Co-occurrence.....	140
Results.....	142
Bottom-up Process.....	143
Felt Emotions.....	146
Analysis.....	146
Panic and Calmness .....	148
Heroism.....	149
Hope .....	150
Trust.....	151
Other Felt Emotions.....	152
Summary of Felt Emotions .....	156
Situational Context.....	158
Analysis.....	158
Scope.....	158
Technological Issues .....	159
Cooperation .....	160
Safety Context .....	164
Support for Workers.....	166
Magnitude.....	167
Summary of Situational Context.....	169
Crisis Response.....	170
Analysis.....	171
Confirmation of Existing Theory and Limitations .....	171
Potential Gaps in the Data Analysis .....	179
Summary of Crisis Response.....	181
Sensemaking.....	181
Analysis .....	181
Sensemaking Overview .....	182
Sensemaking Results – All Cases.....	183
Sensemaking Results – Non-event Cases.....	185
Sensemaking Fukushima Only Case.....	186
In-crisis versus Post-crisis Analysis.....	187
Summary of Sensemaking .....	187
Decision-making.....	188
Analysis.....	188
Decision-making – Indecision .....	190
Decision-making – Anchoring.....	193
Decision-making – Communications.....	199
Decision-making – Escalation of Commitment.....	202
Decision-making – Incorrect Basis .....	203
Decision-making – Instinct.....	203
Decision-making – Inflexibility.....	204
Decision-making – Political Bias.....	205
Decision-making – Gestalt Structure.....	207

Summary of Decision-making.....	209
Leadership.....	210
Analysis.....	210
Leadership Perspective – Events .....	211
Summary of Leadership.....	213
Integrated Summary of Results and Implications.....	214
Integrated Results.....	214
Implications.....	216
Chapter 5: Discussion.....	218
Overview.....	218
Situational Context.....	220
Felt Emotions.....	226
Linkage to Literature.....	231
Constructive Defiance.....	234
Additional Perspectives on Decision-making.....	239
Crisis Response .....	250
Sensemaking.....	256
Leadership.....	262
Integrated Model of Extreme Crisis Leadership .....	268
Limitations and Areas for Future Research.....	271
Conclusions.....	277
References.....	279
Appendice A. Table of Unified Extreme Event Characteristics.....	294
Appendice B. Summary of Extreme Leadership Concepts.....	295
Appendice C. Research Threads Identified in Extreme Event Paper .....	300
Appendice D. Addressing Individual Research Threads.....	304
Appendice E. Generation of Leadership Interview Questions.....	306

## LIST OF TABLES

### Table

1	Matrix of Theoretical Relationships.....	33
2	Characteristics of Specific Disasters.....	53
3	Key Data Collection Process Terms.....	108
4	Codings.....	111
5	Applicability of Extreme Event Characteristics.....	114
6	Matrix of Targeted Interviews .....	115/ 126
7	Interview Sample Matrix – Variance.....	116/127
8	Matrix of Actual Interview Subjects.....	128
9	Non-linearity of Extreme Events.....	219
10	Continuum of Situational Context.....	222
11	Continuum of Felt Emotions.....	227
12	Continuum of Decision-making.....	245
13	Continuum of Crisis Response.....	254
14	Continuum of Sensemaking.....	261
15	Continuum of Crisis Leadership .....	263
16	Integrated Model of Extreme Crisis Leadership.....	269

## LIST OF FIGURES

### Figure

1	Flowchart of Research .....	23
2	Hierarchy of Crisis Management Theories.....	30
3	Data Gathering Flowpath .....	107
4	Example Code Network.....	139
5	Second-order Analysis Clusters.....	141
6	Second-order Coding Analysis 3D.....	142
7	Major Code Clusters.....	143
8	Network View for Higher-order Coding.....	145
9	Psychological - Felt Emotions.....	147
10	Decision-making Network.....	190
11	Indecision Code Network.....	191
12	Decision-making Anchoring.....	194



## CHAPTER 1: INTRODUCTION

### A Qualitative Study of Extreme Event Leadership

As the world “flattens” (Friedman, 2006) exposure of more populations to the risks of extreme events expands. An extreme event is defined as “a discrete episode or occurrence that may result in an extensive and intolerable magnitude of physical, psychological, or material consequences to or in close physical or psycho-social proximity to organization members” (Hannah, Uhl-Bien, Avolio & Caverretta, 2009, p. 898). A hundred years ago, in a simpler world, people considered a dam failure resulting in hundreds of deaths an extreme event. Today, we prevent dam failures and many other events of that scale; however, with the global expansion of our world, we are vulnerable to extreme events on a more massive scale. For example, with extensive worldwide participation in air travel by different cultures, epidemics, e.g., SARS, are likely to spread much faster today than just a few decades ago (Lagadec, 2009).

With significant advances in communications technologies over the past decades, we now also have the ability to create massive worldwide fear as extreme events occur (Hannah, Uhl-Bien, Avolio & Caverretta, 2009). A recent example of the global “flatness” and global fear caused by an extreme event is the Great Japan earthquake, tsunami and Fukushima nuclear event of 2011. As the first web-streamed nuclear event, it raised fears of a harmful radioactive plume reaching globally. Conversely, during the Chernobyl nuclear accident (1986) there were few pictures of the accident as the event transpired. In fact, the world did not learn of the event until several days afterwards when radiation appeared in milk in neighboring countries. During the Fukushima event, cameras showed the world the explosion of nuclear reactors in real-time. Real-time

images of the earthquake, tsunami, and nuclear event exacerbated fear around the world and thus added to the social disaster. This social disaster resulted in a major leadership challenge for not only the Japanese but much of the international leadership community as well. The international context altered the management of the crisis in Japan and the manner in which their leaders resolved the event. That context raises questions regarding how the existing crisis leadership theories address the new era of extreme events.

According to some researchers (Dynes, 1974; Dynes, Quarentelli & Kreps, 1981), the abilities of leaders are second only to the cause of the event itself in determining the outcome of a disaster. A leader's ability to control fear and to mitigate the impact of a crisis at the earliest point in the progression of the crisis to avoid turning a "routine" crisis, e.g., a hurricane, into an extreme crisis, e.g., Hurricane Katrina, is critical. Allowing a "routine" crisis to cascade into an extreme event significantly increases the leadership challenges. Additionally, in many ways the "reach" of a crisis around the globe, regardless of whether the crisis is man-made or natural, is increasing. Because of the international political pressures brought to an event, the importance of understanding extreme crisis leadership becomes even more important (Nafday, 2009). Crisis leadership in extreme events is a relatively underdeveloped domain of research (Boin, 2009). Through this research, a better understanding of crisis leadership in extreme events emerged.

In sum, the world is shrinking; extreme events by nature and impact are growing; modern communications systems are expanding fear; leadership of extreme events increases in complexity; and the crisis management research is struggling to explain the theories in these contexts (Mikusova, 2011). This research intends to expose the

theoretical elements of this new era of extreme events and gather up those elements to understand better their theoretical linkages. My hope is to extend or discover leadership theories or insights that explain those linkages. Then new theories allow leaders to understand better the effective approaches to resolving the modern extreme event. Finding these theories might help turn the modern dam failure, e.g., Fukushima, into a manageable crisis.

### Research Threads

Many different research threads exist in the extreme crisis literature. There are few links among the theories or systematic approaches to crisis management theory building (Mikusova, 2011). There are three important areas of research gaps or threads identified in the existing crisis management literature (Mikusova, 2011): first, there is a tendency for researchers to oversimplify insights from the more routine crisis; second is the multiplicity of researchers who study in this domain; and finally, researchers tend to miss the changing nature of crisis over time. The next few paragraphs will describe these trends in detail.

One thread comes from the methodology used by a number of researchers. Mikusova (2011) describes the existing body of crisis management literature as “the Tower of Babel<sup>1</sup>”. Many researchers simplify the research by studying more routine events such as first responders and then attempt to extrapolate their insights to extreme

---

<sup>1</sup> “The Tower of Babel is a story told in the Book of Genesis of the Bible. According to the story, a united humanity of the generations following the Great Flood, speaking a single language and migrating from the east, came to the land of Shinar, where they resolved to build a city with a tower “whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth”. God came down to see what they did and said: “They are one people and have one language, and nothing will be withheld from them which they purpose to do”. “Come, let us go down and confound their speech”. And so God scattered them upon the face of the Earth, and confused their languages, so that they would not be able to return to each other, and they left off building the city, which was called Babel “because God there confounded the language of all the Earth.”” (In *Wikipedia, The Free Encyclopedia*. Retrieved 20:43, March 1, 2013, from [http://en.wikipedia.org/w/index.php?title=Tower\\_of\\_Babel&oldid=540947902](http://en.wikipedia.org/w/index.php?title=Tower_of_Babel&oldid=540947902))

events. This research fails to grasp all of the complications that come from extreme events, and it limits the appropriate insights.

Further, the second research gap or thread discussed by Mikusova (2011) concludes that scientists from many disciplines have added to the research of crisis management, studying it from their perspective with their own context, language, theories, and approaches. Consequently, as illustrated in the literature review in this dissertation, this haphazard approach, while resulting in a broad scope of crisis leadership insights, neglects to create an integrated theory of leadership in extreme events.

Finally, Boin (2009) describes a significant research thread in the crisis management literature that has come with the changing nature of crisis over time. Boin (2009) concludes that few researchers have delved into “transboundary” effects of crisis.<sup>2</sup> This insight relates to the “flattening” of our cultures and thus the corresponding “reach” of a crisis. The reach of a crisis may not only physically transcend national boundaries, e.g., SARS, but certainly, with communications advances the reach has expanded the potential for fear across national boundaries. Further, his analysis of the crisis management literature has highlighted a heavy concentration of articles focused on the United States and Canada with a scarcity of research about transboundary effects in Asia.

Additionally, Lettieri, et al. (2009) discovered gaps in crisis management literature including the lack of research on setback management, policy mapping, capacity mapping, and incident command. Those research threads all involve routine crisis preparation, not extreme crisis leadership. While these gaps identified by Lettieri,

---

<sup>2</sup> The definition of the transboundary crisis considers the functioning of multiple, life-sustaining systems, functions, or infrastructures that are threatened by the crisis and cause uncertainty of outcomes. Essentially, the transboundary effects are different from a routine crisis in that the effects involve the coupling of systems within and among countries (Boin, 2009).

et al. (2009) are important, because they do not directly apply to extreme events they are not in the scope of this dissertation.

### Research Directions

As illustrated in the current literature review, a new generation of crisis management research has emerged in the last half-decade. Rather than focusing on the basic elements of a crisis and its phases, the emerging research addresses strategic topics such as sensemaking (Weick 1978), complexity (Mirvis, 1996), and failure theories (Reason, 1997; Sagan, 1994; Turner & Pidgeon, 1997). Boin (2009) discusses three current crisis management research directions. First, Boin (2009) highlights the need to know and understand the political-leadership linkages involved in extreme events, that is, how elected political leaders who are responsive to public outcry might influence the decision-making of the leaders who are managing the crisis. The second direction is to understand how resiliency of leaders and organizations influences how leaders respond to events, that is, how firm or committed the leaders and the organization are to resolving the crisis itself. Might they lose their resolve under pressure from the public or politicians? The last direction is to understand that these events necessitate the need for deep thinking. Deep thinking is essentially sensemaking (Weick 1978). Extreme events are very complicated and need a cognitive form of sensemaking well beyond that of a routine crisis. Thus, given the intensity of these topics, I believe that a qualitative methods approach would be useful in generating theory that links the research threads together in a manner that explains the complicated leadership challenges during extreme events.

Consequently, my study conducted an in-depth investigation into these and other directions by using a qualitative research methodology. Conger (1998) lays out a sound case for the qualitative method. Driven mainly by the multi-dimensional aspects of leadership, qualitative methods are best suited for understanding the “whys” behind research. This has led to heavy use of qualitative theory and case-study examination of leadership in crisis contexts (House, 1977; Berlew, 1974; Katz & Kahn, 1978). Conger’s (1998) main caution in using qualitative methods is to ensure that researchers “lead” by not just cataloging leadership abilities but extensively investigating the unexpected and unexplored aspects of leadership. An extensive review of Conger’s (1998) insights follows in the methods section of this dissertation. Several other serious methodological issues exist when studying leadership using the qualitative approach. This dissertation addresses those issues in the literature and methods sections.

Next, this dissertation reviews the extant literature around crisis management. My qualitative research tends to follow the methodologies of contemporary researchers such as Eisenhardt and Graebner (2007) who offer a number of recommendations to qualitative researchers, two of which address how researchers should approach the extant literature. The authors recommend that researchers identify clear research threads, and justify why theory building is better than theory testing in addressing those gaps. In addition, Eisenhardt and Graebner (2007) suggest that qualitative research rests on broad research threads involving interesting phenomena and lack of associated theory; this gives the researcher the potential to develop new theories. Given that the domain of crisis leadership is relatively broad, a literature review beforehand is not only helpful but

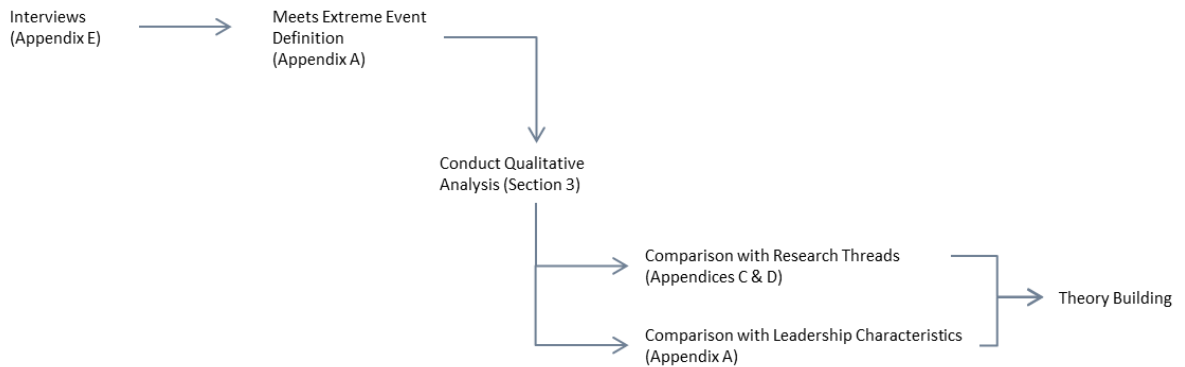
also necessary in determining the scope of the research and identifying clear research threads.

## CHAPTER 2: EXTREME EVENT LITERATURE

This literature review provides an overview of the existing state of research in extreme crisis management. It establishes a broad foundation for guiding my qualitative study of leadership in extreme contexts. Normally, when using quantitative methods, researchers hone their foundational hypotheses through deductive reviews of the literature. My study uses an inductive approach; therefore, the overview of the existing literature allows for post-hoc incorporation of the observations and results made in the research. Incorporating my findings with the existing literature complements the commonalities, differences, and extensions of the existing extreme crisis management theories. In addition, by providing a broad perspective of the literature, this review highlights specific areas of focus for my qualitative analysis. By providing a broad overview of the literature first, I identify the concepts that led to specific questions that I developed for interview subjects. Additionally, in this review, I summarize, where applicable, the focus areas that inform the qualitative method used in my research.



**Figure 1 - Flowchart of Research**



The literature review is necessarily dense. The literature review intends to capture a broad perspective of crisis leadership in extreme events to avoid biasing the qualitative research. Nevertheless, because this literature review is dense, I provide a general roadmap that depicts the fundamental process that is contained in this dissertation (Figure 1, Flowchart of Research). I discuss many theories, characteristics of both extreme events and leadership, and methods in this section. Appendices A-D capture the essential points made in throughout the literature review. The summaries in the Appendices allow for post-hoc simplicity. Figure 1 shows that after the interviews, the data is screened to ensure that the event meets the definition of an extreme event. If the data meets the extreme event definition, then I proceeded to conduct the qualitative review. I compared the output of the qualitative review to the open research areas and the characteristics of leadership. From that comparison, I built upon or generated new theory.

## Characteristics of Extreme Events

In exploring the existing literature in detail, it is necessary to describe the characteristics of extreme events. Outlining the characteristics of extreme events sets the stage for an explanation of the subsequent theories and associated concepts explored by researchers. Appendix A provides a list of unified extreme event characteristics. Characteristics of extreme events have implications on the concepts used to investigate crisis leadership. For example, in some contexts, a “crisis” might involve a threat to the achievement of a corporate goal or layoff of workers. That threat is distinct from a threat experienced under an extreme crisis condition, which might include life and death situations; therefore, this implies that like concepts such as trust, or followership, among others, can be non-linear (Thompson & Hunt 1997). For example, in quantitative leadership research, the construct of “trust” is commonly included as a leadership variable (Hannah, et al. 2009; Weick, 1978; Shrivastava, et al. 1988). In extreme events, beyond the threshold of life and death, a survey or even an experiment struggle to replicate the stress of a life and death situation, and therefore, those research methods are slightly more limited than a deeper study based on the qualitative approach that actually studies an extreme event. These non-linear effects are important as “threshold” effects in crisis events (Chatterjee & Hambrick, 2007). Concepts like trust may be linear up to the point where life and death of the people involved become part of the decision-making. Non-linearity suggests that beyond an undefined threshold, some concepts may take on completely new meanings (Thompson & Hunt 1997; Chatterjee & Hambrick, 2007).

Threshold effects can influence the way researchers might measure concepts such as trust (Thompson & Hunt 1997). Within the leadership literature, common leadership

concepts take on an entirely new meaning in extreme crisis as compared to a routine crisis, and the difference will affect the research methodology. Thus, knowing the specific characteristics of an extreme event becomes important not only in defining the concepts but also in how one approaches the research methodology. This is one reason that inductive research is appropriate in this domain. Inductive research through rich discussions can explore and draw-out the issue of non-linear construct thresholds. Section 2.12 covers extensively the science of inductive research on the non-linearity of leadership.

My review of the literature did not yield a unified list of extreme event characteristics. Some researchers have identified their own unique descriptions of the characteristics of extreme events (Hannah, et al. 2009; Taleb, 2010). Those characteristics, as discussed in the following paragraphs, serve as part of a foundation for the qualitative research.

The characteristics that differentiate a routine crisis from an extreme event are important in defining an extreme event. I believe that those characteristics are also a prime consideration for using the qualitative method in this research. Primarily there are four differentiators of a routine crisis from an extreme event (Hannah, et al. 2009). First, whereas crisis involves the threat to a high priority goal, e.g., a corporate or organizational goal, the definition of an extreme event holds a tighter requirement. Such threats must reach the threshold of “intolerable magnitude” (Hannah, et al. 2009, p. 898) where goals are imperative, such as life and death, and require a level of leadership much beyond that of a routine crisis. I believe that the study of life and death situations, or situations under which major damage to infrastructure, e.g., hurricanes, nuclear events,

etc., requires a deep understanding of the parameters and decision-making involved in the event as best investigated by qualitative methods.

Second, preparation time is a non-characteristic in describing the differences between a routine crisis and an extreme crisis (Hannah, et al. 2009). One would think that extreme events might come without warning and with little preparation time; however, Hannah, et al. (2009) assert that organizations involved in extreme events may have lengthy preparation time yet still be unprepared when the event occurs. Hannah, et al. (2009) cite as an instance the U.S. military preparation for Operation Desert Storm. For Operation Desert Storm, there was a lengthy force buildup prior to the event, yet military planners did not comprehend all aspects of the “crisis”, for example, the deliberate burning of oil wells. This characteristic implies that strategic considerations are involved in the research of extreme events. Thus, through interviews of leaders involved in the event, I discovered a deeper understanding of the leadership considerations of readiness.

Third, “probability” is an ingredient, but not necessarily a stand-alone characteristic (Hannah, et al. 2009). Fire departments sometimes face severe fires that might involve life and death, but that consideration alone is not enough to qualify as an extreme event. Low probability must be accompanied with other characteristics, e.g., an intolerable magnitude, to truly qualify as an extreme event; therefore, low probability is a constituent characteristic of an extreme event but low probability alone is not enough. An intense investigation of the probabilities and consequences is an essential element in using the qualitative method in this research.

Finally, the fourth characteristic separating a crisis from an extreme crisis is “ambiguity of cause, effect, and means resolution” (Hannah, et al. 2009, p. 899). Organizations may find themselves in an extreme crisis with the capacity to respond but may not be able to execute the capacity adequately or may become hampered by ineffective decision-making. This characteristic rests on the shoulders of leaders who may be ineffectual in organizing the proper means of resolution. Through interviews I delved deeply into the considerations and thought processes used by leaders in making crucial decisions. Using open interview questioning I found that leaders “opened-up” and were willing to explain how difficult the decision-making process is during extreme events.

“Black Swan” events (Taleb, 2010) are events which come out of nowhere with many unknown consequences. It seems that no one ever plans for Black Swan events, or one does not recognize the possibility of an impossible catastrophe. Taleb (2010) focuses on the human element that often ignores the possibility of Black Swan events. Taleb (2010) provides five unique characteristics of human behavior that lead to blindness of the possibility of Black Swan events. Those unique characteristics include confirmation biases, narrative fallacy, lack of human imagination, signal theory (missing signals), and ludic fallacy (tunnel vision).

In sum, while the characteristics of extreme events are not well defined in the crisis literature, other theories, such as sensemaking, and transboundary theory offer more insights into the characteristics involved in extreme events. Later in this dissertation is a discussion of extreme event characteristics. Exploring the characteristics of an extreme event is an important consideration in developing the concepts and is a foundation for the

research. I use the extreme event characteristics to develop research areas and interview questions.

### Extreme Event Context

Defining extreme event context is the first step of the leadership concepts discovery process. Hannah, et al. (2009) define extreme “*contexts*” as:

Environments where one or more extreme events are occurring or are likely to occur that may exceed the organization’s capacity to prevent and result in an extensive and intolerable magnitude of physical, psychological, or material consequences to—or in close physical or psycho-social proximity to—organization members (p. 898).

The difference between an extreme event and an extreme context is that extreme contexts can involve multiple extreme events. Some extreme events cascade into extreme contexts. This is a very important concept that is essentially uncovered in the research. For instance, in Japan, the Great Eastern Earthquake (an extreme event) cascaded into a tsunami (extreme event), which caused a nuclear meltdown (extreme event), and resulted in a social disaster (extreme event); all four extreme events combined to create an extreme context. This is likely to be one of the greatest extreme contexts ever. Outside of war, humankind has rarely ever faced the forces of nature and the forces of physics that the Japanese faced at that time. We remember that America bore the brunt of several extreme contexts for example, the Great San Francisco earthquake, Hurricane Katrina, and the attacks of September 11, 2001, to mention only three. In

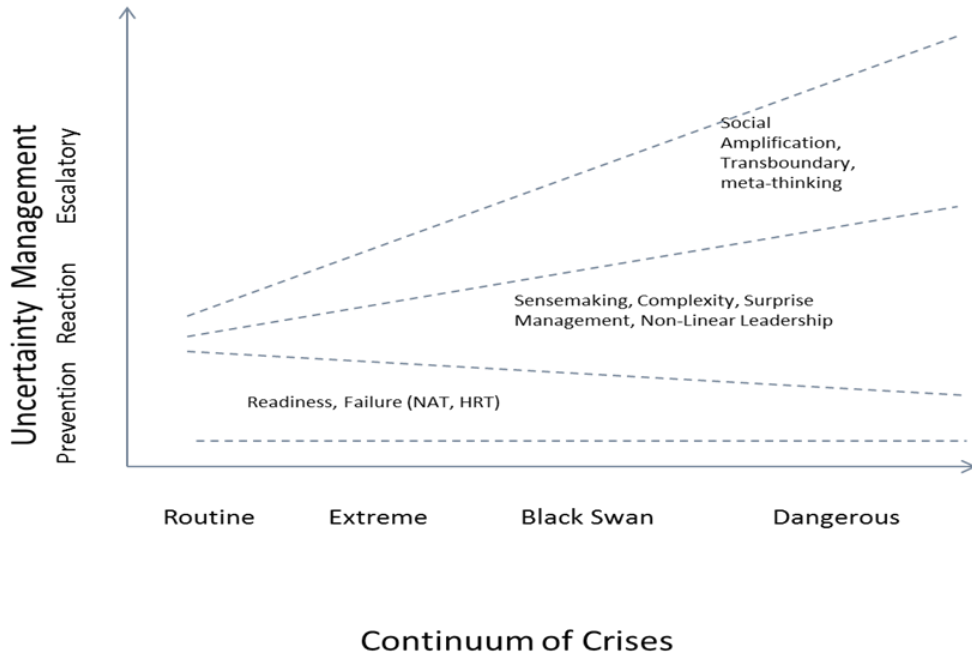
Fukushima, Japan, the extreme events leading to an extreme context all happened at one time and in one place. The uniqueness of that context makes it rich in research potential.

Extreme contexts may be global in nature, likely unknown, and beyond the control of the responsible organizations. Lagadec (2009) terms the extreme event context, as the “Wilderness of the Unknown” (p. 478). Lagadec (2009) describes an extreme event context as an unstable world with events that display a domino effect.

### Theories Used in Extreme Event Research

Within this dissertation, I reviewed crisis theories, leadership theories and decision-making theories, as those theories relate to extreme crisis management. Extreme crisis leadership lies at the heart on a continuum of crises. Figure 2, Hierarchy of Crisis Management Theories, depicts the relationships of major crisis leadership theories to the continuum of crises. Crises range from the routine, to extreme, to Black Swan and dangerous events. This dissertation focuses specifically on extreme crisis and Black Swan and delves a little into the other ends of the crises leadership continuum (routine and dangerous).

**Figure 2 - Hierarchy of Crisis Management Theories**



Source: Casto 2014

As depicted in Figure 2, as the complexity of crisis increases, each of the crisis management, leadership, and decision-making theories has special applicability. For instance, readiness theory has special applicability to routine crises. Routine crises are frequent events, not complex and generally predictable. Thus, for routine events, readiness theory generally explains the type of crisis management needed for these events, i.e., typically prevention and reaction. Crisis leaders do not need to possess superior cognitive abilities to react to these types of events. Fire departments are a good example of a “readiness” organization that often faces routine crises. Readiness is less effective and applicable for Black Swan events where by nature, events are rarely predictable, thus unpreventable, and they are extremely complex requiring a superior cognitive response by crisis leaders. As extreme events escalate into transboundary or



international events, greater cognitive abilities are required of crisis leaders. Understanding that demand for greater cognitive abilities for extreme events is an essential point of this dissertation.

Next, this literature review catalogs the theories used in crisis management literature (seen in Figure 2). My review finds that Sementelli's (2007) taxonomy of the disaster and crisis theories is useful. Sementelli (2007) bundles a sampling of basic crisis theories in an attempt to gain a broad perspective on the state of crisis literature and theory. With regard to the applicability of leadership theories in crisis management, Sementelli (2007) concludes that there is little in the way of *leadership theory* development in the crisis literature. Specifically, Sementelli (2007) concludes that *leadership* theories remain "heavily examined yet poorly understood" (p. 501) in the crisis context. It appears that most researchers stay in their lane in that most researchers do not compare and contrast theories. Apparently, most researchers approach the domain strictly from their own perspectives and do not contrast their findings with extant theories. I have integrated these theories with my research results. I develop a theory that integrates the existing literature as an expansion of the extreme crisis leadership theories.

While Sementelli's (2007) taxonomy is thorough, because he focuses mainly on the basic crisis research, it does omit several theories used in the crisis management literature. Sementelli's (2007) focuses on decision, administrative readiness, economic, and social theories, even though I found significant research in the more advanced research areas of complexity, failure, sensemaking, and transboundary theories in the literature. These areas will be reviewed later. Further, despite the research gaps or

threads mentioned by Sementelli (2007) regarding cross-disciplinary research, there appears to be some work not considered in his paper in the area of multi-team linkages which is essentially cross-disciplinary research (e.g., DeChurch, et al. 2011; Gill, 2007).

Sementelli (2007) captures most of the theories used in the crisis management literature. Nevertheless, my literature review consists of a brief summary of the insights from the theories in Sementelli (2007) that I believe are most applicable to the extreme context, including readiness, complexity, failure, sensemaking, transboundary, and administrative (leadership and decision-making). These theories are necessary to provide the overall landscape of the literature and serve as the foundation of my literature review. The associated concepts were the starting point for my inductive approach to advance the theories of extreme crisis management and crisis leadership. As stated earlier, there can be many theoretical approaches to this topic. For completeness, I discuss a broad set of theories; however, this dissertation ultimately focuses on administrative theories, especially leadership theories. My goal with this literature review was to identify the applicable concepts from the existent literature that enriched my qualitative study; therefore, I review each theory for its specific application to extreme contexts.

#### Consolidation of Extreme Event Theoretical Concepts

Before I delve into each theory in detail, a brief overview of each theory and its relationships is helpful. Table 1 - Matrix of Theoretical Relationships depicts how each theory manages uncertainty, the related advantages and disadvantages of theory. The goal of this research is to tie the research threads together in ways that explain leadership in an extreme crisis. As shown in Table 1, each crisis theory has its own approach to

dealing with a crisis (uncertainty), and some theories are better at explaining how leaders should approach extreme events.

**Table 1 – Matrix of Theoretical Relationships**

<b>Crisis Theories, Leadership &amp; Decision-making processes</b>	<b>Uncertainty Management</b>	<b>Advantage(s)</b>	<b>Disadvantage(s)</b>
Readiness	Prevention	Based in educational theory - Learning & preparation skills	Blind spots; Signal theory flaws
Complexity	Absorbs	Based in human behavior theories - flexibility in response	Somewhat antithetical to organization theories
Failure	Acknowledges reality & copes	Recognizes latent organizational errors & human errors	Theory not well developed; conflict between High Reliability (prevention) & Normal Accidents (inevitable)
Sensemaking	“Enacts” – frames	Shared understanding Adaptation & innovation	Oversimplification; Optimism bias; and pluralistic ignorance
Transboundary	Controls failure & Mitigates impacts	Allows for “clumsy solutions” & creative thinking	Highways for failure & escalatory power
Surprise Management	Removes threats & Clears obstacles	Read & react in an anticipated fashion	Extensive education & training required
Non-linear Leadership	Embraces disorder & disequilibrium	Rooted in chaos theory – creative breakdown	Leaders must reject stability & equilibrium; live on verge of chaos
Extreme Event Decision-Making	Optimizes	Based upon leader self-efficacy	Slow decisions and lack of accuracy; fuzzy organizational boundaries
Social Amplification	Manages risk perceptions	Use of technical justice	Disproportionate public response; secondary impacts

Source: Casto (2013)

### Readiness Theory

The readiness theory derives from Smits and Ezzat-Ally’s (2003) discussion on the merger of the role theory and the learning theory. Fundamentally, this theory asserts that organizations that are subject to crises or extreme events must establish a preparedness to face their roles and organizational lessons. That includes the identification of emergency roles and responsibilities, role knowledge, training, rehearsals, and standards for behaviors during crisis.

Other important concepts in the readiness theory are command, control, and coordination. For instance, Voogd (2004) investigated the impact of command and control on the readiness theory. Voogd (2004) concludes that the existing personnel, structures, and emergency responders in a team context aid crisis preparation but have their limits. Similarly, Smith (2004) investigates the role of disaster simulation, which is an element of readiness. Through disaster simulation studies Smith (2004) finds that organizational decentralization often used to respond to extreme events becomes significant and complex thereby, challenging organizational success. Quarantelli (1988) makes the strongest conclusion about prior planning. In considering the elements of prior planning, e.g., identification of emergency roles and responsibilities, role knowledge, training, rehearsals, and standards for behaviors during crisis, Quarantelli (1988) concludes that prior planning is helpful, but prior planning cannot eliminate complexity; therefore, adaptations will be required under extreme conditions. Finally, Quarantelli (1988) suggests that if the definition of extreme events is applied, organizations cannot predict or prepare for the unknown-unknowns.

In another twist to the efficacy of readiness, Joffe (2003) suggests that *optimistic bias* actually reduces preparation. Optimistic bias can falsely convince oneself that uncertainty can be controlled. This means that as one trains and simulates, one is not only preparing oneself for events but that organizations are driving out uncertainty, thereby causing blind spots. Such optimism causes one to ignore the multiplicity of factors that can come of extreme events.

It seems that Smits and Ezzat-Ally's (2003) readiness theory adds little theoretical development to extreme crisis management for several reasons. For example, readiness

concepts described as roles, responsibilities, command, control, simulation, and optimism, while practical, offer little in the way of supporting or advancing a scholarly theory of extreme event leadership. Because extreme events by definition exceed the ability of the organization to cope, I believe the readiness theory is unlikely to provide any substantial foundation for extreme event theory development; nevertheless, I explore it for completeness. Considering that Voogd (2004) identifies command and control limitations of the theory, Smith (2004) adds the challenges of decentralization and Quarentelli (1988) concludes extreme events necessitate adaptations, my research could potentially add value to readiness theory by addressing these limitations. Knowing the important concepts associated with extreme event leadership could enable organizations to better inoculate themselves against the uncertainty of extreme events through improved readiness; however, as stated earlier, for extreme events, readiness might have limited inoculation power.

### Complexity Theory

Readiness theory asserts that organizations should focus on preparation, while complexity theory asserts that organizations should develop an ability to embrace the complexity of a crisis. The complexity approach can lead to a reframing of crisis management for organizations. By reframing crisis management from an avoidance strategy to a strategy of absorption, organizations can better cope with the challenges of an extreme event through changes in their behaviors (Ashmos, Duchon & McDaniel, 2000). From the inception of the complexity theory, research (Mirvis, 1996) acknowledges that the complexity theory is counter-intuitive for organizations. Organizations seek to drive out uncertainty from their environments; however, the

complexity theory offers organizations a means to face a multiplicity of factors and make sense of rapidly changing circumstances (Mirvis, 1996).

Fundamentally, Ashmos, et al. (2000) suggest that by using a behavioral approach, organizations can reduce and absorb complexity to limit the edge of chaos. Those behaviors include gathering information about threats, encouraging multiple and conflicting organizational goals, using sensemaking to understanding coupling, and by embracing complexity in their processes, that is, living with uncertainty, they become familiar with the complex. Thus, when faced with a complex situation, the organization will be better prepared to deal with chaos. This is the counterfactual thought to the readiness theory's *optimistic bias*.

This multiplicity of factors involved in extreme events makes the complexity theory more attractive as a research theory compared to the readiness theory. Because the complexity theory tries to unearth the surprising patterns in a complex interaction, it seems to be more enlightening in identifying leadership concepts for extreme events. The complexity theory purports that when you step back from a set of complex interactions, unforeseen connections begin to appear (Muffet-Willett & Kruse, 2009). Muffet-Willett and Kruse (2009) describe complexity as a rubric of *complex responsive processes*. Abel (2011) describes it as *dissipative structure* that moves into *the edge of chaos*. Abel (2011) explains that this self-organization is not chaos; it is near chaos, because chaos involves the study of simple patterns leading (linearly) into repeated patterns, while complexity involves simple patterns leading to higher-level patterns, which are multiple unique interactions, and usually non-linear.

While to some degree, organizations may be able to adopt the complexity theory approach; high-risk technological organizations<sup>3</sup> are unlikely to do so. Researchers (Daft & Weick, 2001, p. 255) recognize this tension and discuss what they call *enacting organizations*. Enacting organizations recognize the indeterminate nature of life, but actively engage with it rather than being reactive or passive. Organizations often test and experiment with adaptive processes, models, and programs. Organizations typically learn by doing and create a double-feedback loop to improve processes (Daft & Weick, 2001). Mental models affect the way people work with the information and determine the final decision (Argyris, 1977). The decision itself changes, but the mental models remain the same. Once fixed, the established mental model allows for quicker decision-making. A double-feedback loop (Daft & Weick, 2001) suggests that organizations develop mechanisms to interpret ambiguous events and provide meaning and direction for participants. Unlike single loops, this model includes a shift in understanding, from simple and static, to broader and more dynamic, such as taking into account the changes in the surroundings and the need for expression changes in mental models (Argyris, 1977).

I find the complexity theory model generally antithetical compared to other rational behavioral theories of individual and organizational behaviors, e.g., rational choice, theory of planned behavior, equity, and expectancy theories. Most organizations want to limit uncertainty, and organizations do so by building procedures and processes that constrains individuals to behave in predictable ways for predictable events. The concern then becomes for individual and organizational behavior during unperceived events. Typically, when people behave outside expected norms, the organization seeks to

---

<sup>3</sup> High-risk technical organizations often include industries such as nuclear power, airlines, and NASA (Weick 1979).

return the behavior to those within norms. Complexity theory tends to *require* that people behave outside of norms in responding to a crisis. As Mirvis (1996) stated, this requirement is counterintuitive.

Nevertheless, the concept of an *enacting organization* leads one to a discussion of failure theories. It seems that the complexity theory, while useful, actually serves as the foundation for failure theories (Reason, 1997; Sagan, 1994; Turner & Pidgeon, 1997). Failure theory suggests that organizations structure themselves in uncertain frameworks, i.e., into organizations that are prepared for complexities but organizations also retain methods to avoid failure. Thus, the failure theory is a compromise between relying solely on readiness, i.e., living with uncertainty, to organizations structuring organizations that both prevent and cope with complex situations.

#### Failure Theory

Early in the understanding of organizational disasters and disaster management, researchers blamed organizational failures simply on human error or errors that were beyond human control (Reason, 1997; Sagan, 1994; Turner & Pidgeon, 1997; Weick & Sutcliffe, 2001). These were simple explanations with single or few root causes. As research progressed, these researchers began to see the multiplicity among high-risk technology, human error, organization culture, and their context. Researchers discovered other more complex explanations of organizational failure.

From this research emerged two main theories of failure. Those theories are the normal accident theory and the high reliability theory. I explore these two theories generally, and I explore them from the perspective of extreme events. The question is



how these theories explain or provide insights into the potential for a new theory generated by this research.

Perrow (1994) and Reason (1997) are the fathers of the normal accident theory. Perrow (1994) and Reason (1997) began the discussion of organizational failure with an assumption that accidents came from, “just the right combination of circumstances to produce a catastrophe” (Perrow, 1994, p. 217). Perrow (1994) and Reason (1997) viewed accidents as inevitable. The signals of extreme events bypassed organizational controls and went unrecognized by the organization until the signals appeared and escalated into full-fledged events. Miller (1988) suggests that it is not the “sick” organization that produces disasters, but it is likely the complex, modern, and efficient organization that experiences major failure.

Modern organizations assume rationality in their contexts (Turner & Pidgeon, 1997). The assumption of rationality can actually magnify small errors turning them into large-scale accidents. Should individuals miss the signals of error in their work, those minor errors can stack-up and become errors that are bigger than the sum of their parts. Perrow (1984, 2009) extends this argument through his research on complexity and coupling. Perrow (1984, 2009) asserts that the most knowledgeable people in the organization will undervalue errors. Operators will miss signals in tightly coupled systems. Then, these errors will reappear as major accidents called “normal accidents”. Others explain those missed signals as latent organizational issues (Aini & Fakhru’l-Razi, 2013; Vaughan, 1997). These latent issues sit in the organization until the environmental conditions change, and then latent issues reemerge as much bigger issues. Vaughan (1997) in her assessment of the NASA space shuttle accidents refers to this scenario as

the “normalization of deviance”. Vaughan (1997) explains that organizations often miss signals that are counterfactual to the established mental models.

Normal accident theory has yet to explain everything about the escalation of accidents. If accidents are “normal”, then the question is why do most organizations avoid them? Not every organization experiences accidents; therefore, perhaps most organizations have learned to become safer. It could be that organizations learn to decouple their processes, or it could be that organizations have just become more reliable. Nutt (2004) suggests that these and other questions are questions that normal accident theory researchers have yet to answer.

While Perrow (1984) does not subscribe to the theory that organizations can prevent accidents, other researchers (La Porte, 2011; La Porte & Rochlin, 1994; Sagan 1994; Weick & Sutcliffe, 2001) argue that organizations can. High reliability theory suggests that organizations could become reliable by using a dedicated safety culture (Egan, 2011; La Porte, 2011). In fact, by using pervasive challenging and a questioning attitude, organizations can become highly reliable. Weick and Sutcliffe (2001) go even further. The authors insist that organizations can merge culture and organizational structure into a Highly Reliable Organization. While La Porte (2011) and La Porte and Rochlin (1994) agree with the basic high reliability theory, they somewhat disagree with Weick and Sutcliffe (2011). La Porte (2011) and La Porte and Rochlin (1994) challenge the ability of organizations to combine culture and structure to prevent events.

Certainly, Perrow (1994, p. 213) doubts the ability of organizations to become “highly reliable”. Perrow (1994) insists that, “trying hard will not be enough” and believes therefore that accidents are inevitable. This debate between normal accident

theory and high reliability theory has reached a deadlock. High reliability theory researchers (Weick & Sutcliffe, 2001; Sagan, 1994) believe that organizations do more than “try hard”. Weick and Sutcliffe (2001) and Sagan (1993) claim organizations can erect defenses that prevent accidents. LaPorte (2011) and La Porte & Rochlin (1994) are somewhere in the middle of this argument. LaPorte (2011) and La Porte & Rochlin (1994) believe that organizations should try hard by implementing procedures and processes to minimize the possibility of failure (NASA), but LaPorte (2011) and La Porte and Rochlin (1994) do not go as far to claim that organizational culture relates to disaster. One aim of this research is to explore the disagreement between the theories that failures can be prevented (high reliability theory) and that culture matters (normal accident theory). This disagreement is particularly relevant in the extreme event context. Developing extreme event leadership theory that addresses the efficacy of readiness for extreme events would help to advance the disagreement between the two theories and may tip the scale towards one or another. Knowing more about how readiness would mitigate extreme events would help to determine readiness countermeasures as suggested by the two theories. Advancing theory as to this disagreement could demonstrate to organizations whether readiness theory is more useful in the extreme context, that is, high reliability theory would assert readiness theory concepts apply and organizations can prepare adequately for extreme events.

Other researchers weighed into the debate between normal accident and high reliability theories. Shrivastava, Sonpar and Pazzaglia (2009) claim that the two theories are not incompatible but that there is a temporal relationship that allows the two theories to explain accidents at different times. Shrivastava, Sonpar and Pazzaglia (2009)

describe this as an open-systems argument that views organizations as energy transformers. As organizations expand from their stable state, organizations go through energy transformations and this open systems view accounts for both theoretical perspectives. Further, Shrivastava, Sonpar and Pazzaglia (2009) acknowledge the fallibilities of humans and the bounded rationality assumed by the theories.

Conversely, Perrow (2009) himself wrote a rejoinder to Shrivastava, et al. (2009). Perrow (2009) dismissed the temporal and open systems arguments. Perrow (2009) reminds us that normal accident theory acknowledges the role of humans and that time was never a component of the theory. Perrow (2009) states that normal accident theory rests beside the other failure theories. Because normal accident theory explains the coupling concepts involved in accidents, there is no need to reconcile the two theories. There is only a need to find applications of normal accident theory. Turner and Gray (2009) talked with Perrow (2009) about his comments. In that article Perrow (2009) states that the temporal element is both immaterial and unnecessary because it is the coupling that causes the rare event not the time component.

Shrivastava, et al. (2009) rebutted Perrow's (2009) comments. Shrivastava, et al. (2009) reiterated that the normal accident theory applies only to a small set of accidents and that the theory does not account enough for human failures. The debate continues and a conclusion is elusive.

These arguments raise many important issues related to extreme events. For instance, what is the role of norms on behaviors during an extreme event? Do norms serve as constraints on humans and exacerbate the accident? As mentioned earlier, latent organizational issues play a significant role in crises. Vaughan's (1997) normalization of

deviance is but one example of how organizational errors lie dormant then split wide open during a crisis. Organizational issues are an important factor in understanding a crisis. Therefore, I gave particular attention to organizational matters as I formulated this research.

To this point, research does not integrate high reliability and normal accident theory with complexity theory. Integrating these theories could enable high-risk technological organizations with insight on the degree in which organizations should prepare for extreme events. There is a balance between adding layers of prevention vice the acceptance of normal accidents. Companies must judge their investment in prevention versus acknowledgement of the risks and establishing methods to cope with accidents when accidents happen. Acceptance of the risks might imply that companies would rely more on the leadership theories and invest in training their leaders on the more complex leadership theories, e.g., sensemaking. My research sheds some light on this integration. My integrated model of crisis leadership might be helpful in resolving the deadlock to consider whether embracing complexity helps move the debate forward. Through the investigation of extreme events, my research may shed light on the argument and help to settle the deadlock.

### Sensemaking Theory

The theories of readiness, complexity, and failure set the stage for more complex theories and thus should be useful in explaining crisis management or extreme event management. While those theories shed some light on the scope of concepts surrounding complex events, other higher-level theories can more fully explain the concepts for extreme events. The first of these high-level theories is sensemaking. Sensemaking is

the process of social construction that occurs when discrepant cues interrupt individuals' ongoing activities, and involve the retrospective development of plausible meanings that rationalize what people are doing (Weick, Sutcliffe, Obstfeld & David, 2005, p. 409). Again, the intent of this review is to focus on the insights from the theory that would help give clarity and meaning to understanding extreme events by helping develop concepts and theories.

Clearly, the seminal work in sensemaking is Karl Weick's (1988), "Enacted Sensemaking in Crisis Situations", that appeared as part of the *JMS* Special Issue on *Industrial Crisis Management: Learning from Organizational Failures*. This work broke new ground on the thought that technological failures had a strong construct of human failure associated with them. Weick's conclusion that crises are not just the machines' fault but also the results of human-machine interactions sets the foundation for sensemaking. It is a theory that tries to explain those interactions. Sensemaking is about taking cues from the environment and framing those cues into a picture of what is transpiring. This framing is where Weick suggests the *enacting organization* structure is created, although one caution comes from Hernes, et al. (2008), who concluded that sensemaking could lead to an oversimplification of an event because humans tended to consider only a few factors during crisis. Humans have limitations on their cognitive abilities, and therefore, seek to simplify problems. For example, bounded rationality suggests that (Simon, 1972) chess players can only envision about one hundred moves out of over  $10^{120}$  possible moves. Therefore, as I proceeded with my research I was conscious of information missed by leaders and thus the leaders never considered in their sensemaking.

In analyzing Weick's (1988) work regarding crisis management, there is a central argument that when organizations (people) sort out a crisis, organizations generate both the understanding used in sensemaking as it affects the crisis and the actions that changes the progression of the event. Weick (1988) states, "There is a delicate tradeoff between dangerous action which produces understanding and safe inaction which produces confusion" (p. 305).

For instance, in the Bhopal (Weick, 1988) case<sup>4</sup>, management's lack of commitment to the facility resulted in weak procedures, training, emergency planning and other latent organizational weaknesses. Therefore, as the operators tried to respond to the event, i.e., they took actions to understand better the plant conditions, the latent weaknesses combined with the human interaction resulted in exactly what the operators were trying to prevent. Thus, their actions led to the enactment of a self-fulfilling prophecy. In sorting out hundreds of control room alarms, operators complicated the event through their actions of trying to mitigate the problem and understand it, simultaneously. The operators themselves, while attempting to understand it, changed the event scenario. This assessment is one of Weick's (2010) most powerful conclusions. Weick (2010) offers that sensemaking can improve crisis prevention and management by promoting shared beliefs about self-control and voluntary cooperation that will allow people to understand that their own actions and decisions can be determinants of the conditions that organizations try to prevent. A caution is that if the shared belief is based

---

<sup>4</sup> The Bhopal disaster was a gas leak incident in India, considered the world's worst industrial disaster. It occurred on the night of December 2-3, 1984 at the Union Carbide India Limited pesticide plant in Bhopal, Madhya Pradesh. Over 500,000 people were exposed to methyl isocyanine gas and other chemicals. The toxic substance made its way in and around the shantytowns located near the plant. Estimates vary on the death toll. The official immediate death toll was 2,259. The government of Madhya Pradesh confirmed 3,787 deaths related to the gas release.

upon flawed thinking or “collective stupidity” that would have serious implications on the outcome of the crisis.

### Sensemaking Diverges

Research on sensemaking diverges into two paths from Weick’s (1988) work. The first path describes sensemaking as the events unfold. This path (Kayes, 2004; Vendelo & Rerup, 2009; Wicks, 2002) unpacks a wide-ranging set of disasters as they unfold. The second is a retrospective path that looks for sensemaking post-hoc (Brown & Jones, 2000; Shrivastava, Mitroff, Miller, Miglani & Anil, 1988; Turner & Pidgeon, 1997). The retrospective path primarily bases the research upon public inquiry reports and others that describe the events post-hoc. The purpose of these studies was to present institutional learning. These articles are very beneficial sources for my inductive study. Using these retrospective path articles provided me with techniques to merge the retrospective articles with the interview results to triangulate on the facts from the event. Consequently, the interviews and retrospective views provided a clearer picture on the leadership issues faced by the personnel involved in the event(s).

This divergent path of research, i.e., while events unfold or through retrospective review, is an important consideration that might enable a better understanding of extreme event responses. First, the initial response by people makes up the sensemaking during crisis by blocking out contradictory cues until it is much too late causing an overly positive view of the situation (Pfeffer & Salancik, 2003; Salancik, 1977). Again, the *optimistic bias* concept creeps into the research. Second, research on collective sensemaking in crisis demonstrates that there is a range of challenges facing groups and teams (Maitlis & Sonenshein, 2010). These challenges generate obstacles to shared



understanding and coordination of action in conditions that are escalating and unfathomable. Third, the institutional contexts in which the organization and its members are embedded influence sensemaking in crisis, and sensemaking often serves to maintain these institutions (Maitlis & Sonenshein, 2010).

Not explicitly discussed among the three themes is the role of “felt” emotions in sensemaking. Maitlis and Sonenshein (2010) discuss the role of “felt” emotions, such as panic, on sensemaking. The next few sections discuss all of these themes in detail.

### *Fallacy of Optimism*

An optimistic mindset that creates blind spots can be devastating for individuals. In uncertainty, i.e., crisis, once individuals begin to express optimism openly, individuals establish an unfounded commitment that begins a path to failure. Kayes’ (2004, p. 1277) study of eight climbing deaths on Mount Everest shows how pre-summit statements made by climbers, like, ‘as long as the weather holds, we will have success’ and ‘we’ve got the Big E [Everest] all figured out,’ sounded overly positive and blocked out the contradictory clues that would allow them to sense that they were facing an ill-defined problem without clear goals, or solution paths.

Weick (1993) also highlights the effect of public statements by spotters on the smokejumpers’ aircraft during the Mann Gulch fire (1949) when 12 smoke jumpers who parachuted into the area to fight a fire in the Helena National Forest, Montana, United States, died. The spotters stated, “The crew would have it under control by 10:00 the next morning” (Maclean, 1992, p. 43). Those optimistic statements constructed a blind spot that blocked out growing evidence to the contrary. When commitments are active, voluntary, and public, those statements often create the biggest blind spots (Cialdini,

Trost & Newsom, 1995; Salancik, 1977). Cialdini, Trost and Newsom (1995) find that publicly assessing, explaining, and recommending actions in response to a crisis causes people to feel much more bound to them than when people keep their commitments non-public. Over-commitment to a position along with the normalization of deviance creates these blind spots (Nickerson, 1998; Vaughan 1997; Weick & Sutcliffe, 2007). These public statements might increase accountability of the leader as the statements more strongly connect the leader's image to the position. However, the accountability that those statements generate for the leader may have a detrimental effect if the leader is wrong.

On the contrary, Landau and Chisholm (1995) argue that pessimism, with the failure-avoidance organizational perspective that it entails, can actually mitigate a crisis. Landau and Chisholm (1995) suggest that organizations should “institutionalize disappointment” as a means to counteract self-deception. This conclusion is consistent with the research articles on High Reliability Organizations. High Reliability Organizations instill in their members a sense of a “preoccupation with failure”. High Reliability Organizations are encouraged to use “vigilant wariness” at all times (Weick, et al. 1999; Weick & Sutcliffe, 2001). Optimism has a place in crisis management as it motivates individuals to take action; however, it can create blind spots and prevent individuals from adapting to circumstances.

#### *Establishing a Shared Understanding*

The second challenge for responders during a crisis lies in establishing a shared understanding of the environment, especially, in extreme events, when trying to formulate shared understanding among responders is difficult. Weick (1995) discusses

three types of understandings: commitment, identity, and expectations. *Commitment* is a foundation for sensemaking because responders often generate over-optimistic statements or even generate explanations retrospectively to justify their actions (Weick, 1995). While this has the potential to create helpful meanings in the wake of ambiguity, it can also create dangerous blind spots (Weick, 1995).

*Identity* is another type of shared-understanding construct (Weick, 1995). The importance of identity in such contexts becomes evident especially when it is threatened. In crisis, responders can lose their own identity. Weick (1995) talks about this in the Mann Gulch study when the smokejumpers dropped their tools and ran. The opposite can happen as well. Wicks' (2002) study refers to the Westray mine disaster (1992) as an example, where miners' identities as "real men" and "providers" blinded them from seeing the dangers inherent in their work.

The other type of shared understanding is *expectations* (Weick, 1995). Weick (1995) suggests that expectations connect with cues to create understandings. Individuals then filter subsequent cues against this understanding and slowly build up their confidence about a picture of the situation. Of course, as in the other types of understandings, this can be good or bad. As in the Mount Everest case, an over-optimistic picture can be very detrimental. The best strategy is for individuals to adjust their expectations throughout the disaster.

In the end, shared understandings are difficult to gain, and create a positive or negative outcome (Weick, 1995). Weick (1995, p. 148) suggests that, "wisdom" can overcome the contradictions in developing shared understandings. For Weick (1995) the

elements of wisdom are “updating and doubt”, and importantly, updating and doubt enable adaptation and innovation.

### *Institutional Effects*

There is relatively little research on the institutional effects of sensemaking in crisis (Jennings & Greenwood, 2003). Obviously, this would be a fruitful area of research. One of the most useful studies on the institutional effects is contained in Wicks’ (2002) study of the Westray mine disaster. Wicks (2002) investigates the institutional causes of blind spots. Wicks (2002) finds that the miners’ daily practices led to the creation of blind spots for them. There are a number of components leading to a “mindset of invulnerability” created by work rules, non-work rules, and the culture of the organization. Much like the normalization of deviance, these miners normalized risk. The miners became overly comfortable with the risks that miners face every day in the mines. Wicks (2002) echoes Weick’s (1988) suggestions of enacted sensemaking. The normalizing behavior of the miners became detrimental to safety.

### *Role of “Felt” Emotions*

Besides shared understandings, another area of sensemaking discussed earlier is *panic*. Obviously, emotions play a role in crisis management. Some research discusses how emotions, especially “felt” emotions, can be detrimental to cognitive thought, especially in sensemaking (Shrivastava, et al. 1988). Weick (1995) argues that felt emotion, which comes from arousal, makes use of cognitive ability. It takes attention away from the task. Conversely, as in much of sensemaking, felt emotions can also be helpful. Maitlis and Sonenshein (2010) argue that emotions can actually facilitate sensemaking. Maitlis and Sonenshein (2010) add that other emotions such as shame,

guilt, embarrassment, anxiety, and pride can play a role as well. These negative and self-conscious emotions can be the strongest of all emotions affecting sensemaking (Maitlis & Sonenshein, 2010).

#### *Retrospective Sensemaking Research*

Regarding the post-hoc studies on sensemaking, some research (Brown & Jones, 2000) concludes that public inquiries constitute a valuable source of insights for reviewing institutional sensemaking. Brown and Jones (2000) find that these studies mostly focus on rebuilding trust and according legitimization to the organization. Another insight from these studies is that the post-hoc enquiries tend to rebuild authorities and leadership in the affected organization. This stream of literature informed my research, in that my qualitative study used some inquiry reports. In cases where this research could not find individuals directly associated with extreme events to interview, I reviewed a secondary data source. For instance, an inquiry report from the Deepwater Horizon was used to develop the sensemaking concepts used by the leaders who were involved in the event.

#### *In Search of Common Characteristics*

In an attempt to identify operational characteristics of sensemaking, I conducted a mini-longitudinal review of sensemaking articles seeking a common set of characteristics that might be used to qualitatively review extreme events. I developed a review of sensemaking characteristics for several significant disasters as summarized in Table 2, *Characteristics of Specific Disasters*. I intend this review to identify trends or commonalities among sensemaking characteristics that might lead to the development of concepts. The sources for the information are Weick's (1990) review of the Mann Gulch

disaster, Vendelo and Rerup's (2009) review of the Roskilde Festival disaster, and Dunbar and Garud's (2009) review of the Columbia shuttle disaster. I chose these articles because they were case studies of single crisis (events), and each of the articles focused on understanding the characteristics of sensemaking.

*Definition of Terms:*

Risk Context – Vendelo and Rerup (2009) situations where threats are low; perceived low risk environments but risks can incubate.

Incubation period – Self-explanatory; period where latent weaknesses are present but yet unobserved or active.

Pluralistic ignorance – Weick (1990, p. 588) describes *pluralistic ignorance* as a view by crisis responders that they are, “puzzled by what is going on, but I assume that no one else is”.

Collective sensemaking – Dunbar and Garud (2009) organizational members' struggle to make sense of the situation.

Team trust – Self-explanatory.

Panic – Self-explanatory.

Length of disaster – Self-explanatory; units provided.

**Table 2 - Characteristics of Specific Disasters<sup>5</sup>**

Mann Gulch	
Characteristic	Magnitude
Risk context	High
Incubation period	Short
Pluralistic ignorance	High
Collective sensemaking	Low
Team trust	Low
Panic	Growing
Length of disaster	Hours
Roskilde Festival Crush	
Risk context	Low
Incubation period	Short
Pluralistic ignorance	High
Collective sensemaking	Low
Team trust	Low
Panic	Growing
Length of disaster	Minutes
Columbia Shuttle Disaster	
Risk context	High
Incubation period	Long
Pluralistic ignorance	Low
Collective sensemaking	High
Team trust	High
Panic	Growing
Length of disaster	Days

A few examples of this author’s judgment on the codings illustrate how sensemaking characteristics reveal themselves through cross-case comparisons. For example, for the risk context, my judgment is that it is reasonable to view a forest fire and a space shuttle launch as high-risk, while attending a rock concert is a low-risk environment. People would not reasonably be worried about dying from attending a rock concert. However, as the situation unfolds, I judge that *panic* grew in all three events as the situation deteriorated. During the rock concert crush, people panicked. Further, for the Columbia shuttle disaster there were over a hundred shuttle flights before the fateful loss of the Columbia; therefore, the incubation period was extremely lengthy, while the other two cases had short incubation periods. These are examples of my rationale for determining the behaviors of the sensemaking characteristics.

<sup>5</sup> Source: Casto (2014). The magnitudes are based upon my own personal judgment.

The conclusions drawn from Table 2 are mixed. All three accidents resulted in deaths. The risk context seems immaterial to the outcome. In the Roskilde festival case, risk was low but deaths still occurred. Similarly, incubation period, pluralistic ignorance, collective sensemaking, team trust and length of disaster seem immaterial as well. The clearest conclusion from the three events is the growing state of panic during these life and death situations. While it is obvious that panic exists among individuals when a disaster unfolds, it would be interesting to find measures of organizational or leadership panic. Leadership panic is a characteristic not extensively covered by the crisis leadership research. In my research, I was conscious of developing characteristics of leadership panic where appropriate.

Later in this research review, I will discuss the characteristics of extreme leadership. Some sensemaking characteristics are common among two of the disasters in Table 2, but not all three; nevertheless, this collection of characteristics could serve as a tool in quantifying sensemaking in this research study.

In sum, I believe that sensemaking is a highly complex theory that can shed light on extreme event crisis management. There are many concepts to consider regarding sensemaking when conducting a qualitative study. These begin with the determination of whether the organization is “enacted”. The measure of an enacted organization is best generated by reviewing a number of concepts to compare, contrast, and discover linkages between those potential concepts (Weick, 1995). It starts by understanding the initial response to the event by determining the degree of shared understanding that occurs. Shared understanding is broken into three pieces: commitment, identity, and expectations (Weick, 1995). As in the high reliability theory, a preoccupation with failure is an



essential element of sensemaking. That preoccupation includes the normalization of deviance, institutional disappointment, degree of optimistic statements, and wisdom (doubt and updating). Finally, understanding the types of “felt” emotions and cognitions involved in the response could be one of the most powerful factors in sensemaking.

### Transboundary Effects

Researchers have expanded the literature of crisis management through the review of a relatively new theory called “transboundary effects” (Boin, 2009). Transboundary effects literature considers what Perrow (1994) would call the “coupling” of modern society. The definition of the transboundary crisis considers the functioning of multiple, life-sustaining systems, functions, or infrastructures that are threatened by the crisis and cause uncertainty of outcomes (Boin, 2009). Essentially, the transboundary effects are different from a routine crisis in that the effects involve the coupling of systems within and among countries. The recent 2009 financial crisis is an example of a transboundary effect in that it affected not just the United States’ economy, but the world’s economy.

Few crisis management researchers have delved into studying transboundary effects. Given that the number of articles associated with crisis management is on the decline, many researchers believe that the crisis management domain is exhausted (Boin, 2009). Nevertheless, with the opening of the transboundary theory, there is a new domain of interest for researchers of crisis management. A related stream of research lies in the area of the “Black Swan Events” (Taleb, 2010), which are unforeseen and unanticipated events. Nafday (2009) claims that unforeseen and unanticipated events are “unknown-unknowns”, i.e., completely out of left field (p. 194). Often, these events are non-linear and cascading in their seriousness (Nafday, 2009). For example, as in the

Fukushima nuclear plant disaster (2011) a natural event cascades to an artificial (man-made) event and then to a global social event.

The characteristics of a transboundary crisis as documented by Boin (2009) are a good fit even when describing the characteristics of an extreme event. These characteristics include:

- Tightly coupled systems
- Extends cross-functionally and cross-nationally
- Transcends time boundaries
- No defined beginning, end, or ground zero
- Escalates quickly in unforeseen directions exploiting linkages
- Causes unfathomable damage

Boin (2009) describes the “escalatory power” of a transboundary crisis. Boin (2009) suggests that because globalization makes the world flatter (Friedman, 2006) small perturbations may have drastic consequences. A coupling of systems (Perrow, 2009) extends this issue by creating what Boin (2009, p. 370) calls the “highways for failure”. Boin (2009) acknowledges that governments cannot keep pace with this challenging and changing environment; therefore, governments have little capability to deal with transboundary issues. The trends exposed deal with technological growth that speed up transboundary effects. International terrorism is another trend that creates opportunities to spread crises. Finally, escalation caused by demographic shifts and shifts in global power arrangements introduces new dimensions that can contribute to an escalation of the crises (Boin, 2009).

For the present research, I note the importance of Boin’s (2009) study in the light of his list of executive tasks in managing a crisis. The following five tasks are difficult

and fraught with complications: 1. preparing in the face of indifference; 2. making sense of an emerging and evolving crisis; 3. managing large response networks; 4. offering credible answers; and 5. learning under pressure. These five tasks were useful in informing the qualitative concepts in my research by providing a categorization of tasks and allowed me to separate tasks from cognitive reasoning skills.

Other authors explore further transboundary effects. For instance, Wachtendorf (2009) describes an effect she refers to as “trans-boundary social ruptures”. Wachtendorf (2009) refers to transboundary social ruptures defined by Quarentelli (1988), Lagadec (2009) and Boin (2009) as events that reach beyond social boundaries and disrupt multiple social systems. Social ruptures could become transnational as well (especially in the cases of the United States, Canada and Mexico). Transboundary effects bring entirely new problems to the leaders of extreme events. With the rapidly connected world come new challenges for event leaders. The challenge of a tightly connected world requires new readiness, mitigation, and response strategies. I explored these new dimensions in my interviews.

There are other transboundary effects, specifically the relationship between risk, crises, and public management (Lodge, 2009). Public managers often seek clarity of response to extreme events. Public managers seek to purify readiness and response thereby desire to limit uncertainty and that public crisis management employs one-way of responding to a crisis. However, crises are often “clumsy” and might require “clumsy” solutions (Lodge, 2009, p. 406). In my research, clumsy solutions were juxtapositioned against sensemaking to find new links of interconnectivity between transboundary effects and sensemaking.

Some authors (Santella, Steinberg, & Parks, 2009; Parks, 1971) bridge research and practice by creating software tools to model the crisis for policy-makers. These tools often model routine crises. Software tools provide a roadmap for leaders in approaching their response to a crisis.

Another applicable article for this research is Lagadec (2009) whose focus is on innovative thinking in the context of transboundary crises. Lagadec (2009) concludes that, “in our cultures and in our selection (of leaders) creative thinking is punishing and punished” (p. 483). The argument is that nonconventional thinking is needed in nonconventional crisis. As discussed earlier in this dissertation, creativity in crisis response is antithetical to the norm of organizations that often drive for certainty through procedures and processes. Nevertheless, in my research this concept of driving out creative thinking can be interesting. That is, if a leader concludes that he/she was unprepared for an extreme event because crisis drills leave him/her unprepared for creative thinking, that insight itself would be interesting.

#### *Extreme Event Context as Related to Transboundary Crisis*

There is a similarity between a transboundary crisis and an extreme event or an extreme event context. While there appears to be little, or no, literature in this area, these crises, events, and contexts appear to have similar characteristics. Among the similarities are the international implications of an extreme context. Farazmand (2009) discusses a perspective that all “grand failures” by governments have global implications. Farazmand (2009) believes that a grand failure by a global government, e.g., the United States, implies that lesser governments would have little chance of success in a similar situation is a gap in the literature. This is true especially for the United States in its

position as a global leader. Failure to respond to a large event shakes the confidence of other nations regarding the United States as a global leader. Certainly, in the Chernobyl case, the failure of the Soviet Union fostered a lack of confidence by Soviet citizens and the world. Farazmand (2009) also suggests that smaller nations lose hope that a smaller nation could cope with an extreme event given that a country as developed and powerful as the United States failed to address Hurricane Katrina in an appropriate and timely fashion.

The ability of leaders to manage crisis response is essential to leadership success. This is the second step in the leadership construct discovery process. Finding the necessary leadership concepts needed in an extreme event is a goal of my research. Can great leadership minimize the impact of extreme event? Is it a goal of leadership can be to arrest the cascade from a routine crisis becoming an extreme crisis? For instance, do leaders control panic and mitigate the impact of a crisis at the earliest point in the progression of the crisis to avoid turning a routine crisis, perhaps a hurricane, into an extreme crisis, for example, Katrina or moreover turning an extreme event into an extreme context? The answers to these questions, among others, were essential for my research.

In sum, transboundary effects are highly important considerations for this research. As the world flattens, extreme events multiply, and our ability to create fear around the world expands, most extreme events will take on the characteristics of a transboundary event. As the qualitative study progressed, I attempted to reflect upon the data to determine how transboundary issues comport with extreme crisis. The applicable concepts for my research gleaned from transboundary effects included the six

characteristics of transboundary effects and the five executive tasks identified by Boin (2009). Other notable effects of interest were Wachtendorf's (2009) transboundary social-ruptures and Lagadec's (2009) innovative thinking.

Considering the complications entailed in a combination of the extreme crisis, extreme context, transboundary, and Black Swan aspects, integrating the associated concepts could provide fertile ground for crisis management theory research. This combination can provide researchers with a significant new domain. Few, if any, researchers are publishing articles in the domain of integrating these theories, but I believe that these domains bring with them new leadership challenges that might call for new research concepts and associated leadership competencies. As stated earlier, most crisis research uses routine crises as a foundation and then extrapolates the findings to extreme events. Through studying extreme events explicitly in this research, there were interesting and valuable findings while walking through the specifics of the extreme events.

Next, this review moves into the final area of theory, in fact, two administrative theories. First, I cover leadership theory as it applies to routine events and discuss the limitations of existing theory to explain extreme event leadership. Understanding the concepts behind leadership is especially crucial in extreme crisis management. I discuss the decision-making theory last. Decision theory moves leadership from the strategic thinking cognitive levels to the action levels.

## Administrative Theories

### *Leadership*

Understanding leadership theory in extreme events is a daunting challenge. Given that the dimensions of an extreme event are continually changing as humankind advances, keeping pace with the demands of leadership under these conditions is nearly impossible. A significant challenge for this part of the literature review is the lack of articles exploring extreme event leadership. However, the lack of extreme event literature is both a challenge and an opportunity.

Because extreme events are rare, past research on extreme event leadership comes mainly from two domains: most researchers study routine crisis events, for example, hurricanes, and then extrapolate their conclusions to extreme events (Mikusaova, 2011; Kayes 2004; Maclean 1992). Another line of scholarly inquiry studies military battles and then applies the conclusions to non-military extreme events (Baron & Scott, 2010; Campbell, Hannah & Matthews, 2010; Fisher, Hutchings & Sarros, 2010; Weeks 2007). Studying these domains has methodological limitations. Due to the threshold effect described earlier in this literature review, routine crisis events are not likely to produce conditions that leaders face during extreme events; therefore, the usefulness of extrapolation is questionable (Yammarino, et al. 2010). In the research on military applications, there seem to be even more problems. When fighting wars, military training permits troops and leaders to sacrifice themselves, and troops often train for and experience extreme events (Weeks, 2007). Unlike in extreme events, in these classic and military research domains, command structures usually remain in place. Additionally, in

the military structure, people follow the established rules without question, e.g., displaying a respect for rank (Weeks, 2007).

In non-military extreme events, organizations usually do not train for unfathomable conditions (Yammarnio, et al. 2010). Additionally, by definition, extreme events usually involve the loss of governance, particularly the loss of corporate control and government control (Comfort, 2002). By nature, extreme events can exceed the capacity of both military and non-military. Similarly, many of the government agencies, unlike the military agencies, do not have directive leadership and are unfamiliar with failure of business continuity (Yammarnio, et al. 2010). There are broad organizational, leadership, and readiness differences between the military and non-military organizations (Yammarnio, et al. 2010).

Hannah, et al. (2009) discusses the tensions between leaders who are adaptive versus those who are “administrative” during an extreme crisis. By “administrative”, the authors mean classic authoritative or directive leadership. There exists a general tension between using adaptation during an event versus following the administrative, i.e., classic leadership route. Thus, using the military model for extreme leadership research is challenging. I believe that this is an important consideration when conducting extreme event research. Researchers usually do not control for military organizational structure considerations, such as self-sacrifice, training and adherence to rank, when examining non-military-based extreme events (Hannah, et al. 2009; Useem, et al. 2005); thus, using articles that use military contexts in the present research controls for administrative differences.



An insight from a seminal article (Hannah, et al. 2009) that provides a broad perspective of extreme leadership and addresses not only the leadership concepts but importantly, the methodological issues as well, frames the direction of my research. Hannah, et al. (2009) focuses on developing a framework of study using a typology that defines and distinguishes extreme context from crises and other contexts. The Hannah, et al. (2009) article strongly endorses the qualitative approach to research of extreme event leadership. Hannah, et al. (2009) frames the direction of continued research on leadership in extreme events. One important direction that is applicable to this research is their recognition that extreme leadership research may not change the essence of leadership, or make existing leadership concepts invalid; however, the Hannah, et al. (2010) suggest that research could discover new relationships between concepts and necessitate advanced methodologies. That discovery is one potential contribution of this research. Perhaps I can make discoveries of the unique interrelationships among leadership concepts, and discoveries of the most important leadership concepts within the extreme event context.

#### *Sensemaking, Surprise Management and Non-linear Leadership*

Developing insights on leadership strategies used in addressing extreme events is an important element of this study. A key to the necessary leadership insights comes from the work of Mumford (2005). Mumford (2005) finds that underlying a leader's sensemaking activities is the formation of a prescriptive model. Mumford (2005) suggests that finding a "prescriptive model often provides the "solution" to the problems broached by the crisis" (p. 522). Weick (1988) suggests this as well in his study on sensemaking. Weick (1988) and other scholars ('t Hart, 1990; Turner & Pidgeon, 1978)

identified “making sense” as a crucial element that dictates leaders’ success. Mumford (2005) concludes that, “the bewildering pace, ambiguity, and complexity of a crisis tends to overwhelm the normal modes of situation assessment” (p. 372). For these reasons, my research included the elements of the complexity and the sensemaking theory to derive the sensemaking and making sense insights of extreme events and developing an integrated model.

Farazmand (2009) introduces the strategic theory of “surprise management”. Surprise management, Farazmand (2009) suggests, “Aims to read and act in an anticipated fashion, remove or minimize potential threats and clear obstacles to achieving goals and missions” (p. 407). According to Farazmand (2009), surprise management has roots in chaos, complexity, and dynamic systems’ theories. For me, surprise management clearly has roots in Weick’s (2001) “management of the unexpected” as well because the dynamic elements of surprise management, e.g., understanding, framing and enacting, are essential in surprise management and management of the unexpected. Finding the linkages or intersections among these theories may result in new and powerful leadership strategies. Farazmand (2009) finds some of the linkages between chaos, complexity, and dynamic systems theories; in my research I discovered linkages among other crisis theories.

The bottom line is that managing non-linear events (extreme events are non-linear) successfully necessitates non-linear leadership techniques like surprise management (Comfort, 2002). The key is that extraordinary and emergency situations require leaders to reject stability and equilibrium. Leaders must use non-linear-dynamic thinking, which often calls for embracing disorder and disequilibrium. This means living

on the edge, at the threshold, where the situation appears stable but is on the verge of chaos (Farazmand, 2009). Farazmand (2009) calls this situation “creative breakdown”. Farazmand (2009) references Schumpeter’s (1942) quote that “Breakdowns may be the “birth pangs” of a better future” (p. 405).

Weick (1995) cautions that most managers often make a big mistake of thinking linearly; managers try to solve non-linear organizational problems in a linear fashion. Instead, managers should get out of the causality box that has frozen their mindsets. Managers must think strategically and non-linearly to anticipate and manage the “unexpected” (Weick & Sutcliffe, 2007). Educational and training programs, formal and informal, periodic and continuous, can help to train and develop surprise management teams, leaders, and managers for crisis management in the age of rapid and non-linear changes that constantly produce complexities (Farazmand, 2009). Hospitals are a good example of organizations that train and develop surprise management that face non-linear challenges from simple gunshot wounds to mass casualty events.

Managing complexity on the “edge of chaos” (Pascale, 1990), too, requires a different set of organizational learning, a learning to learn surprise management capacity (Waldrop, 1992). Farazmand (2009) asserts that developed or advanced nations fail to take surprise management seriously. Farazmand (2009) finds that the combination of complicity, ignorance, arrogance, leisurely habit, and dismissive attitudes results in a frozen mind-set of government leaders during catastrophes. Farazmand (2009) suggest that when developed or advanced nations learn to address surprise management besides helping them respond to catastrophes, it will help the less developed nations address catastrophes by learning from the developed world.

Some authors (Farazmand, 2009; Waldrop, 1992; Weick, 1995; Weick & Sutcliffe, 2007) remind us of the importance of non-linear thinking. Leaders must release their rigid mindsets in order to manage surprise or unexpected events. These authors generally agree that it takes education and training that is continuous and periodic, formal and informal, and that stresses adaptive management to help cope with crises and disasters. Accordingly, Farazmand (2009) asserts that developing such a capacity of adaptive management requires the integration of capacity building to support surprise management from youth to adulthood. Farazmand (2009) gives the examples of children in countries that are taught at an early age to prepare for natural disasters, e.g., floods, earthquakes, and droughts, as an example of capacity building.

For me, I believe that the meta-thinking work of Crittenden and Woodside (2007) with regard to thinking-about-thinking could play a role in the education of crisis-leaders. Their thought that leaders need more than intuitive thinking seems appropriate, in that the classic linear crisis management tools do not work in the non-linear environment. Meta-thinking seems to address many of the limitations identified in linear decision-making, such as ignoring non-conforming information, implementing decisions based on little knowledge, and being over-confident in the leaders' initial impressions of the event. I believe that challenging leaders to think *about thinking* as leaders respond to a crisis will cause the leaders to consider gaps in their knowledge and discover flaws in their decision-making processes. Meta-thinking is not mentioned in the extreme event literature, and I believe that including meta-thinking in this research would be useful. Using the techniques of meta-thinking could provide crisis leaders with a new cognitive

tool heretofore underdeveloped by the literature. I believe that meta-thinking in leadership is a relatively undeveloped concept.

*Leadership Lessons from Hurricane Katrina*

From a strategic perspective, Farazmand (2009) provides a comprehensive list of strategic lessons learned from Hurricane Katrina. Farazmand (2009) advises leaders never to compromise the long-term strategic goals of a nation, system, or organization for political or economic benefits. Farazmand's (2009) other advice includes building capacity in preparation; leadership and central command are the most important elements of crises management. Farazmand (2009) suggests that traditional crisis management is useless in the extreme event that these events test a government's competency, and that governments avoid surprises by preparing for simultaneous and multiple crises. My research considered these elements of leadership strategy, i.e., maintaining national strategic goals, building response capacity, competent leadership, and preparation for extreme events.

A problem with Farazmand's (2009) thesis is that he sees the government as the savior that steps in to arrest chaos; however, I believe differently. In the Deepwater Horizon oil spill (2010) the government did play a role, especially in requiring compensation of victims; however, British Petroleum (BP) managed the resolution of the technical aspects of the event. Similarly, with the new private spacecraft companies, the government expects them to plan, control, respond, and recover from the events that those private entities cause. It would be helpful to identify new leadership strategies so that private companies can control more of these events. The world is flattening more,

and more naïve companies are facing extreme events and often without advanced governments to support them during an extreme event.

Others who have researched lessons learned from Hurricane Katrina have other thoughts about leadership in an extreme event (DeChurch, et al. 2011). While DeChurch, et al. (2011) agree that a leader's first role in the crisis is to develop a strategy; DeChurch, et al. (2011) believe that the largest benefit of the strategy is when it serves as an accurate picture and response framework for the entire response team. These thoughts are consistent with Weick's (1978) ideas on sensemaking because Weick (1978) suggests that developing a strategy framework is crucial to enactment.

#### *The Role of Trust in Leadership*

Hannah, et al. (2009) capture the essence of the trust in leadership literature by building a framework for examining extreme event leadership. Hannah, et al. (2009) believes that an extreme event stretches organizations to or beyond their limits. It is then that trust in the leader becomes a crucial element. Although as discussed earlier, this is a different kind of trust, it is trust above the threshold, or life-or-death trust. Some of that trust is idiosyncratic in that it is built-up beforehand, but in extreme events, it may break down on reaching the life-or-death threshold.

Further, Hannah, et al. (2009) describes other important characteristics mentioned in the literature. Hannah, et al. (2009) stresses cohesion of the followers as a crucial factor of trust. According to their work, leaders achieve cohesion by using Weick's (1996; 1998) sensemaking or even "sense-giving" techniques. The authors refer to Weick's (1998) caution that leaders can be overconfident in their ability to understand a situation, or at least believe as leaders they understand the situation. Therefore, by

having too much confidence the leader over-acts and thereby makes errors and loses cohesion of the group. Hannah, et al. (2009) discuss the work of Weick (1988) and Shrivastava, et al. (1988) who developed the concept of *triggering points*, which are disabling events linking back to human judgment; judgment that deteriorates under pressure. I discovered triggering points in my data collection, and those triggering points are discussed in the Results.

#### *Tension of Adaptive and Administrative Leadership Styles*

When analyzing the literature on leadership in extreme events, one sees a fundamental tension between adaptive leadership and administrative leadership styles (Yukl, 2006). Adaptive leadership consists of “improvisational” and “ambidextrous” leadership styles (Yukl, 2006), which are styles that flex between exploitation and exploration (exploration refers to pursuit and acquisition of new knowledge, whereas exploitation indicates the use of knowledge for efficiency). While administrative leadership styles are those of classic leadership, for example, autocratic or directive, one of the keys to the success of the present research is to uncover the relationships between leadership styles in extreme events. This tension is an important insight for this research. Understanding whether organizations need to be more improvisational or whether organizations need to be more ambidextrous could provide valuable insights for leadership. Further examination of this tension was necessary as this research progressed.

## Decision-Making

### *Extreme Event Decision-making*

It is important for this research to identify the major concepts involved in making decisions during moments of extreme crisis. Ultimately, these concepts should guide the research but not direct it. Within the crisis management literature, there exist classic decision-making articles along with articles on decision-making during crisis (Hannah, Campbell, & Matthews, 2010; Sweeney, 2010). The goal for this research is to explore the conclusions of the literature regarding extreme event decision-making. I focus herein on what the literature asserts with regard to the important potential differences between crisis decision-making and extreme event decision-making.

### *Decision-making Accuracy*

Hadley, Pittinsky, Sommer, and Zhu (2011) study many of the complex factors that might predict the decision-makers' accuracy in cases of the extreme events. Hadley, Pittinsky, Sommer, and Zhu (2011) observe that the optimal solutions that are available to the decision-makers under normal circumstances are usually absent during a crisis. The lack of time and information render decision-making based upon optimal solutions unlikely. Therefore, Hadley, et al. (2011) suggests that there is a need for greater precision in the measures of decision-making. Those measures should focus on "difficulty" and "confidence". Difficulty of the decision and the confidence of the leader influence decision-making precision. Obviously, the strain of the situation affects decision-making difficulty. For that matter, the strain of the situation affects confidence regarding the decision as well. This is because the quality of the decision-making process affects the decision-makers' confidence as Hadley, et al. (2011) state. Thus, the



authors suggest that a single measure that might capture all of these considerations is “self-efficacy”. Bandura (1986) defined self-efficacy as:

People’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses (p. 391).

Hadley, et al. (2011) suggest that decision-makers’ confidence is conditioned by their prior success and perhaps even vicarious experiences, which contribute to their belief in success. Hadley, et al. (2011) call for ability measures, which might be valid predictors of decision-makers’ accuracy; therefore, for this research, understanding a leader’s self-efficacy could be an important consideration leading to a theory of extreme event decision-making.

#### *Tools for Decision-making*

Some authors (Santella, et al. 2009; von Lubitz, Beakley & Patricelli, 2008) devise specific tools or models used for decision-making in extreme crises. These authors attempt to structure crisis management decisions by the use of decision tools. This process seeks to achieve decisions that are more accurate by simplifying crisis information. For example, von Lubitz, et al. (2008) devised the OODA loop (Observe, Orient, Decide, and Act), and Santella (2009) proposed the CIPDSS (Critical Infrastructure Protection Decision Support System) model, while Hadley, et al. (2011) designed the C-Lead scale (Crisis Leader Efficacy in Assessing and Deciding scale) to model or guide decision-making under extreme conditions. Research that develops

decision-making tools is interested in modeling whether these sophisticated models or tools can provide insights on the decision-makers' competencies, cognition, or accuracy under extreme conditions.

#### *Use of Expertise in Decision-making*

More importantly, it is critical to consider what the decision-makers should not do when facing a crisis. James and Wooten (2005) discuss a phenomenon, which can occur during a crisis, whereby as the complexity increases, the ability to make wise and rapid decisions decreases. This comes as the highest echelon of decision-makers seeks advice from technical experts. Sometimes, the power of the expert slows the speed and accuracy of decision-making processes. James and Wooten (2005) assert that the experts, with their narrow knowledge, are not in the best position to make decisions. They question whether experts hold the proper perspective to give advice on how best to position the organization.

#### *Escalation of Commitment*

Sometimes, a routine crisis escalates into an extreme event, and this escalation could bring with it new considerations for decision-making. Parashevas (2006) highlights this escalation as an acute stage in the crisis where the organization reaches a "critical instability" point that might involve a "bifurcation point" or "phase transition". This transition may become important because it often decentralizes decision-making. Complex events change organizational boundaries (Parashevas, 2006). As the event becomes complicated, more leaders of the organization become involved in the decision-making process. This transition may result in "fuzzy" boundaries and diverse leaders, who might see the crisis from different perspectives. The fuzziness might affect the

accuracy of decision-making. In the end, either the organization fails, survives, or evolves into another dimension. That new dimension may consist of various agents of the old organization. It is likely that the new leaders will lose their connection with the old central authority (Kauffman, 1993). The direction an organization takes is somewhat dependent upon the readiness of the organization to face the complex event (Waldrop, 1992).

Parashevas (2006) suggests that complexity science could provide insights to the agents. Parashevas (2006) asserts that there should be early warning systems and feedback mechanisms to detect and monitor event escalation. Agents should not script decision-making, but agents should define the interaction between them beforehand. Parashevas (2006) believes that decision-making should be a living and evolving system, where leaders, followers or others involved in the crisis must understand their roles in this system. Finally, Parashevas (2006) suggests that researchers should use complexity science in researching the kind of leadership necessary to generate these realizations and behaviors.

In the end, decision-making is a complex science (Parashevas, 2006). The difference between crisis decision-making and extreme event decision-making is most significant when the unfathomable conditions change the parameters of the decision point (Parashevas, 2006). During this research, I maintained awareness of occasions when the extreme event conditions change, particularly those “game changing” events. At game changing points, complexity is likely to increase causing new and significant leadership challenges.

### *Social Amplification and Its Impact on Crisis Leadership Decision-making*

Social amplification of risk framework (SARF) research is a concept that explains the effects of public involvement in helping to frame a risk significant event (Renn, 1992, 1998; Kasperson, et al. 1987). Crisis leaders often attempt to frame adverse events for public understanding. Typically, crisis leaders frame the discussion in their own terms. Once the public better understands or is indirectly or directly affected by the adverse event, the public begins to frame the issue in their (social) terms. The public's perspective might be manifested through mass media, social media, lawsuits, government intervention, or other social mechanisms that bring pressure on the company. Social amplification causes ripple effects that may affect the company, its industry, or others involved both directly and indirectly. The public itself becomes a transmitter either moderating or amplifying the consequences of adverse events.

After decades of research on the public experience of risk, no comprehensive theory exists to explain why an apparently minor risk or risk event, as assessed by technical experts, sometimes produce massive public reactions, accompanied perceptions of risk and risk related behaviors (Renn, 1998). Often the reactions are a disproportionate response to the risk. Renn (1992) refers to the work of Kasperson, et al. (1987) who approached the study of social perceptions of risk. The concept became known as the social amplification of risk framework (SARF). SARF is a conceptual perspective and with further research could develop into a full-fledged theory. According to Kasperson, et al. (1987), "the concept of SARF is based upon the perspective that events related to hazards interact with psychological, social, institutional, and cultural processes in ways

that can raise or attenuate individual and social perceptions of risk and shape risk behaviors” (p. 139).

The social amplification phenomenon consists of two parts. Information flow from the event feeds the amplification channels, and then the reaction to the information flow either attenuates or amplifies the risk perception. This begins the ripple effect (Renn, et al. 1992). I see as an example of ripple effects in the nuclear accident at Three Mile Island. While there were no deaths or serious health effects because of the accident, there was extreme public interest in the accident. Fear was rampant throughout the country, and the President appointed an emergency manager and visited the site himself. Further, the accident caused repercussions in other industries. This ripple effect is in part because of the social amplification of the nuclear accident. In this sense, social amplification provides a corrective mechanism by which society acts to bring the technical assessment of risk more in line with a fuller determination of risk (Kasperson & Kasperson, 2005). According to Renn (1998), crisis managers usually focus on the technological justice of these events and not on social justice aspects. Renn (1998) suggests that crisis managers tend to evaluate the event in their context of science, and crisis managers underappreciate the social justice impacts such as fear, worry, and the sense held by the public that adverse events are not under control.

#### *Why Crisis Leaders Should Consider Social Justice*

Crisis leaders often discount the public’s view during their response to an extreme event (Slovic, 1991). Nevertheless, the public reaction to actual or perceived risk should be a significant input into the considerations of crisis leaders. Slovic (1991) addresses the issue of the calculation of actual risk and perceived risk. Slovic (1991) concludes that

public perceptions are the product of intuitive biases and economic interests and reflect cultural values more generally. Thus, if crisis leaders ignore the public's input, the public will voice their perceptions at the highest levels of government. Then political involvement becomes a major consideration for the crisis leader.

### *The Risk-Perception Link*

From a risk-perception perspective, Kasperson, et al. (1987) define social amplification as the mechanism by which information processes, institutional structures, social-group behavior, and individual responses determine the social perception of risk. Risk perception becomes a factor that companies must consider when an event occurs. This concept illustrates the issue of social justice in that risk events and their social impacts are a framework that the public considers in their assessments. Risk perception gives meaning to how people think about risks and their relationship to the risk. Slovic (1991) asserts that there is no such thing as "true" (absolute) and "distorted" (socially determined) risk. Rather, the information system and characteristics of public response that compose social amplification are essential elements in determining the nature and magnitude of risk. The bottom line is that from the public's perspective a given event is a risk if the public thinks that it is. This public perspective is a key in determining the appropriate response to an event. Public opinion conditions the technological response.

### *Amplification*

So how does risk perception become amplified? Cantrell (2011) claims that the public information system is like a stereo receiver and it may amplify risk events in two ways. Cantrell (2011) suggests that stereo receivers can intensify or weaken signals that are part of the information that individuals and social groups receive about the risk.

Further, stereo receivers could filter the multitude of signals with respect to the attributes of the risk and their importance. Conversely, there may be the opposite communications mechanism than a stereo receiver. Some mechanisms, e.g., the affected organization itself, may act as a transmitter. Public information systems may transmit intent through press releases, government filings, lawsuits, and other public mechanisms. Conversely, other organizations act as a stereo receiver. Those include the news media, activists and social organizations, fanatics, governments, social media and other reference groups (Cantrell, 2011). There are many communications channels these groups can use to either expand or weaken the conversation. In the technological environment of today these signals are amplified greater and faster than at any time in the history of humanity. Those stereo receivers can become social amplification stations generating and transmitting information via communications channels. Beyond that, the receivers of the information themselves become additional transmitters that provide information to their communications channels, e.g., Facebook, Twitter, Instagram, etc.

#### *Consequences of Amplification*

These receivers and their echoes are multiplications of the original risk signal. As such, at each level of transmission, risk signals cause resultant behaviors. These secondary transmissions result in associated secondary impacts. Secondary impacts include such effects as the following (Yannopaoulo, 2011):

- Enduring mental perceptions, images, and attitudes (e.g., anti-technological attitudes);
- Alienation from the physical environment;
- Social apathy;
- Stigmatization of the environment or risk manager;

- Local impacts on business sales, residential property values, and economic activity;
- Political and social pressure (e.g., political demands, changes in political climate and culture);
- Changes in the physical nature of the risk (e.g., feedback mechanisms that enlarge or lower the risk);
- Changes in training, education, or required qualifications of operating and emergency response personnel;
- Social disorder (e.g., protesting, rioting, sabotage, terrorism);
- Changes in risk monitoring and regulation;
- Increased liability and insurance costs; and
- Repercussions on other technologies (e.g., lower levels of public acceptance) and on social institutions (e.g., erosion of public trust).

These secondary impacts can repeat themselves many times over and can cause the company to change the means by which the company responds to a crisis, and thus begins the ripple effect. Clearly, in the current age of technology, social amplification is evermore present. I see several examples of this in the present world culture. For instance, the Arab Spring of 2011 escalated through virtual petitions and slogans. Global political protest, Occupy Wall Street, Greenpeace, and others use social media to facilitate communications. Societal discussion often facilitates participative decision-making.

### *Ripples*

The ripple effect essentially moderates the signals created by an event that can raise or lower the social significance of an event. Usually the immediate victims of an event are the first to be notified of the situation. The victims then raise or lower the amplification. This amplification results in the secondary impacts particularly associated with the specific company involved. As in the Three Mile Island case, indirect effects are



caused by secondary impacts. This sometimes results in industry-wide effects. Therefore, not only are there secondary signals, but there also are resultant secondary impacts. Yannopaoulo (2011) suggests that amplification can introduce substantial temporal and geographical extension of impacts. The representation demonstrates the possibility that social amplification may increase the direct impacts quantitatively and qualitatively. In this case, the inner circle changes its shape with each new round of ripples and can influence the actions of politicians who then can affect the decision-making of crisis managers. In some cases, the political impact can be counter to the technological need to resolve the event.

In sum, the social amplification of risk is a framework that recognizes the role of the public in crisis leadership. Crisis leaders often only consider the technological justice involved in “solving” an event. Crisis managers then manage the consequences. Meanwhile, social media transmits a signal that conditions the technological justice through a social justice prism. As the amplification increases, there is more sociological pressure on the event leaders. Sometimes these social pressures are counterproductive to the technological solution to the crisis. For instance, in the Fukushima nuclear disaster, the social concern of highly radioactive water reaching the ocean led the Japanese Prime Minister to decree that the crisis leaders prevent, at all cost, highly radioactive water from reaching the ocean. As a result, the crisis leaders had to minimize the flow of water into the reactors thus delaying the safe shutdown of the reactors. Social justice sometimes “corrects” for technological justice. As stated earlier, when crisis leaders make public statements predicting a successful crisis outcome prematurely, accountability theory can cause crisis leaders to hold unnecessarily to those public pronouncements. Politicians

might succumb to social pressures and impose constraints or politicians may make public statements that commit them to a course of action.

### Leadership in Dangerous Contexts

Next is a brief summary of the literature on leadership in a *dangerous* context (Campbell, et al. 2010). This context is beyond the extreme event context on the crisis management continuum. Usually a dangerous context involves the life and death of the people involved. As stated earlier, the concepts contained within this literature may shed light on the leadership concepts for extreme events. Extreme event leadership does not consider all the characteristics of dangerous contexts, e.g., life and death of the leader or followers; however, considering the characteristics of dangerous contexts might be the natural progression of extreme event leadership research. Thus, considering leadership beyond extreme events is analogous to considering “routine” leadership concepts on the other end of the continuum to dangerous contexts.

This summary begins with Yammarino, et al. (2010), Campbell, et al. (2010), and Hannah, et al. (2010), who conceptualize dangerous contexts leadership separately from other crisis leadership research. Similarly, as my dissertation suggests that extreme event leadership differs from routine leadership, Yammarino, et al. (2010) asserts that there is a special model of dangerous context leadership. This dangerous context leadership model rests on the proposition that leadership in dangerous context is best assessed on a multilevel basis (individual, dyadic and group), and further that the dangerous context leadership model is multiplexed (pragmatic, individualized, and shared leadership) rather than contingent. The Yammarino, et al. (2010) dangerous context leadership model

allows for the consideration that leadership may be unnecessary in normal conditions if the group dynamic is competent and skilled.

Baran and Scott (2010) develop leadership concepts based primarily on sensemaking and complexity theories. Baran and Scott (2010) argue that leadership in these contexts is a collective sensemaking activity that reduces ambiguity while improving resilience. Essentially, Baran and Scott (2010) are suggesting that group members are the choreographers of leadership; that the job of the group involves framing, heedful interrelating, and adjusting. It is almost as if Baran and Scott (2010) are concluding that the group members will resolve the issue themselves and that the leader serves to guide them along, rather than the leader organizing the ambiguity through framing, heedful interrelating, and adjusting.

I discuss the construct of “trust” within my dissertation. There is an interesting article by Sweeney (2010) that investigates whether or not followers reassess their trust in the leader throughout the event. Sweeney (2010) finds that followers are constantly reassessing their leader’s abilities and that trust in leadership is of paramount importance. Fisher, et al. (2010) reaches a similar conclusion in arguing that leader competence develops trust by followers. Fisher, et al. (2010) discusses the influence that leader competence has on engendering trust by the followers. In dangerous contexts, Fisher, et al. (2010) concludes that trust is a function of how well a leader performs in the dangerous contexts. Further, both studies highlight the importance of supportive relationships (loyalty) between the leader and the group. The concepts of trust and loyalty are interconnected and cannot exist alone.

Samuels, et al. (2010) and Hannah, et al. (2008) write about leaders' "self-efficacy". Fundamentally, Samuels, et al. (2010) find that past success portends future success, i.e., experience in dangerous contexts prepares leaders for future events. Also, experience builds confidence in leaders by building the leader's self-efficacy, self-control, and assertiveness. Most importantly, their research supports the idea that personal mastery is a key to developing self-efficacy along with loyalty. The more dangerous the context, the more followers reassess their trust in the leader and the more the followers expect personal mastery of the leader. This is a crucial dynamic in Samuels, et al.'s work.

Hannah and Avolio (2011), Quick and Wright (2011), and Hannah, et al. (2010) discuss character-based leadership in dangerous contexts. These authors suggest that the character of a leader may be the most important element to the construct. Character does not mean personality or even the values of the leader. Instead, character consists of a leader's mastery and hands-on experience, and it is contextualized across multiple levels of the group with each level having its own concepts.

I considered all of character-based leadership concepts in the methods section of the dissertation, and I used the character-based leadership concepts to develop interview questions. Appendix B provides a summary of the leadership concepts for both extreme events and dangerous contexts. I used character-based leadership concepts in the methods design to draft interview questions and formulate codes for data analysis. Very interesting insights were revealed from the interrelationship between extreme events and dangerous contexts.

## Areas for Research

Before delving into specifics of my research methodology, I address a fundamental question regarding how inductive research addresses existing areas of research. The fundamental point is how an inductive research paper addresses the existing research, particularly the open research threads identified in the literature. There must be a clear understanding of how the existing research threads contribute to the methodology.

Principally, case study inductive research can build upon theory or extend existing theory (Eisenhardt & Graebner, 2007). Eisenhardt and Graebner (2007) state, “sound empirical research begins with strong grounding in related literature, identifies a research gap, and proposes research questions that address the gap” (p. 26). For theory driven research, Eisenhardt and Graebner (2007) suggest that the research has to frame the research within the context and then explain why inductive research is beneficial. On the other hand, Eisenhardt and Graebner (2007) suggest that for phenomenon-driven research, the researcher has to justify the importance of the phenomena and justify why the inductive approach is necessary for theory building.

Another interesting perspective on the use of existing literature and open research threads in inductive research comes from the work of Bryman (2004). One important concept raised by (Bryman, 2004) is the concept of cumulateness of the inductive research. Because qualitative researchers tend to build theory rather than extend theory, there becomes a lack of cumulative research. Cumulating theory is a major benefit of quantitative research methods. Thus, Bryman (2004) concludes that without building on existing theory qualitative research may be idiosyncratic, duplicative, incoherent (with

existing literature), and lack common terminology, among other flaws. I believe that this lack of cumulative research could be the basis for the earlier criticism discussed in this paper about the crisis leadership research resembling the Tower of Babel (Bryman, 2004). By strictly adhering to what the interview subjects share with researchers, those researchers sometimes fail to engage in theoretical reflection (Kaghan, Strauss, Barley, Brannen, & Thomas, 1999; Lofland, 1971). Bryman (2004) describes three approaches to the use of existing literature. First, researchers can use the existing literature as a “springboard” for their work; second, qualitative researchers can use the existing literature as a counterpoint to their own work; and finally, qualitative researchers can use the existing literature post-hoc to compare their findings with the existing literature. Bryman (2004) confides that the journal *Leadership Quarterly* expects authors to describe how the underlying logic of their argument applies to existing research and how the author’s research will contribute to expanding the knowledge of the subject. Bryman (2004) admits that qualitative researcher must “straddle” the issues related to the use of existing research.

In Section 2 of this dissertation, I have outlined the existing crisis leadership literature including the open research threads identified by each author and some open research threads I have identified myself. In summary, the review of extant literature on extreme crisis leadership indicates several research threads in addition to those previously identified by other scholars (Mikusova, 2011; Lettieri, 2007). Appendix C provides a compiled a list of the 27 research threads that emerged from the literature review. I used these research threads to identify some general research areas; however, this dissertation only addresses research threads that are applicable to extreme events. I do not consider in

this research threads that are applicable to other types of crises or are not concerned with crisis leadership.

Appendix D identifies the disposition of each research thread. I examined each of the 27 identified research thread to determine specific research areas of interest to my dissertation that might extend the existing literature. Many of the identified research threads are duplicative or may be addressed post-hoc or the threads are addressed in the methods section of this research. In Appendix D, I list all 27 research threads and disposition those research threads in the last column of the Table. I evaluated the first three research threads in the methods section of this dissertation. I considered a few of the research threads post-hoc after discovery of my results. After evaluating all 27 of the research threads, I identified nine primary research areas that I considered in developing the interview questions and the coding methodology.

It is important to note that while I identify these research areas in my literature review, the essence of inductive research as conducted in this study is to focus on issues that develop from the qualitative data. I allowed for both theory development and theory extension in my research. While my intent was to explore the issues as the issues develop from the interviews without pre-supposing those issues based on existing research, I used predetermined research areas as linkage to the past research to enable theory building. The nine areas are merely research threads that I discovered in the literature review and that my research potentially would extend. The research areas do not represent all of the actual research topics, nor was my study constrained by them. Those nine research areas were:

**Area 1** – Is there a conflict between behavioral theory, e.g., rationality, and organization theory during an extreme crisis?

**Area 2** – Which theories are the best fit for leadership during a Black Swan event?

**Area 3** – What is the impact of “felt” emotions in extreme event leadership?

**Area 4** – Is sensemaking a crucial component of extreme crisis leadership decision-making?

**Area 5** - What impact, if any, does leadership panic play in extreme crisis management?

**Area 6** – As the transboundary effects of an extreme crisis accelerate, how do the executive tasks of the crisis leader change?

**Area 7** – Are there measures of decision-making precision during the event?

**Area 8** – Is there a relationship between social justice and technical justice that influences political accountability and influences leader decision-making in significantly negative ways?

**Area 9** – What are the overlaps between extreme and dangerous event leadership?

In the next section of this dissertation, I describe the methodology used in this research. I followed the guidelines for inductive research. Ultimately, by using an inductive research, i.e., grounded theory, approach, this research developed an integrated theory of extreme crisis leadership.



### CHAPTER 3: METHODS - QUALITATIVE RESEARCH DESIGN

Inspired by the methods for developing theory created over 40 years ago by Glaser and Strauss (1967), this dissertation was influenced by those methods to investigate several cases of leadership during extreme events using qualitative methods and to discover new crisis leadership theory. Conger (1998) and Bryman (2004) endorse qualitative methods as a valuable technique to investigate leadership. Conger (1998) suggests that qualitative researchers are more sensitive to the implications of a specific circumstance. Qualitative researchers are often the best to assess the style of a leader including during a crisis (Conger, 1998). Conger (1998) adds that it is remarkable how a few qualitative studies have added so much value to the research of leadership. Specifically, Conger (1998) discusses the benefits of applying the qualitative approach to the social process of leadership. Those benefits include: qualitative methods can help to reconcile differences between quantitative and qualitative results; qualitative theorists are quick to explore new forms of leadership, e.g., e-leadership, environmental leadership; qualitative researchers have questioned the status quo of leadership research; and qualitative researchers have brought forth new data analysis methods (Conger, 1998).

My sampling approach acknowledged challenges described in the literature review. For instance, I used theoretical sampling<sup>6</sup> as a technique to guard against researcher bias. With regard to the rarity of extreme events, my use of natural, artificial, i.e., man-made, and extreme events broadens the sampling domain to capture as much data as possible. Finally, where needed, I used other triangulation methods<sup>7</sup>, e.g., review

---

<sup>6</sup> In theoretical sampling, the researcher chooses samples based upon their contribution to theory development and less on the case uniqueness (Yin, 1994 as discussed in Eisenhardt, et al. 2007; Glaser & Strauss, 1967).

<sup>7</sup> Refer to the Roshomon Effect, Roth, et al. (2002).

of post-hoc event reports, to guard against retrospective bias, forgetfulness and other interviewee biases. Section 3.1 “The Qualitative Debate” (below) provides more examples of the challenges with qualitative technique along with the strategies I used to avoid these challenges.

I conducted a number of semi-structured interviews of key players in these extreme cases. Each of these interviews generated rich data that was used to develop leadership concepts. Then, I analyzed that data to reveal potential theories. I used the appropriate controls, checks and balances to assure the academic rigor essential for ensuring the validity of this research including the use of theoretical sampling. Theoretical sampling allowed me to proceed in a methodical approach to collect data, then analyze and develop theoretical statements to guide the next data collection and further theoretical sampling.

My methodology used the literature review to inform the methodology. I acknowledge, however, that conventional grounded theory research relies relatively little (or even not at all) on a literature review to start the research process (Glaser & Strauss, 1967). In fact, purists in this technique would reject any method beyond pure inductive research that relies on interviews and other methods, as these might bias the researcher’s understanding of the existing research and prevent the emergence of theoretical insights from the data (Thomas & James, 2005). To a purist, prior knowledge of the literature undermines the method (Thomas & James, 2005). Nevertheless, since Glaser and Strauss’ (1967) seminal work, much of grounded theory research has varied in its approach to both literature reviews and technical grounded theory methods (Thomas & James, 2005).

Grounded theory is not without its legion of critics. Dey (1999) gives a comprehensive list of claims against the method. Fish (1989) asserts that grounded theory is not theory at all, but it is mere “theory talk” (p. 14). Most of these criticisms attack the validity of the inductive approach itself as “interpretation before understanding”. Next, I discuss these challenges as they apply specifically to the use of grounded theory as a method to research the leadership domain.

### The Qualitative Debate

This section of this dissertation reviews the general debate surrounding the methodological issues in using the qualitative research method. I intend to cover some of the more pertinent critiques along with counterpoints that I used in my research to increase the viability of my results. Considering the issues involved in this debate was helpful in avoiding known pitfalls of qualitative methods.

In a unique “From the Editors” column, Gephart (2004) raises a number of issues related to the efficacy of qualitative research as noted by the Editors of the *Academy of Management Journal* (AMJ). Gephart (2004) raises six problems noted in qualitative article submissions to AMJ. Further, Gephart (2004) offers avoidance strategies for qualitative researchers. I address these avoidance strategies in the Limitations section.

First, Gephart (2004) suggests that there are too many “one off” papers submitted. Many authors are not involved in ongoing research programs and therefore have little ability to go back out into the field when AMJ reviewers ask for more data. Suggesting that researchers be a part of an ongoing research program, Gephart (2004) believes that researchers can avoid this problem. While my research is not part of an ongoing research program, I avoided this problem by ensuring that my research is well constructed, using

my dissertation committee for advice, obtaining thorough reviews of this research, and maintaining awareness of recent qualitative leadership literature as I progressed through the process.

Second, Gephart (2004) concludes that researchers fail to conduct a thorough literature review at the beginning of their work, conducting the literature review only after knowing the results of the researchers' study. This seems somewhat counter to the grounded theory (Glaser & Strauss, 1967) method; however, Gephart (2004) is addressing all methods of qualitative research.

A third and related problem noted by Gephart (2004) is that qualitative researchers need goals, objectives, or research questions to guide their work. By identifying the research gaps, Gephart (2004) suggests that qualitative researchers can state the fundamental contribution made by their paper.

Fourth, Gephart (2004) advises that research papers provide the theoretical background related to the concepts covered by the researchers' paper including explaining key concepts among the theories, research questions, and methodologies of the domain. Gephart (2004) expects that the reader of the research can anticipate how the researcher reflects the theories and concepts of the domain in the data or observations.

Fifth, Gephart (2004) concludes that many qualitative researchers fail to describe thoroughly the methodology, especially in capturing meaning of data, thoroughly interpreting results, drawing linkages across data, and explaining the origins of conclusions. Gephart (2004) advises that, where possible, qualitative researchers should include raw data as much as possible in the researcher's submission.

Finally, Gephart (2004) notes a problem in that qualitative researchers fail to revisit research questions or goals in the results section of the researcher's submittal. In addition, qualitative researchers fail to offer the broader implications and contributions that the researcher is making with the submittal.

Because grounded theory heavily influences my dissertation, I should discuss the challenges with using grounded theory as an influence. Glaser and Strauss (1967) in their book entitled, "The Discovery of Grounded Theory", discovered a method a qualitative research known as "Grounded Theory". Glaser and Strauss (1967) defined procedures to generate theory from empirical data. Their procedures remain highly respected as a method to analyze sociology (Thomas & James, 2005). Glaser and Strauss (1967) solved the data problem that many social researchers faced at that time. Researchers had data from interviews, observations, and other methods; however, researchers lacked consistent procedures to mold raw data into theory. Glaser and Strauss (1967) found the answer. Glaser and Strauss (1967) developed procedures and a means to generate theory. Their solution enabled a generation of qualitative researchers to discover new theories. Motivated by their frustration with the obsessive use of hypothetic-deductive research at that time, Glaser and Strauss (1967) wanted to counter it and developed grounded theory as an alternative. As discussed earlier in this dissertation, over the past few decades qualitative research has grown considerably in popularity (Thomas & James, 2005). In this dissertation the methods identified by Glaser and Strauss (1967) influenced my work.

Despite existing for over four decades, qualitative research still has its detractors. The many challenges of the grounded theory approach are beyond the scope of this

dissertation. For the sake of parsimony, I focused on fundamental questions about the method by highlighting some of the most pertinent challenges.

Thomas and James (2005) offer a critique of grounded theory by challenging three fundamental precepts of grounded theory, i.e., ground, theory, and discovery. Thomas and James (2005) claim first, that,

Grounded theory oversimplifies complex meanings and interrelationships in data; second, that it constrains analysis, putting the cart (procedure) before the horse (interpretation); and third that it depends upon inappropriate models of induction and asserts from them equally inappropriate claims to explanation and prediction (p. 768).

Ironically, Thomas and James (2005) seem to claim that grounded theory research suffers from its own self-identity. Thomas and James (2005) assert that holding to the terms ground, theory and discovery, limits the appreciative inquiry of researchers. By over proceduralizing grounded theory research with “epistemological and theoretical precepts embodied in its name”, (p. 787) researchers confine themselves. With the academic demand to develop a ground, and theory, along with all the coding and synthesis, researchers walk past the most important benefit of appreciative inquiry, i.e., understanding what is missed or dismissed through rigorous processing of information. Thomas and James (2005) challenge the benefit of “interpreting interpretations” (p. 789) as taking the process a step too far.

Thomas and James (2005) also offer some cautions that seem worthy of consideration when using grounded theory. Those cautions involve the significance of interpretation, narrative and reflection techniques used in the process of grounding

theory. Thomas and James (2005) argue that many ground theory researchers conduct simple interpretation, give basic narrative and use superficial reflection techniques. In my analysis of the results in this dissertation, I considered these cautions when performing the data analysis. I sought to find the correct balance between adequate interpretation and over-interpretation.

Conversely, Suddaby (2006) answered Gephart's (2004) "From the Editors" column in the Academy of Management Journal (AMJ) on the problems identified by AMJ Editors with qualitative research, specifically grounded theory research. Suddaby (2006) gives six misconceptions regarding "what grounded theory is not", and the overuse of the term "grounded theory". Those six misconceptions are described in the following paragraphs.

First, in his "Letter from the Editors" Suddaby (2006) offers that Grounded Theory is not an excuse to ignore the extant theory and literature in qualitative research. Suddaby (2006) debunks much of the advice given to grounded theorists that suggests grounded theorists ignore the literature by starting a proceeding with a blank slate. Suddaby (2006) suggests that grounded theorists should link to past literature and constantly remind themselves that they are human. Suddaby (2006) encourages the grounded theorist to stay in the middle ground between being biased by the extant literature and totally ignoring the literature. I followed that advice as I proceeded through the collection and analysis of my data.

Second, grounded theory is not theory texting, content analysis or word counts (Suddaby, 2006). Suddaby (2006) refers to grounded theorists' tendency to slur the methods in that grounded theorists test what they expect to unearth. The caution offered

in this regard is to avoid “forced categories” in the coding process (Suddaby, 2006, p. 637). In my dissertation I provided examples of codings, and I did not claim those are the exact codings driving my data collection.

Third, grounded theory is not a formulaic approach (Suddaby, 2006). Grounded theorists must continue the interaction between the data and the researcher. This is a reason that recursive cycling and saturation were important to my research.

Fourth, and fifth, Suddaby (2006) reminds us that the grounded theory method is not perfect, nor is it easy. These misconceptions are self-explanatory. I acknowledge that the method and the resultant data in this dissertation was not “clean”.

Finally, the use of grounded theory is not an excuse for the lack of a methodology (Suddaby, 2006). As developed in my dissertation, the proposed methodology is rigorous, and thorough. By clearly defining the methodology I followed, the results should reveal themselves clearly in the data.

Other techniques, e.g., qualitative data analysis<sup>8</sup> (QDA), and methods, e.g., naturalistic inquiry<sup>9</sup> have invaded the grounded theory approach (Glaser, 2007). Naturalistic inquiry divides into two research camps of positivists and constructivists (Cupchick, 2001). Positivist researchers assert that truth is native in that it is real and comprehensible while constructivist researchers believe that truth is created by individuals and groups (Cupchick, 2001). Regardless of the positivist or constructivist question, Glaser with Holton (2007) takes issue with the use of these naturalistic questions and QDA as these concepts apply to grounded theory. Glaser with Holton

---

<sup>8</sup> Qualitative Data Analysis (QDA) is the range of processes and procedures whereby researchers move from the qualitative data that have been collected into some form of explanation, understanding or interpretation of the people and situations we are investigating (Coffee, 1996).

<sup>9</sup> "Naturalist Inquiry" deals with a fundamental problem: "the concept of truth" (Guba, et al. 1985). Guba and Lincoln (1985) formulate truth as a systematic set of beliefs, together with their accompanying methods, and paradigm.



(2007) takes strong exception to these ideals invading grounded theory. Furthermore, Glaser with Holton (2007) believes the flaws of QDA are many, including:

A short list of these would include accuracy, interpretation, construction, meaning, positivistic canons and naturalistic canons of data collection and analysis of unit samples, starting with preconceived structured interviews right off, sequencing frameworks, preconceived professional problems, pet theoretical codes, etc, and etc. The list is long, the idea is clear (pp. 66, 67).

On the other hand, Glaser (2009) talks about the benefits of retaining grounded theory in the hands of the novice. Glaser (2009) believes that the future of grounded theory rests in the hands of the novice. Glaser (2009) summarizes his believe in stating,

My general point or message in this chapter is read the novice's situation, problems and actions correctly. Do not rescue the initial confusions and data overwhelm with preconceived frameworks and outs. They block GT. Trust to emergence and skill development using GT methodology. Trust to delimiting procedures of GT. Encourage the novice's openness to emergence by encouraging him/her to stick to the tedium of conceptualizing constant comparisons and allowing GT skill development, and letting categories of latent patterns make sense of the confusion (p. 19).

Glaser (2009) strongly encourages the novice to use his/her enthusiasm to guide their research. Finally, Glaser (2011) addresses many of the recent challenges to conceptualization in grounded theory. Glaser's book, "Getting out of the Data: Grounded Theory Conceptualization", identifies many blocks to the researcher's conceptualization of the information gained in the research. Those blocks include:

Authoritative blocks, preconceptions, inability to adequately conceptualize, the initial confusion and regression, multiversion view of GT, QDA requirement blocks, data collection overload, data coding overload, peer reviews, dealing with jargonizing GT, and being a novice both in experience and in scholarship with GT (Chapter 10, p. 1). NOTE: This list is plentiful with challenges that must be considered in proceeding with this dissertation.

### *Qualitative Research on Leadership*

Early in the study of leadership, many researchers (House, 1977; Berlew, 1974; Katz & Kahn, 1978) wrote theory articles on the study of leadership. At that time, quantitative research on leadership was limited. Little was known about the subject of qualitative methods, so developing models and questionnaires without a fundamental knowledge of leadership concepts would have yielded relatively few meaningful results. Thus, early research in an emerging field often starts with theoretical pieces and qualitative study to develop fundamental insights (Parry, 1998). Ultimately, after identifying general theories, yielding initial ideas, quantitative research may develop the literature further through empirical testing (Parry, 1998).

If this research progression is applicable and we know more about leadership today than in the 1970's and before, why then is qualitative leadership research still worthwhile today? Conger (1998) offers an explanation that leadership theory remains complex, and the enduring nature of the topic necessitates continued deep pursuit of the phenomenon. Despite hundreds and maybe thousands of qualitative and quantitative research articles on leadership, we continue to identify new concepts and fail to identify a

general theory of leadership (Yukl, 1994). Qualitative research can help with deep pursuit of theory (Yukl, 1994).

Given that researchers also continually identify multilevel aspects of leadership, those dimensions need further exploration. We remain in the infancy of multilevel leadership theory (Hannah, et al. 2008; Yammarino, et al. 2010). As discussed earlier, whenever research is in its infancy, one method is to start with qualitative methods to begin identifying the interactions and interrelationships among concepts (Parry 1998). In this case, the multilevel leadership concepts (Hannah, et al. 2008; Yammarino, et al. 2010) are still in relatively early phases of understanding. For instance, a caution regarding the limits of quantitative research comes from Avolio and Bass (1995), who caution that quantitative research can be limited in drawing conclusions across levels of leadership. Avolio and Bass (1995) suggest that surveys are usually mono-dimensional and therefore may miss the interactions among multiple levels of leadership. Philips (1973) argues that quantitative leadership research focuses mainly on attitudes about leadership rather than actual observed leadership behavior. Finally, quantitative research fails to develop the “how” and “why” of leadership behavior (Pettigrew, 1990). Nevertheless, many authors (Hiller, DeChurch, Murase, & Doty, 2011) hail the value of quantitative research in leadership, with over 95% of leadership research in academic journals from 1985 to 2009 conducted with quantitative methods.

Using a quantitative methods approach to extreme event leadership is particularly difficult given the dynamic nature of the situation. In those dynamic situations, not only is leadership working at multiple levels, but the relationship between leader and follower is changing throughout the event response (Sweeney, 2010). Sweeney (2010) finds that in

dangerous contexts followers undergo constant reevaluation of their leaders. In addition, the threshold effect discussed by Chatterjee and Hambrick (2007) would be difficult to measure quantitatively. Usually measuring shifts in attitudes through surveys is problematic given surveys are usually based on a snapshot in time (Conger, 1998; Bryman, 2004). Surveys are usually not rich enough in explaining why attitudes change to be valid over time, especially if there are intervening variables. Nevertheless, Sweeney, Thompson and Blanton (2009) did conduct a quantitative study of the non-linearity of trust. Sweeney, et al. (2009) developed a trust and interdependence model for combat situations.

Given the social nature of relationships between leaders and followers, qualitative research often allows the researcher to identify previously unrecognized or emerging factors or concepts (Conger, 1998). While quantitative methods allow for researcher detachment from the observed phenomenon, which might improve validity, this very detachment prevents the researcher from contextualizing the findings in a particular setting. Qualitative approaches allow for contextualizing more easily (Conger, 1998). In fact, Conger (1998) cautions that qualitative researchers are relying too much on solely using interviews in their research. Conger (1998) asserts that a mixed method allows for a more balanced approach and removes the biases that a knowledgeable researcher might bring to a familiar topic.

Since the conclusions of Conger (1998) that leadership research remains in its infancy, the amount of qualitative research on leadership increased significantly. Bryman (2004) finds that there were only 10 qualitative articles on leadership prior to 1991, and since then each year there has been at least one substantial qualitative piece published.

Qualitative leadership research was slow to take hold (Bryman, 2004). Research designs were mostly case studies and now have evolved to cross-sectional studies with the interviewing technique as the dominant research method (Bryman, 2004). Further, Bryman (2004) concludes that most qualitative leadership research focuses on an “input-output” model that explores the questions of the leadership impacts, factors that influence how leaders behave, or the type of people who become leaders. Finally, Bryman (2004) stresses that most qualitative leadership research works to investigate both the context surrounding the leader and the style of leadership used in that context (often researchers focus on the senior leader in a given context). Bryman’s (2004) challenge to researchers is not to focus on the context itself, but to find the generic insights surrounding the degree of task structure, leader–member relations and the leader’s position power that are of interest, not the situational factors.

Bryman (2004) offers many conclusions regarding the benefits of qualitative research and the insights it might generate. Bryman (2004) calls for the qualitative research of leadership studies to be both contextualized and generative; while the situation is important, understanding the generic insights leads to grounding new theory. Kempster and Parry (2011) responded to Bryman’s (2004) call for qualitative research with a critical realist perspective for grounded theory research. Kempster and Parry (2011) see a critical realist approach to grounded leadership theory through two lenses. First, Kempster and Parry (2011) believe that by placing an emphasis on the lens of contextual understanding and explanations for the social processes of leadership and leadership development, rather than the identification of universal truths about leadership, Kempster and Parry (2011) can meet Bryman’s (2004) challenge. That is, the task is not

to focus on the context itself, but to find the generic insights surrounding the degree of task structure, leader–member relations and the leader’s position power that are of interest, not the situational factors. Second, Kempster and Parry (2011) believe that the using a lens of contextual variation across outcomes variations will allow researchers to amass a body of knowledge on the social processes of leadership. This too would address Bryman’s (2004) challenge not to focus on the context alone. Kempster and Parry (2011) suggest that researchers should think out of the box and not worry so much about classic research rigor; that researchers should embrace their own experience and be creative in their research. Kempster and Parry (2011) offer a number of characteristics that make up the critical realist approach.

#### *Grounded Theory and the Social Process of Leadership*

Leadership is a process of social influence (Conger, 1989; Bryman, et al. 1988; Yukl, 1994). Thus, researchers may consider the applicability of using the grounded theory approach to study a social process. Many researchers have addressed the applicability of using grounded theory in detail (Conger, 1989; Alvesson, 1996; Bryman, et al. 1988). Those researchers borrow from the disciplines of sociology and anthropology to complete their research, and using qualitative research methods identified many social influence processes.

Grounded theory was used by Hunt (1991), Martin and Turner (1986), and others to theorize about the leadership process. The descriptive nature of the grounded approach is useful in describing social processes. In addition, Pettigrew (1990) suggests that the importance in the grounded approach comes from theory generation of secondary data, and interviewing, as an inductive method to integrate and explain the leadership process.

Bryman, et al. (1988) suggests that the qualitative and quantitative approaches are not competitors, but are complementary partners, and using them in combination could actually allow for the triangulation of leadership theories.

There is a continued call for using the grounded theory method for leadership research (Avolio, 1995; Bass & Avolio, 1990; Bryman, 1992). Grounded theory as a research method comes from, and is grounded in, the data (Glaser & Strauss, 1967). A key to the grounded process is finding the basic social processes in a given situation, and then deriving a theory about those processes based on data. With data collection and analysis around a situation (Glaser & Strauss, 1967) grounded theory is discovered, developed, and verified. In order to “ground” the theory there must be a continuous process of gathering more data, performing additional analyses, frequently draw comparisons to past analyses, and repeating the process until no new insights emerge. This inductive approach is a source of validity in the grounded method (Silverman, 2001).

Glaser and Strauss (1967) discuss two approaches to the grounded theory method: the full and the partial grounded theory method. In the full-grounded theory method, the researcher follows the entire process of “rinsing and repeating” the data and analysis steps, whereas in the partial method the researcher stops at the data collection stage and begins the process of theorizing about the data. Obviously, there are benefits and pitfalls to both approaches.

Other concerns about using the grounded theory approach to investigating a social process include: the researcher’s intellectual ability to understand sociology; the researcher’s personal biases; validity of the researcher’s analysis; the sources of data; and

the lack of replicability of the method (Parry, 1998). Parry (1998) makes a number of suggestions regarding improving the validity of grounded theory research to investigate a social process. Among his suggestions is to continue using the entire method submitted by Glaser and Strauss (1967) in grounded theory research and to validate the emergent grounded theory with the extant leadership literature. Parry (1998) argues that these suggestions might improve the replication of the methods and result in a more formal theory of leadership. I acknowledge the point made by Parry (1998) to continue using the Glaser and Strauss (1967) methodology, but as discussed throughout this Section, there are valid alternative approaches.

#### *Qualitative Research in Extreme Contexts*

Extreme contexts bring especially difficult challenges for the qualitative researcher (Bass & Bass, 2009). Different extreme contexts usually require different leadership styles, and, as discussed earlier, different leadership styles may be required before, during and after the events. The need to contextualize these phenomena would help to contextualize the research. Bass and Bass (2009) suggest that this may result in conflicting findings because a taxonomy of extreme contexts has not yet been developed. Thus, Bass and Bass (2009) suggest that without a taxonomy, comparisons across cases are very difficult. Hannah, et al. (2009) suggests that to resolve this difficulty, researchers should disentangle the relative effectiveness or proper mix of effectiveness by focusing on the agentic behaviors of adaptive and administrative leadership styles. Hannah, et al. (2009) admit that there is not a clear answer to this issue other than focusing on the agentic behaviors more than the event context; however, few events lend



themselves to that level of disaggregation particularly because extreme events usually require centralization of authority (refer to the discussion of readiness theory, p. 17).

As discussed throughout this dissertation, many of the leadership concepts have non-linear effects, with a wide range of variance and volatility depending upon the context (Chatterjee & Hambrick, 2007). Pursuing research on leadership in extreme contexts requires concomitant thinking about required methods to study these contexts. This limits the generalizability of qualitative research, particularly when attempting to define specific methodological criteria. Because of the opportunity to hold a dialogue with interviewees, digging deeper into the thought processes of leaders is another reason that an inductive approach is useful in the research of leadership in extreme contexts.

Qualitative researchers must also allow for the possibility that new concepts might appear during the study of extreme events. Given that extreme events exceed the normality of leadership, unfamiliar and unknown situations may arise. In the Fukushima reactor case, for instance, leaders never fathomed that the reactors would explode (Yomiuri Shimbun, August 16, 2012). This unique situation may result in new or unique leadership concepts. Those situations could also bring high variation in expected outcomes. Several researchers (Mohr, 1982; Cabral & Cunha, 2003; Denrell, 2003) discuss special modeling considerations when studying non-linear concepts, unique concepts or variable outcomes in research. Mohr (1982), Cabral and Cunha (2003), and Denrell (2003) suggest concentrating on special situations that might occur during extreme events that could expose these concepts. Special situations might be situations of hyper-turbulence, oscillations, divergence in strategies, or chaotic conditions.

Researchers should concentrate on special situation situations, for special situations might expose non-linear concepts, unique concepts or variable outcomes.

In sum, using the grounded theory concepts to conduct research on leadership during extreme events should provide a deeper understanding of the ontology involved in this special case of leadership. By pursuing the uniqueness of extreme event leadership, this dissertation may discover unique concepts that could serve as a foundation to a theory of extreme event leadership. Once such understanding is developed, then the linkages to other forms of leadership can be investigated and contribute to a general theory of leadership.

*Building Theory from Cases – Suggestions for Good Qualitative Research*

Qualitative researchers seek to build theory from their work (Eisenhardt & Graebner, 1977). This is not an easy task. In their seminal article on building theory from case studies, Eisenhardt and Graebner (2007) give some useful advice to qualitative methods researchers. Although the article focuses on the case-study approach, the authors provide useful suggestions for qualitative research, including the use of interviews. Some major points include:

- Concentrate on the recursive cycling<sup>10</sup>; this keeps researchers “honest.”
- Identify clear research gaps; justify why theory-building is better than theory testing in addressing those gaps.
- Qualitative research rests on broad research gaps with interesting phenomena and lack of associated theory; this gives the researcher flexibility.
- Random or stratified sampling is unnecessary; cases are selected on their suitability for illuminating the concepts.

---

<sup>10</sup> Recursive cycling is a theory-building process occurring via cycling among the case data, emerging theory, and later, extant literature (Eisenhardt & Graebner, 2007).

- Multiple case studies provide a stronger base for theory building (Yin, 1994); they also result in more deeply grounded empirical evidence with more precise concepts.
- Use of “extreme” cases that are polar opposites is beneficial.
- Interviewer bias is controlled for by diverse perspectives of interviewees and using retrospective and real-time cases.
- Stronger theory comes from “pooling” the case data rather than isolating each case; the challenge becomes that you lose the “interesting” story, but gain strength in theory. Write a good theory, not necessarily a good story.
- Tell the theory story in many different means; use narrative, graphic models and tables.

Eisenhardt and Graebner (2007, p. 30) challenge the qualitative researcher to find fresh theory bridging well from rich qualitative data into mainstream deductive research. Through the strategies mentioned within this Chapter, I concentrated on ensuring that this research sought to comply with these major points. Specifically, this research relied upon recursive cycling, the identification of research gaps, smart sampling of cases to illuminate interesting concepts, controlling interviewer bias, and pooling the data to develop a “good” theory. One area where this research has limits is in sampling routine crisis cases. As discussed earlier, I studied extreme event cases.

#### Data Collection - Doing the Dirty Work – Organizing Chaos

Conger (1998) calls it the dirty work of research, organizing the data. After collecting hundreds of pages interview transcripts, observation notes, company records and other information, it all must be organized into something useable. Conger (1998) strives to follow the guidance of Glaser and Strauss (1967) in developing a continual integrating process of data review, analysis, comparison and result finding to synthesize

the information. Even with an efficient coding process and continual streamlining of the data, the work is laborious. Since the work of Conger (1998) computer software has improved the efficiency of the data (Lewins & Silver, 2007; Friese, 2012). Yet it remains a strenuous process. Conger (1998) concludes that even with the intensity of qualitative methods, the richness the method brings to the development of theory is worth doing the dirty work needed to expose new ideas and interrelationships of leadership.

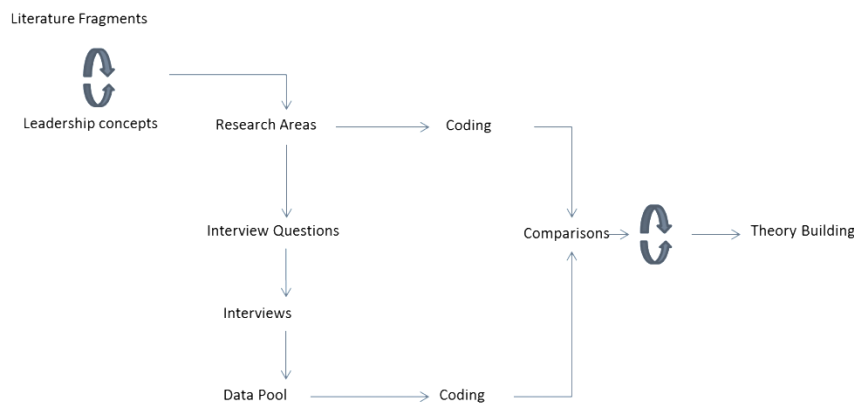
Of course, there are benefits and challenges (Glaser, 2007, 2011; Wolfe, et al. 1993; Kelle, 1995; Gephart & Wolfe, 1989) with the use of software to conduct qualitative data analysis (QDA). In his work, Glaser (2007, 2011) strenuously opposes the use of software for the grounded theory method; Glaser (2007, 2011) is not opposed to its use in the QDA method. Glaser (2007, 2011) opposes the mixing of QDA and grounded theory methods. Glaser's (2007, 2011) reluctance to use software comes from the concern that the richness of data will be lost and that the mechanical nature of software coding dilutes the influence of the researcher's memoing.

Others (Wolfe, et al. 1993; Kelle, 1995) support using software for coding while acknowledging the challenges. Wolfe, et al. (1993) and Kelle (1995) recognize that software cannot use intuition and reasoning. Wolfe, et al. (1992) and Kelle (1995) do however believe that software can facilitate intuition, reasoning by offering a systematic, timely, and exhaustive analysis of data. Wolfe, et al. (1993) and Kelle (1995) also see the benefits of presentation, manipulation and analysis offered by software including the potential to identify linkages not envisioned by the researcher.

Using microcomputer storage methods has distinct advantages. As an advantage, Gephart and Wolfe (1989) offer that data storage systems allow for the collection of large

amounts of data without losing the natural occurring meanings. Data storage allows for concepts and meanings to emerge from the data and allows for managerial management of the data. In effect, Gephart & Wolfe (1989) see software as a merger between qualitative and quantitative research. In addition, Gephart (1997) acknowledges that software allows the research to “pool” the data from the context and then recombine the subsequent analysis back with the context to provide descriptions or examples of the analysis.

**Figure 3 - Data Gathering Flowpath**



Source: Casto (2013)

For this dissertation, I followed the systematic data collection techniques of coding and memoing. Given that the semi-structured interviews generated significant data, I coded the data with the support of computer software (Atlas.ti). Next, I classified the data into categories and themes (I mention some practices throughout this dissertation). I continued to collect data to “ground” my observations and substantiate the emergent themes. This iterative process will sustain the inductive approach to

generating theory from data. Figure 3 depicts the overall data gathering flowpath for this research.

**Table 3 - Key Data Collection Process Terms**

TERM	Description
Theoretical sensitivity	The ability to generate concepts from data and to relate them according to normal models of theory in general, and theory development in sociology in particular.
All is data	Any data is good as long as it is qualitative.
Theoretical coding	Incidents articulated in the data are analyzed and coded, using the constant comparative method, to generate initially substantive, and later theoretical, categories. This is the conceptualization process.
Open coding	The minimum of preconception, using as many codes as necessary.
Theoretical sampling	Data collection for generating theory whereby the analyst jointly collects codes and analyses the data and decides what data to collect next and where to find them, in order to develop the theory as it emerges. The process of data collection is controlled by the emerging Theory.
Constant comparative method	The process involves three types of comparison: Incidents are compared to incidents; concepts are compared to more incidents; and concepts are compared to concepts. The purpose is theoretical elaboration, saturation and verification of concepts, densification of concepts by developing their properties and generation of further concepts. Further, to establish the best fit of many choices of concepts to a set of indicators, the conceptual levels between the concepts that refer to the same set of indicators and the integration into hypotheses between the concepts, which becomes the theory,
Core variable	After constant comparison, a core category begins to emerge. This core variable, which appears to account for most of the variation around the concern or problem that is the focus of the study, becomes the focus of further selective data collection.
Selective coding	Selective coding means to cease open coding and to delimit coding to only those variables that relate to the core variable in sufficiently significant ways as to produce a parsimonious theory.
Delimiting	Subsequent data collection and coding is thereby delimited to that which is relevant to the emergent conceptual framework. This selective data collection and analysis continues until the researcher has sufficiently elaborated and integrated the core variable, its properties and its theoretical connections to other relevant categories.
Interchangeability of indicators	GT is based on a concept-indicator model of constant comparisons of incidents (indicators) to incidents (indicators) and, once a conceptual code is generated, of incidents (indicators) to emerging concept.
Pacing	Increments of coding, analyzing and collecting data cook and mature and then blossom later into theoretical memos.
Memoing	Memos are theoretical notes about the data and the conceptual connections between categories.
Sorting and writing up	Once the researcher has achieved theoretical saturation of the categories, he/she proceeds to review, sort and integrate the numerous memos related to the core category, its properties and related categories. The sorted memos generate a theoretical outline, or conceptual framework, for the full articulation of the GT through an integrated set of hypotheses.
Analytic rules developed during sorting	While theoretical coding establishes the relationship among variables, analytic rules guide the construction of the theory as it emerges. They guide the theoretical sorting and subsequent writing of the theory. Analytic rules detail operations, specify foci, delimit and select use of the data and concepts, act as reminders of what to do and keep track of and provide the necessary discipline for sticking to and keeping track of the central theme as the total theory is generated.

Source: Glaser and Holton (2007)

As a reference, definition of key process terms is appropriate. Borrowing from Glaser with Holton (2007), Table 3 reflects some key process terms from the grounded theory approach. These key process terms are useful to organize the process as this

dissertation proceeds through data collection. I will review to these terms as appropriate in the next subsection of this dissertation.

### *Coding and Memoing*

The goal of coding is to disaggregate the interview data then build it back in a different form (Glaser & Holton, 2004). By breaking them down, the data become independent of the case and take on a neutral form (Glaser & Holton, 2004). Coding allows the data to be put back together in a form that might allow new theories to emerge (Glaser & Holton, 2004). The codes can be generated either top-down, i.e., from the literature to the data, or bottom-up, i.e., from the data to the literature (Edwards, 1993). In this research, I used both top-down and bottom-up coding as depicted in Figures 1 & 3 (refer to Figures 1 & 3 for the comparative flowpath process used in this research). Key to the grounded approach is the comparative analysis process (Glaser & Strauss, 1967). The comparative process consists of three stages. First, I compared the data from each event (across events) as code-to-code. One goal was to gather as much data as possible, through multiple interviews. Of course, the more interviews there are, the more variability will likely occur and the more time consuming and difficult the research becomes. Obviously, many codes emerged from these three events. As those codes emerged, I sought to find relational groupings to minimize the data scatter. As groupings appear, the second step is to add in the data from the next event to validate the group. A final step is to compare groups to groups to seek new insights from the data and to reduce duplication among the groups (Glaser & Holton, 2004).

This constant comparative method is fundamental to grounding the research. It brings out the richness of the data and allows the researcher to discover insights that

ground the potential theory. In this case, I used the comparative method to validate existing theories, as described in the literature review, and to identify new theories.

Throughout the process, it was useful to keep research notes regarding the rationale behind the groupings (coding). This documentation process is almost as essential as the data themselves. NOTE: There is a difference between memoing and defining codes. Typically, the researcher records the definition of the codes in a codebook. However, typically the research uses memoing to describe ideas or insights discovered while looking at relationships among codes or categories. The identification of the relationships between groupings is where new theory might emerge. Locke (2001) calls this the “memoing” process. Researchers keep memos about the relationships or linkages between groups and ultimately these relationships or links become the foundation for the new theory. The general areas of research are generated from the research gaps or threads and leadership concepts identified in the literature review. These research areas serve two primary purposes. First, research areas guide the development of basic/ preliminary interview questions that allow for interview flexibility. Second, I used the research areas to facilitate the development of some codes based on extant literature that is used to analyze the data. Essentially, the literature-based coding provided me with the “book answer” to crisis leadership in an extreme event. In addition, I generated codes from the data pool resulting from the actual interviews and other sources of information. In the end, I compared the two codings, i.e., the literature-based coding and evidence-based coding, by using the recursive cycling technique. From this comparison, conclusions were extracted that provided general insights towards an integrated theory of extreme crisis leadership.



This dissertation involved both a top-down and bottom-up approach to data analysis. Appendix E identifies the leadership concepts associated with the nine research areas. Each of the research areas has associated leadership concepts. These concepts helped explore the interview questions. You can view these Research Areas as the opening conversation. Research areas are the areas of interest exposed by the literature. The interview itself then takes a direction either consistent with these concepts or it will begin a dialogue in different concepts. That is the purpose of the qualitative approach.

**Table 4 – Codings**

Codings from Literature	Codings from Data	Differences in Codings
Trust		
Command & Control (readiness)		
Sensemaking		
Executive tasks		
Effective leadership		
Leadership efficacy - Self-efficacy		
Leader character as a locus - Character-based leadership, context and consequences		
Contextualized leadership in extreme events		
Ambiguity		
Extreme leadership		
Interdisciplinary, multilevel model of leadership and team dynamics		

Source: Casto (2013)

Table 4 is an example of the coding process. Table 4 provides examples of the codings concepts associated with the nine research areas. As I identified new concepts during the interviews, I generated new codings. Those would were listed in the Column “Codings from Data”. Ultimately, differences and similarities were explored in the last column, also remembering that a key to the success for the grounded approach is “memoing” by the researcher. Describing the thought process behind both the coding and the analysis is crucial in the discovery of new theory.

### *Sample*

As discussed in the literature review, because of the nature of extreme events, past research has primarily focused on routine crises as samples in qualitative work. This includes samples in case study research as well. Because of the rarity of extreme events, and the work involved in studying those events, relatively little research exists in this area. This dissertation tried to expand extreme event research by exploring multiple extreme events. The sample used was rich and purposeful. As discussed by Guest, Bunce and Johnson (2006) a purposeful sample is a deliberately selected sample where the researcher believes it is representative. In order to better assure representation, my research consisted of three extreme event types. Those events were chosen based upon the applicability to the extreme event characteristics, the access to information, and the variety of events. There are a number of extreme events that I used in this study including: a natural event (e.g., Hurricane Katrina in 2005), an artificial or man-made event (the Three Mile Island nuclear event in 1979, or the Deepwater Horizon oil rig explosion in 2010), or a natural event that leads to an artificial event (the Great Japanese Earthquake and Fukushima nuclear accident in 2011). These three types of events give the most purposeful sample that I could postulate given the resources at my disposal. Before selecting the specific events, I continued to generate my theoretical sampling process because ex-ante I was not certain of the access that I had for specific interviews, e.g., the Three Mile Island accident, for memories have likely faded.

My personal experience includes over 30 years in the nuclear power business. More importantly I was the lead US federal executive in Japan for the Fukushima nuclear event. Therefore the potential for researcher bias does exist for the Fukushima event.

Thus, I included multiple cases in my sample selection and select interview targets that provided the best theoretical sampling for the dissertation thereby controlling for researcher bias.

In qualitative work, sample size is less a matter of quantity and more a matter of quality of information gained from the sample (Crouch & McKenzie, 2006; Morse, 2000). In addition, Morse (1995) suggests that there are not exact guidelines for reaching the saturation point<sup>11</sup> (refer to Section 3.2.4 for further discussion on saturation). One study (Guest, et al. 2006) finds that twelve interviews are likely to produce a purposeful and homogeneous sample. For this research, I targeted nine specific interviews and expected that at least three additional interviews would be developed from the initial set of planned interviews. I will allowed for a potential of many more interviews to emerge during the research. In the allowing for recursive cycling and saturation techniques the resultant number of interviews was 19, in addition, there were secondary sources.

My criteria for sample determination were both the breath of applicable theories and the variance for the interviews. Table 5 – Applicability of Extreme Event Characteristics, lists the major characteristics associated with the three major extreme event types (natural, artificial and natural leading to artificial).

---

<sup>11</sup> Theoretical saturation is simply the point at which incremental learning is minimal because the researchers are observing phenomena seen before (Glaser and Strauss, 1967).

**Table 5 - Applicability of Extreme Event Characteristics**

Characteristics	Natural Event (e.g. Hurricanes)	Artificial Event (e.g. Three Mile Island or Deepwater Horizon)	Natural + Artificial Events (Great Japan earthquake & nuclear event)
Transboundary	Limited	Limited	Potentially
Sensemaking	Limited	High	High
Failure/Complexity	Limited	High	High
Readiness	High	Potentially	Low
Extreme with Ground-zero	No	Potentially	No
Extreme without Ground-zero	Yes	Potentially	Potentially

Source: Casto (2013)

Table 5 lists each characteristic as it applies to the event (i.e., has no applicability, limited applicability, potential applicability or has high applicability). This overview facilitates the determination of required interviews (sample size). Generally, I initially propose interviews for those situations where the characteristics either have: limited, potential, or high applicability to the extreme event or a combination of those situations. In cases where the characteristics have no applicability to the extreme event there is little of interest; therefore, I eliminate these situations. After consolidating the characteristics into four major areas of interest, i.e., Transboundary, failure theories, ground-zero events and cross-cases (including counterpoints of each case), Table 6 – Matrix of Targeted Interviews – gives the most suitable representative sample of the extreme event theories.

**Table 6 – Matrix of Targeted Interviews**

	Natural Event (e.g. Hurricanes)	Artificial Event (e.g. Three Mile Island or Deepwater Horizon)	Natural + Artificial Events (Great Japan earthquake & nuclear event)
Transboundary	Limited	Limited	Potentially Interview (1)
Sensemaking	Limited Limited High Interview (2)	High High Potentially Interview (3)	High High Low Interview (4)
Failure/Complexity			
Readiness			
Extreme with Ground-zero	No	Potentially	No
Extreme without Ground-zero	Yes Interview (5)	Potentially Interview (6)	Potentially Interview (7)
Cross-cases	Interview – National Leader (8)		
	Interview – 1 <sup>st</sup> Responder (9)		

Source: Casto (2014)

Further, Table 6 – Matrix of Targeted Interviews and Table 7 – Interview Sample Matrix provide the specific level of leader targeted for the nine interviews. I chose the specific leadership levels on the bases of their closeness to the event. In addition, I chose them to provide the variance among the leadership levels. Additionally, to aid in triangulation, cross-case interviews are helpful for theoretical sampling<sup>12</sup>, and I depict those at the bottom of Table 7.

<sup>12</sup> In theoretical sampling, the sample choices are chosen by their contribution to theory development and less on the case uniqueness (Yin, 1994 as discussed in Eisenhardt, et al. 2007).

**Table 7 - Interview Sample Matrix – Variance**

	Natural Event (e.g. Hurricanes)	Artificial Event (e.g. Three Mile Island or Deepwater Horizon)	Natural + Artificial Events (e.g. Great Japan earthquake & nuclear event)
Transboundary			Interview (1) Senior Government Leader
Sensemaking Failure/Complexity Readiness	Interview (2) Electric Utility Operator	Interview (3) Governor's Office	Interview (4) On-scene leader (military or corporate)
Extreme with Ground-zero Extreme without Ground-zero	Interview (5) State Emergency Management Director	Interview (6) On-scene leader	Interview (7) Social Organization
Cross-cases	Interview – National Leader (8) – White House  Interview – 1 <sup>st</sup> Responder (9) – State Police Leader		

Source: Casto (2014)

Table 7, Interview Sample Matrix, specifies the level (type) of leader who should be interviewed in each case. I chose these levels to provide a wide variance of perspectives on extreme events. For instance, because transboundary events may cross national boundaries, I targeted a national or senior government leader for an interview. Exactly which national leader depended on the access available, fortunately I was able to obtain the highest level of national response, e.g., The White House Office of Resilience. Similarly, on the cross-cases interviews, I sought the highest-level official available and first-responder e.g., state police leader. In addition, Table 7 sought for variance in government, private sector, social organizations, e.g., Red Cross, and military leaders, all of whom offer a unique perspective on extreme events. Access to these individuals was facilitated by my experience in the area of emergency management. In addition, I have unique access to White House Officials, military and electric power utility executives.

### *Interviews*

I approached the interviews in a step-wise fashion, meaning that in theoretical sampling, the researcher collects, codes, and analyzes the data, but he/she has to decide what data to collect next and where to find that data (Glaser & Strauss, 1967, p. 45). Thus, the theory emerges as the research proceeds through the process. A key to success in the interview process is to be flexible so that different insights might emerge. Theoretical sampling allowed me to follow the interviewers' suggestions for other interviewees and became new ground for future interviews. Thus, as the interviews progress, new places, individuals or situations are exposed, and I incorporated those changes into the process (Goulding, 2001).

I conducted at least the nine interviews as shown in Table 7. In the end, I conducted 19 interviews and used secondary data. I generated the preliminary/basic interview questions from the nine research areas. I used the same questions for the leaders associated with leading the extreme event and a different set of questions for the social organization leaders. I focused the questions for the social organizations in two areas because the social organizations do not actually lead the event. I designed those areas to illuminate the impact of the extreme event on the public and reflective questions that assess the acumen of the leaders who were leading the extreme event.

Use of interview transcripts and coding exposed emergent themes from the actual events, which were then compared to the themes derived from the literature review. I correlated the research areas to specific leadership concepts. I developed interview questions that would best allow me to investigate each of the nine research areas (Appendix E). The goal was to ask interview questions that would unearth insights

around those areas. My procedure, Figure 3, Data Gathering Flowchart, called for a comparison of the codings from the literature with the codings from the data. This allowed me to both address the research threads and discover new areas of theory. From those insights, an integrated general theory and specific insights about extreme crisis leadership was revealed.

Each interview was recorded (with permission) via personal interview, Skype, or telephone. I transcribed and entered each interview into Atlas.ti for coding. As a validation sample, I provided the transcripts to one interviewee. I coded the interview responses to compare them with the leadership concepts. Those correlations served as the analysis phase of my research. My analysis, subsequent conclusions, and memoing all served to form the foundation of my integrated model of crisis leadership.

#### *Theoretical Saturation*

When is enough, enough? Understanding when the research has reached its “saturation point” or “data adequacy” is essential to the reliability of the research (Morse, 1995). Two considerations aid in finding the saturation point. First, “the tighter and more restrictive the sample and the narrower and more clearly delineated the domain, the faster saturation will be achieved” (Morse, 1995, p.148). Second, Morse (1995) highlights the importance of the richness of the data. My thinking is that richness comes from quality interview questions and by allowing the data to take you where it takes you that is as a researcher, i.e., being flexible in following the data.

#### *Analysis*

Gioia, et al. (2012) offers a method for improving the rigor of grounded research. Gioia, et al. (2012) submits that there is a need for further rigor in conducting grounded



theory work. Gioia, et al. (2012) offers a model that seeks to move the method beyond merely identifying the applicable concepts. Gioia, et al. (2012) encourage researchers to move into improving the means by which research conceptualizes 1st order themes, i.e., an analysis using informant-centric terms and codes, and 2nd order themes, i.e., one using researcher-centric concepts, themes, and dimensions; thus, inspire the 1st- and 2nd-order labeling. Gioia, et al. (2012) believes that depicting the resultant relationships into graphic models improves the understanding of the reader. Further, Gioia, et al. (2012) ask qualitative researchers to write better stories that create excitement in the minds of the reader, and Gioia, et al. (2012) challenge grounded theorists to improve the writing in both the methods and results sections.

In an article on dangerous contexts, Baran and Scott (2010) address the issues of analyzing higher-order leadership thinking through qualitative methods. Previously, I discussed their call for further study in the areas of sensemaking, particularly in organizing ambiguity through framing, heedful thinking, and adjusting. Their research on near-miss reports from firefighters exposed the sensemaking used by firefighters to lead their crews. Their technique of summarizing the classification of typical leadership concepts (as discussed in the literature review) to the categories of framing, heedful thinking, and adjusting has appeal as a technique to reflect how leaders use sensemaking in complex situations. Baran and Scott's (2010) article is an example of a method to collect and categorize the data in a parallel framework of sensemaking. It was a useful reference in using the grounded theory approach for the purpose of this dissertation.

In a highly relevant stream of research, Gephart (1997) uses the interpretive textual analysis of sensemaking using a computer-supported approach. Interpretive

textual analysis (ITA) “seeks to represent and understand members’ meanings and discourse, two objectives which are increasingly important in organizational inquiry”, (Gephart, 1997, p. 584). Kelle (1995) describes interpretive textual analysis as applying QDA to understand the meaning of data and text. This is a significant twist in QDA and grounded theory in that Gephart (1997) and Kelle (1995) offer that ITA differs from QDA by establishing the understanding and meaning of the text for social actors and then developing and elaborating theory.

According to Gephart (1997), QDA can become mathematical, while in the research of sensemaking in particular, the meanings behind the social actions are most significant. QDA can establish the facts; however, to derive a richer meaning from social behavior, interpretation of those facts is needed (Gephart, 1997). This is especially true in technical situations where numbers and technical jargon can get in the way of analysis (Gephart, 1997). Interpretative analysis as founded by Shutz (1973) is a methodological strategy for identifying valid and scientific constructs by identifying constructs of the social actors involved in the event which express the actors’ actual meanings to their statements.

Specifically regarding meaning in the use of sensemaking, Weick (1995) discusses sensemaking as more of a plausibility process rather than an accuracy process. Sensemaking is about the reasonableness of the plausibility of the facts (Weick, 1995). Weick (1995) concludes that the plausibility, whether or not it perfectly meets the facts, is a key consideration for sensemaking. A story may have factual errors, but the story is plausible and makes sense (Weick, 1995). Plausible sensemaking is thus the provision of

acceptable and credible accounts which explain phenomena and energize action (Weick, 1995, p. 61). Finding these plausible accounts is the work of ITA.

ITA uses many of the same structure as QDA and actually expands QDA (Gephart, 1997). The primary structure of ITA is analysis, theoretical sampling, computer software-supported textual analysis, expansion analysis, and producing textual statistics and meaningful linkages (Gephart, 1997, p. 587). I discussed earlier in this Section, theoretical sampling and computer software. The areas where ITA and QDA depart are in the textual analysis and expansion analysis. I explain those processes herein.

Data expansion analysis is an hermeneutic approach that involves writing an interpretation (line-by-line) that show a contextual analysis to theoretical concepts operate together in a data display or representation (graphic) (Gephart, 1997). Many of the software programs, e.g., Atlas.ti, perform this task easily by delinking the statements from the context and then allow for recontextualizing the statements. An important feature of ITA is collocation statistics (Gephart, 1997) which provide a quantitative measure of the likelihood that the co-occurrence of selected key words in a text segment differs from (is more likely than) the likelihood of the words co-occurring in the overall text (p. 587). I use collocation statistics to discover meaningful linkages between keywords, discourse and behaviors. Thus, by using textual statistics and meaningful linkages the analysis (through interpretation) finds meanings behind the behavior then linking these meanings provides the basis for a theory. For this dissertation, especially with its focus on sensemaking and other cognitive theories, ITA provided a powerful

process for theory expansion and creation. As I proceeded through data collection, I sought to use of ITA.

The next section will present the data collection, coding, analysis and results. Another important activity for the researcher is to validate the process. That validation criteria and process is also included in the following subsection.

#### Data Collection – Results

Data collected for this study were primarily from personal interviews. Interviews were then transcribed and entered into an ATLAS.ti Hermeneutic Unit<sup>13</sup> for coding, memoing, and analysis. Because it was difficult to obtain interviews for one of the cases (Deepwater Horizon), secondary data including one book, an interview of a knowledgeable oilrig Captain (and coauthor of a book on Deepwater Horizon), and transcription of legal testimony were included in the dataset and used for triangulation purposes. Chapter 3.3.3 describes the interview sampling in detail.

For this dissertation, one case-specific Hermeneutic Unit was created for each case. Having one Hermeneutic Unit for each case allowed for case-specific coding and analysis; however, as each case was built, existing codes were carried forward from each case (Hermeneutic Unit) to prevent duplication of codes and facilitate the development of an emergent coding structure. Further, using separate Hermeneutic Units aided in the measurement of theoretical saturation, i.e., as cases built the number of new codes decreased indicating a decrease in new learning. Ultimately, all of the case-based Hermeneutic Units were merged into one integrated Hermeneutic Unit that covered all of

---

<sup>13</sup>Friese (2012) explains that a Hermeneutic Unit provides the data structure for each project in ATLAS.ti. The name was chosen to reflect the initial approach taken when building a support tool for data interpretation. The most basic level of a Hermeneutic Unit consists of the Primary Documents, followed closely by the “quotations” (selections from the Primary Documents). On the next level, codes refer to quotations. A Hermeneutic Unit can become a highly connected entity, a dense web of primary data, associated memos and codes, and interrelations between the codes and the data.

the case samples. For the integrated Hermeneutic Unit, there were 165 codes established to capture the essence of 1187 quotes. Every code contained a comment either regarding the context of the code or the definition of the code. A code-book was established in ATLAS.ti capturing all 165 codes with their respective comments and definitions. There are 17 memos in the Hermeneutic Units that capture insights on the research questions and other theoretical issues.

#### *Management of Coding<sup>14</sup>*

Management of coding and memoing in this dissertation was conducted using the insights from several references. These included *Analyzing Qualitative Data* (Bernard & Ryan, 2010), *Qualitative Data Analysis with ATLAS.ti* (Friese, 2012) and *Qualitative Research in the Study of Leadership* (Klenke, 2008). These references were used as the primary guidance for the establishment of codes and memos (Note: The actual coding comes from the data, i.e., bottom-up. These references served to help establish a coding infrastructure/framework). Content analysis was aided greatly by the Bernard & Ryan (2010) book which focuses on the proper methods of analyzing qualitative data to provide meaning. The Friese (2012) book served as guidance on structuring codes and memos, providing extensive and valuable suggestions on building the ATLAS.ti infrastructure. The Klenke (2008) book served as a valuable guide in content coding for leadership. Its focus on narrative analysis and content analysis gave leadership meanings to the infrastructure created by the Friese (2012) book. These three resources were instrumental in establishing meaningful codes, memos and the proper infrastructure for the ATLAS.ti Hermeneutic Units.

---

<sup>14</sup> Refer to Chapter 3.2.1 for coding definitions and processes.

Also, the structure outlined in Chapter 3.2.1, Coding and Memoing, was used as a guide throughout the process of data collection. As discussed, that guidance includes top-down and bottom-up analyses, use of the constant comparative method to bring out the richness of the data, and memoing. As stated in Chapter 3.2.1, these techniques are crucial in the discovery of new theory.

Before codes and memos were established, the data was read to identify meaningful quotations (Friese, 2012). Each transcript was read line-by-line to identify sentences or phrases that gave meaning to leadership in extreme events. For this dissertation, there were 1187 quotations identified which provided some insight into the interviewees' thoughts on extreme crisis leadership. As suggested by Friese (2012), every sentence that an interviewee stated, even introductions and salutations, are considered as potential quotations. In some cases those opening and closing sentences did provide insights into the interviewee's demeanor or experiences associated with the event under discussion. Those quotations were coded as well. No statement by the interviewee was "left off the table". Furthermore, each quotation was "renamed" in ATLAS.ti in a short title format that allowed for easy reference to the quotation. Those titles became useful in the analysis phase as a bridge between the coding and the quotation.

Establishing specific codes and memos came after reading the quotation. The researcher established either one or more codes that capture the essence of the quotation. Prior experience can help a researcher define specific codes while considering the interviewee's perspective; refer to discussion in Chapter 3.2.2 regarding my personal experiences (Friese, 2012). Also, knowing individual constructs in the literature helps

the researcher to establish and define codes (Friese, 2012). It is important, however, to keep eventual biases in check and “let the data speak” instead of imposing preconceived notions on the emergent insights (Gioia, et al. 2012). In the end, there is a blending of experience and literature that aids the definition of codes.

### *Sampling*

As described in Chapter 3.2.2 Sampling, multiple data sources were included in the dataset to ensure rich and purposeful data (Guest et al., 2006). As discussed in Chapter 3.2.2, this dissertation included three sample event categories; i.e., natural events, artificial, i.e., manmade events, and a natural event that leads to an artificial i.e., manmade event. Those sample event categories were based upon the criteria set out in Chapter 3.2.2, which provided for an appropriate amount of variance. In accordance with Chapter 3, Table 5 – Applicability of Extreme Event Characteristics, each sample was screened for applicability as an extreme event. From the identified samples, specific interview subjects were chosen. Chapter 3, Table 6 – Matrix of Targeted Interviews and Table 7 – Interview Sample Matrix provide the foundation for both theoretical sampling and the variance in the sample data.

As discussed in Chapter 3.2.2, Table 6 – (replicated below) a specific set of interview targets was identified to provide data on specific extreme event theories. After consolidating the characteristics into four major areas of interest, i.e., Transboundary, Failure theories, ground-zero events and cross-cases (including counterpoints of each case), Table 6 – Matrix of Targeted Interviews – gives a suitable representative sample of the extreme event theories.

**Table 6 – Matrix of Targeted Interviews**

	Natural Event (e.g. Hurricanes)	Artificial Event (e.g. Three Mile Island or Deepwater Horizon)	Natural + Artificial Events (Great Japan earthquake & nuclear event)
Transboundary	Limited	Limited	Potentially Interview (1)
Sensemaking	Limited Limited High	High High Potentially	High High Low
Failure/Complexity	Interview (2)	Interview (3)	Interview (4)
Readiness			
Extreme with Ground-zero	No	Potentially	No
Extreme without Ground-zero	Yes Interview (5)	Potentially Interview (6)	Potentially Interview (7)
Cross-cases	Interview – National Leader (8)		
	Interview – 1 <sup>st</sup> Responder (9)		

Furthermore, to ensure adequate variance in perspectives and experience, a specific hierarchy of interviewees was envisioned as discussed in Chapter 3, subchapter 3.2.2. See Table 7 – Interview Sample Matrix – Variance, from Chapter 3, replicated below, for the specific hierarchy. The actual dataset used adhered to this proposed hierarchy (refer to description below). For the Natural Events (e.g., Hurricanes) and the cross-case events, i.e., non-case specific, the interviewee sample included a first responder at the State level (State Police Colonel for Super Storm Sandy); and several White House Situation Room Directors, along with an Electric Utility operator. With regard to the artificial, i.e., manmade, events, Three Mile Island and Deepwater Horizon, the interviewees included first responders, the Governor, and White House Situation Room Leaders; however, as stated earlier, for triangulation purposes some secondary data was used for Deepwater Horizon. This approach for the Deepwater Horizon event was necessary because of the lack of access to rig personnel due to ongoing Grand Jury



proceedings. Regarding the natural and artificial, i.e., manmade, event, interviews in the dataset included first responders, military leaders, politicians, and a respected journalist. Additionally, for cross-case analysis, i.e., not a specific event, instead individuals with experience with many events, the interviewees include one senior U.S. military leader (Admiral) and an Executive Vice President of the Red Cross.

**Table 7 - Interview Sample Matrix – Variance**

	Natural Event (e.g. Hurricanes)	Artificial Event (e.g. Three Mile Island or Deepwater Horizon)	Natural + Artificial Events (e.g. Great Japan earthquake & nuclear event)
Transboundary			Interview (1) Senior Government Leader
Sensemaking Failure/Complexity Readiness	Interview (2) Electric Utility Operator	Interview (3) Governor's Office	Interview (4) On-scene leader (military or corporate)
Extreme with Ground-zero Extreme without Ground-zero	Interview (5) State Emergency Management Director	Interview (6) On-scene leader	Interview (7) Social Organization
Cross-cases	Interview – National Leader (8) – White House  Interview – 1 <sup>st</sup> Responder (9) – State Police Leader		

In the data collection process, this dissertation exceeded the number of interviews in most categories. For natural event, there are six interviewees; for artificial event, i.e., manmade, there are seven interviewees; and for natural event leading to artificial, i.e., manmade event there are five interviewees. In summary, the actual interviews conducted (Table 8) include the following individuals.

**Table 8 – Matrix of Actual Interview Subjects**

Event Name	Natural Event	Artificial Event	Natural + Artificial Event
Super Storm Sandy	Commander New Jersey State Police (Ref. JH) and White House Situation Room staff and electric utility executive (see cross-case list below)		
Three Mile Island		Lead Presidential Responder (Ref. HD) Governor of Pennsylvania (Ref. DT)	
Deepwater Horizon		Fleet Captain Secondary data – 4 transcripts (including Captain, Oilman in charge, and two key staff members) and one book (Fire on the Horizon, Shroder, et al. 2011) (Leaders: Ref. CK, JH Crew Ref. CP, AM Ref. Fire on Horizon JK)	
Fukushima			On-scene commanders (3) (Ref. IN, IZ, MA) Prime Minister’s representative (Ref. GH) Journalist (Ref. YF)
Cross-Case	White House Situation Room leadership (2) (Ref. OD, JB) Executive Vice President of Red Cross (Ref. RR) Admiral – (Ref. RW) President of a Large Coastal Utility (Ref. SS)		

Consistent with the proposal in Chapter 3.2.2, the interview samples are provided in Table 8. For each case there is at least one first responder interview and at least one

senior level official interview. This approach helps with providing variance in the dataset. Furthermore, the cross-case interviews, in addition to providing many leadership insights, provide insights into the transboundary issues associated with extreme events.

Further, with regard to sample structure, throughout Chapters 4 and 5, this dissertation provides references for each quotation. Those references are from the individual interview transcripts. The reference, cited as “Ref” refers to an individual interview. In Table 8 there is a reference initial for each interview, e.g., RW. Thus, in the narratives a citation of “Ref. RW” refers to the interviewee RW as marked in Table 8<sup>15</sup>.

#### *Interview Process*

In the dataset, there are 19 interviews along with the secondary data. Interviews lasted from one hour to two hours. All interviews were transcribed and entered as Primary Documents into ATLAS.ti through a Hermeneutic Unit for each case. Interview questions were primarily open-ended and were included in the transcripts. All but three interviews (including all of the Japanese interviews) were conducted face-to-face in a conference room or office setting. There were three telephone interviews. The telephone interviews were: interview OD for the cross-case sample, JH for Super Storm Sandy, and DT for the Three Mile Island event. For the interviews in Japan, even though there was an interpreter present, all interviews were transcribed from the Japanese speaker to English. The interpreter’s words were not included in the data.

---

<sup>15</sup> For purpose of autonomy, consistent with the interview agreement, actual names are not used in this dissertation. This coding is used to autotomize the individuals.

### *Theoretical Saturation*

As discussed in Chapter 3.2.2, Sample, theoretical saturation<sup>16</sup> is about quality – not quantity – in qualitative research. Guest et al. (2006) find that twelve interviews are likely to produce a sufficient sample for qualitative research. As discussed in Chapter 3.2.2, the original goal for this dissertation was nine interviews; however, allowing for recursive cycling and reaching the saturation point, the final sample is 19 with additional secondary data of four courtroom transcripts, a book (Shroder, et al. 2011), and interviews with an independent, knowledgeable oilrig Captain (and co-author of the book on Deepwater Horizon).

For this dissertation, the ATLAS.ti structure used separate Hermeneutic Units for each case, which aided in the determination of theoretical saturation. As each case is built, the codes are collected and advanced to the next case; therefore, the researcher can assess exactly the number of codes added by successive cases. As the interviews built, and the Hermeneutic Units were created, fewer and fewer new codes were created. Other methods for determining the theoretical saturation point include assessing the cross-loading of codes, use of the co-occurrence analysis tool in ATLAS.ti which depicts the embedded nature of similar codes and potentially through the use of the “word cloud” feature in ATLAS.ti which shows the frequency of each word in the transcripts (Frieze, 2012). The word cloud gives a researcher the ability to assess the most frequently mentioned operative words. If certain words dominate, there is little benefit in continuing with more interviews (Guest et al. 2006). Theoretical saturation is simply the

---

<sup>16</sup> Theoretical saturation is simply the point at which incremental learning is minimal because the researchers are observing phenomena seen before (Glaser & Strauss, 1967).

point at which incremental learning is minimal because the researchers are observing phenomena seen before (Glaser and Strauss, 1967).

### *Interviewer Bias*

Researcher bias is discussed in Chapters 3.1.1 and 3.1.4. In Chapter 3.1.1 many authors (Perry, 1998; Conger, 1998; Bryman, 2004) discuss the challenges with researcher bias for those researchers using the qualitative approach. Those methodological issues were addressed in Chapter 3.1.1. In Chapter 3.1.4, the challenge of controlling researcher bias in the interview process was discussed. As listed in Chapter 3.1.4, Eisenhardt and Graebner (2007) suggest controls for researcher bias from interview data. Major points that Eisenhardt and Graebner (2007) suggest with regard to researcher bias in the data collection and analysis process include:

- Use of diverse perspectives of interviewees and using retrospective and real-time cases
- Stronger theory comes from “pooling” the case data rather than isolating each case; the challenge becomes that you lose the “interesting” story, but gain strength in theory. Write a good theory, not necessarily a good story
- Tell the theory story in many different means; use narrative, graphic models and tables

Further, Eisenhardt (2007) suggests that a technique used to control for researcher bias is through the use of “highly knowledgeable informants” and maintaining extensive ties to the appropriate literature also helps control for bias as well. These suggestions were considered throughout the data collection process. For each of the extreme event cases, except for the Three Mile Island case, data was collected from at least three interviewees.

All of the extreme event cases were “pooled” into one data-set. The data itself was analyzed using multiple analytical methods, Chapter 4.

## CHAPTER 4: RESULTS AND MODEL DEVELOPMENT

This chapter presents the data analyses and results of the interviews conducted as described in Chapter 3: “Methods and Qualitative Design”. The approach used in this dissertation as detailed in Chapter 3 was both, a “bottom-up” and “top-down” process whereby a theoretical model and the associated insights derive from the data and were compared to existent, relevant literature. This Chapter presents the results of the data analysis. The discussion in Chapter 5 is intended to examine existing and associated theoretical models to identify the similarities, weaknesses, imperfections, and new territories.

### Preview of Results

As a preview, Chapter 4 will reveal six important crisis concepts of extreme event leadership that emerged from the data. Those six crisis concepts were (1) Situational Context, i.e., the fathomable and unfathomable impacts associated with the event and the organization’s ability to respond to those impacts; (2) Felt Emotions<sup>17</sup>, i.e., the effectual influence of traumatic or unfathomable events on leaders/leadership; (3) Crisis Response, i.e., the management of response; (4) Sense-making implications; (5) Decision-making; and (6) Leadership. The data suggested that felt emotions cause significant alterations in normal leadership responses during an extreme event including instances of inducing emotions of strong defiance among leaders and followers. Also, the data suggested:

---

<sup>17</sup> The role of felt emotion in extreme event leadership is discussed in Chapter 2.8.1.4.

- That the situational context is unique for each extreme event.
- That the concept of “crisis response” has a significant influence on successful outcomes of an extreme event.
- That the actual event cases evoke more emotion in the first responders than in the senior level officials.

With regard to decision-making, this research revealed a number of insights in terms of the efficacy and efficiency of the decision-making process in extreme events. Finally, for leadership in extreme events, a number of crisis concepts were reviewed related to the extreme event leadership.

#### Approaches to Qualitative Analysis

In qualitative literature, there are many potential approaches to generate theory from data. While approaches to the analysis phase can vary, the literature provides a general process for grounding the theory in the data. Primarily, this dissertation followed the approach outlined by Gioia et al. (2012). Gioia et al. (2012) offer clear guidance on the approach to be adopted through a three-order analysis. Some of the key approaches discussed by Gioia et al. (2012) include using an iterative approach to interviewing and analysis, i.e., interviews inform the coding and the coding informs the subsequent interviews in a recursive process. Gioia et al. (2012) suggest that 10 interviews can generate as many as 50 to 100 so-called “first-order” concepts. The first-order analysis suggests that the researcher should adhere faithfully to the interviewee’s phrases and terms; therefore, using a liberal number of first-order concepts. In this dissertation, the



research proposal targeted nine interviews. With recursive cycling and theoretical saturation there were 19 interviews, which generated a total of 165 first-order codes. As the research progressed, the number of codes increased significantly, implying that the researcher kept faithful adherence to the interviewee's phrases and terms giving them unique codes.

Once the researcher embarks on successive interviews, Gioia et al. (2012) suggest that there arises the need to see the common themes and crisis concepts that emerge from the collated data. Thus, the researcher can initiate the "theoretical sampling process" (refer to Chapter 3). In theoretical sampling, there is an overlap between the different orders of analysis, especially the second and third-order analyses. As each order of analysis progresses, the researcher begins to recognize the start of the next order of analysis, i.e., theoretical sampling occurs as the interview progresses and the researcher asks the question, "What's going on here?" (Gioia, 2012, p. 20). This commences the "second-order" analysis as suggested by Gioia et al. (2012). In the second-order analysis, the number of codes narrows down significantly to usually around 25 to 30. Gioia et al. (2012) suggest that this narrowing is the theoretical sampling piece that leads to the third-order analysis of "aggregate dimensions".

Finally, in the third-order analysis, the researcher introduces the relevant literature and starts recursive cycling (Chapter 3, Section 1.4) between the data, themes, concepts, dimensions, and the relevant literature. This cycling also serves a purpose in identifying the past precedents in the literature through the top-down process while the gaps in the literature begin to reveal new concepts. Ultimately, the researcher hones in on the new

concepts in the “findings” chapter to enable examination by other researchers and create a point from where further research can take off.

This dissertation followed Gioia et al.’s (2012) approach of incorporating the three-orders of analyses. In identifying those 165 first-order codes, I tried to comply with Gioia et al.’s (2012) admonition to maintain close fidelity with the interviewees’ comments. Each interview identified and captured the germane concept mentioned by the interviewee as a code (refer to the detailed description of coding and memoing in Chapter 3 section 3.1). After a peak in the number of codes, and after a reasonable number of interviews, the researcher found himself between the first- and second-order coding with each successive interview generating fewer codes. This has been termed the saturation process (refer to Chapter 3, subchapter 2.2). The challenge for the researcher is to remain open to new codes and refrain from immediately limiting the number of codes. On the other hand, the second-order analysis starts during the course of the first-order analysis. If the researcher waits until all the interviews are completed to begin the second-order analysis, the number of interviews could be infinite much before any conclusion has been reached while the extra interviews would not add value to the data.

For this dissertation, the first attempt at a second-order analysis resulted in 23 major second-order themes (refer to Chapter 3 subsection 3.3). This is less than Gioia et al.’s (2012) suggestion that the number of second-order codes should be between 25 and 30. While that deviation was true for my early attempts at second-order themes, the categorizations changed with continued analysis. Specifically, Chapter 4, subsection 2.4 details the means in which 23 second-order themes produced eight third-order concepts. The difference between the original number of second-order themes in this dissertation

and Gioia et al.'s (2012) guideline is driven by several factors. Those factors are primarily related to the continued recursive cycling with the literature and through the use of the ATLAS.ti co-occurrence process which was not used by Gioia et al. (2012). Chapter 4 subsection 4.2 (Approaches to Qualitative Analysis) elaborates this cycling process.

The subsequent subchapters discuss the validity of the coding and the correlations between them. Significant results emerge when using the bottom-up methodology for data collection and the third-order analysis process. These results have also been discussed in Chapter 3, subsection 3.3.1.

#### *Code Linking*

ATLAS.ti is a powerful software tool that allows the researcher to establish codes, memos, comments, code networks, and use many other features to organize data. However, the cautions mentioned by Friese (2012) are important to ensure a clean and organized system to prevent what she calls the “code swamp”. The researcher initially establishes a code in ATLAS.ti. This code is subsequently linked to a second-order and perhaps, a third-order code. Further, the researcher might add comments or memos to the code. Establishing an organized Hermeneutic Unit is essential for maintaining data fidelity and enabling second- and third-order analyses. An example of code linking for this dissertation<sup>18</sup> is presented below:

**Code: Felt\_emotions\_crisis\_response\_Calmness {76-5}~**  
Comment: Calmness of the leader. Opposite of panic.  
<is part of> crisis\_response\_(in)ffectiveness  
<is associated with> Felt Emotions

---

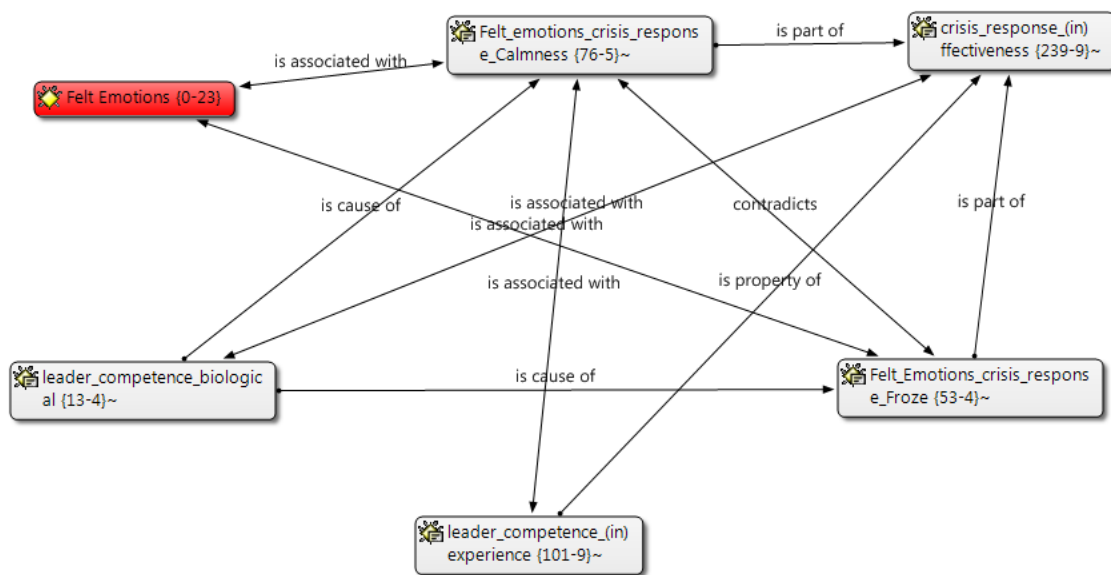
<sup>18</sup> See Chapter 3.3.1 for specific examples of how quotations are coded.

The code is “Felt\_emotions\_crisis\_response\_Calmness” and has been established by the researcher. First, the code refers to a category of “felt emotions” and is also associated with the crisis response. The felt emotion is “calmness”. Thus, the code string is created as “Felt\_Emotions\_Crisis\_response\_Calmness”. Further, there was a “comment” field in this code written by the researcher as a reminder or for adding clarifications or comments. Links are established to other codes and perhaps, second- and third-order codes. In this case, the “Felt\_Emotions\_crisis\_response\_calmness” code was linked to five other concepts, four of which were first-order concepts and one is “Felt emotions” which is a second-order theme. Also, listed after the code, in parentheses, are the measures for code groundedness and density (76-5) where 76 indicates the number of quotes associated with groundedness, i. e. the number of quotations to which the code is applied, while 5 refers to the number of second-order codes linked to density, i.e., the number of links to other codes. Also, each link has a “relationship”, e.g., <contradicts>, as defined by the researcher. This relationship is used in the network view (see Section 4.2.2 for a description of code networks) to describe the relationship between the codes. It is most useful in establishing the links between the first- and second-order codes. Note that the tilde after the “(76-5) ~” above, indicates that there is a comment for this code. This coding process is duplicated for all 1187 quotes, 165 codes and the first- to third-order codes. The analysis/results for the Hermeneutic Unit were derived from these relationships.

### Code Network

In this dissertation, initially the 165 codes were organized into eight second-order themes (see Chapter 3, subsection 3.3). All of the second-order themes are linked through a relationship editor that enables the researcher to describe the relationship between the code and a coded network. The code example above: “Felt\_emotions\_crisis\_response\_Calmness” looks like this in ATLAS.ti network view:

**Figure 4 – Example Code Network**



Note that the code “Felt Emotions” in Figure 4 is the highest order code (which is why it is highlighted in red) and its groundedness and density are (0-23). This means that “Felt Emotions” is a second-order code; hence, the first number is zero and it subsumes 23 first-order codes. The symbol inside the rectangle means that there is a memo associated with this code that describes its theoretical linkages with the literature, e.g., a research question discussed in Chapter 2. Ultimately, second-order codes are analyzed

using the analysis tools in ATLAS.ti to produce third-order codes and relationships that build the results.

### *Code Co-occurrence*<sup>19</sup>

The use of co-occurrence is critical to code integration because it enables the discovery of meaningful relationships and themes among the codes in that the software seeks instances where the codes intersect or have similar meanings. As a starting point for the second-order analysis of the data, a global co-occurrence matrix was generated in ATLAS.ti. As a means to understand the overall perspective of the codes, the co-occurrence query in this first analysis included all 165 codes that were queried against all other codes. Essentially, this query finds cases where codes intersect or have common codes. The specific query involves 165x165 codes and seeks to combine concepts. ATLAS.ti generates a matrix of the results which provides the common codes, the associated number, and links to the quotations. The ATLAS.ti matrix is too large to replicate in this dissertation; however, I generated two charts that depicted the information from two different perspectives. The purpose of this analysis was to determine significant themes, as discussed in Chapter 4.2. Further, according to Gioia et al.'s (2012) suggestion that the first-cut at the second-order analysis should result in 25-30 codes, this particular query resulted in 23 codes<sup>20</sup>.

Figures 5 and 6 below depict the results of the second-order analysis. Figure 5 is a complex line graph. The vertical axis shows the number of quotations; the horizontal

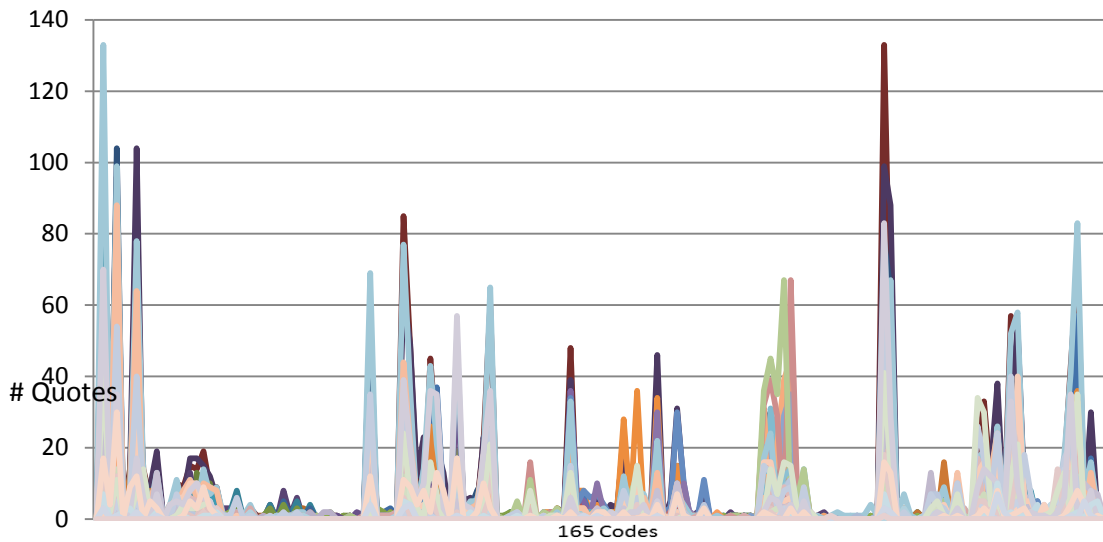
---

<sup>19</sup> ATLAS.ti has many analytical tools to aid the researcher in discovering concepts, constructs, themes or dimensions of importance in the data. The Co-occurrence Explorer allows the researcher to ask different types of questions (refer to Chapter 3.2.5 for a description of co-occurrence). Using this tool, the researcher can ask ATLAS.ti to show all codes that co-occur across all of the primary documents. The result is a cross-tabulation of all codes. Compared to the Query Tool, whereby the researcher has to determine and select codes or code families and the appropriate operator, the Co-occurrence Explorer by default looks for all codes that co-occur in the margin area combining the operators WITHIN, ENCLOSES, OVERLAPS, OVERLAPPED BY and AND. Instead of cross-tabulating all project codes, it is often more meaningful to apply filters for certain codes and documents in order to concentrate on a more specific set of concepts.

<sup>20</sup> After subjective evaluation of Figures 5 and 6, I judged significant codes as those having more than 20 associated quotations

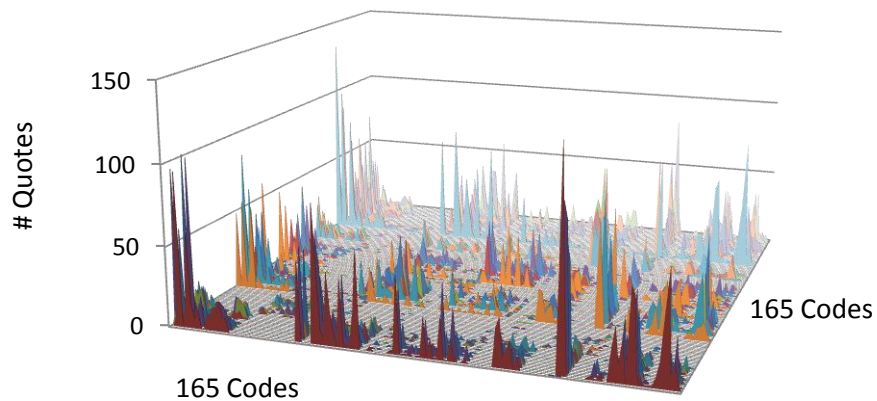
axis shows the 165 codes. In the graph are the 23 “peaks” above 20 quotations. These peaks represent the most significant codes from the data. The lines also show the overlapping of the codes superimposed on them. The specific codes that constitute these peaks will be discussed later.

**Figure 5 – Second-order Analysis Clusters**



The takeaway from this graph is that there are 23 significant code clusters (peaks) in the data. The same data are depicted in 3D (Figure 6) below. Figure 6 depicts the 165x165 matrix in 3D. The various code clusters stand out in this Figure, indicating resonance around certain concepts.

**Figure 6 – Second-order Coding Analysis 3D**



This figure is merely another depiction of the 23 code clusters (peaks) in the coding data. It must be noted that from the 3D image of Figure 6, one can see that the 23 code clusters (concepts) are tightly coupled or grouped. The researcher believes that this tight grouping demonstrates the validity of the second-order analysis. Figure 6 reflects the fairly consistent code density and frequency, i.e., the 3D pattern is reasonably symmetrical.

Developing the co-occurrence is an initial step in the second-order analysis process. So far, the analyses show that there are 23 code clusters (concepts) that have at least 20 associated quotations. Next, in the second-order analysis, it is necessary to further consolidate those 23 code clusters into a smaller group of themes to begin the final stage of the second-order analysis.

### *Results*

At this point, the analysis is primarily a co-occurrence correlation of codes that have similar quotations (Figures 5 and 6 above). There are also other considerations specifically that the analysis should be more than a mere quantitative analysis of the

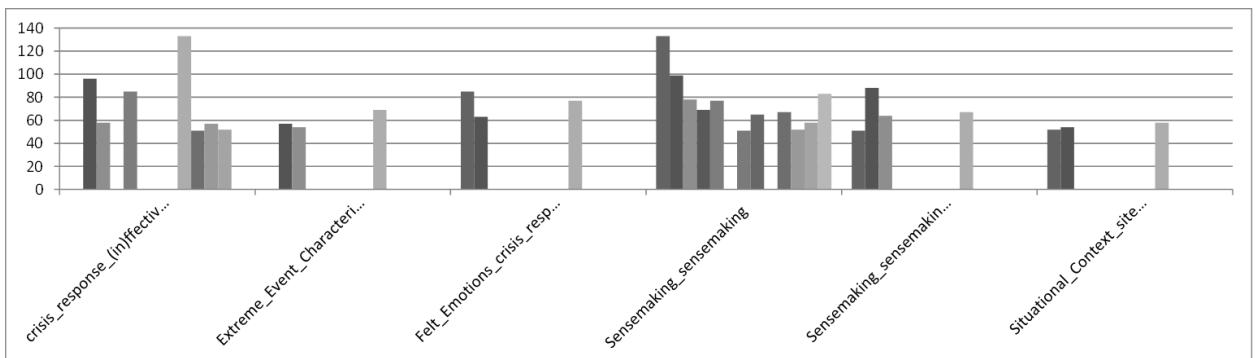


codes. Code density and other qualitative analyses enable the researcher to identify themes and concepts through memoing, density, and other more judgmental processes. The co-occurrence process analyses codes with regard to their relationships with each other. This results in an analysis that is well integrated; however, there may be codes that stand alone when offering independent insights. In the bottom-up process, this dissertation conducts both, a co-occurrence and a qualitative assessment to identify the “bottom-up” results.

*Bottom-up Process*

Continuing with the bottom-up process, the results were identified by analyzing the 23 code clusters identified through the co-occurrence analysis. Once those clusters were identified, they were examined to determine the importance of the concept underlying each cluster. This approach leads to constructive results contributing to the research. The process began with identifying the clusters, then, running the co-occurrence analysis tool again to further refine the actual theme.

**Figure 7 – Major Code Clusters**



Examining the code clusters, using the actual 165x165 matrix data, indicated the major clusters as shown in Figure 7. An examination of Figure 7 provides insights into the second-order codes that emerge from the data. These are:

- Crisis response
- Extreme event characteristics
- Felt emotions
- Sensemaking
- Situational context

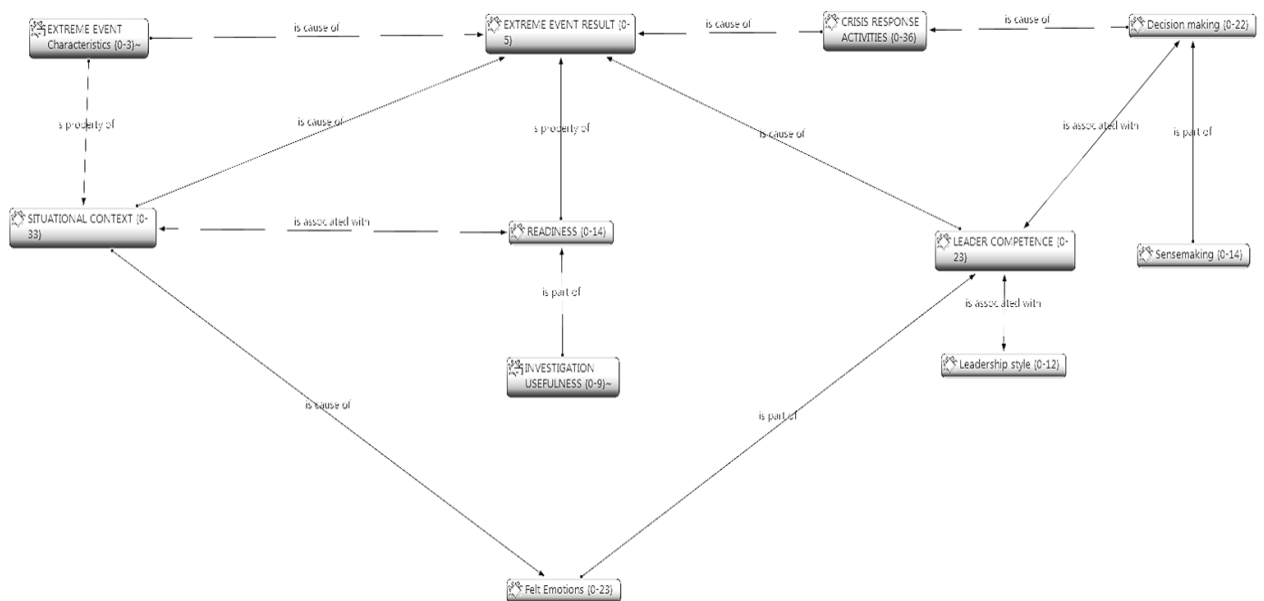
At this point, the second-order analysis has refined the initial 23 code clusters into five aggregate third-order codes; however, this analysis is not sufficient. Further analysis is needed to determine if other important codes exist, or whether they are either masked or perhaps have less than 20 associated quotations.

Note that the code “extreme event characteristics” was used to label quotations that indicate an interviewee’s discussion of the characteristics of the actual extreme event. This code was generated by the researcher to ensure that the events analyzed in this dissertation met the definition of an extreme crisis as described in detail in Chapters 2 and 3. For purposes of identifying second-order codes, this code is not applicable to the analysis itself. Thus, that code was eliminated from the second-order coding analysis.

It must be noted that in Figure 7 (above), several codes are not just important concepts on their own, but they are very similar in content. For instance, in “Crisis response” there are two similar codes, i.e., command and executive tasks. These codes stand alone as important leadership codes. As such, the researcher elected to create a code entitled “Leadership” to the list of second-order codes.

Next, a qualitative analysis of the coding may reveal concepts beyond those discovered in the co-occurrence method. A network view of the highest density codes in the code hierarchy provides a qualitative perspective of the coding. Linkages are established between the higher order codes in the hierarchy along with their densities. Figure 8 – Network View for Higher-order codes, is the network view for these high order codes.

**Figure 8 – Network View for Higher-order Coding**



In Figure 8, many of the second-order codes are identified in the co-occurrence analysis as important codes (including the importance of the “Leadership” code). It must be noted that the density for decision-making is very high, i.e., 22. This means that decision-making links to 22 other codes. One potential explanation for the second-order code of decision-making not revealing itself in the co-occurrence analysis is that, its associated quotations were amortized over 22 other codes and the threshold of the 20

quotes used in the co-occurrence analysis is too high to capture decision-making. In summary, the results of both, the co-occurrence and qualitative analyses reveal the following third-order codes:

- Felt emotions
- Situational context
- Crisis response
- Sensemaking
- Decision-making
- Leadership

The remaining subsections of this Chapter describe the second-order themes that make-up the third-order codes (aggregate dimensions) of felt emotions, situational context, crisis response, sensemaking, decision-making, and leadership. In some subchapters, the researcher provides a brief literature review to improve linkages with the results. Then, the results will be discussed in Chapter 5 along with the theoretical implications. This process of describing the second-order themes begins with an analysis of the role of felt emotions in extreme crisis.

### Felt Emotions

#### *Analysis*

Felt emotions are a significant concept discussed by many of the interviewees. As shown in Figure 9, Psychological – Felt emotions, all of the data samples include some discussion of felt emotions. As depicted in Figure 9 below, from the interview data in the various ATLAS.ti Hermeneutic Units, felt emotions are particularly significant in the

Deepwater Horizon and Fukushima cases where loss of life and unfathomable conditions (Yammarnio, et al. 2010) existed.

**Figure 9 – Psychological - Felt Emotions**

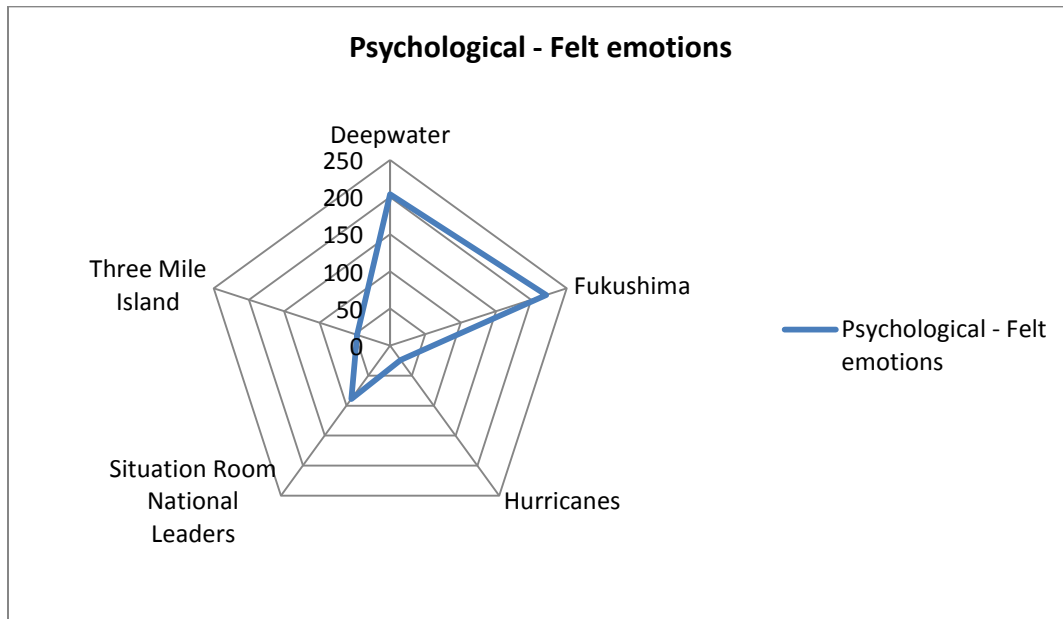


Figure 9 indicates that the Deepwater Horizon and Fukushima cases were the most significant with regard to the felt emotions involved. These two cases suggest that there are unique insights on the role of felt emotions for extreme events. These insights will be discussed further in Chapter 5.

Given that there were 707 quotations coded under the “Felt Emotion” code, felt emotions are clearly a major concept in extreme events. Many of those impacts of felt emotions are discussed in Chapter 5.

As discussed in Chapter 2 earlier, extreme events are usually unfathomable and unpredictable, and they have transboundary aspects. In the Fukushima and Deepwater Horizon cases, the interview and transcript data reflected the impact of felt emotions on

the leaders involved. Many of the interviewees discussed the deaths that occurred in those two cases, as well as the major explosions and fire, and the threats to further loss of life along with how those circumstances altered their cognitive abilities. It is under these circumstances that leaders or their followers may be struck with felt emotions that are of interest in this research. The types of felt emotions experienced by the interviewees were: panic/calmness, awareness, success, heroism, hopefulness, humor, optimism, outrage, skepticism, and trust. Each of these felt emotions is reviewed in the following subchapter.

### *Panic and Calmness*

Several important considerations of panic emerged here. First, during the extreme events, leaders revealed that they personally had to resist the urges caused by panic. Many interviewees talked about the need to control panic by remaining calm and suppressing the urge to flee. Second, a unique phenomenon emerged from the interviews related to protecting oneself from external sources or “interferences” due to panic generated by external organizations. Finally, many of the interviewees provided specific insights on issues that leaders needed to consider when controlling the panic of the both their leaders and their subordinate workers. Specifically, the interviewees discussed the need for leaders to be self-aware, to maintain situational awareness, and support and protect workers.

My data implied that the onus is on leaders to control both their own panic, and that of the workers during an extreme event. Many of the interviewees in the above cases spoke of the need to remain calm even during fight-or-flight conditions. When faced with stressful conditions, many of the leaders shared techniques that they used to control

panic. After reviewing those panic control techniques, a grouping of techniques emerged: leader self-consciousness, situational awareness, and protecting workers. From the interviews, it appeared that the leaders were successful in controlling panic by resorting to these techniques. In fact, one interview clearly reflected the individual's thoughts on controlling panic:

It appears to be necessary for an extreme event leader to understand that all eyes are on them immediately upon the disaster. A conscious leader remains aware of the need to maintain calmness themselves, the staff's emotions, and the site conditions. A conscious leader understands that the staff's trust in the leader resets to almost zero at the instant of the event and rebuilds with every decision, emotion and action shown by the conscious leader. (Ref. RW.)

### *Heroism*

In extreme events, interviewees discussed many acts of heroism. Throughout the interviews, there were nearly 72 quotes directly related to heroism. The interviews highlighted a significant difference between military and non-military situations. There were several quotes that highlighted the severity of the Deepwater Horizon and Fukushima cases, in particular. In the Deepwater Horizon case, 11 workers died on the rig, while in the Fukushima case, two workers died on site due to the tsunami along with several workers who lost family members and houses in the tsunami. This area of research, i.e., military versus non-military, is explored in detail in Chapter 5 and is an area for future research.

## *Hope*

My second-order analysis, another significant emotion, “hope”, was revealed. Given the unfathomable aspects of extreme events, not only do workers sometimes need hope, but the Transboundary nature of extreme events calls for “hope-giving” to the public. Interviewees provide numerous examples of the need to infuse both the workers and the public with the hope that the situation will improve. Interviewees also provide examples of hopelessness. A brief summary of the points expressed by the interviewees is mentioned here:

- Hope is the essence of information people want (Interviewee SS speaking to her workers during a hurricane response).
- One interviewee explained, “I think it becomes, in the worst time of a crisis, a fragile environment from a leadership standpoint that you’ve got to hold together and that’s everyone’s mindset around you”. He goes on to elaborate, “**I recall vividly the yearning in their eyes for leadership**” (**emphasis added**). Ref. RW
- When operators were isolated during the Fukushima event, phone calls home served as more than a mechanism to communicate; those phone calls served as hope that at some point normality would return to their lives.
- An interviewee gave up all hope after the last reactor exploded. Their work seemed futile and continuing with their work seemed futile as well.
- The equipment that was dispatched to the site was not only the equipment to be used in controlling the event, it also represented hope. When it did not arrive, the leader experienced hopelessness.
- After the final reactor exploded, this leader expressed the hopelessness he felt.
- Even something as simple as establishing room lighting was a source of hope. The lighting represented more than light; it represented success and hope.
- The leaders were offered encouragement by the emergency response center in Tokyo who told them that help was imminent; yet time again that help did not



arrive as promised.

- The significance of “praying to God”. Many of the people did not hold strong religious views prior to the event; however, in these circumstances, religion emerged.
- At Fukushima, the younger operators wanted to leave the control room. In dispensing encouragement, the leader appealed to their sense of duty. It must be noted that the cultural aspect of bowing and apologizing to the workers while he spoke did imply that the leader was asking and begging for help.
- The Presidential visit to the Three Mile Island accident also included the First Lady on the trip. This visit was not only to inform the President, but to give comfort and hope to the citizens.

### *Trust*

As a felt emotion, trust and its impact during crisis situations are extensively studied across domains. In this dissertation, it is important to provide special considerations of trust in crises involving extreme events. There are 52 quotations in the ATLAS.ti data related to the code “trust”. Some of those quotes involve life, death, or unfathomable circumstances. Given below is a brief summary of the points expressed by the interviewees:

- Despite not knowing his rescuers, a victim trusted them.
- A Governor was new to his position – when the time of need arrived, the Governor leaned on people who he knew prior to his position and trusted them above those leaders who were in established State roles.
- An interviewee remarked that familiarity bred trust. As the military gained experience in providing humanitarian assistance, they gained trust and improved communication.

- Leader competence as a fundamental building block of trust was discussed extensively.
- One interviewee mentioned that an element of trust was shown by being present on the ground and displaying competence. Followers can often tell if the leader is competent. Further, the leaders must be willing to do those things that they ask of their followers.
- The leader was the first to volunteer for the hazardous task. Even though he ultimately did not participate, his willingness to volunteer paved the way for the others to volunteer.
- In one case, the corporate leadership asked for trust from the onsite leaders. Also, the corporate leaders conveyed hope to their counter-parts onsite and asked for their trust.
- The leader sought to know the personal issues plaguing his workers. According to interviewee MA, this helped limit the trust debt during the extreme event.
- The importance of safety culture was deeply established throughout the organization prior to the event.
- The leader took responsibility for all mistakes. He used that as a mechanism to build trust and motivate.
- A prior relationship with the fire department was essential in encouraging the department to face this hazardous situation. The interviewee had a weak relationship with the subcontractors and they did not stand by him during the extreme crisis.

In summary, as expected, “trust” as a felt emotion appears as a crucial component of extreme crisis leadership. There were other felt emotions discussed by the interviewees, and those emotions are discussed next.

#### *Other Felt Emotions*

As discussed above, the interviewees discussed a number of felt emotions that occurred during the extreme event. Besides the emotions of trust and hope, there were

other emotions discussed, i.e., awareness, success, humor, optimism, outrage, and skepticism. These emotions were mentioned in the interviews; however, other than “awareness”, none of these rose to the level of panic and heroism in the discussions.

Clearly, awareness, and more importantly, unawareness, was a key concept mentioned across the interviews. Interviewee RW suggested that a conscious and aware leader was essential to the successful outcome of an extreme event. RW suggested that awareness also fed sensemaking. RW alluded that if the leader was not aware, then sensemaking and decision-making were not likely to occur. That is, if the leader is not aware of the actual situation then the leader’s ability to analyze, assess, and direct (elements of sensemaking and decision-making) are either limited or non-existent. Awareness and unawareness have been discussed as part of sensemaking and decision-making in the subchapters of Chapter 4. As for the impact of leadership celebration as a felt emotion, the interviews revealed that in the Fukushima case, at times the leaders performed celebrations after successful activities and these celebration moments were effective in assuring workers (Ref. MA).

I was not particularly worried (about their motivation), but for the first two days, I tried to make myself clear to them what we were going to do. From the third day, after connecting one cable, we all celebrated by clapping hands. Also when they heard a motor was installed, or a test-run was completed, we clapped hands. We worked on preparation for getting equipment from the Fukushima Dai-ichi, and when a helicopter landed with the equipment, we all celebrated. There was a sense of achievement. I don’t remember this but it seems that I always said

“thank you” when one task was completed even though I was yelling when I was instructing. I was happy to have heard of that. I think this is something that kept the workers motivated for the first four days to one week. (Ref. MA.)

As with celebrating success (discussed above), the use of humor as a motivational tool did surface even in dire circumstances. In fact, the leader in the next Fukushima example used humor effectively as a tool for sensemaking. Through humor he acknowledged the desperate reality that the group faced. It must be noted that in the midst of the Fukushima accident, the operators exceeded their emergency response training. Normally, once the event progressed beyond a certain training point, the instructors would say: “Freeze the simulator here”. After the actual event exceeded the simulator’s “freezing” point, the control room supervisor reflected in the interview: “To my surprise, under that situation, still some operators were bold enough to say that we stopped right around here if it had been a normal situation. I did not have my instructor behind me but I wished I have had him there and heard him saying, “Freeze.”” (Ref. IZ.)

In Chapters 2 and 3 the researcher has included discussions on “optimistic bias – escalation of commitment” (Joffe 2003). The interviews include a significant example of this concept. The concept of “optimistic bias” was most notable in the Fukushima case where an incorrect response strategy seriously complicated the event. It must be understood that implementing an incorrect strategy immediately and incorrectly holding onto the strategy despite indications to the contrary (optimistic) causes wholesale failures in event response. Additionally, the Fukushima operators held onto the strategy even

when the speed of events exceeded the speed of their response as seen in this interview's statement:

Then the leaders started shouting, really shouting, or scolding. He told us, "You know, we can never repeat this program for Unit 2 and Unit 3". Our mistake was that we were always acting under assumption of prediction, very bad prediction. "From now, you must report to me exactly what you were doing and what are you going to do by when". He also scolded to headquarters through the TV monitor, "This request or command is to you, as well". And the people said, "Yes, very small, very low". (Ref. IN.)

This dissertation has a few instances of leaders who were overly optimistic in their assessment of the events; however, in this one example above, the consequences of the blind spot caused by optimistic bias were severe and it greatly complicated the outcome of the event.

Public outrage, like the panic of the workers, was another emotion discussed by one interviewee (refer to the issue of social amplification of risk in Chapter 2). As public concern increased, so did the political involvement in the event's leadership. Quote: "From the White House perspective, on these domestic events, and you have public outrage like (hurricanes) Katrina and Sandy, you're really just looking for the governor, for the Stafford Act, how else would they get involved if there's a high public concern? If the State ... you talked earlier about the White House gets involved and if the federal government fails". (Ref. JB.)

In many interviews, the feeling of skepticism while perhaps not a true felt emotion certainly is related to felt emotions. Though this issue will be discussed later in this Chapter since it relates to defiance, here is an example from the Three Mile Island event:

Interviewer: “So in terms of deference to expertise, you were a bit skeptical about expertise? Interviewee: “Yes I was. I became skeptical. Initially, I was like everybody else. If you let these guys run this sophisticated reactor, anything they tell us must be accurate. Well, as I recounted in the case of the Lieutenant Governor, that was dissipated within a couple of hours. These guys simply lied to us. Well that’s ... no, it isn’t too strong. They told us things that weren’t true. Now, maybe they were well-intended, and maybe they were simply incompetent, but there was no question that we were misled badly in the early stages of the accident. The worry was over whether what we were releasing was factual, but our skepticism was established very early on so that this carried through all of the events that transpired over the next week or 10 days that we were very careful to examine”. (Ref. DT.)

#### *Summary of Felt Emotions*

There were 707 quotations related to felt emotions within the interviews. This number suggests that there is a major link between the felt emotions experienced by leaders in an extreme event along with the emotional links associated with situational awareness, sensemaking, decision-making, and crisis response. Obviously there is

significant co-occurrence between these concepts. As each of these concepts is analyzed, the role of the felt emotions is included in the analyses. Ultimately, Chapter 5 seeks to integrate the results and provide some overall conclusions.

This subchapter highlights that the felt emotions were most prominent in the Fukushima and Deepwater Horizon events; however, nearly all interviews contained some related emotions. Those felt emotions included: panic/calmness, awareness, success, heroism, hopefulness, humor, optimism, outrage, skepticism, and trust. In summary, the interviewees indicated that:

- The unfathomable circumstances (Yammarnio, et al. 2010) involved in the extreme events can create panic among leaders and workers. The interviewees from both the events expressed the need for the extreme event leaders to control panic. The interviews revealed several insights to help do so, including: 1. protecting the situation from external interferences; 2. being self-aware; 3. being aware of the situation, i.e., sharing calmness not panic; and 4. supporting the workers' welfare.
- Throughout these interviews there were countless recollections of heroic acts, including 72 quotes directly related to heroism. The interviews highlighted a significant difference between military and non-military situations.
- The emotion of hope was very dominant in the interviews.
- Another dominant emotion was the feeling of trust among the leaders and subordinates.

## Situational Context<sup>21</sup>

Throughout the interview process, each interviewee discussed the situation at the scene of the event they were involved in. Because each event was somewhat different, it was necessary for the coding process to enable the conditions for each site, yet acknowledge that according to the process suggested by Friese (2012), the codes would have to allow for the consolidation of the quotations. Therefore, the researcher developed a hierarchy of codes under the general code heading “situational context”. This higher-level code was then broken down into a series of first-order codes and ultimately second-order and third-order codes.

### *Analysis*

A pattern emerged as the researcher reviewed the first- and second-order codes. Most of the codes and associated quotations fell into two major categories: the issues associated with the scope of the event, and those associated with the magnitude of the event. This subsection covers the scope and magnitude under the overall “situational context”. Each of the first- and second-order codes associated with situational context are described below.

### *Scope*

From the interviews, the scope of the situation included areas such as technological issues, cooperation, safety context, and support for workers. Next is a discussion for each of the scope issues.

---

<sup>21</sup> Situational context basically refers to the situation on the ground of the event. It is a collection of interviewee quotations that describe the scope and magnitude of the event.



### *Technological Issues*

Interviews from each event reveal technological issues. Some of these technological issues were common among the events. For instance, in all three technical events (Deepwater Horizon, Fukushima and Three Mile Island), interviewees discussed the technical complexities of these facilities and the complications that these complexities caused during the extreme events. In each of the events, interviewees discussed the challenges created by pushing the boundaries of the technology. Events were greatly complicated by the site conditions, including unknown information, missing information, lack of planning, disagreements, old equipment, lack of workers, and the expanding scope of the event being greater than their comprehension. Another common issue in all three technical events was the social bias against technology. That social bias manifested itself in public fear, which resulted in an expansion of the scope of the events to include public outrage. The social bias also complicated the communication of technical issues to the public.

Interviewees discussing non-technological events, such as hurricanes, focused the technological discussions on urban versus suburban impacts. They suggested that the urban technological impacts are greater than the suburban impacts. In the urban context, hurricanes, forest fires, and other natural disasters wreak significant damage on technological infrastructure. According to some interviewees, the key technological issue for leaders managing these events is to manage the expectations of the victims, i.e., provide the victims realistic recovery periods for infrastructural repair and restoration of services, such as the Internet, electrical power, water services, etc. At the senior

government level, the Situation Room interviewees focused on more strategic technical issues such as:

- The need for consistent decision-making
- Gaining cooperation among organizations
- Matching resources and capability with needs
- Getting the right people involved and keeping the wrong people out of the leadership
- Using simple language
- Determining the level of resources for the response
- Preventing events from cascading
- Familiarizing leadership technically through the use of experts and technical interpreters
- Encouraging community reliance/planning

Also, the Situation Room leaders discussed the evolution of these extreme events where events that were once considered extreme, such as hurricanes, were now seen as being more routinely managed; yet there were new extreme events emerging to replace those. Those new extreme events included events, such as major land fires in places where major fires had never occurred or cyber-attacks or even potent pandemic events, e.g., H1N1 virus.

#### *Cooperation*

For the second-order concept of “cooperation”, each of the events had unique issues related to the cooperation among entities during the response. According to the interviewees, the lack of, or inadequate, cooperation often resulted from role confusion and consequently in miscommunication at times when close communications were

particularly important. In each case, the breakdown of cooperation exacerbated the recovery from the event. A summary of the breakdowns in cooperation for each event is explained below.

Deepwater Horizon interviewees and data highlighted two sources of role confusion (cooperation). First, it was not clear among the crew whether legally, Deepwater Horizon could be considered as an oil rig or as a vessel. This confusion resulted in the lack of clarity in whether the vessel's captain or the "oilman" was in charge. As a result, during the disaster, it was not clear who was giving orders about Mayday calls and evacuation to the crew. Second, there were a number of entities responsible for operations on Deepwater Horizon. There was an owner company, a drilling company, and a leasing company, all of whom had roles and responsibilities. These roles made it difficult to coordinate activities including operational, training, evacuation drills, and other day-to-day activities. The lack of clarity regarding roles and responsibilities was exposed greatly during the event.

According to interviews, during the Fukushima disaster there were breakdowns in cooperation among many organizations. Interviewees stated that there were breakdowns of cooperation within the government, between the government and the utility services, within the utility companies, and more importantly, between the emergency response center at the site and the control rooms within the reactors. Strategically, organizational stovepipes hampered the response. Interviewees discussed the failure of the government to provide adequate information to limit public panic, the frustration of a slow response system, the lack of accurate information, a poor communications structure, and the challenges of democracies in controlling harmful information, all of which compounded

the event. Importantly, the interviewees were concerned that the regulator did not have representatives at the site to provide a safety perspective. There was also the possibility that without the legal authority to compel the workers to remain at the site, all the workers would leave or be withdrawn by the operating company leaving the site unstaffed resulting in further reactor damage and radiation release.

Interviewees discussed several cooperation issues that occurred during the Three Mile Island accident. There were communication and trust breakdowns with the company that owned and operated the plant. There were distractions caused by outside politicians who unnecessarily wanted information merely to indicate their involvement in the response. There were miscommunications that led to an unnecessary evacuation of 100,000 residents, which then caused more infrastructure complications, and there was a concern that other nuclear facilities would have similar accidents. Interviewees discussed the consequences of poor technical and management leadership at the facility. All of these issues caused coordination challenges for the people actually responding to the event. There were some examples of positive cooperation issues noted by the interviewees e.g., the Presidential site visit at Three Mile Island, gaining the cooperation of the correct experts, and the recognition that the Federal government should allow local responders to lead the response.

For the interviews discussing hurricanes as an extreme event, the interviewees highlighted the need for “intelligence led management”. (Ref. JH.) That is the necessity for leadership to get in front of the event, for leaders to set expectations for everyone involved in the response and impacted by the hurricane, to match resources with strategy, and the need to be transparent with the media and public.

At the White House Situation Room level, interviewees discussed a number of strategic cooperation issues. Most notably, from a strategic perspective, the interviewees talked about the need to match the speed of response with the speed of the event, including matching the available resources and capabilities to the needs of the event response. All of the interviewees discussed the importance of local control and local command including the value of domestic resilience for community-preparation. Some interviewees discussed the need for leadership to have a team of people around them that they were comfortable with and could trust. In one event, an interviewee discussed an anecdote where social justice trumped local control. Note: This issue of social justice versus technical justice was discussed in Chapter 2. The other coordination issues discussed by interviewees included:

- Decision-making – the need to get expert advice
- Leadership – the need to co-locate commands if necessary
- Rumor control
- In the cases of international response, to be conscious of ensuring the host country is most appreciated for their response
- Clarity, speed, normalization, integration, prioritization of communications
- Unity of effort through the use of consistent coordination models and adjusting the model to fit the specific event, using familiar and established relationships
- Acknowledging the reality that the federal government is not in charge and the value of local community relationships

In summary, all of the interviewees stressed the importance of organizational and individual cooperation during these events. In all cases, the interviews provided examples where less than adequate coordination complicated the event response.

Breakdowns in cooperation were generated through both organizational and individual weaknesses.

### *Safety Context*

The second-order code of “safety context” combines a number of first-order codes. Safety context include the first-order codes of: natural versus artificial (man-made) events, training, site conditions, turnover, safety culture, safety system status, distraction, fatigue, and procedures made up the safety context code. Interviewees provided hundreds of quotations in this area. A summary of the discussions follows below.

Regarding the safety context on the Deepwater Horizon, data and interviews illustrated that there were many safety barriers that failed, and those failures contributed to and complicated the accident. Those barriers included safety training, safety culture, site safety conditions, crew distractions, worker fatigue, turnover, and safety procedures. Interviewees talked about significant failures in each of those areas.

There were many quotations provided by the interviewees relating to the Fukushima disaster. Regardless of their level of responsibility in the response, each interviewee provided his perspectives on the breakdowns in safety processes during the Fukushima disaster. Each interviewee, even the journalist interviewed (Interviewee YF) expressed concerns regarding safety breakdowns, for example:

- The journalist, Mr. YF focused on the fortitude of the Prime Minister and the worry of a proposed doomsday scenario as a possibility, and the defiance displayed by some leaders at the site.

- At the Fukushima site, interviewees passionately discussed their confusion regarding what was happening. Significant concerns they mentioned included: the need to implore workers not to quit; the role of their leader (note: this will be discussed later in Chapter 4 under leadership); the lack of information; making decisions without information; the fatigue associated with a long response; and their failure to develop the correct response strategy.
- At the senior government level, regarding Fukushima, interviewee GH focused on the need to immediately repair infrastructure to support the response, discussed the reluctance of some senior government leaders to travel to the site (note: this will be discussed later in Chapter 4 under leadership), and enumerated the challenges of disagreements between the government and the company.
- Interviews with hurricane responders focused on the safety context areas in discussing the differences between natural versus artificial (man-made) events. Interviewee JH implied that natural events tended to have a larger impact on normal life and the victim's needs were greater. Interviewee JH stated that key strategy points were related to the use of intelligence information regardless of the event, using the same emergency response organization, interlacing resources, and strategies. Finally, JH suggested that the major difference was that artificial (man-made) events tended to require more analytic capability.

In summary, with regard to the safety context of the Situation Room interviews, the interviewees discussed their perspectives on the national level of safety. They provided quotations that give insights into the White House priorities. A summary of their perspectives is:

- The value of frequent involvement in disasters
- The cautious role of the US military in international response
- Keeping with the normal response plan as long as possible but understanding that these one-percent events would be novel
- The technical limitations of government and companies
- Resolutions of inter-agency concerns
- Understanding the need to educate the leadership on technical issues
- Taking the necessary steps to gain a unity of effort including repurposing resources
- Having an appreciation that all events are local and having an appreciation for the use of local resources

#### *Support for workers*

The second-order code of support for workers consists of all the first-order codes that are related to providing resources, mental and physical protection, and other issues related to worker needs. In some cases, interviewees discussed support for victims. These discussions are included in this code as well. Below is a summary of the interviews.

Support for the health and safety of workers was a significant source of quotes for Fukushima (Ref. IN, IZ, MA). There was a significant difference in the concern for worker health between the military and non-military interviewees. Discussions with military interviewees (Ref. RW) revealed more of a willingness to focus on immediate event response over the care for worker health.

Interviewee SS talked about supporting workers during hurricane responses. Clearly the interviewee placed worker well-being above all other concerns. Further, the



interviewee discussed the value of engendering the company's full support of workers, for instance, the electrical line crews, in the field. Some techniques discussed included providing call center representatives to answer questions and identify needs of the workers, involving everyone in the company to support the response workers, and supporting the families of the workers so that the workers' stress was relieved and this enabled them to focus on recovery activities.

From the Situation Room perspective, interviewees discussed the comparison between the victims of earthquakes versus tsunamis. Earthquakes resulted in a significant need for rescue and first aid, while tsunamis resulted in either life or death of the victims. Interviewees focused on the helpful role of the Red Cross and other non-governmental bodies in assisting those affected. Finding funding for the response was clearly an important task at the Situation Room level. The topic of resilience was mentioned throughout the interviews. Resilience thinking includes the realization that victims can also serve as a resource for recovery. It then becomes critical that the federal government help manage the expectations of the survivors.

### *Magnitude*

This subchapter provides a summary of the interviewee reflections on the magnitude or severity of the event. The magnitude ranges from the fathomable to unfathomable crisis conditions. Each event (and non-event) is discussed from this perspective.

According to the interviewees, the sights and sounds experienced during the Deepwater Horizon event were far beyond what the crew had anticipated through their training. Some safety procedures, e.g., life raft functionality, emergency disconnect

switches, among other safety features, failed to function. In fact, the interviewees suggested that as a result, the fires and explosions actually defeated some of the safety features, thereby contributing to expanding the magnitude of the disaster.

For the Fukushima interviews, interviewees expressed their disbelief at the extreme conditions at the facility. All interviewees discussed the impact of the explosions, their fear and panic, their lack of understanding of the events, their personal doubts and fear for their lives and that for the lives of others, and they expressed an unbelievable sense that conditions were well beyond anything that they would expect to witness during a nuclear event.

Interestingly, there was only one quote with the first-order code of “unfathomable conditions” for the hurricane interviews. That quotation involved setting expectations for the victims of hurricanes. This was interesting because as depicted in data for this dissertation, the classification of hurricanes as an extreme event was questionable. Also, during JB’s interview, during a discussion of rare events, the interviewee suggested that hurricane response was more normalized then than in the past.

In the Three Mile Island interviews (Ref. HD, DT), there were a number of quotations that co-occurred with other codes already covered, so those are not reiterated here. However, there was one quote from interviewee HD who discussed the option of the federal government to take over an event from a company should the company fail in their event response. The interviewee surmised that this would be a “nuclear option”, meaning an option of last resort and thus not likely to happen but that it would remain an option for the Federal response.

For the Situation Room interviews, there was significant amount of co-occurrence in the discussions especially related to the characteristics of the one-percent (rare) events. The other area of co-occurrence was in the need for advance planning for these extreme events. Given the co-occurrence for this code, there were no specific quotes in this area that were coded as “unfathomable” conditions that had not already been addressed elsewhere in this Chapter.

#### *Summary of Situational Context*

In summary, the five second-level codes (technological issues, cooperation, safety context, support for workers and magnitude) reflected all of the quotations for the first-order codes associated with “situational context”. Essentially, situation context reflects the actual situation surrounding a given event. That situational context will influence the response in a number of ways. Subsequent to this, the researcher discusses the correlation of these second-order codes with the literature through the third-level coding. The purpose of this third-order coding is to allow for theoretical evaluation of the data thereby better enabling theory construction. Correlation with the literature allows for the identification of gaps, and theoretical extensions of the theories. This process is consistent with the Gioia et al.’s (2012) process and the bottom-up, top-down process used in this dissertation. First, a review of the five second-order codes as they relate to the existing extreme event literature is helpful for the discussions in Chapter 5. My literature review reveals:

- The technological issues discussed by the interviewees are consistent with the resilience activities discussed in the literature (Wachtendorf, 2009). For instance,

ensuring a community is technically robust against the effects of a hurricane is consistent with the resilience philosophy ascribed in the literature. Similarly, ensuring that a nuclear plant or oil rig can withstand the technical challenges that it may face is a resilience issue. Thus, technological codes (second-order) correlate with resilience as a third-order code.

- The second-order coding of “cooperation” and “support for people/workers, are consistent with the literature related to “executive tasks” (Boin, 2009) which refers to gaining cooperation among response entities which is a role of the event response leader. As such, the second-order code cooperation correlates with executive tasks becoming a third-order code.
- The safety context second-order code is consistent with the literature regarding readiness (Smits & Ezzat-Ally, 2003; Voogd, 2004). Activities such as developing an adequate safety culture, providing safety training, developing safety procedures are readiness tasks. Thus, the second-order code correlates to readiness as a third-order code.
- Finally, the second-order code of “magnitude” does not correlate directly with the literature. However, this researcher considers the conditions at the site as essentially a demand for resources. That is, the severity of the conditions at the site will generally dictate the resources needed for a response.

### *Crisis Response*

In the codebook, crisis response is defined as “quotes that refer to instances where leaders discuss activities, thoughts, or comments related to the actual performance of tasks

or conditions that contributed to the outcome of the event”. Essentially, this refers to instances when the interviewees maintain that they acted so as to bring about a crisis event outcome. These actions were keys in deciding the event outcomes: either successful or unsuccessful outcomes. There is one sole code related to crisis response “outcomes”. This code is labeled as “(in)effectiveness”.

### *Analysis*

My analysis is intended to highlight some of the more important interviewee quotations for the code “(in)effectiveness and to extract insights from the literature for the each quotation. This process is consistent with the Gioia et al.’s (2012) bottom-up and top-down approaches that have been used throughout this dissertation. The summary subsection below provides general description of the results and the insights that are further developed in Chapter 5.

### *Confirmation of Existing Theory and Limitations*

This subchapter provides a summary and an analysis of the literature associated with crisis response. I reviewed existing crisis response theories and their limitations. The intent of this review was to determine if the data in this dissertation provides any evidence to support, refute, or illuminate those theories. A summary of the analysis is provided here:

Adaptive Leadership theories and Sensemaking theories - Evidence provided by some interviewees suggested that Adaptive Leadership and Sensemaking theories are viable and important insights into crisis leadership. For sensemaking, among many quotations discussed in the “Sensemaking” subchapter, there were a number of

sensemaking related quotations provided during the interviewees' discussion of crisis response. For instance, examine the quote: "I had a mind-set that I would not say no to their decisions because I did not know all the parameter on the reactors. I just remember asking them to wait when they wanted to stop something" (Ref. MA.). Consistent with the thoughts of Mumford (2005), this quotation refers to the interviewee's establishment of a prescriptive model in his thinking.

Next, several interviews provided confirmation of the importance of adaptive leadership in the interviewees' experiences. There were countless quotations reflecting the need for adaptation in responding to events. In these quotations, the interviewees discussed the use of judgment, leaning forward (adapting), innovating, repurposing (adapting), using people as resources (adapting), and authoritative leadership. These are all the principles of adaptive leadership. One specific quote highlights the importance of adaptive leadership:

Leaning forward by making everything available, saying hey, something bad's coming your way, money's no object, get things in place, right. That's what a presidential emergency declaration does for you. Then when it comes through you've got everything lined up, so that you immediately can staff the Stafford Act and again everything pops up. The only thing that slows you down is the leadership, right, it's not the playbook. Playbook is in play and you're running. We've got people who've been incredibly trained, they have experienced crisis and they're mature, they're steeped in an understanding of emergency management. (Ref. JB.)

Readiness and Failure theories - Some interviewees provided examples that confirmed limitations in terms of Readiness and Failure theories. Specifically for the readiness theory, many interviewees provided examples of situations where the responders were unprepared despite all the prior work related to preparedness. Their examples implied that there were limits to their ability to predict and prepare for these Black Swan events. These quotations illustrate the points made by Quarantelli (1988) that despite the usefulness of readiness, prior planning is not enough for extreme events. As one example, an interviewee talked about his complete lack of preparedness in responding to an unfathomable condition: “It was a terrible moment. This is mainly about Unit 3. For Unit 3, my colleagues tried to make a hole in the reactor building to avoid the explosion, but we didn’t have suitable tools”. (Ref. IN.)

Another theory where a limitation was identified is the failure theory (refer to the discussion of failure theory in Chapter 2). As in the example for the readiness theory, given the unlimited combinations of events, neither high reliability nor normal accident theories can predict all of the potential events that can occur, particularly with regard to latent organizational weaknesses. Many interviewees expressed situations where latent organizational weaknesses were greatly exposed and led to extreme complications in responding to the event. In the Deepwater Horizon case, the Captain’s lack of knowledge of the emergency procedures and the confusion regarding crucial authorities led to significant complications during the event. Specifically, the Materials Management Agency’s interview of the Captain and the “Oilman in Charge” highlighted these latent organizational weaknesses:

Interview of Deepwater Horizon Captain<sup>22</sup>:

Q. Where are the safety procedures located on the vessel?

A. I don't recall.

Q. So you don't remember whether there was a paper copy, computer?

A. Most of those small details I just don't recall.

(Ref. CK.)

Q. Now, you said there is a power point presentation on the safety management system?

A. Yes.

Q. What is in this power point presentation?

A. I'm sorry, I don't recall the details.

(Ref. CK.)

Q. Everybody on board a vessel needs to know how safety is managed on the vessel correct?

A. Yes.

Q. Would the information of the Safety Management System be in this power point presentation?

A. Honestly, I don't recall what exact details are in there.

(Ref. CK.)

Interview of Oilman in Charge:

Who has the authority to activate the system?

A. Well, there is the drill floor and it would either be the driller or the tool pusher, myself and I guess at times, you know, during a real emergency, even the captain.

(Ref. JH.)

---

<sup>22</sup> From Materials Management Hearing Transcripts (130819\_001 Captain Curt Kuchta testimony) (Completed 08/27/13)



Q. Okay. Can you please tell me what procedures were in effect that would have avoided people being in the areas where they were killed?

A.....you have to have people there....we always notify our personnel when we have a high content level of gas and get them out of any space, shut down anything during drilling. Normally you don't get...gas back there when you're displacing the riser....but when mud was coming up at a high rate somebody knew that there was well control problems—

Q. Before there was an explosion somebody knew that there was a problem with the well control. Maybe not you, but somebody on the rig knew that they had problems right?

A. That key time when there was mud coming out, have obvious flow from the well, did Transocean have any written policies on getting those men...out of that area that's anticipated there will be gas....no policy but we make sure that people get out....

(Ref. JH.)

Setback Management theory - Within the crisis response literature (refer to Chapter 2), Lettieri et al. (2009) concludes that more research is needed on Setback Management, including policy mapping, capacity mapping, and incident command. A number of interviewee quotations reflect instances of setbacks in the events. Specific research on these instances could advance this stream of literature. For example, one interviewee discussed the complications of organizational infighting that is not discussed in the literature. Another dilemma discussed by the interviewees expressed the need to implement an incorrect strategy as their only option. They understood that the strategy was incorrect, but it was the only option available to them (Ref. IN). This concept of implementing an incorrect strategy is not covered in setback management literature. Also, in the Fukushima case, interviewees expressed their disappointment regarding the untimely arrival of safety equipment on-site. This disappointment reflected the setbacks that they had experienced. Setback management literature does not discuss the

consequences of “disappointment”. Thus, these interviews confirm the assertion of Lettieri, et al. (2009) that much more research is needed for Setback Management.

Surprise Management theory - The theory of surprise management is another area where these interviews suggest that an extension of the literature is necessary. While interviews confirm Farazmand’s (2009) assertions regarding the importance of *goals and missions*, some quotations suggest some extension of those concepts is needed and is not yet considered in the literature. For example, more work is needed on the downside of over-eagerness, the role of logistics, and the communications mechanisms used to convey changes in strategies to event responders. Farazmand (2009) reflects that surprise management, “Aims to read and act in an anticipated fashion, remove or minimize potential threats and clear obstacles to achieving goals and missions” (p. 407). In these interviews there were a number of extensions of this concept espoused, for instance, by one quote:

Actually, I had to change the priorities once along the way. I later learned that the workers on the ground were very confused by this change of instruction; because for those who were connecting the cables, it was not possible to change the cable route all of a sudden. This is true. So I needed to be more cautious with the people working on the site when I changed the priorities. I still needed to change the priorities. If I had been persistent with my words, everyone would have been confused, so the priorities needed to be changed. However, I needed to be more cautious and considerate about those who had been working on the time-consuming task when I made a change in the priorities. (Ref. MA.)

Non-linear Leadership and Escalation of Commitment theories - These are two related crisis response theories that were confirmed by the interviews. Also the interviews implied a necessary extension of the theories is necessary. For example, Non-linear Leadership is discussed by Comfort (2002); Farazmand (2009); and Schumpeter (1942), among others (refer to Chapter 2). Within this research are a number of illustrative quotations related to the need for non-linear leadership. In these instances, interviewees discuss the unfathomable conditions and their difficulties of leading others through those conditions. Clearly, there was a breakthrough point where the event became extremely complicated, beyond the interviewees' abilities to control the event (Ref. IN). In the second case, the interviewee confirmed the thought of Weick & Sutcliffe (2007) that managers needed to think strategically and non-linearly to manage the expectations. They did so through "buying back decision space". The specific quote is:

Also, even though there was no water, they tried to cool them off as much as possible by circulating water. They gave us extra 18 hours by doing all these. We started cooling off the reactors just then when the restoration team was done with changing motors and putting power supplies back. We had only two more hours left before the pressure reached the designed pressure after all. While the operation team worked really hard to save time, the restoration team collected necessary equipment and installed it. (Ref. MA.)

In another interview, the interviewee discussed the importance of preventing a cascading breakthrough. This interview was in relationship to stopping the spread of an infectious disease, the specific quote is:

Regarding the mitigation effort - that was to say what can the federal family and state, and local communities bring the mitigating and one that was closing schools are cancelling big events or wash or cover your cough that whole thing and stay home if you're sick also part a mitigation with was medications, antibiotics to treat symptoms and those sorts of things the third effort was on vaccine as we leverage the global vaccine market to create a vaccine and to innovative distribute and ship it. (Ref. RR.)

In a related theory, i.e., Escalation of Commitment, interviewee quotations highlight the principles espoused by Parashevas (2006) regarding the phase transition of extreme events:

We were focusing on the scam function. I was checking if everything was done as in the exercises, and receiving reports. From time to time, I was checking the manual if they were not missing anything written there. I was making sure everything was done by the proper procedure until we got hit by the tsunami. (Ref. IZ.)

Enacting Organizations - This research suggests the potential for theory extension with regard to Enacting Organizations as discussed by Daft and Weick (2001); and Argyris (1977), (refer to Chapter 2). The enacting organization theory suggests that single and double-loop mechanisms exist and they provide responders with feedback to their enacted mental models. My dataset, includes a number of quotations where interviewees implied that their mental models were formed solely through instinctual responses. Instinct played a significant role in the enacting feedback loop for some interviewees. In this area of instinct, interviewees provided a number of examples where instinct was the sole basis for their enactment. For instance, in the Deepwater Horizon case, the Captain suggested that not only was instinct important but that the company had codified instinct in the emergency procedures: “The safety manual stresses just all of the stuff that we do instinctively in the event of an accident”. (Ref. CK.) Again in this research, the role of instinct seems an important concept with regard to emergency leader response.

#### *Potential Gaps in the Data Analysis*

My analysis of the interviews indicates that there are several theoretical constructs (or codes) that are not explicitly discussed within this dissertation, yet they are discussed by the interviewees regarding crisis response. These constructs could represent gaps in my data analysis. Those constructs are:

- Psychological or physical proximity
- Be on the scene (of the event)
- Offer credible answers
- Self-complexity/self-concept

- Confidence and uncertainty in judgmental forecasting
- Idiosyncratic theory
- Fragmentation of control

While some of these constructs above may be related to other constructs that are discussed in this dissertation, there may be some uncertainty regarding how thorough the discussion is regarding those constructs in this list. For instance, the construct “offering credible answers” (in the list above) could be contained within the decision-making discussion in Chapters 2 and 5, but it is not discussed explicitly. Also, the construct “confidence and uncertainty in judgmental forecasting” could be contained within the sensemaking discussion. Finally, the “fragmentation of control” construct could be contained within the leadership discussion. Nevertheless, without re-coding all of the data, omission of these constructs represents a limitation in this dissertation. Otherwise, all of the constructs referred to by the interviewees for the code of “(in)effectiveness” have been discussed in this dissertation.

During the interviews many of the interviewees discussed concepts such as procedures, logistics, and the prioritization of recovery efforts. Because these issues are treated in the literature as management practice issues and not theoretical issues (refer to Chapter 2), there is limited discussion on these concepts in the various crises theory literature. Nevertheless, from the bottom-up perspective, these management issues were discussed in the interviews so they are considered in the bottom-up assessment despite not being concepts covered by the literature. Even though they are management issues are not theoretical issue per se, Chapter 2 does contain a limited discussion on some of these management issues.

### *Summary of Crisis Response*

A thorough analysis of the crisis response codes, quotations, and literature was explored in my analysis of the interviews. This analysis resulted in several conclusions regarding the management aspects of crisis response theory. Those conclusions were supported by interviewee quotations. With regard to the consistency of these results to existing theories, the conclusions provided evidence that confirms several crisis theories. For some crisis response theories, limitations were confirmed, in several cases existing crisis response theory is confirmed and extended, and there were several crisis response theories that were confirmed and where gaps or the possibility for theory extensions were identified. The results of the crisis response analysis will be discussed further in Chapter 5.

### Sensemaking

Sensemaking literature and the elements of sensemaking are discussed in Chapter 2.8. Sensemaking is one of the six major crisis concepts identified through the co-occurrence review of the data. The purpose of this subchapter is to present the results of an analysis of those elements of sensemaking that come from the interview data. This subchapter conducts a detailed analysis of the elements of sensemaking (as described in Chapter 2.8) to conduct a comparison from the bottom-up review of the data compared to the top-down approach that comes from the literature.

### *Analysis*

There were 13 codes generated for sensemaking in ATLAS.ti with over 100 associated quotations. As discussed in subchapter 4.2, sensemaking is one of the six important concepts generated from the interviews. Data from this subchapter confirms

the importance of sensemaking as an element of extreme event leadership. These results generally suggest that the Fukushima and Three Mile Island events had more positive sensemaking interviewee reflections than the Deepwater Horizon case.

### *Sensemaking Overview*

The results in this subchapter disaggregate the elements of sensemaking into two groups to improve homogeneity of the review. One group of sensemaking elements (from Chapter 2) consists of:

- Positive evaluations<sup>23</sup>
- Pessimism
- Pluralistic ignorance
- Collective sensemaking
- Optimistic bias
- Institutional effects
- Updating
- Doubt
- Felt emotions

The second set consists of another set of elements created by Weick (1988; 1995), (also from Chapter 2) regarding:

- Commitment
- Identity
- Expectations

---

<sup>23</sup> Kayes defines sensemaking characteristics as: positive evaluations, pessimism, pluralistic ignorance, collective sensemaking, optimistic bias, institutional effects, updating, doubt, and felt emotions.



I reviewed each sensemaking code against each set of sensemaking elements to determine which elements of sensemaking were applicable to the interview. First, all cases are reviewed as a group, then the non-event cases are reviewed, then the Fukushima case only is reviewed (to provide a single-case example), and finally a review of the interviewees reflections as “in-crisis” or “post-crisis” reflections are covered.

#### *Sensemaking Results – All Cases*

I reviewed all cases (actual events and situation room interviews) for sensemaking quotes that were related to the appropriate element of sensemaking. From my review, the data suggested:

- Positive sensemaking evaluations - is significant for Fukushima and Three Mile Island
- Pessimism quotes - are evenly distributed across all cases
- Pluralistic ignorance - is most significant for Deepwater Horizon
- Collective sensemaking - is significant for Fukushima
- Optimistic bias is - consistent among all cases
- Institutional effect - is consistent among all cases
- Updating - is significant for Fukushima
- Doubt - is significant for the Deepwater Horizon case
- Emotional – is consistent for Fukushima and Deepwater Horizon events and non-existent for the Three Mile Island event

This data are consistent for the emotional element of sensemaking as discussed in Chapter 4.3 that indicates a high degree of emotion for these two events. Clearly, the Fukushima and Deepwater Horizon events generated the most emotion among the interviewees. What is most interesting among this set of data is that the more positive

elements of sensemaking, i.e., positive evaluations, collective sensemaking, and updating, were significant for the Fukushima event. The negative elements, i.e., pessimism, pluralistic ignorance, doubt, and emotions, were significant for Deepwater Horizon. Discussions with the interviewees were consistent with this data. In the Fukushima case, the interviewees generally reflected a positive attitude in responding to the event up until the explosion of the reactors. In the Deepwater Horizon case, there was little discussion of positive sensemaking by the interviewees. Discussions indicated an immediate recognition by most people that a rig evacuation was necessary and that there was little opportunity for successful resolution of the event after the emergency disconnect device failed. Also, for the Deepwater Horizon case, the level of pluralistic ignorance was significant given a general lack of sensemaking during the event. It is critical to note that an analysis of all the data with regard to the “in crisis” and “post crisis” data will be provided at the end of this subchapter.

The same data was analyzed against the sensemaking elements suggested by Weick (1988; 1995): commitment, identity, and expectations. Overall, the results for these elements were inconclusive. Each element was essentially evenly distributed in the data. This suggested, as discussed in Chapter 2.8, that these elements of sensemaking are better evaluated at the individual level versus the case level. For instance, Weick (1995) discusses the element of “identity” in his assessment of the Mann Gulch firefighters when they dropped their fire implements to run from the fire (1949). According to Weick (1995), at that point the firefighters lost their identity as firefighters. It appears that Weick’s (1995) single case study approach to these types of analyses is more appropriate than a multiple case study analysis.

### *Sensemaking results – Non-event cases*

Some interviewees discussed non-actual event cases e.g. situation room interviewees. Their interviews were analyzed against the first set of sensemaking elements and their interview data suggested:

- Positive evaluations – all interviewees discussed the benefits of positive sensemaking activities
- Pessimism – a few interviewees mentioned the value of being pessimistic in sensemaking, but there was not a significant emphasis on looking for the dark-side of the situation
- Pluralistic ignorance – a few interviewees reflected or considered that there could be less than adequate understanding of the event across the responding organizations. There were only two quotes related to this element
- Collective sensemaking – most interviewees talked about the value of sharing perspectives of the event
- Optimistic bias – there were no quotes from the interviewees that considered over-optimism
- Institutional effect – all interviewees discussed the challenges of aligning organizations, especially the government, into an effective response structure
- Updating – all interviewees mentioned the value of continuous updating of information as a mechanism to improve sensemaking
- Doubt – a few interviews mentioned the value of building in doubt to the sensemaking process. This was not a significant element of the discussions
- Emotional – as might be expected from interviewees who were not directly involved as first responders, their acknowledgment of the emotions involved in sensemaking was low

Overall this analysis suggested that sensemaking at the senior official level is more positive than that observed at the first responder level. Further, the data could suggest that senior level officials could benefit from better understanding the challenges of the first responders. As discussed earlier in this subchapter, even the positive evaluations have unintended consequences in that they can create blind spots.

#### *Sensemaking Fukushima Only Case*

In an attempt to determine whether a case-study approach provides a different perspective for this analysis, the researcher analyzed the Fukushima case against both sets of sensemaking elements

The results suggest:

- Positive evaluations – all of the Fukushima interviewees discussed the value of positive evaluations of sensemaking
- Pessimism – the level of pessimism was consistent among interviewees
- Pluralistic ignorance – the level of event misunderstanding was more significant for the first responder interviewees
- Collective sensemaking – generally consistent among interviewees
- Optimistic bias – this was stronger for the first responder level suggesting that the first responders were more hopeful than the senior officials
- Institutional effect – this was consistent among interviewees
- Updating – interestingly, the first responder interviewees were more likely to mention the need to update their understanding of the situation. Perhaps, this was because they had more information about the local conditions than the senior officials were aware of about the local conditions
- Doubt – again, the first responders were more likely to build doubt into their situational (sensemaking) analysis

- Emotional – as expected, emotional assessments were more likely among the first responder interviewees

From my analysis of the second set of sensemaking elements, i.e., commitment, identity, and expectations, there were inconclusive results. There were references to each of the three sensemaking elements in the interviews. Again, this analysis suggested that a more individualistic approach is needed to assess these elements.

#### *In-crisis versus Post-crisis Analysis*

All quotations were assessed to determine if the interviewee was reflecting on his comment as being part of an “in-crisis”, situation i.e., during the crisis, or a “post-crisis” scenario, or even making rhetorical reflections. Also, for the national leaders, i.e., Situation Room leaders, an attempt was made to determine if their reflections were based upon actual experiences or if they were post-hoc.

Generally, the interviewees who were the first responders reflected their comments as being made with reference to “in-crisis” situations rather than post-hoc ones. For those interviewees who were not first responders, their reflections were generally post-hoc or post crisis. These results are not surprising and therefore offer little value in advancing this portion of the literature.

#### *Summary of Sensemaking*

The data suggested that the actual event cases reflected more emotion in terms of sensemaking by the first responders than the senior level officials did in the non-event cases. There were inconclusive results regarding the second set of sensemaking elements, i.e., commitment, identity, and expectations. Also, there were inconclusive results for “in crisis” and “post crisis” reflections by interviewees. Similarly, the

Fukushima case analysis did provide some insights on multilevel sensemaking; however, the overall results seemed consistent with the “all data” events. The implications of these results on an integrated model of extreme event leadership are incorporated into Chapter 5.

## Decision-making

### *Analysis*

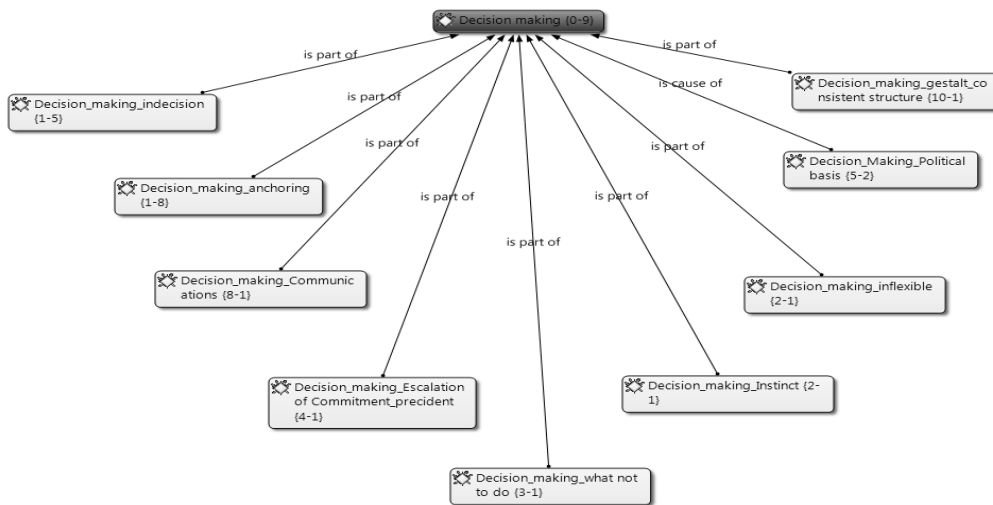
An analysis of the interviewees’ quotations associated with decision-making is provided in this subchapter. The researcher discusses the individual decision-making concepts raised in the interviews after describing the qualitative process. From that discussion comes a set of second-order codes (Gioia et al. 2012) that provide the foundation for the third-order (Gioia et al. 2012) codes and associated literature review as will be seen in Chapter 5.

As a preview, the data reflected nine fundamentals of decision-making which have been deduced from the interviews. These nine fundamental precepts are essentially the bottom-up review of the data. Regarding the literature link, i.e., the top-down analysis (Gioia et al., 2012), the second-order coding raised in this subchapter suggested that there are additional literature streams that were not covered in Chapter 2 that should be considered when discussing the results. These additional literature streams include the literature associated with naturalistic decision-making, recognition primed decisions, and macrocognition. Consistent with the process described by Gioia et al. (2012) the results of this analysis, which have been used in Chapter 5, were used to build upon the existing literature streams.

Many interviewees discussed the factors associated with decision-making. Each interview quotation was coded with regard to the essential factor(s) that drove the decision or the indecision. Consistent with the process, these codes were linked together to create a network analysis of the overall decision-making structure. Figure 10 – Decision-making Network depicts that coding structure. Ultimately there were nine codes reflecting 89 direct quotations regarding decision-making. Associated with those nine codes are a set of sub-codes. Specifically for two codes (decision\_making\_anchoring and decision\_making\_indecision), the researcher provided a set of sub-codes which were consolidated into the higher-order codes. The sub-codes are discussed here.

Decision-making is one of the six crisis concepts identified in subchapter 4.2. As shown in Figure 10, there are nine factors that are parts of the decision-making structure. In the next paragraphs, the researcher discusses each of those nine factors. For the two codes that include sub-codes, the researcher discusses them as well. There is no particular hierarchy for these factors; therefore, the order of discussion is not germane.

**Figure 10 - Decision-making Network**

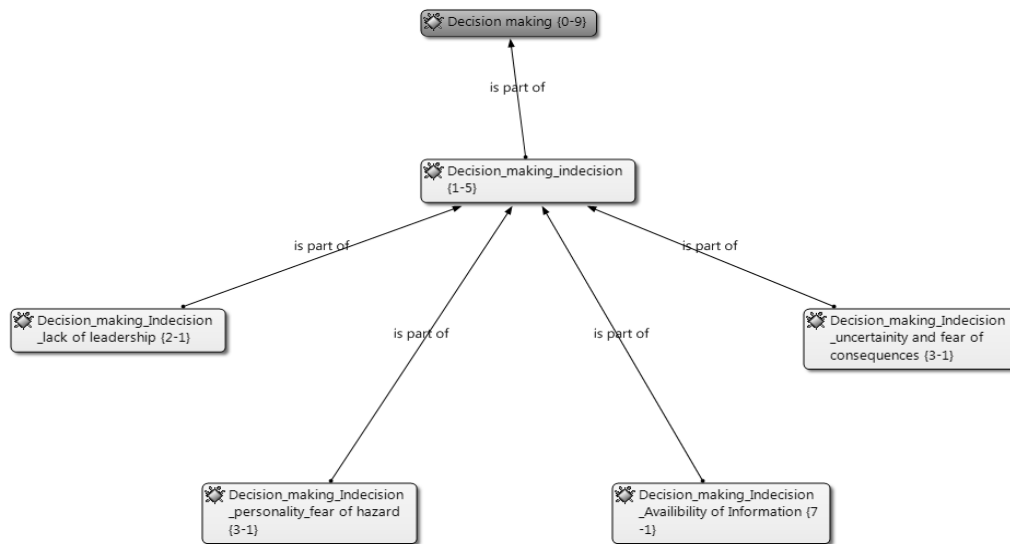


*Decision-making – Indecision*

Interviewees talked about indecision in extreme event situations. These quotations were coded as “decision\_making\_indecision”. This is one of the two codes which include sub-codes. There are four sub-codes as a part of indecision. Figure 11 – Indecision Code Network depicts this sub-network structure.



**Figure 11 – Indecision Code Network**



The factors that influenced indecision are depicted in Figure 11. These included instances where there was a lack of leadership, a personal fear of the hazard involved, a general fear of the uncertainty and consequences of the decision, or a lack of information needed to make the decision. Examining these sub-codes exposed an interesting concept around indecision based upon uncertainty and fear of the consequences of the decision. According to the network analysis, both sub-codes of lack of leadership and lack of the proper information are common root causes for indecision. Thus, as a focus on the two sub-codes of fear, the researcher presents the following examples of quotations to provide insights into these unique root causes.

Some interviews discussed instances where decision-makers were fearful of the hazard involved in the event and that this fear resulted in indecision by that decision-maker. An example quotation: “Their fear of the radiological environment took me

aback in this instance and began to affect some of their decisions within the first, I'd say, few days". (Ref. RW an on-scene leader).

In this instance some leaders were hesitant to lead through a radioactive event. This fear affected their decision-making abilities. In another instance, a leader recognized this and suggested that those leaders step aside, if they could not overcome their fears. Clearly, some leaders were ineffective in their command, and the leader was offering a safe way out of the circumstances. For this sub-code, the interesting concept was that of personal fear of a particular hazard and how that could affect leadership abilities. This issue is discussed in subchapter 4.8 Leadership. In a related sub-code, there were interviewees who discussed occasions of indecision based upon the decision-maker's fear of the subsequent consequences for instance:

Mr. M. argued for expanding the evacuation zone because the radiation monitoring system strongly indicated that they should go beyond, even beyond 30 kilometers radius. At that time, the Japanese government had expanded that radius to 30 kilometers. When Mr. E. chaired that meeting with Mr. K., and Mr. M and several other people and Chief Risk Officer, Prime Minister's Officer, former metropolitan police agency chief and the others, they simply could not make a decision on as to what should do, what the government should do. (Ref. YF.)

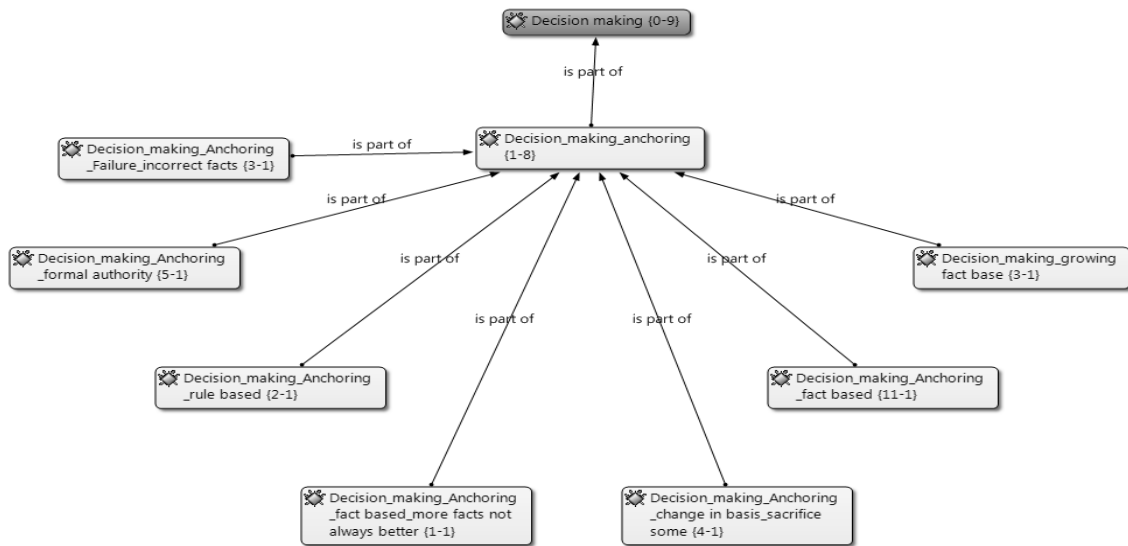
In this instance, the leaders were fearful of the panic that an expanded evacuation might cause; therefore, they were indecisive in making the decision about expanding the

evacuation zone. This concept of indecisiveness is not new; however, the interviewees discussed the non-linear impact of indecision during extreme events. This refers to the implications of not expanding the evacuation zone that diminished the level of trust by the people of the government. It caused a disagreement with the Americans on the need to protect citizens (the Americans did decide to expand the American evacuation zone to 50 kilometers). Interviewees suggested that the leaders failed to consider the consequences of their indecision. These concepts, i.e., fear of consequence, failure to consider the consequences of indecision, are considered here in the analysis of the decision-making literature. The other issues, lack of leadership and less than adequate information, were considered in the literature review.

#### *Decision-making – Anchoring*

Anchoring of decision-making is another code that consists of sub-codes. Figure 12 – Decision-making Anchoring, depicts the sub-codes such as: growing fact base, anchoring fact based, failure due to incorrect facts, formal authority, rule-based decisions, more facts not always better, and some facts must be sacrificed. These sub-codes are explained below.

**Figure 12 – Decision-making Anchoring**



Many interviewees discussed the need to anchor decisions in facts. Those discussions included suggestions regarding the non-linearity of extreme events, the need to base decisions in fact, the downsides of facts in decision-making, the authority structure for decisions, and the need to grow the fact base (updating and doubt as discussed in the subchapter on situational awareness).

One interviewee (RW) discussed his insight that many of the decisions made during the Fukushima event seemingly were rule-based decisions. He suggested that with extreme events the decision-makers made conservative decisions that were within the rule base, but when there was an extreme event that could not be the basis for the decision. He suggested that the “whole decision set changes and you have to recognize that you are in that, that you’re now the leader inside that scope of change”. (Ref. RW.)

Non-linearity of decision-making is an interesting concept that is explored in the crisis decision-making literature review later in Chapter 5. In a related discussion,

interviewee RW discussed the need to overcome the consequences of decisions and act regardless of those consequences even to the point of sacrificing some people. He stated:

You likely will have to, and when you say risk, it can be life or death. It can be potential injury. It can just be putting them in an extreme situation that isn't going to kill them, but nonetheless it's going to stress them and you're making a decision to do that because it has to be done. You have to do it. (Ref. RW) Note: Interviewee RW is a military commander. Throughout the interviews, his attitude of sacrificing some people for the greater good permeated the differences between civilian leaders and military commanders.

Regarding the use of formal authority for decision-making, there were a number of different concepts discussed by the interviewees. In two cases, the interviewees believed that they were the last decision-makers standing; therefore, they made the decisions regardless of their decision-making authority. The clearest instance of this thinking came from a leader in the control room at Fukushima. His thought was:

When I was a young operator, I remember this shift supervisor was saying that when you were in that position, you were the final decision-maker. However, when I really had that situation, I did so not because I remembered that, but probably because my instinct told me to do so. At that moment on that day, although I had my senior supervisor next to me, I was the supervisor of the day; I was the last person of last resort. It is not something I learned from someone, but

more like Bushido (the spirit of the samurai). I have read a lot of Bushido related books. Basically, I had a feeling that I had to take the responsibility to be the last person to last resort. Therefore, in the main control room, I was the decision-maker. I think that was the basic thought in mind. I can't explain what that was based on words. (Ref. IZ.)

What is interesting in the quotation above is that the operator based his authority upon his instincts. As noted in other subchapters, the instinctual emotion appears in a number of these extreme events. Another example of authority-based decision-making comes from a Situation Room leader:

The distance from the facility where the Japanese said 20 kilometers and we said 50 miles. I remember that day where the president asked the chairman and others, he said, 'What would we do if that happens here in the United States?' Everybody said, 'This is the advice we would give our citizens.' He said, 'That's the advice we need to give in Japan.' The rub was it wasn't the advice that the Japanese government was giving to their people. The politics around that was necessarily complicated, but I think he made the right choice by just simply saying, 'Let's not further complicate the decision. If this is the advice we'd give our folks here, let's give our folks there the same advice,' which sounds really simple. It got really complicated. The leadership lesson there is: do not try new tricks in the middle of a dance that the processes and everything from the regulations and all of that that

we use here on a daily basis can apply overseas when it comes to protection of the American public. Once we settled in on that, it got less complicated. (Ref. RR.)

Two powerful insights come from this quotation. First, as discussed under the sub-code “fear of consequences” as the Japanese were indecisive in their decision-making for Fukushima evacuations, the Americans moved forward even in the face of uncertainty. As stated, moving forward in the face of uncertainty caused major complications, e.g., international disagreements. The above quotation implies that the Americans did resort to rule-based decision-making. Second, is the insight from the interviewee that decision-makers should not ‘try new tricks in the middle of the dance.’ (Ref. RW)

The last four sub-codes all involve fact-based decision-making. Interviewees discussed the need for fact-based decision-making while speaking also about updating and doubt in decision-making. Further, there was one caution raised that more facts were not necessarily better for decision-making. In that context, a Situation Room leader said,

My whole point to that whole thing is decision-making in the immediate aftermath of a bad event is difficult, and you’re doing it oftentimes with less than full information. Decision-making during the recovery phase of an event and Fukushima is another good example is equally difficult and complicated. You would think that with more information comes more clarity. Sometimes more information comes more confusion which is counterintuitive. It’s like golf that way; the harder you swing, the less far the ball goes. It doesn’t make sense. It is

an important point. I'm not sure how to characterize it for you other than to say most people don't see it that way. You think with clarity comes precision. Not necessarily. (Ref. RR.)

With regard to fact-based decision-making, one interviewee, a former Attorney General and Governor, stressed the importance of interrogating the facts *and* the source of facts. He was adamant about the need to keep pace with the facts when making decisions. A first responder during the Three Mile Island event characterized the leader's dedication to the facts as:

I felt I was being interrogated when we started, what's the basis for this, because he was interested in just the facts. He didn't want opinions. He wanted to know what the facts are and I'm willing to make the hard decisions. You tell me the facts and I guess, I realized or he made it clear that under our constitution, the governor is the one who can declare a state emergency, not the N.R.C. can, and we don't have any troopers or anything out there. (Ref. HD.)

In sum, the code of "indecisions\_anchoring", raises a number of theoretical issues to pursue in the literature review. Those issues included anchoring decisions in facts, the non-linearity of decision-making, sacrificing some to save many (consequential indecision as discussed in the indecision code), decision authority (last person standing), and decision-making in the face of uncertainty, i.e., proceeding in the face of uncertainty.



These are important issues that suggest far reaching implications for the decision-making theories.

*Decision-making – Communications*

A number of communications issues were raised by the interviewees. Some of those issues have been discussed in other subchapters, i.e., there are some co-occurrences with regard to communications. These co-occurrences include quotations involving communicating the reality of the situation to the public (Ref. OD), and communicating expectations to the public regarding their own resilience (Ref. CF & RR). The issues not discussed previously include the importance of communicating expectations quickly, seamless communications, and the differences in communications among different governmental structures. Specific examples in this regard are provided below.

Rapid communication is important in conveying the President's expectations throughout the response structure (Ref. RR). This same interviewee discusses the imperative of matching the speed of response to the speed of the event. The need for alignment of rapid policy and communications was discussed extensively by interviewee RR. A specific example is derived from a Situation Room leader interview:

We struggle with that as part of the AAR (after action review) around hurricane Sandy. Really it's just improving communication mechanisms so that, for instance, if the President convenes all of the key cabinet secretaries around a response that hits the most populated area of the United States. We have got to be able to communicate the decisions that are being made in those high level meetings quickly down through a system that allows people to understand the

intent at the highest level of the government, all the way down to those people who are out there aiding as a result of the incident. (Ref. RR.)

Another area of concern raised in the interviews focused on the need for seamless communication. As maintained by interviewee OD who worked both in the Situation Room and the Red Cross, there was a specific need to value prior relationships to improve communications:

After the actual framing of the messages and the decisions that have to be made around what will and what won't be shared. That's going to be very dependent upon the organization and agency that you're working for. That is always a very delicate conversation, whether it's here at the American Red Cross, over at the National Security staff, or even at the FEMA level. It's critically important that the relationship between the disaster management and the external communications press or communications department is seamless. It's not establishing relationships on the day the event happens. This is something that has been rehearsed, practiced, thought through, well in advance of the disaster. (Ref. OD.)

Finally, the differences between the State government organizational structures require different communications strategies. According to the interviewee, the decision-makers must understand the differences between their situations and those of other

entities, and decision-makers must understand the situation as it exists on the ground.

The specific quote is:

The dynamics of New Jersey are different than the dynamics of New York. You saw that play up between Bloomberg and Cuomo. In New Jersey, Christie is the unitary executive. He most of those people in that state that have a position of leadership were appointed by him. There was no question who was making the decisions. On the other side of the street, when you look at New York and New York City, you realize that there was a tension between the mayor and the governor. When you look deeper into New York City, you realize that it wasn't just a city; it was actually five little cities that were all big. You had high rise structures with no power and elderly people that couldn't get up and down the stairs. There was this lot of disparity around the boroughs in New York. Once we realize that we need to all treat those as separate entities. In other words to yes, absolutely work with the mayor but also work with the borough presidents because if you don't, the mayor may not either have the insight or the appreciation of the uniqueness of the needs. (Ref. JH.)

Thus, for communicating the decisions, these interviewees highlight the following concepts as important considerations to be undertaken by decision-makers. These issues will be reviewed in the decision-making literature review.

- Sharing reality
- Communicating expectations

- The importance of communicating expectations quickly
- The importance of seamless communications
- The differences in communications among different governmental structures

### *Decision-making – Escalation of Commitment*

Interviewees raised three issues regarding “escalation of commitment” as described in the literature (Parashevas, 2006). Interviewees illustrated what appear to be examples of the theory of Escalation of Commitment. One of the examples is consistent with the Path-dependence Model and the Escalation of Commitment. The specific interview statements include:

When considering Japan’s energy situation, we needed to distinguish the Hamaoka plant from the other cases. I made sure probably three times that the Hamaoka was an exception, and that we were shutting down the plant for a technical reason. Prime Minister Kan said yes. We could not shut down other nuclear power plants in the same way as the Hamaoka. Because of the wrong decision on the Genkai, we had to face the Ohi nuclear plant debate. It is still going on. (Ref. GH.)

That’s really the power of how do you optimize the organization’s capacity. Most people will tell you, ‘We’ll just do the mission creep thing.’ We start off as an organization that does things. Now we’re doing everything under the sun which is the wrong approach because you’re going to do it poorly. It’s not sustainable. (Ref. RR.)

In a disaster, it is easy to get to this illusion that people that are victims need somebody to take care of them. They need somebody to empower them and give them permission to take care of themselves. (Ref. CF.)

The concept of escalation of commitment will be pursued when reviewing the decision-making literature in Chapter 5.

*Decision-making – Incorrect Basis*

This code was created during the interviews when interviewees discussed situations where decisions were made for the wrong reasons. Those reasons included a political bias, a role basis, (e.g., the Red Cross does not build houses (Ref. RR)), and the resilience of the victims/survivors, i.e., the need to see them as a source of help, not as victims. All three of these quotations co-occur with other codes. Thus, those quotations are not covered here but were incorporated with the co-occurring codes. Even though this code could have been deleted, it was not dropped for purposes of completeness/integrity of this dissertation.

*Decision-making – Instinct*

There were two direct quotations that referenced the need to use instinct in decision-making. One of those quotations was from interviewee IZ, who discussed his position as the last person standing and his use of instinct in making decisions. The issue of instinctual decision-making was discussed earlier and will be considered in Chapter 5. The second quotation that discussed the last person standing or instinctual decision-making is attributed to RW who stated:

You may be the last man standing and take one for the Gipper, but you can never relent. So how a leader, when he's getting fatigued, so this has gone long, the crisis seems to be out of my control, it's still the best decisions you can make. You're still prioritizing. You're still trying to asses, figure out what you don't know, empower other people to lead because you're falling behind, whatever it is, and you do it until your dying breath. That's what I believe and that is, I think, what the military probably tends to drill into most of us because of the combat circumstances, and the ground forces know this, so you fight on. The concept of stopping, stop leading ... I've been overcome so I'm going to stop leading ... that is a non-starter. (Ref. RW.)

#### *Decision-making – Inflexibility*

There was one quotation coded as inflexibility in decision-making. It was generated when reflecting on the response generated for Hurricane Katrina by a Situation Room leader. He reflected on a concept mentioned by interviewee RW who stated that inside of an extreme event, rule based decision-making could be ineffective. This specific quotation from the Situation Room leader was: “My sense of it and I wasn't directly involved in the Katrina response. Just from an outsider's perspective, my sense was that this strict adherence to protocols and rules absent flexibility and making decision at the lowest level inhibited a flexible response.” (Ref. RR.) This reflection was later incorporated into a new decision-making protocol by the Federal Government after

Hurricane Katrina. Chapter 5 will address these new thoughts about decision-making through a revised literature review.

*Decision-making – Political Basis*

Interviewees related instances where political involvement impacted extreme crisis decision-making. There were five mentions of political influences in the interviews. Three of the instances were related to Fukushima, one was related to Hurricane Katrina and another had to do with Super Storm Sandy.

In the Fukushima case, the political decisions discussed by interview GH mentioned the political involvement of the Prime Minister and his cabinet with regard to shutting down and operating the reactor after the Fukushima accident. There was a concern that if they shut one reactor down (because of seismic concerns) then all 50 of the other reactors would have to shut down. That scenario did occur and all of the reactors in Japan were shut down. The issue set a precedent and was the first step in the path-dependence chain. The path-dependence model has been discussed in this dissertation in Chapter 2.

The second case involving Hurricane Sandy was discussed by interviewee RR, who questioned the decision by the Governor of Louisiana to build an earthen berm in the Gulf of Mexico after Hurricane Katrina. His challenge to that decision was based upon the poor engineering basis for the berm. He suggested that it was a politically motivated decision. In the end, RR's summation was that sometimes politics trumped good decision-making. This is an issue to consider in the literature review; however, that summation is not unusual in decision-making, i.e., that politics plays a role.

Nevertheless, Mr. RR made a significant point regarding the political side of the decision-making equation when he stated:

Then there's a political side to events. I never gave much thought to that, really didn't appreciate it a whole lot. In fact, I would tell you that most of my career, I always felt like, "Sh\*@, here we go. We've got a 95% solution but now we're going to polish this thing until it's irrelevant on the political side". After almost seven years over at the White House, I better understand it. I understand it has a part to play. You can weave those two pieces together; the technical and operational and the political pieces can all come together. It requires some level of maturity. Looking over the pandemic to Haiti to the oil spill to Japan to Sandy, the reason Sandy went so well is we had all of that other stuff under our balance. I've also focused on one another. It's understanding less about them understanding me and more about me understanding them and building and spacing the dialogue to, "Okay, let's talk to the operational piece and now let's get to the political piece. Now let's get to the economic piece. Maybe there was a bit of an evolution on everybody's part where I understand the political side of it. I'm not an expert in it. I don't necessarily like it that much. It has a role to play. You've got to carve out that space because if you don't it will just steamroll you and they'll make less better decisions. (Ref. RR.)

The final mention of political influence in decision-making was related by interviewee RR who discussed the impact of the upcoming Presidential elections during



the country's recovery from Super Storm Sandy and the distraction that the elections caused in the State and the Federal response. The decision to build and staff polling locations was made at the Presidential level. The interviewee stated, "That election, the relative timing of the election in the event to your point added a layer of complexity we wouldn't have otherwise seen. We wouldn't have to make those decisions". (Ref. RR.) Again, these types of political decisions are not unique; however, in terms of extreme event leadership, this instance appears to be an example, as discussed in Chapter 2, of social or political justice trumping technical justice. That is, the social concerns (voting) overrode the needs for a technical response and caused a distraction from the extreme event's perspective.

#### *Decision-Making – Gestalt Structure*

During the interviews, there was one reference to establishing a "Gestalt structure" for decision-making by Mr. RR, a Situation Room leader. Also, there were other interviewees who described a decision-making structure without explicitly discussing a "structure" or method. Mr. RR described a national government response structure that focused on coordination of the responsible entities. He explained that during the Haiti earthquake response, the United States had to modify or adapt its structure to fit the Haitian circumstances. Specifically, Mr. RR, stated in part:

Haiti was a little different than the pandemic but from a leadership perspective it was the same it was so to get there, assess, you know, all the gestalt of everything you had and then figure out what is the best way to optimize and it turned on Haiti, given that it was a sovereign nation and given that there different

organizations have different relationships what I thought we can effectively was to say here's a structure which everybody can have a role to play and we help manage that structure until the point that it became sustaining on its own. We really remain an active participant where necessarily, not leading it anymore. (Ref. RR.)

In relating these points Mr. RR provided another example with the response to the damage done by Hurricane Katrina. His point is that a decision-making structure was important and it was important to assess the specific situation and adapt the decision-making structure to that situation. Thus, the points to consider with the literature review in mind relate to having a structure and adapting that structure as necessary to the circumstances.

If you went by the book, you said, 'Yup, we did steps one through five and yet we got people starving in the Super Dome'. How do you explain that? Flexibility is the key. I tell my people here all the time that, 'Our job according to our mission statement is to reduce suffering in the face of disasters.' You do that in a variety of ways. It depends on who is suffering from what and how do you best fix it or at least address it. (Ref. RR.)

There were a few other points made during the interviews that are not included in the above quotations. However, many of them co-occurred therefore they were discussed at least on some level. Those isolated points may be summarized as:

- Do not try new tricks in the middle of the game (Ref. RR.)
- The differences in decision-making structure between New York and New Jersey (Ref. RR.)
- Like golf, swing hard does not mean better with regard to the quantity of facts (Ref. RR.)
- Treating victims as survivors and having them assist in the decision structure (Ref. GF.)
- The need to establish a decision-making model early on in the event (Ref. RR.)
- Adaptation of that model where necessary, i.e., flexibility (Ref. OD)
- Acknowledging the political realities of the situation (Ref. OD)

#### *Summary of Decision-Making*

A number of decision-making concepts are discussed here in Chapter 4 that were not discussed in Chapter 2. These concepts should be considered and pursued in another review of the literature. Thus, the discussion on decision-making in Chapter 5 incorporates these third-order decision-making concepts raised here in Chapter 4 into the decision-making literature. Also, that additional decision-making literature review will give a focus on those concepts that are especially applicable to extreme events. In summarizing the interviews from this subchapter on decision-making, the issues and second-order concepts include:

- Fear of consequence and the failure to consider the consequences of indecision
- Anchoring decisions in facts
- Non-linearity of decision-making in extreme events
- Sacrificing some to save many (consequential decision-making)
- Decision authority (last person standing) or instinctual decision-making

- Decision-making in the face of uncertainty (proceeding in the face of uncertainty)
- Communicating expectations, sharing reality, communicating seamlessly, the importance of communicating expectations quickly, and acknowledging the differences in communications among different governmental structures
- Escalation of commitment and path dependence models
- Establishment and flexibility of an appropriate decision-making structure
- Acknowledgement of political realities including social justice concerns

### Leadership

Leadership was one of the most important concepts identified in this dissertation. During the interviews there were hundreds of quotations associated with leadership. Those quotations reflected good and bad leadership examples. The goal of this subchapter is to analyze the leadership quotations in a bottom-up approach to identify those leadership concepts that are uniquely applicable to extreme events. Interviewees discussed many typical leadership concepts e.g., encouragement of workers, or the importance of leader mastery. In this dissertation, it is important to discover which leadership concepts were the most important in these extreme events and how those leadership concepts were influenced and how they influenced the outcome of the extreme event. This subchapter is intended to provide insights that might extend the literature discussed in Chapter 2 or discover new territories of leadership.

#### *Analysis*

With regard to leadership, I conducted a detailed analysis of the interviews. In the aggregate, the perspective of all events indicates that the leader's level of (in)experience is the largest contributor to the interview codes. After (in)experience is ranked the leader's personality and character, leader mastery and leader trust are the most significant

leadership codes. Interviews indicate that the other leadership codes, e.g., age, perfection, etc., are much less significant.

An analysis of the data suggests that the leader's level of "(in)experience" has a significant effect on the results. It is interesting that the code "sensemaking" does not appear as an associated code of "(in)experience". The absence of the sensemaking code could imply that without experience, sensemaking becomes more difficult. Another interesting code that does appear as an associate code of "(in)experience" and that is the code of "(in)effectiveness". This inclusion of (in)effectiveness relating to (in)experience could imply that (in)experience is directly related to (in)effectiveness in extreme events.

On the other hand, in the code association with the "personality and character" code, the two codes of "crisis command" and "felt emotions" are highly associated. This could imply that a leader's personality and character are directly coupled with his/her ability to command and reaction to felt emotions during an extreme event. Also, (in)experience, trust and (in)effectiveness are coupled together implying a direct relationship between those leadership concepts. Finally, sensemaking is reasonably un-associated with the leader's personality and character. However, it must be stated that interviewees did mention the concepts of leader, personality, experience, trust, and effectiveness more during their discussions as compared to sensemaking.

#### *Leadership Perspective – Events*

As a significant insight from the interviews, it appears from the data that each event suggests a unique set of leadership traits. The data indicates that for each event, interviewees discussed separate leadership traits that were important for that event. I disaggregated the data on leadership between the events, i.e., Fukushima, Three Mile

Island and Deepwater Horizon, the Situation Room and other interviews. Clearly, the largest number of quotations regarding leadership is derived from the Fukushima and Deepwater Horizon events which eclipse all the other interviews in terms of leadership quotations. Further, each event and the Situation Room interviews result in unique models of leadership. While similar situational influences apparently exist, each set of interviews resulted in differences in the significance of the leadership concepts; therefore, each event was reviewed separately to discover the important leadership concept for that unique event.

In the Deepwater Horizon event, the interviews indicated that (in)experience and mastery were the two most significant leadership traits discussed by the interviewees. An analysis of the codes was completed. That analysis found that leader (in)experience is the most insightful of the codes for Deepwater Horizon. The results implied that there was significant impact from the felt emotions associated with the event, significant inexperience of the leaders, little mastery of the safety procedures, and significant unawareness of the conditions. In the Fukushima event, the interviews indicated that:

- As in the Deepwater Horizon event, the felt emotions dominated the leadership code in their influence on the leader.
- Leaders needed to be perceptive but not overly involved in solution finding.
- Leaders under normal conditions were not necessarily good crisis leaders – some high-risk organizations would perhaps not consider this factor.
- Leaders, especially first responders, would need to be strong against interference – engendering respect, trust, and admiration (also possessed strong mastery and leadership skills).
- Leaders would be required to be emotional – to the point of admonishing subordinates when required.

- Some leaders lost focus because of weariness and frustration.
- Some operators expressed disappointment in their leader's reaction, and this disappointment led to a loss of confidence in the leaders.
- Aggressiveness, skills, physical and mental fitness were deemed important leadership traits.
- Strong mastery and calmness led to leader credibility.
- First responder leaders displayed calmness and acts of humility.
- Leaders assumed full responsibility for mistakes of everyone and expressed this claim.
- Interviewee felt embarrassed for a peer leader regarding that peer leader's ineffective decision-making (the interviewee did not want to criticize his colleague's performance).
- Leaders who were compassionate were effective.
- Leaders who had strong personalities and character were effective.
- Leaders may change personalities under stress.

### *Summary of Leadership*

A series of analyses for each of the events was completed. As diagnosed, each event revealed a unique modality of leadership. This implies that extreme event leadership is variable and based upon the situation. Refer to the discussion in the decision-making and sensemaking subchapters, which maintain that extreme events can involve non-linear leadership thinking. This diagnosis was not surprising given the specifics provided in these subchapters. First, the researcher diagnoses an overall perspective of leadership for all of the events and then, breaks down the leadership modality for each event. Ultimately, the researcher diagnoses the events to determine the unique leadership modalities.

An analysis of the interview data in suggested that the leader's level of (in)experience has a significant effect on the data concerned. Closely ranked and following (in)experience are the leader's personality and character, leader mastery and leader trust. Interviews indicate that the other leadership codes, e.g., age, perfection, etc., are much less significant.

My literature review related to leadership suggested that future researchers could investigate the relationships between leadership and the threshold effect, instinct, transboundary effects, locus of leadership, role of felt emotions, and comparisons with dangerous military contexts. These constructs and the insights garnered from this subchapter are discussed in Chapter 5, as are all six of the crisis concepts derived through the process mentioned by Gioia et al. (2012).

### Integrated Summary of Results and Implications

#### *Integrated Results*

There were six major (third-order) crisis concepts identified from interviews conducted for this dissertation. Those six crisis concepts included: (1) felt emotions, (2) situational context, (3) crisis response, (4) sensemaking, (5) decision-making, and (6) leadership. By far, the concept of felt emotions was discussed the most by the interviewees. Some interviewees faced unfathomable conditions, and as a result, their interviews were dominated by discussions of their feelings and the consequences of those feelings on their sensemaking, crisis response, decision-making, and leadership abilities. Therefore, there was significant co-occurrence between these concepts throughout the interviews. This was especially the case for the Fukushima and Deepwater Horizon events; however, all interviews contained some discussion of felt emotions. Interviews



indicated that the felt emotions included: panic/calmness, awareness, success, heroism, hopefulness, humor, optimism, outrage, skepticism, and trust. The results indicated that the levels of felt emotion were related to the extremeness of the events and the situational contexts both of which influenced these individuals' abilities or inabilities to respond.

Interviewees related that the situational context challenged the in-situ readiness of the organization and its leaders immensely. Further, the non-linearity of the unfathomable conditions significantly tested their resilience and their abilities to execute leadership tasks, e.g., sensemaking. Data from this sub-chapter confirmed the importance of sensemaking as an element of extreme event leadership. These results generally suggested that the Fukushima and Three Mile Island events had more positive interviewee-reflections regarding sensemaking than the Deepwater Horizon case; nevertheless, data suggested that the actual event cases reflected more emotions regarding sensemaking from the first responders. There were inconclusive results regarding some sensemaking elements, e.g., commitment, identity, and expectations. A deep analysis of the Fukushima case analysis did provide some insights on multilevel sensemaking; however, the overall results are consistent with the "all data" events analyzed.

With regard to crisis response theories, the results indicated that the sub-codes related to procedures, logistics, and prioritization were significant factors in terms of event response. The conclusions provided evidence that confirmed several crisis theories. For some crisis theories, the limitations were confirmed and in several cases, the existing crisis theory was confirmed and extended. There were several crisis theories that were confirmed or where gaps or the possibility for theory extensions were identified.

Interviewees discussed their abilities and the importance of decision-making throughout the interviews. Some of the issues and concepts that were raised included: anchoring decisions in facts, causes of in-decision, the non-linearity of decision-making in extreme events, decision-making, authorities for decision-making, communications of decisions, flexibilities needed in decision-making, escalation of commitment, and the need to acknowledge the political realities of the decisions. As leaders, the interviewees reflected that each event revealed a unique modality of leadership. Complicating the leadership factor was the amount of experience a leader possessed.

### *Implications*

Chapter 5 provides a thorough discussion of the implications of these results on an integrated model of extreme event leadership. Overall, the non-linearity of these extreme events impacts almost all aspects of the crisis response. In events where the situational context exceeds the organization's readiness and resilience, the leaders are faced with unique sensemaking, decision-making, and leadership contexts. The interview results suggested a continuum of responses that relates to the non-linearity of the situation. That is, as the event progresses, the leaders are capable of offering an effective response if the situation rests between their readiness and their resilience. For instance, the Hurricane Katrina and the Three Mile Island events were within the abilities of the organizations concerned. As the event progressed beyond these points, the influences of the felt emotions (uncertainty and unfathomable conditions) began to vary. In the case of the Fukushima event, leaders were moderately effective up until the point when the reactors exploded. After the reactors exploded, their ability to execute a crisis response dropped dramatically because of the influence of the leaders' felt emotions. In the

Deepwater Horizon case, the situational context immediately exceeded the in-situ abilities and resilience of the organization; therefore, leadership efficacy and crisis response were minimal. In the Deepwater Horizon case, the crisis response was essentially limited to an immediate evacuation. At that point, the crew and leadership were functioning primarily from their survival instincts; therefore, Chapter 5 will focus on a review of instinctual decision-making.

## CHAPTER 5: DISCUSSION

### Overview

The goal of this Chapter is to merge the crisis management theories and the research results from Chapter 4 into an integrated model that describes the characteristics of extreme crisis leadership. Because researchers tend to use single case studies as a research method for these types of phenomena, those case studies have generated useful but disparate crisis management theories (Chapter 1). The research presented here considered a number of extreme events along with cross-case interviews to integrate crisis leadership theories into one integrated model of extreme crisis leadership.

Overall, the results suggest that extreme events are unique, non-linear, and abound with felt emotions that heavily influence a person's thoughts and behaviors. Results demonstrated this non-linearity in the six crisis concepts of situational context, felt emotions, decision-making, crisis response, sensemaking, and leadership. Table 9 below shows a general overview of the non-linearities in the crisis concepts. In this Chapter, the discussion will develop the concepts depicted by the arrows in Table 9, step-by-step, building on each other, and describe the non-linear thresholds ultimately culminating in an integrated model of crisis leadership. For example, in column one of Table 9, the situational context crisis concepts has a continuum that ranges from

“fathomable”, through a non-linear threshold of “extreme” to the far end of the continuum called “dangerous or unfathomable” events.

**Table 9 – Non-linearity of Extreme Events**

<b>Situational Context</b>	<b>Felt Emotion</b>	<b>Decision-making</b>	<b>Sensemaking</b>	<b>Crisis Management</b>	<b>Leadership</b>
<b>Routine (fathomable)</b>	Subliminal	Classical	High reliability and Normal Accident	Readiness	Collaborative
↓	↓	↓	↓	↓	↓
<b>Extreme</b>	Supraliminal	Naturalistic	Macro-cognition	Elasticity	Non-linear
↓	↓	↓	↓	↓	↓
<b>Dangerous (unfathomable)</b>	Mortality Salience	Situational & Warrior ethos	Situational & Warrior ethos	Situational & Warrior ethos	Situational & Warrior ethos

Each step of the discussion introduces and develops the integrated model of extreme crisis leadership. Discussed first are three crisis concepts, i.e., situational context, felt emotions and decision-making, as these concepts emerged or developed extensively as a result of this research. The crisis concept of “situational context” emerged as a new organizing crisis concept not explicitly addressed in the previous literature, and it is discussed first. The crisis concepts of felt emotions and decision-

making yielded new insights that emerged from the grounded theory process beyond those discussed in Chapter 2 and thus require a deeper investigation and development of the corresponding literature. Finally, the crisis concepts of sensemaking, crisis management, and leadership are also further discussed in terms of the new theoretical insights discovered in this research.

### Situational Context<sup>24</sup>

During the data collection process, there were many codes that captured the interviewees' discussions of the severity (scope and magnitude) of the event as well as their organization's readiness to cope with the severity of the event. As data collection and analysis progressed, the third order code of "situational context" was created to organize the relationship between the actual event severity and the corresponding in-situ coping readiness of the organization. Thus, the code of situational context reflects whether an event is consistent with the organization's readiness, or whether the condition exceeds the organization's readiness.

The crisis concept of situational context consists of three significant categories: routine, extreme and dangerous. The first category, "routine events", comprises those events in which the organization can predict the event and has the in-situ ability to successfully respond, i.e., fathomable events. This situation is consistent with the concept of readiness theory (Smits & Ezzat-Ally's, 2003), in that routine events are predictable and organizations can adequately prepare for them. Included in the categories of routine events are "resilience" events. Resilience events exceed the predicted severity of the routine events; however, these types of events are fathomable (Wachtendorf,

---

<sup>24</sup> Situational context refers to the situation on the ground of the event. It is a collection of interviewee quotations that describe the scope and magnitude of the event along with the in-situ response capability.

2009). For resilience events, the organization can expand its abilities through external assistance such as mutual aid agreements to match the severity of the event. These situations are consistent with the discussion of resilience theory (Korac-Kakabadse, et al., 2002).

The second category, “extreme events”, describes contexts where the severity of the event exceeds the fathomable. Like resilience events, extreme events exceed the organization’s in-situ ability to respond or expand its crisis capabilities to match the situation. Unlike resilience events, extreme events, e.g., failure, catastrophic and super-catastrophic, exceed the organization’s ability to expand its crisis capabilities and reach into unfathomable conditions. Several existing crisis management theories apply in extreme events, including surprise (Farazmand, 2009) and failure (Reason, 1997; Sagan, 1994; Turner & Pidgeon, 1997) theories. Surprise and failure theories generally explain how organizations respond to extreme events; however, the results in Chapter 4 identified some new insights not currently covered by surprise and failure theories (those new insights are discussed below).

The last category of the situational context is “dangerous contexts” (Campbell, et al. 2010; Yammarino, et al. 2010). Dangerous contexts include unfathomable events that greatly exceed the organization’s abilities and include conditions where the life and death of those involved could be in jeopardy or where several extreme events combine into one context (Campbell, et al. 2010; Yammarino, et al. 2010), like the Japanese tsunami 2011 and the Fukushima nuclear event.<sup>25</sup> Table 10 shows the crisis concept of situational context including the categories of events.

---

<sup>25</sup> For purposes of refinement in this discussion, the dangerous contexts were subdivided into two categories. One category includes situations where the leaders begin to fear for their lives and the other where loss of life is highly probable. The reason for this

**Table 10 – Continuum of Situational Context**

<b>Situational Context</b>	
Routine	Readiness
	Resilience
Extreme	Surprise
	Failure
Dangerous Contexts	Catastrophic
	Super-Catastrophic

Next is a general discussion of how the data for the code of situational context is or is not consistent with the extreme crisis events theories. Generally, the results indicate consistency with the literature regarding routine events. That is, routine events in this study tend to proceed as described in the literature. Nevertheless, the interviews suggest that in the 21<sup>st</sup> Century, new extreme events appear, e.g., H1N1 virus, cyber-attacks, and unique environmental catastrophes, e.g., floods in places where floods rarely occur, among others. In fact, the data indicate that some extreme events are becoming increasingly “normalized” as readiness strategies improve. For instance, one interviewee talked about the normalization of some extreme events:

It is like when we prepared to fight battles in nuclear battlefields, we don't have that doctrine now. We will never go through a nuclear battlefield; we'll go

---

subdivision is to explain better the consequences of felt emotions by leaders. As discussed in the felt emotions section in this Chapter, in a situation where leaders fear death, the felt emotions related to “death anxiety” influence the leader’s thoughts and actions. Conversely, near-death situations are consistent with the felt emotion of “mortality salience”. In the integrated crisis leadership model, these categories of extreme events are labeled as “catastrophic” events and “super-catastrophic” events respectively.



around it. We just will say hey, you know there are other places to fight the battle, so we don't have that doctrine anymore. In the same way, mutually assured destruction as an existential threat was something you had to avoid at all cost, and today, as you look at nuclear terrorism, you're looking at a really bad Katrina, a really bad Fukushima, a really bad Sandy, right. It's not an existential threat anymore, so you think about these one percent events. I think that's what ... for those we're only at a half percent now. I think that the landscape shifts.

Ref. JB.

Therefore, as organizations learn, extreme events become more "routine", with new extreme or even dangerous events created in different forms than in the past. This phenomenon suggests an opportunity for organizations to consider both fathomable and unfathomable events in their crisis planning scenarios. That is, once an organization normalizes its predictable events, it can begin to study events that may be beyond the fathomable, i.e. unfathomable. This phenomenon of normalization of events and creation of new events provides an opportunity to expand the extreme crisis literature as well. The normalization of events and appearance of new events provides fresh case studies for researchers. As the uniqueness and transboundary nature of events evolve, the crisis leadership literature should evolve along with these unique and transboundary events thereby improving the relevance of the literature.

Another insight from my study reveals that at the dangerous context level, the thoughts of the leaders can be dominated by supporting their workers' wellbeing. This

emotional domination of the leaders' thoughts was especially evident in the Deepwater Horizon and Fukushima events. For instance, in the Fukushima case:

Mr. Y, was very, very careful about the work allowed in Unit 3. Even when we have a very small change of status, like the reactor pressure, he asked us to stop the work and to call back to the Emergency Response Center. We repeated a promise to do this. Fortunately, the explosion of the Unit 3 ... When the explosion in Unit 3 occurred, probably 30/40/50 people were around the reactor ... I don't know the exact number. Fifty people, maybe about 50 people were working around Unit 3. It was a terrible moment for me. That TV conversation, or the conference system, the DVD shows me putting my hands on my head. My feeling at that moment was that I could be a martyr. So many people were working. Mr. Y immediately started asking us to ask them to come back. And people who came back had really the pale ... Some of them were bleeding. Ref. IN.

Thus, it appears from my study that there is an opportunity to expand the surprise (Farazmand, 2009) and failure (Reason, 1997; Sagan, 1994; Turner & Pidgeon, 1997) theories by including the significant felt emotional impacts revealed in this study. In particular, at the dangerous context category of extreme events, where life and death situations influence the leaders' thoughts and emotions, surprise and failure theories that focus on creating predictable leadership outcomes can benefit from considering the felt

emotions of the leaders. This life and death phenomenon is discussed in detail in the felt emotions subchapter below.

In sum, I created the concept of situational context as an organizing code to capture the severity of the event and the capability of the organization to respond. For routine events, the results indicate that the factors involved in each situational context studied here were consistent with the literature. At the extreme event categories, interviewees discussed the “normalization” of extreme events into routine events, and the creation of new forms of extreme and dangerous context events. Finally, my study reveals that at the dangerous context end of the situational context continuum, felt emotions often dominate the leaders’ thoughts and actions.

Next is a discussion of the first of two expanded crisis concepts (felt emotions and decision-making) that emerged from the data analysis and that require further review of the literature. This literature expansion was necessary to better understand the implications of the data. First is a discussion of felt emotions. The data indicated that for extreme and dangerous contexts, felt emotions heavily influenced the other concepts, e.g., decision-making, crisis management, sensemaking and leadership. The literature review in Chapter 2 discussed felt emotions; however, the data in my study, especially those interviewee quotations related to death anxiety and mortality salience, indicated that a deeper understanding of these concepts is needed in order to more fully explain the results.

Also, as each extreme crisis concept is developed, I begin to build the integrated model of extreme crisis leadership. For each extreme crisis concept, I explain its associated continuum, including any non-linearities and describe various other

characteristics of the continuum. For each crisis concept Table 10 is updated to show this continuum and is carried forward to the next extreme crisis concept to step-by-step build the integrated extreme crisis leadership model.

### Felt Emotions

The results of this study show that there were many quotations that reflected the interviewees' discussions of their felt emotions<sup>26</sup> and the effect of felt emotions on the interviewees' leadership abilities. As this research progressed, the concept of felt emotions expanded considerably from that considered in my initial literature review. For instance, in the extreme and dangerous context events that I studied, there were 707 quotations related to felt emotions. Thus, for those contexts, felt emotions dominated all of the other crisis concepts, particularly decision-making, leadership, crisis management, and sensemaking.

The continuum of felt emotions (see Table 11<sup>27</sup>) ranged from thoughts of success to worries about impending death i.e., mortality salience. Organizations generally plan for routine events; therefore, the leaders' felt emotions are subliminal thoughts of impending success during routine events. As a result, leaders' thoughts remain mostly positive. If an event exceeds the routine or the fathomable, then subliminal feelings of skepticism emerge. For example, in the Three Mile Island case, one interviewee stated, "Our skepticism was established very early on so that this carried through all of the events that transpired over the next week or 10 days that we were very careful to examine everything". Ref. DT. In the resilience category of events, feelings of skepticism are

---

<sup>26</sup> Extant research discusses how emotions, especially "felt" emotions, can be detrimental to cognitive thought, especially in sensemaking (Shrivastava, et al. 1988). Weick (1995) argues that felt emotion, which comes from arousal, influences cognitive ability.

<sup>27</sup> Throughout the discussion of the six crisis concepts, the continuums from the previous crisis concepts are included and shaded in the Tables to facilitate the development of an integrated model.

generally subliminal. As the event severity progresses beyond the organization’s ability to respond or expand their response, felt emotions, e.g., failure, death anxiety or mortality salience, often transition from subliminal to supraliminal (Table 11).

As a result of interviews from this research, it is clear that for some events, the threat of impending death was a significant factor in the extreme events considered. Thus, death-related anxiety is worthy of study for extreme crisis leadership. From the associated literature, it is concluded that the level of a person’s cognition changes depending on their awareness of a threat (Yanagisawa, et al. 2013). When thoughts of threats are subliminal, the subconscious mind seeks out positive emotions and thoughts to offset these subliminal thoughts. When subliminal, slightly positive emotions become more positive and the individual gathers positive thoughts as an “antidote” to fear (Beck, 1985). In reality, the mind attempts to block out negative thoughts (Yanagisawa, et al. 2013). Research shows that through this collection of positive thoughts, the mind broadens its cognition (Beck 1985).

Once the thoughts about threats reach supraliminal awareness, the mind narrows its focus, although the amount of cognitive narrowing varies by individual (Fredrickson, 2003). Even the mere thought of death has a significant impact on cognition (Hayes et al., 2010). These impacts are studied extensively in research associated with mortality salience, death association, anxiety-buffer threat, and dispositional effects.

**Table 11 - Continuum of Felt Emotions**

<b>Situational Context</b>	<b>Felt Emotion</b>
<b>Routine</b>	Success (Subliminal)

<b>Resilience</b>	Skepticism (Subliminal)
<b>Surprise</b>	Unawareness (Supraliminal)
<b>Failure</b>	Failure (Supraliminal)
<b>Catastrophic</b>	Death anxiety (Supraliminal)
<b>Super-Catastrophic</b>	Mortality salience (Supraliminal)

For example, in the Fukushima case, when the situation exceeded the organization's ability to cool the reactors, the interviews reflected indications of unawareness or failure. At that point, the felt emotions (failure) of the leaders became supraliminal:

When the explosion occurred at Unit 1, we hadn't established sea-water injection; because fresh water was very limited. So the explosion occurred. We were very surprised. We could not find out what happened. Because we felt only one very significant jolt, radical jolt, and nothing more, normally, when we have an aftershock, one big jolt and then a series of jolts; but this time, only one single jolt. So we start to say, "What happened?" Someone started saying it was an explosion of main generator, because main generator contains hydrogen. Another person started saying it was an explosion of hydrogen cylinders, to make up the hydrogen to the generator. Then we watched NHK, national TV program monitor, and we found the reactor building, was a kind of skeleton. Still, I said, "What is that?" Still, I didn't believe, or I could not believe ...Then the TV monitor showed the moment of explosion, so we were forced to believe. The full

or entire Emergency Center suddenly became very silent, and people were looking at their feet.

This is the point where the surprise and failure theories can benefit by considering the felt emotions of leaders during events, which begin to exceed the in-situ capability of the organization. For example, surprise management theory research suggests (Farazmand, 2009) that ‘surprise management’ requires: “extensive, specialized and rigorous training in various techniques with harshest conditions, strategies, tactics, and scenarios; decision-making under stress and system breakdown conditions; practices that signal the need for dealing with ‘impossibilities’; and surprises that would only surprise the non-experts” (p. 408). My research suggests that surprise management also requires the abilities of leaders to face and to control their felt emotions during extreme events. Expanding these theories to include the effects of felt emotions might allow for earlier termination of extreme event if leaders are prepared in advance to accommodate their felt emotions. As example, in the Super Storm Sandy case, a State Police Colonel (JH) expressed the need to consider all the factors of intelligence in leading emergency response:

I find that in some cases the communications is not fluid, the intelligence is not favorable, the delivery of information is not timely and that culminates in one’s inability to then manage and control, not only information but in some cases, the operation, i.e., to get out in front of it all and a source for concern. It’s intelligence-led management at its finest and the ability to articulate that concisely

and efficiently to all members that would ultimately be impacted, albeit a member of first response community or a member that could become a victim or survivor of the event.

In the “dangerous context” category of events, i.e., catastrophic or super-catastrophic, the results demonstrate significant felt emotions related to the realization of life or death. This was particularly relevant for the Deepwater Horizon and Fukushima events. In the Deepwater Horizon event, one leader described his fear (Shroder, et al. 2011), “People were screaming, why don’t we leave, I don’t want to die. Doug tried to remain calm, but he was scared. The rig was coming apart”. In each of the life or death circumstances discussed by the interviewees, their felt emotions were extremely strong. Even after more than two years past the event, while interviewing the Fukushima operators, they were overcome with their felt emotions. At times we had to stop the interview so that the interviewees could collect their emotions. Clearly the events of Fukushima impacted these seasoned operators very dramatically. One described his fear during the event, “It was a real nightmare. I have to say, I thought, at least three times, ‘I will die soon.’” Ref. IN.

As I reviewed the interview results, it emerged that once the subliminal/supraliminal threshold was reached, codes related to felt emotion dominated the data; therefore, a better understanding of the role of felt emotions in extreme crisis leadership was necessary to complete a coherent analysis of the results. The discussion of felt emotions in Chapter 2 was limited in the discussion of supraliminal awareness of death as well as the pervasiveness of the related emotions throughout all interviews



where participants encountered extreme events. Thus, once these insights emerged, I conducted a review of the literature associated with death anxiety and mortality salience (Table 11). These literature streams are quite encompassing, so I limited the literature review that follows to research that directly discusses both phenomena.

### *Linkage to Literature*

#### Subliminal v. Supraliminal Death Anxiety

As a result of interviews from my research, it is clear that for the dangerous categories of extreme events, the threat of impending death was a significant emotional factor for the interviewees. Thus, the literature associated with the effects of near death or impending death on a person's thought processes and awareness is worthy of study to better understand extreme events. This literature falls generally into two streams. One stream is related to simple negative thoughts, such as fear, skepticism, doubt and near death (near-death emotions are recognized in the literature as death-related anxiety). My literature review in Chapter 2 did not explore death-related anxiety; therefore, a deeper literature review was conducted and is presented in this subchapter. Another literature stream is related to a person's thoughts of impending death. This emotion is recognized in the literature as morality salience. Additionally, it is important in the study of death-related anxiety and mortality salience whether the emotions are subliminal or supraliminal (Greenberg, et al. 1997). Once negative thoughts, e.g., death-related anxiety or mortality salience, are supraliminal, a person's ability to think (cognition) is significantly impacted (Greenberg, et al. 1997). These concepts are discussed next.

Research shows that the level of a person's cognitive<sup>28</sup> ability changes depending on the person's awareness of impending threats, i.e., subliminal or supraliminal (Yanagisawa, et al. 2013). When thoughts of negative emotions, e.g., death, are subliminal, the subconscious mind seeks out positive emotions and thoughts to offset any subliminal negative thoughts (Yanagisawa, et al. 2013). When subliminal, slightly positive emotions become more positive and the person gathers positive thoughts as an "antidote" to fear (Beck, 1985). In reality, the mind attempts to block out negative thoughts (Yanagisawa, et al. 2013). Research shows that through this collection of positive thoughts, the mind attempts to broaden its level of cognition when under personal threat (Beck, 1985). The mind's attempt to block out death-related anxiety is a subconscious instinct (Beck, 1985). However, once the thoughts about negative emotions (e.g., impending death) reach supraliminal awareness, the mind narrows its thinking and awareness; this process is called cognitive narrowing (Fredrickson, 2003). Even a mere supraliminal thought of significant personal threat, e.g., impending death, can have a significant impact on a person's level of cognition (Hayes et al., 2010).

A person's thought of impending death, i.e., mortality salience, correlates with that person's cognitive ability. As mortality salience increases, a person's cognition decreases (Tremoliere et al., 2012). Even if a person has high cognitive abilities, the person is not likely to suppress mortality salience; as a result, people experiencing high mortality salience continue to think about death (Tremoliere et al., 2012) despite the presence of supraliminal positive emotions or thoughts, under conditions of mortality salience, those positive emotions are likely suppressed. Further, the likelihood of

---

<sup>28</sup> "Cognition" is a word that dates back to the 15<sup>th</sup> century meaning, "thinking and awareness" (Revlin, 2013).

utilitarian<sup>29</sup> responses to moral conflicts decreases; therefore, under conditions of mortality salience people are more likely to respond to moral conflicts in a manner that protects their self-interest (Tremoliere et al., 2012). That is, when faced with imminent death, moral judgments become clouded because of the natural fight or flight instinct. Also, when consumed by thoughts of death, people tend to lose focus on even the smallest of tasks, and this cognitive narrowing may prevent people from giving full cognitive attention to moral conflicts (Tremoliere et al., 2012).

Simon et al. (1997) found that mortality salience has a motivational effect that facilitates a mental shift from an analytic to an intuitive mindset. This mental shift explains the examples in my research data (Chapter 4) where people act on instinct rather than following proper procedures, authority, and use of morality.

We could not find the water level for a long time (in the reactors). We started talking, Why, why, why?" Suddenly, another leader of the administration group, the experienced guy, shouted that he got the information from his subordinate that the fire engine was stopping due to the fuel because in the field, the radiation level near the fire engines was very high, and they were afraid to add fuel. Mr. Y. scolded to the person who was the general manager of the Emergency Preparedness Department. He was in charge of this, to manage the fire engines. Mr. Y. really scolded him: "You are killing the people, allowing them to die." This voice still ringing in my ears. (Ref. IN)

---

<sup>29</sup> Utilitarianism is a theory in normative ethics holding that the proper course of action is the one that maximizes utility, usually defined as maximizing happiness and reducing suffering (Tremoliere et al., 2012).

This quote illustrates that self-preservation and instinct guided the worker's response rather than the greater good of the organization (this illustration becomes important later during the discussion of leadership). In these impending death events, mortality salience limits individuals' cognitive thinking and awareness and results in a tendency for people to act out of intuition. My study finds that this intuition sometimes not only includes a self-preservation mentality, but also a constructive defiance attitude as discussed in the next section. Further my results also include a description of cognitive narrowing effects on an individual's moral judgments; those judgments may lead to individuals acting in a manner inconsistent with their leader's wishes. Interview data, especially in the Fukushima case, identified a self-preservation mentality of defiance set into the responder's emotions. This felt emotion of "constructive defiance" is discussed next.

#### Constructive Defiance

A key finding emerged from the results considers the cognitive reaction to extreme and dangerous context categories of extreme events. As discussed earlier, when (felt) emotional thoughts remain subliminal, people use positive thoughts to offset negative thoughts. Once felt emotions, e.g., fright or fear for one's life, become supraliminal, cognitive narrowing begins to influence a person's thoughts. This cognitive narrowing impacts a person's ability to make moral judgments. In the Fukushima case, it appeared that as cognitive narrowing occurred, the operators became more defiant. This phenomenon also occurred in the Deepwater Horizon event. That is, when faced with impending death, in some cases, the responders resorted to their intuition, i.e., acts of

self-preservation including defying their leaders. For example, from the Deepwater Horizon event:

Chris [subsea supervisor] turned up the stairs taking two at a time to get to the main deck and the drill floor. Then he saw the fire. He turned around and headed straight for the bridge, and his BOP (blowout preventer) control panel. As subsea supervisor on duty, he was the person responsible for executing the EDS (emergency disconnect switch), which is what he damn sure intended to do right now. Curt [Captain] stepped in front of him. "I'm EDSing" Chris said. (Ref. Shroder, et al. 2011)

Specifically, the operators in the control room at Fukushima defied orders from their leaders in the emergency control center. As mentioned by a commander in the Fukushima control room:

We should not evacuate from this room for that reason (loss of power). Once again, I assured that I would evacuate them safely based on my own judgment when we really needed to. It might be very Japanese, but I bowed and apologized to the operators. It was probably not so much about leadership, but what I was doing there was asking, or begging for help. After we lost all the power because of the tsunami, we injected water into the reactor by using a diesel fire pump (fire extinguishing water system) as part of the accident management procedure. That

was not the instruction from the ERC, but we did it by our own judgment. Ref. IZ.

Similarly, leaders in the emergency control center defied orders from their leaders in Tokyo, including defying both the President of the company and the Prime Minister. Some specific examples of their behavior included: a leader in the emergency command center actually lied to the Prime Minister and President of the company, and continued to inject water into the reactors after being told to stop the injection. From interviews:

Then Mr. Y. started shouting, really shouting, or scolding. He told us, "You know, we can never repeat this program for Unit 2 and Unit 3". Our mistake was, we were always acting under assumption of prediction, very bad prediction. "From now, you must report to me exactly what you were doing and what are you going to do by when". He also scolded to headquarters through the TV monitor, "This request or command is to you, as well". And the people said, "Yes", very small, very low. This is the moment that Mr. Y. became a kind of God. Because after this, there was a very famous exhort that he ignored the request from the headquarters to stop the injection.

From an interview with a Japanese journalist: Interviewer: "Mr. Y. did not stop the injection water when ordered to by the Prime Minister; what did you write in your book about that?" Interviewee: "Mr. Y. was right. I wrote it that way in my book. It's also troublesome. If you see that the leader on the ground,

disrespecting that ... all the problems above at the most critical junction. In pre-war days in Japan, the army was so notorious for always disrespecting, sabotaging, ignoring, defying that authority. That doomed Japan to be such a disaster. It's total lack of governance, total lack of command structure. If you praise that on the ground, defying the authority, that's very much popular, particularly populist culture. That's dangerous.

In the Fukushima case, the young operators in the control room felt vulnerable and hopeless and wanted to evacuate the control room. Only after their leader assured them he would protect them against "outside interferences" and begged and apologized to them did they decide to stay. In some cases, the leader tried to offset constructive defiance with positive emotions. For instance, at Fukushima, the control room leader apologized and begged the young operators to stay. He appealed to their sense of duty. He acknowledged the hazard and he committed to defying his leadership in the event they asked him to participate in acts that might lead to unsafe conditions for the operators. Also, at Fukushima, the top leader defied the Prime Minister and the company President by lying regarding the cessation of water into the reactor, yet he showed respect and dignity to the leaders. In another case, the leader withheld disturbing information from the operators, fearful that they would panic. Others prayed to God as inspiration to have the strength to brave out the adversity. In the Deepwater Horizon case, rescuers simply asked the victims to have faith in them despite having no preexisting trust relationship.

While defiance was most pronounced in the Fukushima data, there were some less serious examples in some other cases. For example, in the Deepwater Horizon case, fear

and instinct motivated young staff members to take unilateral action to disconnect the rig from the well and broadcast a “mayday” signal without the permission of and despite receiving a scolding from the Captain not to issue the mayday call. Specifically, the instance recalled was:

Now Andrea [mate] jumped up and hit the general alarm. She grabbed the radio and began calling over an open channel, yelling, “Mayday, mayday. This is Deepwater Horizon”. Curt [Captain] heard Andrea repeating the mayday. It was a direct violation of chain of command. Regulations permitted only the captain to give the order to call mayday. He came up behind her: “I didn’t give you authority to do that”. (Ref. Shroder, et al. 2011).

As discussed by Simon et al. (1997), mortality salience has a motivational effect that facilitates a shift from an analytic to an intuitive, experimental mindset. Interviewees reported finding motivation in defiance, skepticism, and protection from outside influences and other negative thoughts. In one sense, these negative thoughts resulted in what I describe as *constructive defiance*. I define constructive defiance as intuitive actions taken by individuals or leaders under dangerous conditions that are contrary to the desires of their leader, yet are perceived as consistent (or in the best interest of) with the individuals or leaders directly faced with the dangerous conditions own well-being. That is, the results of this dissertation suggest that in the dangerous context category of extreme events, negative thoughts can serve as a more powerful emotion than positive emotions. That is especially true because constructive defiance implies that the affected



individuals who face a dangerous condition might ignore all the encouragement or directions offered by the leader and succumb to their own thoughts of self-interest. This occurred in the Fukushima and Deepwater Horizon cases because the responders viewed the underlying action as more correct than the action proposed by their leaders.

In sum, consistent with Fisher et al.'s (2010) work on "shadow influences", i.e., subliminal influences on thinking, one can imply that constructive defiance is another shadow influence and is motivated by emotions of self-preservation, protection, or risk for the individual or group. The concept of overwhelming negative thoughts in extreme events, specifically constructive defiance, is an important phenomenon that expands the existing crisis literature. Once a crisis event becomes an extreme crisis event or beyond, felt emotions dominate an individual's thoughts and behaviors. This is especially pertinent once the threshold of supraliminal emotions is reached. When individuals begin to recognize their felt emotions, those emotions dramatically affect their cognition, crisis management, decision-making, sensemaking, and leadership abilities. Ultimately, in the most consequential events, i.e., in dangerous contexts, an individual's emotions of intuition, defiance, death anxiety, mortality salience and constructive defiance dominate their thoughts and behaviors.

#### Additional Perspectives on Decision-making

Decision-making is also one of the six crisis concepts in an extreme event and the literature associated with decision-making was reviewed in Chapter 2. Once the data were collected and analyzed, new implications with regard to decision-making were discovered; therefore, an additional, more focused review of the decision-making literature was warranted to help understand and integrate with the results. I begin by

reviewing three major areas of decision making research not considered in Chapter 2. They are naturalistic decision making, recognition primed decision-making and macrocognition. Also, as in the other subchapters, I develop a continuum of decision-making to support my integrated crisis leadership model. The continuum will include routine to super catastrophic events and will depict how these three general decision-making areas change as the severity of the event increases.

#### Naturalistic decision-making

Some researchers (Klein, 1993, 2003; Lipshitz, 2001) assert that classical decision theories are not flexible enough for extreme events in that classical decision processes primarily use the past to predict the future, and that classical decision theories are about decision processes not decisions themselves. Literature based on naturalistic decision-making (Klein, 1993, 2003) extends the formal, classical, decision-making approach. The naturalistic decision-making framework studies the methods that leaders adopt to make decisions and the ways in which leaders respond to the demands of extreme events (Klein et al., 1993). These demands are characterized by limited time, uncertainty, high stakes, team and organizational constraints, unstable conditions, and varying amounts of experience. In assessing my results, the characteristics of the extreme events support the naturalistic decision-making process. The process of naturalistic decision-making involves the use of options, experience, workable solutions, and naturalistic decisions are focus less on the use of formality in decision-making processes. These concepts of using experience and making decisions with workable solutions and lack of clarity was noted by a leader in the Situation Room (RR) when talking about the Hurricane Katrina response, and the Super Storm Sandy response.

You saw in Katrina, there were multiple disasters. One of them was the mother-nature event. The other one was slipshod approach to the response. Following rigid structures without any flexibility became the undoing. Everybody intended to do the right thing in Katrina. We're following the rules the way they understood them. My whole point to that whole thing is decision making in the immediate aftermath of a bad event is difficult, and you're doing it oftentimes with less than full information. Decision making during the recovery phase of an event and Fukushima is another good example is equally difficult and complicated. You would think that with more information comes more clarity. Sometimes with more information comes more confusion, which is counterintuitive. It's like golf that way; the harder you swing, the less far the ball goes. It doesn't make sense. It is an important point. I'm not sure how to characterize it for you other than to say most people don't see it that way. You think with clarity comes precision. Not necessarily.

These quotations illustrate that leaders in extreme events may use more situational decision-making, particularly, those leaders closest to danger. In extreme events, it is more than likely that much of the information needed for decision-making will not be available. At that point, leaders must use the most reliable source of facts (Ref. DT) at their disposal and make decisions based up situational considerations.

### Data-framing theory

Another literature stream related to naturalistic decision-making comes from Klein (1993) who discusses the decision “data-framing” theory as a subset of sensemaking. In Data-framing theory, Klein (1993) asserts that the situational context is explained when it is fitted into a structure that links observations together into a mental “frame”. Mental frames are a means of organizing data to link to other data. A frame might be a story, a map, a script, a chronology, or landmark to account for observed data. Creating such known frames facilitates a search for more data. Data-framing is primarily based upon the person’s experience. Basically, a person pieces the data gathered based upon the familiar. Once a framing piece is created, the person seeks hidden data to expand the frame. Much as in a three-dimensional picture where a person seeks something familiar and then after studying the 3D picture further or having someone point out a shape, then the person frames or links that new data with the known data. Data-framing is a process of framing and reframing, or linking the data into a frame to allow for interpretation. Conversely, data-framing can start out with a map, and then the person seeks data to match the map by finding data that fills-in the map. Once the data and frame are in congruence, sensemaking stops. Sensemaking can continue if new data or frames are added to the environment; however, Data-framing is not an endless search for data and frames (Klein, 1993) because there is an endless source of data. Also, people with more experience usually are faster at data-framing before less experienced people; however, both novices and experts employ the same reasoning processes (Barrows, et al., 1978).

### Recognition-primed Decision-making

One of the characteristics of extreme event decision-making is the speed of decision-making that is typically required of the leaders (data from Chapter 4 highlights the need to match decision-making speed with the speed of the event). The naturalistic decision-making theory of recognition primed decision-making (Klein, 1998) is consistent with this premise. Recognition primed decision-making essentially suggests that the decision-making process is heavily influenced by the leaders' levels of experience, as these leaders identify parts of the situation and then use their experience and imagination as the foundation to arrive at decisions. In recognition primed decision-making, much of the leaders' decision-making stems from intuition and instinct (Klein, 1998). Recognition primed decision-making is particularly useful in conditions of time pressure, and in which data is partial and goals and outcomes are poorly defined. Recognition primed decision-making is a form of naturalistic decision-making that is based on the use of intuition which can be described as understanding without rationale. It can be considered a 'gut reaction' and can include stages of reasoning, representativeness, feature matching (data framing), situational assessment, and use of experience (Bond, et al. 2005).

### Macro cognition

Macro cognition decision-making is consistent with the naturalistic processes including the recognition primed and framing theories. Much of macro cognition is underpinned by Piaget's notion (Piaget, 1967, 1971) of the constructivist understanding of learning. Piaget recognizes that people learn by linking data and framing their initial

learning. Then people build on their learning by using updating, doubt, rejection and replacement thoughts to continue building a frame.

In sum, decision-making in an extreme event is a highly cognitive process under demanding conditions. The non-linear environments found in extreme events require non-linear decision-making processes. Thus, leaders must rely upon decision-making processes that depend primarily on the leaders' experience, instinct, and intuition. The models of naturalistic decision-making theory, including data-framing and recognition primed decision-making are more aligned with the dynamic characteristics at the extreme category of events.

In Table 12, I have developed a continuum of decision-making consistent with the expanded literature review. The decision-making continuum starts with the routine events and culminates, as do the other continuums, in super-catastrophic events. My study results for routine events are consistent with the classical decision-making literature. My results indicate that for the hurricane events and Three Mile Island, which based on my data, are the least severe emotional events, interviewee quotations regarding decision-making were consistent with formal decision-making process. That is, in each of these events, there were interview quotations consistent with anchoring decisions in facts, and with formal rule-based authorities which are elements of classical decision-making. Similarly, the results indicate that with resilience events, that is, event where felt emotions are subliminal, yet some skepticism and expansion of the crisis response occurs, the data-framing is a typical decision-making model used by leaders.

**Table 12 - Continuum of Decision-making**

Situational Context	Felt Emotion	Decision-making
Routine	Subliminal (success)	Classical
Resilience	Subliminal (skepticism)	Framing
Surprise	Supraliminal (unawareness)	Recognition Primed or Naturalistic
Failure	Supraliminal (failure)	Macro cognition
Catastrophic	Supraliminal (death anxiety)	Situational
Super-Catastrophic	Supraliminal (mortality salience)	Warrior ethos <sup>30</sup>

As the event severity expands, in the surprise situational context when leaders recognize that the organization is not responding adequately to the severity of the event, supraliminal thoughts of surprise can significantly change the leaders' decision-making processes. Once the situational context exceeds the leaders' ability to keep aware of changing conditions, the cognitive challenges expand greatly (surprise theory) and the leaders begin to react with decision-making models such as recognition primed or naturalistic models. As such, the recognition primed decision-making and naturalistic

---

<sup>30</sup> Warrior ethos is a United States Army statement that is sacred to warriors, i.e., "I will always place the mission first; I will never accept defeat; I will never quit; and I will never leave a fallen comrade" (Kolditz, 2007). Warrior ethos discussed in detail in the leadership subchapter of Chapter 5.

models are reactionary models consistent with the demands of these events. An example of this decision-making model can be found in an interview with RW (military commander/cross-case) who stated:

Take one for the Gipper, but you can never relent. So how a leader, when he's getting fatigued, so this has gone long, the crisis seems to be out of my control, it's still the best decisions you can make. You're still prioritizing. You're still trying to get essay, figure out what you don't know, empower other people to lead because you're falling behind, whatever it is, and you do it until your dying breath. That's what I believe and that is, I think, what the military probably tends to drill into most of us because of the combat circumstances, and the ground forces know this, so you fight on. The concept of stopping, stop leading ... I've been overcome so I'm going to stop leading ... that is a non-starter.

Thus, this leader is focused on good decision-making with prioritization techniques, not purely instinct or intuition based decision-making. Note this this is interview was from the military domain. Later in the discussion of the concept of leadership in the non-military domain there will be some differences in the leader's attitude towards decision-making.

In the failure realm of events, the results are consistent with macrocognition decision-making especially in the use of updating and doubt processes used by the leaders facing these events. An example of the use of macrocognition decision-making came in the cross-case interview of RR who stated:



In the immediate response phase of any event, you are making decisions based on less than accurate and full information. You are making decisions, potentially consequential decisions, based on the best advice you can get. We've seen the President and his leadership team do that. By and large, done it well. As you get more clarity around the situation and around what decisions need to be made, if the algorithm changes, it's less about making decisions based on limited information. It's more about making decisions based on all of the things that you didn't have previously. Now you're looking at decision making in the context of geopolitical issues, national issues, election-related issues, economic-related issues.

Specifically, in this quote the interviewee discusses a changing algorithm with limited information causing the leader to think about issues other than the immediate event. That is, using the best advice given the situation. A similar example occurred in the Three Mile Island event when the Governor was faced with disagreements among experts on the potential for a hydrogen explosion, and the need to evacuate citizens from around the area. Also, the President of the United States was arriving on the scene in just hours. Given that the evacuations plans were inadequate, the Governor chose not to order an evacuation based on limited information, inadequate evacuation plans and the disagreement among experts. This decision-making was premised more on the holistic perspective rather than on the technical merits. Thus, this decision-making focused on the macro versus the micro issues, i.e., macrocognition.

Catastrophic events that involve impending death often result in leaders and workers using their instinct and intuition for decision-making. Thus decision-making becomes highly situational. There were many examples of the use of intuition, instinct, and constructive defiance, by leaders in the interview data. One of the significant quotes came from a control room operator at Fukushima (Ref. IZ):

When I was a young operator, I remember this shift supervisor was saying that when you were in that position, you were the final decision maker. However, when I really had that situation, I did so not because I remembered that, but probably because my instinct told me to do so. At that moment on that day, although I had my senior supervisor next to me, I was the supervisor of the day; I was the last person of last resort. It is not something I learned from someone, but more like Bushido (the spirit of the samurai). I have read a lot of Bushido related books. Basically, I had a feeling that I had to take the responsibility to be the last person to last resort. Therefore, in the main control room, I was the decision maker. I think that was the basic thought in mind. I can't explain what that was based on in words.

For super catastrophic events with conditions of high mortality salience, decision-making reflects a warrior ethos that the literature (Kolditz, 2007) discovered in dangerous contexts. The concept of warrior ethos is explored in more detail in my upcoming discussion of the crisis concept of leadership. Nevertheless, in dangerous conditions, most notably military domains, (there is little or no literature in this area for non-military

domains) the environment becomes more like wartime in which decision-making and leadership are heavily dependent on the trust and confidence of the leader. Thus, as will be explained later, decision-making will vary in the military versus non-military domains. In the military domain, leaders focus decision-making first upon completion of the mission and second on the survival of the troops. In the non-military domain the priorities switch. My results indicate that in the non-military domain, survival of workers becomes the important consideration for decision-making over resolution of the event.

In sum, the non-linearity of an extreme crisis means that felt emotions – particularly negative, supraliminal, emotions – make decision-making more challenging. The integration of additional literature beyond classical models of decision making helps to develop a more complete picture of the continuum for decision-making in extreme crisis conditions. The results of this study suggest that there is an opportunity to link the existing crisis response theories, e.g., failure and surprise theories, with decision-making theories of recognition-primed and macrocognition theories in a way that provides an integrated description of the sensemaking cosmology (Lagadec, 2007) for extreme events, especially for the categories of catastrophic and super-catastrophic events.

At this point I have discussed three crisis concepts including a concept introduced from this study, situational awareness, and two previously existing concepts, felt emotions and decision-making. The results from these three crisis concepts imply a significant nexus among them. That is, situational context sets the stage for the other two concepts by describing the event and the organization's ability to cope with the event. The non-linearity of the situational context results in significant felt emotions particularly at the most extreme end of catastrophic and super-catastrophic events. At that end of the

continuum, felt emotions significantly impact the decision-making process of those involved in the extreme event and at that breakthrough point or transition, the ability of a leader to use decision-making techniques, e.g., naturalistic decision-making or macrocognition becomes extremely limited due to cognitive narrowing. As the situation worsens, and when those involved face imminent death, then felt emotions dominate the thoughts of those involved and they tend to use instinct and intuition in their decision-making processes. This dynamic can lead to constructive defiance and a breakdown in macrocognition and naturalistic decision-making. The next section provides a discussion of the other three crisis concepts, i.e., sensemaking crisis response, and leadership. I continue to develop an integrated model that links all six crisis concepts together to explain the cosmology of extreme event leadership.

### Crisis Response

In my ATLAS.ti codebook, I defined crisis response as “quotes that refer to instances where leaders discuss activities, thoughts, or comments related to the actual performance of tasks or conditions that contributed to the outcome of the event”. Essentially, the code of crisis response refers to instances when the interviewees described acts or performances that they believed directly contributed to the outcome of the crisis, either successful or unsuccessful.

Before building the continuum for crisis response, there is a discussion of three areas that provide insights to the existing literature regarding crisis response. Afterwards the continuum of crisis response is discussed, including how the usefulness of crisis response concepts, e.g. logistics, diminished significantly for the most consequential events.

The results identified three areas that expand the existing crisis response literature. First, the results show that latent organizational weaknesses, such as the role confusion on the Deepwater Horizon, have serious negative consequences on crisis response. That is, with the non-linear characteristics of extreme events, even small latent organizational weaknesses become hugely impactful. For instance, in the Deepwater Horizon case, the legal status of an oil rig with regard to whether the rig is also a ship is not clear. The regulations state that if the ship is “attached” it becomes an oil rig. The question becomes, “Does the pipe connecting the ship to the well mean that the ship is attached?” This situation leads to a source of confusion over command of the vessel, that is, whether the ship captain is in charge of the vessel, or conversely if it is an oil rig, then whether the “oilman in charge” is in charge. This lack of clarity in the definition of ship versus oil rig led to leadership confusion regarding actions such as issuing a Mayday call, disconnecting the well from the rig and evacuating the oil rig, among other leadership issues. Ultimately, this latent organizational weakness, i.e., definition of a ship, became a significant complication in crisis response for the Deepwater Horizon event.

Second, the results confirm Lettieri, et al.’s (2009) conclusion that more research is needed on setback management. Throughout the extreme events in this dissertation, there were instances of setbacks. Given the number and severity of setbacks that occurred during these events, it is evident that setback management has an important impact on crisis response and should be studied further. There was a conclusion in Chapter 2, which suggested there are fuzzy boundaries, transition points, or instability points where crisis response becomes unmanageable. The results suggest these points did exist in the events reviewed for this dissertation. As an example, when crisis response

activities were unsuccessful in the Fukushima case, the severity of the event cascaded and that became an instability point. For instance, when the leaders were attempting to adapt and expand their resilience, the event conditions exceeded their capacity to respond. The event worsened and became a “surprise event”. As the event progressed, operators called for supplemental equipment that did not arrive (Ref. IN). Thus, the event became exceedingly complex:

There was a phone call from headquarters. Some electrical engineers from headquarters called them and they are now sending power support trucks, “So please don’t give up”. Maybe after one or two hours, finally I got the information that the truck was too heavy for the helicopter. The disappointment at that time was so large for me. Anyway, we had to wait for the trucks coming on the surface. But, of course, there was traffic jams and road damage. The problem was reactor pressure. Of course, it would stay high. So the problem was, we don’t have any measure to depressurize the reactor. So our thought was, “We need at least ten new batteries or sixteen new batteries of 22 volt”. Because normal batteries: One battery has about 22 volt, and one battery has more than 100 kilogram weight. So I could not imagine how to connect the power supply. We tried to establish a plan to recover some electric power source using the power supply truck and start the pumps. At the hindsight, it was not so appropriate a strategy, but at that time, it was the only option for us.

Thus, the operators at Fukushima attempted to expand their resilience by adding additional power supplies. When that attempt failed, the reactor conditions worsened, and the power supply arrangement forced adaptations and resulted in an inappropriate response strategy. At this point, the crisis response category of resilience was exceeded, i.e., the event cascaded and resulted in a surprise event. At this point, the crisis response became extremely uncoordinated and complex. This situation matched the definition of complexity theory<sup>31</sup>. That is, the event situation bordered on chaos.

Third, the results of this dissertation highlight the importance of communicating changes in crisis response strategies. The downside of over-eagerness, the role of logistics, and the leadership as mechanisms used to convey changes in strategies to workers were most evident in the Three Mile Island and Fukushima cases. For instance, in the Fukushima case, one leader noted the importance of using proper leadership techniques during changes in response strategy. In the Fukushima operator's words (Ref. MA):

I still needed to change the priorities. If I had been persistent with my words, everyone would have been confused, so the priorities needed to be changed. However, I needed to be more cautious and considerate about those who had been working on the time-consuming task when I made a change in the priorities.

---

<sup>31</sup> For complexity theory, Abel (2011) explains that complexity is not chaos; it is near chaos, because chaos involves the study of simple patterns leading (linearly) into repeated patterns, while complexity involves simple patterns leading to higher-level patterns, which are multiple unique interactions, and usually non-linear. Therefore, complexity theory precedes chaos theory. The reader can reference Chapter 2 for more details on complexity theory.

In the end, the results indicate that failures in executing crisis response can lead to events cascading into something more severe. The three areas discussed here, i.e. latent organizational weaknesses, setback management, and communicating changes in strategy, were significant contributors to the complexity of the events and resulting crisis response failures. Next I build a continuum for the crisis response concept.

**Table 13 – Continuum of Crisis Response**

Situational Context	Felt Emotion	Decision-making	Crisis Response
Routine	Subliminal (success)	Classical	Readiness
Resilience	Subliminal (skepticism)	Framing and Cognitive Continuum Model	Resilience
Surprise	Supraliminal (unawareness)	Recognition Primed and Naturalistic	Complexity
Failure	Supraliminal (failure)	Macrocognition	Failure
Catastrophic	Supraliminal (death anxiety)	Situational	Situational
Super-Catastrophic	Supraliminal (mortality salience)	Warrior ethos	Warrior ethos

Crisis response theories reviewed in Chapter 2 include: readiness (routine event) theory, resilience theory, complexity theory, and failure theory. Refer to Table 13 for the



Continuum of Crisis Response. Overall, for routine and resilience events, the results were consistent with the readiness and resilience theories; however, once events reach the situational context of surprise, failure, and beyond, the results indicate that, in reality, the concept of crisis response becomes increasingly less important in determining the outcome of an event. This phenomena happens because as the event worsens, felt emotions begin to influence leadership and decision-making greatly; therefore, the leaders' focus on issues such as logistics, formal decisions, and other general crisis management techniques becomes a lower priority.

Specifically, in the surprise realm of events, conditions are usually unfathomable. Complexity theory suggests that leaders in this realm of events should step back so that they can see unforeseen connections (Muffet-Willett & Kruse, 2009). The crisis response in this realm can be described as a rubric of complex responsive processes (Muffet-Willett & Kruse, 2009). Abel (2011) describes it as dissipative structure that moves into the edge of chaos and is usually non-linear.

Beyond the surprise realm, the situation worsens as the organization has failed to execute sufficient crisis response tactics. At this stage of events, failure theories, e.g., normal accident theory, would suggest that latent organizational weaknesses exist and that those weaknesses result in crisis response failures, as evidenced in the Deepwater Horizon case discussed above.

In the catastrophic and super catastrophic events, crisis response becomes highly situational because of the effects of felt emotions on the leaders. This situation occurs because the felt emotions of leaders become supraliminal (after the failure category of events) and they begin to dominate the data for the other six crisis concepts (we will see

this later under the leadership discussion as well). The results suggest that at the extreme end of the crisis response continuum, felt emotions dominate the thoughts and actions of the responders. Specifically, at these non-linear or breakthrough points, leaders typically resort to intuition and instinct in performing their crisis response duties, rather than organized approaches to crisis response.

In sum, crisis response relates to the outcome of an extreme event in that successful crisis response can mitigate or resolve events. However, there are significant organizational and tactical factors that influence an organizations crisis response, e.g., latent organizational weaknesses. In the continuum of extreme event crisis response, as event conditions worsen, the efficacy of crisis response declined for the events studied. When leaders begin to experience death anxiety or mortality salience as in catastrophic and super catastrophic events, then leaders resort to intuition, instinct and a warrior ethos in executing their crisis response duties.

Next is a discussion of sensemaking as a crisis concept. As one of the six crisis concepts, sensemaking also parallels the non-linearity of extreme crisis events. As in with the other crisis concepts, the next section will develop a continuum for sensemaking that fits into the integrated model of crisis leadership.

### Sensemaking

Although the results indicated that researching the crisis concept of sensemaking across multiple cases is extremely difficult, there were a number of insights discovered in analyzing the results. Specifically, the results show that some of the concepts of sensemaking are more appropriately researched through the case study method than through cross-case studies. I compared my data to the sensemaking elements suggested

by Weick (1988; 1995). As a refresher, Weick (1995) discusses three types of understandings: commitment, identity, and expectations – meaning commitment to understanding, understanding one’s identity; and expectations connect with cues to create understandings (Weick, 1995).

Overall, the results for these elements were inconclusive. Each element was essentially evenly distributed in the data. This suggested, as discussed in Chapter 2.8, that these elements of sensemaking are better evaluated at the individual level versus the case level. For instance, Weick (1995) discusses the element of “identity” in his assessment of the Mann Gulch firefighters when they dropped their fire implements to run from the fire (1949). According to Weick (1995), at that point the firefighters lost their identity as firefighters. Therefore, it appears from my analysis of the sensemaking elements of commitment, identity, and expectations, that Weick’s single case study approach to these elements is more appropriate than a multiple case study analysis used in my research. Thus, my research has no conclusions on the efficacy of Weick’s (1995) three elements of sensemaking.

Other elements of sensemaking were conclusive. Those elements included: the use of positive thoughts; pessimism; pluralistic ignorance; collective sensemaking; optimistic bias; institutional effect; updating; doubt; and felt emotions. The results are discussed next.

In the early stages of the Fukushima event and during the Three Mile Island accident, the use of positive thoughts was at least partially significant in the formulation of sensemaking for those leaders. The leaders in those two cases made positive evaluations of the situation and used those evaluations in guiding the organization

through the event. In all of the cases studied in the dissertation, there were pessimistic quotes noted by the interviewees. Because all of the cases in this research were extreme events with significant consequences, this observation regarding the significance of pessimism in the data is not surprising. In the Deepwater Horizon case, sensemaking was dominated by pluralistic ignorance and felt emotions. Hardly anyone on board the rig attempted to respond to the fire, e.g. firefighting, or had an understanding of the events as they unfolded. Further, in the Deepwater Horizon event, there was a significant amount of doubt in the abilities of leadership by the workers. However, in the Fukushima case, despite the severity of that event, the interviewees all had a significant understanding of the event, that is, collective sensemaking. Although they were surprised by the amount of devastation and severity, they did understand the causes and conditions leading to the event, specifically an earthquake, loss of electrical power, and tsunami. Also, the Fukushima interviewees expressed that they continuously used updating in their sensemaking as conditions changed. Nevertheless, in the later stages of the Fukushima event, felt emotions dominated the leaders' sensemaking abilities. As the Fukushima leaders' mortality salience increased, there were more significant impacts on the leaders' sensemaking abilities.

The level of optimistic bias, which might influence sensemaking, was consistent in the data among all of the cases. This result suggests that over-optimism did not play a huge role in sensemaking for any of the interviewees. Conversely, the degree of institutional effect, i.e., organizational failure, was significant and consistent among all of the cases. During these extreme circumstances, there were institutional barriers to effective sensemaking. From hurricanes to the Fukushima case, the interviewees

discussed the flaws in organizational decision-making, leadership, and crisis response, which impaired their sensemaking ability.

Finally, the effect of felt emotion on the leaders' sensemaking abilities was most significant in the Fukushima and Deepwater Horizon cases. According to the interviewees, felt emotions were not significant for the Three Mile Island case, in that, there was little fear of death for the leaders. Certainly the workers in the plant held significant felt emotions.

For example, the use of positive thoughts for sensemaking (Kayes, 2004) was partially significant for the Fukushima case as follows: In the Fukushima case, interviewees expressed positive emotions up until the reactor buildings exploded. Afterward, their emotions and consequently their sensemaking turned negative or non-existent. From the Fukushima interviews (Ref. IN):

Very, very fortunately, the status wasn't growing worse. We were gradually feeling safe because now we are stable condition status, and certainly safe. Already some people came back to the plant. They are very ... How do you say? Fortitude and the brave. The explosion of the Unit 4, actually, a jolt was caused by the explosion of Unit 4. So this is very confusing. We had only single jolt in the early morning on the 15th, but our imagination was it was due to some problem of Unit 2. That's why some people outside still misunderstand. Unit 4, actually, Mr. Y<sup>32</sup> asked all operators to evacuate to the ERC (Emergency Response Centre), and one shift supervisor reported the reactor building of Unit 4

---

<sup>32</sup> Throughout this dissertation, the reference to "Mr. Y" refers to a senior leader at Fukushima. As in the other interviews, his full name is redacted for purpose of autonomy.

was seriously damaged. So then we started being confused: “Oh, is it Unit 4? Or is it ...Unit 3 or 2, why Unit 4 exploded?”

Prior to the explosions, the interviewee expressed confidence about the situation and the strategic direction that the operators were implementing. Once the explosion occurred, the operators were confused and surprised that such an event could occur. This indicates a significant disparity between sensemaking in events when they are in the early stages when consequences are much less severe versus later in the continuum when circumstances are severe.

In sum, sensemaking was particularly effective for the lesser events, e.g., hurricanes and the Three Mile Island accident. As severity of an extreme event increases, the level of sensemaking generally decreases. Ultimately, in the most extreme cases, e.g., life and death, sensemaking is almost non-existent, and the individuals resort to a situational sensemaking that is primarily based upon self-preservation.

Next, I continue the process of developing the integrated model of crisis leadership by explaining the results related to sensemaking. The continuum of sensemaking ranges from useful sensemaking, that is, leaders understand the event and apply enacted sensemaking to reach a successful outcome. As the event severity progresses, then sensemaking changes forms to adapt to the situation; however, in the most extreme events, as with other concepts, if conditions are life threatening, sensemaking stops as an effective tool. Then those individuals affected resort to situational sensemaking, which is founded in their self-preservation and other strong felt emotions, e.g., instinct and intuition.

**Table 14 - Continuum of Sensemaking**

Situational Context	Felt Emotion	Decision-making	Crisis Response	Sensemaking
Routine	Subliminal (success)	Classical	Readiness	Positive evaluation
Resilience	Subliminal (skepticism)	Framing and Cognitive Continuum Model	Resilience	Collective sensemaking
Surprise	Supraliminal (unawareness)	Recognition Primed and Naturalistic	Complexity	Updating, Optimistic bias, & Institutional effect
Failure	Supraliminal (failure)	Macrocognition	Failure	Doubt & Pessimism
Catastrophic	Supraliminal (death anxiety)	Situational	Situational	Situational
Super-Catastrophic	Supraliminal (mortality salience)	Warrior ethos	Warrior ethos	Warrior ethos

In developing the sensemaking continuum, the results indicate that positive evaluations, also known in the literature as positive felt emotions, will dominate in the less serious events, while felt emotions dominate in the extreme events. The threshold or point at which the continuum deviates is at the point where the surprise realm of (Table 14) situational context is reached, e.g., in the Fukushima case, when the reactor building exploded. At that point, felt emotions became supraliminal and began to dominate sensemaking.

Another finding was that interviewees who were closest to the event were affected most by felt emotions. This insight is not a surprise; however, it suggests that as an event progresses into the extreme categories of events, sensemaking may be more effective for those leaders further away from the event that are less impacted by felt emotions. This insight should be considered when managing an extreme crisis event. Normally, first responders are relied upon to provide leaders the picture of the event; however, in the most severe events, this picture could be clouded by felt emotions of the responders.

Interestingly, the research by Maitlis and Sonenshein (2010) concluded that negative emotions may be more helpful earlier in an event as a countermeasure to optimistic bias. Negative emotions can offset the optimistic bias and positive thoughts that often occur earlier in an event. In fact, Maitlis and Sonenshein (2010) suggest that negative emotions should be built into crisis response. This research confirms the value of their suggestion.

In sum, the continuum of sensemaking follows the non-linear progression noted throughout this research. There exists a threshold where emotions turn from positive subliminal thoughts of success into supraliminal negative emotions of failure. Ultimately, as in the other crisis concepts, felt emotions dominate sensemaking. Next is a discussion of the crisis concept of leadership. My research finds that leadership is a non-linear concept with new insights identified for leadership in the catastrophic and super catastrophic events.

### Leadership

This subchapter discusses the results for the crisis concept of leadership. Generally, my results can be divided into two categories, i.e., general leadership theories and situational leadership concepts. First, I discuss the contextualization of situational leadership concepts. Second, I discuss the general leadership theories as they are applicable to these results. Finally, a continuum of the crisis concept of leadership is developed.

There were a number of situational leadership concepts investigated in the analysis of the interviews. Most importantly, the results show that extreme events are



highly contextualized with regard to leadership<sup>33</sup>. Because of this, they become a maze of situational leadership concepts that is difficult to categorize, summarize, and explain. With the highly contextualized nature of the crisis concept of leadership, my conclusion is that the continuum of leadership is best built with a mix of situational leadership concepts and leadership theories. Discussing leadership with this mix of situational and theoretical allows for case-specific contextualization and integrated discussion of leadership theoretical concepts.

Next, I discuss the results regarding the crisis concept of leadership and build towards a continuum of the crisis concept of leadership. Table 15 depicts the continuum of crisis concepts of leadership.

**Table 15 – Continuum of Crisis Leadership**

Situational Context	Felt Emotion	Decision-making	Crisis Response	Sensemaking	Leadership
Routine	Subliminal (success)	Classical	Readiness	Positive evaluation	Collaborative
Resilience	Subliminal (skepticism)	Framing and Cognitive Continuum Model	Resilience	Collective sensemaking	Authoritarian and setback
Surprise	Supraliminal (unawareness)	Recognition Primed and Naturalistic	Complexity	Updating, Optimistic bias, & Institutional effect	Adaptive
Failure	Supraliminal (failure)	Macrocognition	Failure	Doubt & Pessimism	Non-linear
Catastrophic	Supraliminal (death anxiety)	Situational	Situational	Situational	Situational
Super-Catastrophic	Supraliminal (mortality salience)	Warrior ethos	Warrior ethos	Warrior ethos	Warrior ethos

Starting the discussion with routine events, the results for leadership imply that classical concepts of collaborative leadership are used in responding to routine events, in that leaders, workers and event responders collaborate to address the challenges of a

<sup>33</sup> An assertion that extreme event leadership is highly contextualized was also made by Hannah, et al. (2010).

routine event. Whether the event is an office fire or a worker slipping and falling, typically the organizational response is collaborative. That is, the organization works together in solving the situation (Voogd, 2004; Quarantelli, 1988). This dissertation does not dispute this dynamic. In fact, there were no results that dispute these conclusions.

When events exceed the routine, organizational stress can set in, especially when the event conditions (situational context) exceed the organization's resilience. As event conditions worsen, organizations typically seek external assistance. Classically, the need for leadership and coordination with external assistance organizations increases, and at this point incident management structures are characterized by more authoritarian or setback leadership models (Lettieri, et al., 2009).

As extreme events progress to a situational context category of "surprise", organizations discover that their crisis response mechanisms are failing to arrest the progression of the event. They become surprised that their efforts fail. Farazmand (2009) suggests that surprise leadership has its roots in chaos, complexity, and dynamic systems theory. Under these conditions, interviewees (Ref. JB, RR, OD) suggested that leaders must use their judgment, lean forward (adapt), innovate, repurpose (adapt), use people as resources (adapt), and use an adaptive approach to leadership. These specific leadership concepts are consistent with the theory of Adaptive Leadership (Yukl, 2006).

Once the situational context reaches the failure stage event context, and with supraliminal felt emotions gaining in importance, leadership acumen must be flexible. Farazmand (2009) calls this situation 'living on the edge of chaos.' Other researchers caution that most managers often make a big mistake of thinking linearly; managers try to solve non-linear organizational problems in a linear fashion. Managers must think

strategically and non-linearly to anticipate and manage the “unexpected” (Weick & Sutcliffe, 2007).

In the case of the catastrophic and super-catastrophic events, felt emotions are at their peak and dominate a leader’s thoughts. Under these dangerous contexts, situational leadership concepts begin to influence the leader’s decision-making. Situational leadership concepts in the dangerous categories of extreme events can include: instinct, intuition, hopelessness, defiance and at the far end of the leadership continuum, warrior ethos. Next, I provide a deeper discussion of the specific leadership concepts applicable to the dangerous categories of extreme events.

Situational leadership concepts in the dangerous contexts, specifically super-catastrophic events, are best studied by observing organizations that face life-and-death conditions frequently, e.g., warriors. Generally, the military domain is studied for dangerous context leadership more than the non-military domain (Kolditz, 2007). The major differences between the two domains include the military leader’s familiarity level with experiencing dangerous contexts and cohabitation of the military leaders and their soldiers, which leads to development of a “warrior ethos” mentality (Kolditz, 2007). There are other differences as well. Specifically, Kolditz (2007) defines dangerous contexts as those where leaders: (a) embrace continuous learning because dangerous situations demand it, (b) share risks with followers, (c) maintain a common lifestyle with followers (cohabitation) and emphasize shared values rather than material possessions, (d) possess technical competence (i.e., proficiency in domain-specific skills as opposed to traditional leader competencies) that allows them to make rapid and effective decisions, (e) create feelings of trust among team members, and (f) exhibit and create loyalty.

Samuels, et al. (2007) discuss the uniqueness of dangerous contexts including the ability of leaders in dangerous contexts to build leader trust that overcomes the natural intuitions and instincts of the followers, e.g., as noted by Weick's (1988) study of the Mann Gulch event in 1949 where firefighters dropped their tools and ran away, disobeying their leaders' instructions. This issue of overcoming natural instincts becomes important as situations move from routine to super catastrophic.

Trust between group members is created through training under adverse conditions and by cohabitating responders as in the case of firefighters and the military. This condition rarely exists in a non-military domain. Also, in dangerous contexts, the fear of imminent death, i.e., mortality salience is expected. In the non-military domain, the fear of imminent death is not explicitly considered in both training and daily operations (Samuels et al., 2007).

In the military domain where dangerous contexts and felt emotions are often experienced, a "warrior ethos" is developed among leaders and followers; however, in both the Fukushima and Deepwater Horizon events, examples of a warrior ethos did emerge. Specifically, the leaders and responders stated their immense "concern for workers". For instance, in the Deepwater Horizon event (Shroder, et al. 2011):

Dave Young [chief mate] was torn between staying on the bridge and going back on deck. The bridge was still in chaos, Curt seemed overwhelmed, but as chief mate his responsibility was to direct the emergency response and firefighting. He had to go. When Dave got to the emergency gear locker, the muster point for the emergency team, only one person was there, a roustabout named Christopher Coy.

Apparently, everyone else on the fire team had ignored their training and already gone to the lifeboats. The fire was spreading. Dave knew that he had to hurry. He just grabbed the coat and ran toward the column of flame. Chad Murray [Chief Electrician] came running the other way and said “Dale Burkeen is down”. Dave started toward the crane. Another blast knocked him off his feet and drove him back twenty feet. He picked himself up and checked for Dale’s pulse. He couldn’t find one, but knew he had to stay there trying.

As noted in this quote, the leader valued support for his worker over his fire-fighting duty. This is an interesting conundrum. Had the individual continued on with his fire-fighting duties he may have been able to reduce the fire and save lives. That assumption is counterfactual; however, if it is considered for purposes of example, we can compare and contrast the non-military domain to the military domain. During the interview with a military commander (Ref. RW), he discussed the concept of Total Ship Survivability. The concept of Total Ship Survivability implies that some lives might be lost to save many. In many of the interviews with the Fukushima and Deepwater Horizon leaders, the interviewees emphasized their concern for workers over the crisis management response to the event. The non-military leaders leaned heavily in favor of concern for workers, while the military leader balanced concern for workers with successful crisis response. Thus, the two domains, military and non-military, have significant differences with regard to the warrior ethos. In the military domain, the priorities are (1) mission first, then (2) protection of workers (troops); in the non-military

domain those priorities are reversed. This is a significant area for future research in crisis leadership.

Next I suggest that this integrated model of extreme crisis leadership provides a useful framework for future research in extreme crisis leadership. My integrated model is an attempt to show how disparate theories actually work together in continuums that illustrate the leadership concepts from routine through extreme to dangerous contexts. I incorporated the leadership characteristics from the major crisis theories (discussed in Chapter 3) into six extreme crisis concepts and then demonstrate how those extreme crisis concepts change as events proceed from routine to dangerous. Further the model shows the underlying dynamics of how those extreme crisis theories from Chapter 3 work in concert to explain extreme event leadership.

#### Integrated Model of Extreme Crisis Leadership

In sum, the integrated model of extreme crisis concepts (Table 16) provides a framework for the future study of crisis management leadership. This framework focuses on the crisis management literature as analyzed with the results of this dissertation. I believe that this integrated model helps to reduce the “Tower of Babel” (Chapter 2) criticism of the crisis management literature. Further, that this integrated model offers a continuum of context, underlying dynamics and a model to explain leadership under extreme event circumstances.

As developed for each of the six extreme crisis concepts, Tables 10-15 represent the integrated extreme crisis model shown as Table 16. Therefore, with the integrated model, the situational context represents the categories/severities of the events, and as the situational context continuum progresses from routine events to super-catastrophic, the

other five extreme crisis concepts reflect their associated continuums. For example, for catastrophic events, one could expect to experience supraliminal felt emotions of death, situational decision-making and crisis responses (as stated earlier, these concepts become dominated by felt emotions), situational sensemaking and leadership that is situational and dominated by felt emotions of instinct and intuition.

**Table 16 – Integrated Model of Extreme Crisis Leadership**

<b>Situational Context</b>	<b>Felt Emotion</b>	<b>Decision-making</b>	<b>Crisis Response</b>	<b>Sensemaking</b>	<b>Leadership</b>
<b>Routine</b>	Subliminal (success)	Classical	Readiness	Positive evaluation	Collaborative
<b>Resilience</b>	Subliminal (skepticism)	Framing and Cognitive Continuum Model	Resilience	Collective sensemaking	Authoritarian and setback
<b>Surprise</b>	Supraliminal (unawareness)	Recognition Primed and Naturalistic	Complexity	Updating, Optimistic bias, & Institutional effect	Adaptive
<b>Failure</b>	Supraliminal (failure)	Macro-cognition	Failure	Doubt & Pessimism	Non-linear
<b>Catastrophic</b>	Supraliminal (death anxiety)	Situational	Situational	Situational	Situational
<b>Super-Catastrophic</b>	Supraliminal (mortality salience)	Warrior ethos	Warrior ethos	Warrior ethos	Warrior ethos

Noteworthy for this model is that events can proceed along different continuums. For instance, events may be catastrophic (situational context), yet the leader’s decision-making process remains classical, or at the routine category of events. If decision-making remains classical, this progression would likely be insufficient in creating a successful outcome for the event. This integrated model was developed with progressions through the extreme crisis concept continuums as experienced from the

events studied (including the recognition that the Deepwater Horizon event proceeded immediately as a super-catastrophic event).

In the end, it is possible that the reason there are so many crisis theories is because each event is unique and presents data that create new streams of literature and different theories for each crisis concept and each portion of the continuum. I believe that this uniqueness (primarily driven by case study research which builds unique theories) has created an array of seemingly disparate theories and concepts that lack integration. This integrated extreme event crisis leadership model presented here (Table 16) harmonizes those theories by demonstrating the applicability that each theory has within the continuum of routine to super-catastrophic events. Rather than disparate theories, this integrated model shows how these crisis theories may be more useful at certain points during a crisis and how those theories apply as the severity increases. This integrated model can be used to organize future extreme crisis research so that theories can build upon each other without exacerbating the “Tower of Babel.”

Further, this integrated model of extreme crisis leadership finds the outer reaches of existing theories by discovering the significant impact of felt emotions on extreme crisis leadership. The conclusions herein explore the dynamics that exist at the boundaries of extreme and dangerous events and the associated non-linearities. As such, the felt emotions of leaders result in a warrior ethos of leadership. For non-military domains the warrior ethos focuses on support for workers whereas in the military domain, mission often comes first before the focus on “workers”.



## Limitations and Areas for Future Research

The limitations of qualitative research are covered in detail in Chapter 3. Especially in Chapter 3.8.1, I reference specific limitation from the research. I offer two additional areas where I was limited in my pursuit of issues raised in the interviews. Those were in the areas of organizational adaptation and even more exploration of sensemaking in these events. Next is a brief summary of those limitations and my response to them.

There is a potential limitation in this dissertation for interviewer bias given my extensive background in crisis leadership, and specifically, due to my personal involvement in the Fukushima event. Regarding limitations for qualitative research, as discussed in Chapter 4, Eisenhardt and Graebner (2007, p. 30) challenge the qualitative researcher to find fresh theory bridging well from rich qualitative data into mainstream deductive research. Through the strategies mentioned in Chapters 3 and 4, I concentrated on ensuring that this research seeks to comply with these major points. Specifically, this research relies upon recursive cycling, the identification of research gaps, smart sampling of cases to illuminate interesting concepts, controlling interviewer bias, and pooling the data to develop a “good” theory. One area where this research has limits is in sampling routine crisis cases. As discussed earlier, I intend to study extreme event cases. There are many “routine” crisis studies, which I can use as parallel data during my data analysis.

Gephart (2004) raises six problems noted in qualitative research. First, Gephart (2004) suggests that there are too many “one off” papers, i.e. one-of-a-kind, submitted. Agreed, this dissertation is a one-off paper. Second, Gephart (2004) concludes that

researchers fail to conduct a thorough literature review at the beginning of their work. My literature review was extensive, and I added two additional literature reviews, i.e. felt emotions and decision-making. A third and related problem noted by Gephart (2004) is that qualitative researchers need goals, objectives, or research questions to guide their work. In my research, I identified nine “research threads” that I use to guide my research and avoid this pitfall. Fourth, Gephart (2004) advises that research papers provide the theoretical background related to the concepts covered by the researchers’ paper including explaining key concepts among the theories, research questions, and methodologies of the domain. In my research, I exhaustively explain the applicable leadership theories, concepts, and methodologies contained in the leadership literature. Fifth, Gephart (2004) concludes that many qualitative researchers fail to describe thoroughly the methodology, especially in capturing meaning of data, thoroughly interpreting results, drawing linkages across data, and explaining the origins of conclusions. I believe that this dissertation accomplished these goals through the use of ATLAS.ti, and the qualitative reference books cited in Chapter 4. Finally, Gephart (2004) notes a problem in that qualitative researchers fail to revisit research questions or goals in the results section of the researcher’s submittal. This dissertation revisited the past research prior to the conduct of this study as well as again to better frame some of the findings of this study not considered in the original literature review. Also, the broader implications of the topic were addressed through the linkage of the crisis leadership theories to build an integrated model of crisis leadership.

In addition, as discussed in Chapter 2, Thomas and James (2005) offer a critique of grounded theory by challenging three fundamental precepts of grounded theory, i.e., ground, theory, and discovery. Thomas and James (2005) claim first, that,

Grounded theory oversimplifies complex meanings and interrelationships in data; second, that it constrains analysis, putting the cart (procedure) before the horse (interpretation); and third that it depends upon inappropriate models of induction and asserts from them equally inappropriate claims to explanation and prediction (p. 768).

Thomas and James (2005) assert that holding to the terms ground, theory and discovery, limits the appreciative inquiry of researchers. Thomas and James (2005) challenge the benefit of “interpreting interpretations” (p. 789) as taking the process a step too far. In this dissertation, I made liberal use of direct quotations. Using direct quotes as a reference for conclusions should strengthen my research arguments.

Conversely, Suddaby (2006) answered Gephart’s (2004) “From the Editors” column in the Academy of Management Journal (AMJ) on the problems identified by AMJ Editors with qualitative research, specifically grounded theory research. Suddaby (2006) gives six misconceptions regarding “what grounded theory is not,” refer to Chapter 2. I addressed those misconceptions by:

- Following their advice as I proceeded through the collection and analysis of my data.

- In my dissertation I provided definitions for my codings and examples of codings.
- I address theoretical saturation in Chapter 4.
- Grounded theory method is not perfect, nor is it easy. (Researcher comment: Noted!!!)
- As developed in my dissertation, my methodology was rigorous, and thorough.

Glaser with Holton (2007) takes strong exception to naturalistic approaches to grounded theory research. They believe that quantitative approaches (QDA) are invading grounded theory. Furthermore, Glaser with Holton (2007) believes the flaws of QDA are many.

On the other hand, Glaser (2009) talks about the benefits of retaining grounded theory in the hands of the novice and believes that the future of grounded theory rests in the hands of these novices. Thus, in this dissertation, I used a modified grounded theory approach which was more inductive research from a literature review and I used a fairly rigorous quantitative process with plenty of actual interview data included.

With regard to the validity of the interviews, I have discussed theoretical saturation earlier. I also address retrospective bias of interviewees including conducting a sample analysis of “in-case” versus “past-case” test for validity. The results showed no bias for the sample taken. Also, forgetfulness is a flaw for some historical research. In my interviews, I observed no instances where people could not remember details. It could be that these cases are so dramatic; it is hard for people to forget the details. I did

use secondary data for the Deepwater Horizon case for which there was the potential for retrospective bias or forgetfulness.

Further, there are a number of areas where this dissertation could expand into deeper research. Specifically, this research was limited in the area of organizational structure as it relates to crisis management, and there is additional work that could provide further insights on sensemaking at the case level for the events covered in this dissertation. This subchapter illustrates some of those limitations and offers suggestions for future research.

In the areas of organizational structure, research into the adaptive culture of organizations might provide more insights on the relationships between leadership and organizational structure for extreme events. In several cases, interviewees discussed how a non-adaptive organizational structure and fragmented control have actually complicated the resolution of the event. Specifically, in Super Storm Sandy, the differences between the leadership response in New York and New Jersey were mirror images. In New York, the non-adaptive nature of multiple jurisdictions caused difficulties in establishing a unified command and developing a picture of the consequences of the storm unlike the adaptive and unified command in New Jersey. With multiple jurisdictions in New York, it was difficult for the federal government to work with New York as opposed to the unified command in New Jersey. Also, interviewees claim the response was more effective and efficient in New Jersey. Given that the New Jersey Governor had hired his entire command structure, it was a significant advantage over the situation in New York with multiple leaders and staff tenure. Similarly, in the Three Mile Island event, the Governor, because he was a new and did not have his team in place at the time of the

accident, adapted his organizational structure by bringing in people that he could trust from the outside, into his leadership circle.

In the Fukushima case, interviewees (YF, IN) suggested that early in the event, the organizational structure was non-adaptive. The Prime Minister and the Tokyo Electric Power Company were separated from the operators at Fukushima. This led to a major focus on the consequences in Tokyo (psycho-physical distance). Some interviewees (YF, IN, MA) discussed their view that this non-adaptive, stovepipe organizational structure and how it contributed to elite panic. For instance, not until 10 days into the event did the government establish a unified command with Tokyo Electric Power Company and the Fukushima operators. A similar organizational phenomenon occurred during the Three Mile Island event (Ref. HD).

Many interviewees (YF, GH, SS, RR, OD, and RW) discussed the role of leadership in sensemaking. Chapter 4 provided some pertinent examples of leadership influences on sensemaking. These examples included a case where the leader(s) was not aware of the actual physical condition of the facility because the leaders were sequestered in a bunker, while a leader in a similar situation did leave the bunker and he better understood the physical conditions and consequently was more successful in sensemaking. Also, emotional intelligence was mentioned as a significant factor in leadership's capacity for sensemaking. For example, interviewee (RW) was more appreciative of the role of emotional intelligence in an extreme event than some non-military leaders. Another example of leader capacity noted by interviewees as being significant to sensemaking and crisis outcome was the construct of "optimistic bias". The concept of "optimistic bias" was most notable in the Fukushima case where an

incorrect response strategy seriously complicated the event. The response strategy could not keep pace with the event. This insight of the “response speed keeping pace with the event speed” is discussed by a number of interviewees (RW, RR, and OD) in this dissertation.

These are a few areas that are important future research topics. A better understanding of the role of adaptive organizational structures would enhance the abilities of organizations responding to extreme events. The associated leadership, decision-making, and external influences constructs can only illuminate the elements of sensemaking thereby, enabling clearer insights on the roles of leadership in extreme events.

### Conclusions

The purpose of this dissertation was to explore the leadership constructs that apply uniquely to extreme event crises. A qualitative, grounded theory-influenced approach was used to discover insights regarding extreme events despite their rarity. An inductive and qualitative approach allowed the researcher to explore and gain theoretical knowledge of a phenomenon without biasing the data and results with preconceived ideas or hypotheses (Glaser, 1992), and instead, enabling the gathering of unique theoretical knowledge grounded in real events. Nineteen interviews, one book (Shroder, et al. 2011), and five court transcripts were used as data that ranged from the White House Situation Room, the Red Cross, senior level responders, and first responders of three extreme events. Stories from the interviewees were vivid and highly informative. This dissertation benefitted from their sometimes tragic experiences. The resultant insights regarding the six major crisis concepts, the uniqueness of each event, the role of felt

emotions, and the integrated extreme event crisis leadership model came from those experiences. In particular, the role of felt emotions cannot be underestimated during Black Swan (Taleb, 2010) events. In those events, felt emotions changed the dynamics of each of the five other constructs dramatically and, more likely, determined the success or failure of the extreme crisis responders.

I hope that this dissertation inspires researchers to reach beyond the results discovered herein. In the events researched for this dissertation, and many others, there were heroes who responded effectively to the extreme events and prevented them from cascading into more dangerous events. Those responders are considered heroes for their actions under unfathomable conditions. The goal of this research was to discover new leadership models that would aid future extreme crisis leaders and eliminate or reduce the need for more heroics. Those who toil in this area of research hope that their research means that there will be less need for heroes in the future.



## REFERENCES

- Abel, J. E. (2011). Can cool Japan save post-disaster Japan? On the Possibilities and Impossibilities of a Cool Japanology. *International Journal of Japanese Sociology*, 20(1), 59–72.
- Aini, M. S., & Fakhru'l-Razi, A. (2013). Latent errors of socio-technical disasters: A Malaysian case study. *Safety Science*, 51(1), 284–292.
- Alvesson, M. (1996). Leadership studies: From procedure and abstraction to reflexivity and situation. *The Leadership Quarterly*, 7(4), 455-485
- Argyris, C. (1977). Double loop learning in organizations. *Harvard Business Review*, 55(5), 115-125.
- Arndt, J., Greenberg, J., Solomon, S., Pyszczynski, T., & Simon, L. (1997). Suppression, accessibility of death-related thoughts, and cultural worldview defense: Exploring the psychodynamics of terror management. *Journal of Personality and Social Psychology*, 73(1), 5–18.
- Ashmos, D. P., Duchon, D., & McDaniel, R. R. (2000). Organizational responses to complexity: The effect on organizational performance. *Journal of Organizational Change Management*, 13(6), 577.
- Avolio, B. J., & Bass, B. M. (1995). Individual consideration viewed at multiple levels of analysis: A multi-level framework for examining the diffusion of transformational leadership. *The Leadership Quarterly*, 6(2), 199-218.
- Bandura, A. (1986). *Social foundations of thought & action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Baran, B. E., & Scott, C. W. (2010). Organizing ambiguity: A grounded theory of leadership and sensemaking within dangerous contexts. *Military Psychology*, 22, 42-69.
- Barrows, H., Feightner, J.W., Neufeld, V.R., & Norman, G.R. (1978). *Analysis of the clinical methods of medical students and physicians*. Hamilton, Ontario, Canada: McMaster University.
- Bartone, P. T. (1999). Hardiness protects against war-related stress in army reserve forces. *Consulting Psychology Journal: Practice and Research*, 51(2), 72.
- Bass, B. M., & Avolio, B. J. (1990). *Manual for the multifactor leadership questionnaire*. Palo Alto: Consulting Psychologist Press.
- Bass, B. M., & Bass, R. (2009). *The bass handbook of leadership: Theory, research, and managerial applications*. Free Press.

- Beach, L.R. (1990). *Image theory: Decision making in personal and organizational contexts*. London: Wiley.
- Beck, A. T., Steer, R. A., & Brown, G. (1985). Beck Anxiety Checklist. Unpublished manuscript, University of Pennsylvania.
- Bernard, W., & Kite, M. (2010). The psychology of prejudice and discrimination. (2 ed., pp. 251-254). Belmont, CA: Wadsworth
- Berlew, D. E. (1974). Leadership and organizational excitement. *California Management Review*, 17(2), 21-30.
- Boin, A. (2009). The new world of crises and crisis management: Implications for policymaking and research. *Review of Policy Research*, 26(4), 367–377.
- Bond, S., & Cooper, S. (2006). Modelling emergency decisions: recognition-primed decision making. The literature in relation to an ophthalmic critical incident. *Journal of clinical nursing*, 15(8).
- Brown, A. D., & Jones, M. (2000). Honorable members and dishonorable deeds: Sensemaking, impression management and legitimization in the arms to Iraq affair. *Human Relations*, 53, 655–689.
- Bryman, A. S. (2004). Qualitative research on leadership: A critical but appreciative review. *The Leadership Quarterly*, 15(6), 729–769.
- Bryman, A., Bresnen, M., Beardworth, A., & Keil, T. (1988). Qualitative research and the study of leadership. *Human Relations*, 39, 65–79.
- Bryman, A. (1992). *Charisma and leadership in organizations*. London: Sage.
- Cabral-Cardoso, C., & Cunha, M. P. E. (2003). The business lunch: Toward a research agenda. *Leadership & Organization Development Journal*, 24(7), 371-379.
- Campbell, D. J., Hannah, S. T., & Matthews, M. D. (2010). Leadership in military and other dangerous contexts: Introduction to the special topic issue. *Military Psychology*, 22, S1-S14.
- Cantrell, J. (2011). *Human Dimensions of Wildlife, the Role of a Sense of Self-in-Place and Risk Amplification in Promoting the Conservation of Wildlife*. Taylor & Francis Group, LLC.
- Casto, C. (2014). *Crisis Management: A Qualitative Study of Extreme Event Leadership*, Kennesaw State Dissertation.
- Chatterjee, A., & Hambrick, D. C. (2007). It's all about me: Narcissistic Chief Executive Officers and their effects on company strategy and performance. *Administrative Science Quarterly*, 52(3), 351–386.

- Cialdini, R. B., Trost, M. R., & Newsom, J. T. (1995). Preference for consistency: The development of a valid measure and the discovery of surprising behavioral implications. *Journal of Personality and Social Psychology*, 69(2), 318.
- Coffey, A., B. Holbrook and P. Atkinson (1996) Qualitative Data Analysis: Technologies and representations, *Sociological Research Online*, vol. 1, no. 1.
- Comfort, L. K. (2002). Rethinking security: Organizational fragility in extreme events. *Public Administration Review*, 62(s1), 98-107.
- Conger, J. A. (1998). Qualitative research as the cornerstone methodology for understanding leadership. *The Leadership Quarterly*, 9, 107–121.
- Crittenden, V., & Woodside, A. G. (2007). Building skills in thinking: Toward a pedagogy in metathinking. *Journal of Education for Business*, 83(1), 37–44.
- Crouch, M., & McKenzie, H. (2006). The logic of small samples in interview-based qualitative research. *Social Science Information*, 45(4), 483-499.
- Cupchik, G. (2001). Constructivist Realism: An ontology that encompasses positivist and constructivist approaches to the social sciences. Forum Qualitative Social / Forum: *Qualitative Social Research*, 2(1).
- Daft, R. L., & Weick, K. E. (2001). *Toward a model of organizations as interpretation systems*. Malden, MA: Blackwell Publishing.
- DeChurch, L. A., Shawn Burke, C., Shuffler, M. L., Lyons, R., Doty, D., & Salas, E.A. (2011). Historiometric analysis of leadership in mission critical multi-team environments. *The Leadership Quarterly*, 22, 152–169.
- Denrell, J. (2003). Vicarious learning, undersampling of failure, and the myths of management. *Organization Science*: 227–243.
- Dey, I. (1999) *Grounding grounded theory—guidelines for qualitative inquiry*. London, Academic Press.
- Dunbar, R. L. M., & Garud, R. (2009). Distributed knowledge and indeterminate meaning: The case of the Columbia shuttle flight. *Organization Studies*, 30(4), 397–421.
- Dynes, R. (1974). *Organizational behavior in disaster*. Book, Columbus: Ohio State University Disaster Research.
- Dynes, R. R., Quarantelli, E. L., & Kreps, G. A. (1981). *A perspective on disaster planning* Disaster Research Center, Ohio State University.
- Edwards, J. A. (1993). *Talking data: Transcription and coding in discourse research*.

Hillsdale, NJ [u.a.]: Erlbaum.

- Egan, M. J. (2011). The normative dimensions of institutional stewardship: High reliability, institutional constancy, public trust and confidence. *Journal of Contingencies and Crisis Management*, 19(1), 51–58.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25-32.
- Farazmand, A. (2009). Learning from the Katrina crisis: A global and international perspective with implications for future crisis management. *Public Administration Review*, 67, 149–159.
- Fish, S. (1989) *Doing what comes naturally*. Oxford, Clarendon Press.
- Fisher, K., Hutchings, K., & Sarros, J. C. (2010). The "bright" and "shadow" aspects of *In Extremis* leadership. *Military Psychology*, 22, S89-116.
- Foldy, E. G., Goldman, L., & Ospina, S. (2008). Sensegiving and the role of cognitive shifts in the work of leadership. *The Leadership Quarterly*, 19, 514–529.
- Fredrickson, B. L. (2003). The value of positive emotions: The emerging science of positive psychology is coming to understand why it's good to feel good. *American Scientist*, 91(4), 330-335.
- Friedman, T. L. (2006). *The world is flat [updated and expanded]: A brief history of the twenty-first century*. Farrar, Straus and Giroux.
- Friese, S. (2012). *Qualitative Data Analysis with ATLAS.ti*. Thousand Oaks CA: Sage
- Gabarro, J. J. (1978). The development of trust, influence, and expectations. *Interpersonal Behavior: Communication and Understanding in Relationships*, 290, 303.
- Gephart, R. P., & Wolfe, R. A. (1989). Qualitative data analysis: Three microcomputer-supported approaches. *Academy of Management*, p. 382-386.
- Gephart Jr., R. P. (2004). Qualitative research and the academy of management journal. *Academy of Management Journal*, 47, 454-462.
- Gephart, R. (1997). Hazardous measures: An interpretive textual analysis of quantitative sensemaking during crises. *Journal of Organizational Behavior*, 583-622.
- Gill, D. A. (2007). Secondary trauma or secondary disaster? Insights from Hurricane Katrina. *Sociological Spectrum*, 27(6), 613–632.

- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2012). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods*.
- Glaser, B. G. (with Holton). (2007). Naturalist inquiry and grounded theory. *Historical Social Research/Historische Sozialforschung*. Supplement, 114-132.
- Glaser, B. G. (2009). The novice GT researcher. *Grounded Theory Review*, 8(2), 1-21.
- Glaser, B. G. (2010). The future of grounded theory. *Grounded Theory Review*, 9(2), 1-14.
- Glaser, B. G. (2011). Blocking conceptualization. *Grounded Theory Review*, 10(1), 1-15.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago: Adeline Press.
- Goud, N. H. (2005). Courage: Its nature and development. *The Journal of Humanistic Counseling, Education and Development*, 44(1), 102-116.
- Goulding, C. (2001). Grounded theory: A magical formula or a potential nightmare. [Article]. *Marketing Review*, 2(1), 21.
- Guba, Egon & Lincoln, Yvonna (1985). *Naturalist Inquiry*: London: Sage,
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? *Field Methods*, 18(1), 59-82.
- Hadley, C. N., Pittinsky, T. L., Sommer, S. A., & Zhu, W. (2011). Measuring the efficacy of leaders to assess information and make decisions in a crisis: The C-LEAD scale. *The Leadership Quarterly*, 22(4), 633–648.
- Hannah, S. T., & Avolio, B. J. (2011). The locus of leader character. *The Leadership Quarterly*, 22(5), 979-983.
- Hannah, S. T., Campbell, D. J., & Matthews, M. D. (2010). Advancing a research agenda for leadership in dangerous contexts. *Military Psychology*, 22, S157-S189.
- Hannah, S. T., Uhl-Bien, M., Avolio, B. J., & Cavarretta, F. L. (2009). A framework for examining leadership in extreme contexts. *The Leadership Quarterly*, 20(6), 897–919.
- Hannah, S. T., Avolio, B. J., Luthans, F., & P.D. Harms. (2008). Leadership efficacy: Review and future directions. *The Leadership Quarterly*, 19, 669-692.
- Hayes, J. P., Morey, R. A., Petty, C. M., Seth, S., Smoski, M. J., McCarthy, G., & LaBar, K. S. (2010). Staying cool when things get hot: Emotion regulation modulates neural mechanisms of memory encoding. *Frontiers in Human Neuroscience*, 4.

- Hernes, T., Maitlis, S., Tsoukas, H., Pearson, K. A., Gergen, K. J., & Sutcliffe, K. (2008). First international symposium on process organization studies. *Studies*, 29(11), 1487.
- Hiller, N. J., DeChurch, L. A., Murase, T., & Doty, D. (2011). Searching for outcomes of leadership: A 25-year review. *Journal of Management*, 37: 1137–1177.
- House, R. J. (1977). *A 1976 theory of charismatic leadership*. In J. G. Hunt & L. L. Larson (Eds.), *Leadership: The cutting edge* (pp. 189-207). Carbondale: Southern Illinois University Press.
- Hunt, J. G. (1991). *Leadership: A new synthesis*. Newbury Park, CA: Sage.
- James, E. H., & Wooten, L. P. (2005). Leadership as (un)usual: How to display competence in times of crisis. *Organizational Dynamics*, 34(2), 141–152.
- Jennings, P. D., & Greenwood, R. (2003). Constructing the iron cage: Institutional theory and enactment. *Debating Organization: Point-Counterpoint in: Organization Studies*, 195.
- Joffe, H. (2003). Risk: From perception to social representation. *British Journal of Social Psychology*, 42(1), 55–73.
- Kaghan, W. N., Strauss, A. L., Barley, S. R., Brannen, M. Y., & Thomas, R. J. (1999). The practice and uses of field research in the 21st century organization. *Journal of Management Inquiry*, 8, 67 – 81.
- Kasperson, R. (1992). *The social amplification of risk: progress in developing an integrative framework - Social theories of risk*. Praeger: Westport, CT
- Kasperson, R. & Kasperson, X. (1996). Annals of the American Academy of Political and Social Science, Challenges in Risk Assessment and Risk Management, *Risk Analysis*, p. 95-105.
- Kasperson, X., & Kasperson, R. (2005). *The Social Contours of Risk, Volume I: Publics, Risk Communication & the Social Amplification of Risk*. Earthscan, Virginia.
- Kasperson, R. Renn, O., Slovic, P., Brown, J., Goble, E., Kasperson, X. & Ratick, S., (1987). The Social Amplification of Risk: A Conceptual Framework, *Risk Analysis*, 8, p177-187.
- Katz, D., & Kahn, R. L. (1978) *The social psychology of organizations*. New York: Wiley.
- Kaufman, B. (1993). Kennedy, John, F. as world leader - a perspective on the literature. *Diplomatic History* 17.3 (1993): 447–470.

- Kayes, D. C. (2004). The 1996 Mt. Everest climbing disaster: The breakdown of learning in teams. *Human Relations*, 57(10), 1236–1284.
- Kelle, U. (1995). *Introduction: an overview of computer-aided methods in qualitative research*. In: Kelle, U. (Ed.) *Computer-Aided Qualitative Data Analysis*. Sage, Newbury Park, CA, pp. 1-17.
- Kempster, S., & Parry, K. W. (2011). Grounded theory and leadership research: A critical realist perspective. *The Leadership Quarterly*, 22(1), 106-120.
- Klein, G., Orasanu, J., Calderwood, R., Zsombok, C. (1993) *Decision making in action: Models and methods*. Westport, CT, US: Ablex Publishing.
- Klein, G. (1998) *Sources of Power: How People Make Decisions*, MIT Press, Cambridge, Mass, pp. 1-30.
- Klenke, K. (Ed.). (2008). *Qualitative research in the study of leadership*. Emerald group publishing.
- Lagadec, P. (2009). A new cosmology of risks and crises: Time for a radical shift in paradigm and practice. *Review of Policy Research*, 26(4), 473–486.
- Landau, M., & Chisholm, D. (1995). The arrogance of optimism: Notes on failure-avoidance management. *Management Science*, 3(2)
- Lapidot, Y., Kark, R., & Shamir, B. (2007). The impact of situational vulnerability on the development and erosion of followers' trust in their leader. *The Leadership Quarterly*, 18(1), 16-34.
- La Porte, T. R. (2006). A Strawman speaks up: Comments on the limits of Safety. *Journal of Contingencies and Crisis Management*, 2(4), 207–211.
- La Porte, T. R., & Rochlin, G. (1994). A rejoinder to Perrow. *Journal of Contingencies & Crisis Management*, 2(4), 221.
- La Porte, T. R. (2011). On vectors and retrospection: Reflections on understanding public organizations. *Journal of Contingencies and Crisis Management*, 19(1), 59–64.
- Lettieri, E., & Masella, Cristina & Radaelli, Giovanni, (2009). Disaster management: Findings from a systematic review *Disaster Prevention and Management*, 18(2), 117-136.
- Lewins, A. and C. Silver (2007). *Using Software in Qualitative Research: A Step-by-Step Guide*. Thousand Oaks, CA: Sage.
- Lipshitz, R. (1994). Decision making in three modes. *Journal for the Theory of Social Behavior*, 24, 47-66.

- Locke, K. (2001). *Grounded theory in management research*. London: Sage Publications Ltd.
- Lodge, M. (2009). The public management of risk: The case for deliberating among worldviews. *Review of Policy Research*, 26(4), 395–408.
- Lofland, J. (1971). *Analyzing social settings*. Belmont, Wadsworth.
- Maclean, N. (1992). *Young men and fire: A true story of the Mann Gulch fire*. University of Chicago Press.
- Martin, P. Y., & Turner, B. A. (1986). Grounded theory and organizational research. *The Journal of Applied Behavioral Science*, 22(2), 141-157.
- Maitlis, S., & Sonenshein, S. (2010). Sensemaking in crisis and change: Inspiration and insights from Weick (1988). *Journal of Management Studies*, 47(3), 551–580.
- Morse, J. (1995). The significance of saturation. *Qualitative health research*, 5(2), 147.
- Mikusova, M. (2011). Changes in the research of crisis. *World Academy of Science, Engineering & Technology*, 80, 307–311.
- Miller, D. (1988). Organizational pathology and industrial crisis. *Organization & Environment*, 2(1), 65–74.
- Mirvis, P. (1996). Historical foundations of organization learning. *Journal of Organizational Change Management*, 9(1), 13–31.
- Mohr, L. B. (1982). *Explaining organizational behavior*. Jossey-Bass San Francisco.
- Montgomery, H. (1988). *From cognition to action: the search for dominance in decision making*. In H. Montgomery, & O. Svenson (Eds.). *Process and Structure in Human Decision Making*, Wiley: New York; 471 -483.
- Morse, J. (2000). Determining sample size. *Qualitative Health Research*, 10(1), 3-5.
- Muffet-Willett, S., & Kruse, S. D. (2009). Crisis leadership: Past research and future directions. *Journal of Business Continuity & Emergency Planning*, 3(3), 248–258.
- Mumford, M. D. (2005). Something old, something new: The mission of the leadership quarterly. *The Leadership Quarterly*, 16(1), 9–15.
- Nafday, A. M. (2009). Strategies for managing the consequences of Black Swan events. *Leadership & Management in Engineering*, 9(4), 191–197.
- Nickerson, R. S. (1998). Confirmation bias: A ubiquitous phenomenon in many guises. *Review of General Psychology*, 2(2), 175–220.



- Nutt, P. C. (2004). Prospects and problems in the transformation of public organizations. *Public Performance & Management Review*, 27(4), 51–66.
- Parashevas, A. (2006). Crisis management or crisis response system?: A complexity science approach to organizational crises. *Management Decision*, 44(7), 892–907.
- Parks, C. M. (1971). Psycho-social transitions: A field for study. *Social Science*, 5, 101–115.
- Pascale, R. (1990). *Managing on the edge of chaos*. London: Viking.
- Parry, K. W. (1998). Grounded theory and social process: A new direction for leadership research. *The Leadership Quarterly*, 9(1), 85–105.
- Pearson, C. M., Misra, S. K., Clair, J. A., & Mitroff, I. I. (1997). Managing the unthinkable. *Organizational Dynamics*, 26(2), 51–64.
- Pennington, N., & Hastie, R. (1993). A theory of explanation-based decision making. In G.A. Klein, J. Orasanu, R. Calderwood, & C.E. Zsombok (Eds.). *Decision making in action: models and methods* (pp. 188-201). Norwood, CT: Ablex.
- Perrow, C. (1984). *Normal accidents: Living with high-risk technologies*. New York: Basic Books.
- Perrow, C. (1994). The limits of safety: The enhancements of a theory of accidents. *Journal of Contingencies & Crisis Management*, 2(4), 212.
- Perrow, C. (2007). *The next catastrophe: Reducing our vulnerabilities to natural, industrial, and terrorist disasters*. Princeton, N.J.: Princeton University Press.
- Perrow, C. (2009). What's needed is application, not reconciliation: A response to Shrivastava, Sonpar and Pazzaglia. *Human Relations*, 62(9), 1391-1393.
- Pettigrew, A. M. (1990). Longitudinal field research on change: Theory and practice. *Organization Science*, (3), 267-292.
- Pfeffer, J., & Salancik, G. (2003). *The external control of organizations: A resource dependence perspective*. Stanford Business Books.
- Phillips, D. L. (1973). *Abandoning method*. San Francisco: Jossey-Bass.
- Piaget, J. (1967/1971). *Biology and Knowledge*. Chicago University Press; and Edinburgh University Press.
- Quarentelli, E. L. (1988). Disaster crisis management: A summary of research findings. *Journal of Management Studies*, 25(4), 373.
- Quick, J. C., & Wright, T. A. (2011). Character-based leadership, context and consequences. *The Leadership Quarterly*, 22(5), 984-988.

- Rasmussen, J. (1997). Merging paradigms: decision making, management, and cognitive control. In R. Flin, E. Salas, M. Strub, & L. Martin (Eds.). *Decision making under stress: emerging themes and applications* (pp. 67-84). Aldershot: Ashgate.
- Reason, J. T. (1997). *Managing the risks of organizational accidents*. Ashgate Aldershot.
- Reason, J. T. (1993). Managing the management risk: New approaches to organizational safety. In B. Wilpert, & T. U. Qvale (Eds.), (pp. 7-22). Hillsdale, NJ England: Lawrence Erlbaum Associates, Inc.
- Rempel, J. K., Holmes, J. G., & Zanna, M. P. (1985). Trust in close relationships. *Journal of Personality and Social Psychology*, 49(1), 95.
- Renn O. (1992). *Concepts of Risk: a Classification*. In: S. Krimsky and D. Goldin (eds), *Social theories of risk*. Westport, CT: Praeger, p. 53-79.
- Renn O. (1998). Three decades of risk research: accomplishments and new challenges. *Journal of Risk Research* 1 (1), 49-71.
- Renn, O., Burns, W., Kasperson, R., Kasperson, X. & Slovic, P. (1992). The Social Amplification of Risk: Theoretical Foundations and Empirical Application, *Social Issues* (Special Issue: Public Responses to Environmental Hazards), 48(4), p. 137-60.
- Revlin, R. (2013). *Cognition: Theory and Practice*, University of California, Santa Barbara.
- Roth, W. D., & Mehta, J. D. (2002). The Rashomon effect combining positivist and interpretivist approaches in the analysis of contested events. *Sociological Methods & Research*, 31(2), 131-173.
- Sagan, S. D. (1994). Toward a political theory of organizational reliability. *Journal of Contingencies & Crisis Management*, 2(4), 228.
- Salancik, G. R. (1977). Commitment and the control of organizational behavior and belief. *New Directions in Organizational Behavior*, 1-54.
- Samuels, S. M., Foster, C. A., & Lindsay, D. R. (2010). Freefall, self-efficacy, and leading in dangerous contexts. *Military Psychology*, 22, S117-36.
- Santella, N., Steinberg, L. J., & Parks, K. (2009). Decision making for extreme events: Modeling critical infrastructure interdependencies to aid mitigation and response planning. *Review of Policy Research*, 26(4), 409-422.
- Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. New York: Harper.
- Seligman, M. E. P., Abramson, L. Y., Semmel, A., & von Baeyer, C. (1979). Depressive Attributional Style. *Journal of Abnormal Psychology*, 88, 242-247.

- Sementelli, A.(2007).Toward a Taxonomy of Disaster and Crisis Theories. *Administrative Theory & Practice*, 29(4), 497.
- Shrivastava, P., Mitroff, I., Miller, I., Miglani, D. & Anil, D. (1988). Understanding industrial crises. *Journal of Management Studies*, 25(4), 285.
- Shrivastava, S., Sonpar, K., & Pazzaglia, F. (2009). Normal accident theory versus high reliability theory: A resolution and call for an open systems view of accidents. *Human Relations*, 62(9), 1357-1390.
- Shrivastava, S., Sonpar, K., & Pazzaglia, F. (2009). Reconciliation can lead to better application: A rejoinder to Perrow (2009). *Human Relations*, 62(9), 1395-1398.
- Schutz, A. (1973). *Concept and theory formation in the social sciences*. In: Natanson, M. (Ed.) *Collected Papers I: The Problem of Social Reality*, Martinus Nijho, The Hague, Netherlands, p. 48-66.
- Silverman, D. (2001). *Interpreting qualitative data: Methods for analyzing talk, text and interaction* (2nd ed.). London: Sage.
- Simon, H. A. (1972). Theories of bounded rationality. *Decision and Organization*, 1, 161-176.
- Simon, L., Greenberg, J., Harmon-Jones, E., Solomon, S., Pyszczynski, T., Amdt, J., & Abend, T. (1997). Terror management and cognitive- experiential self-theory: Evidence that terror management occurs in the experiential system. *Journal of Personality and Social Psychology*, 72, 1132-1146.
- Slovic, P. (1991). Perception of risk and the future of nuclear power. In M. Golay (Ed.), *Proceedings of the First MIT International Conference on the Next Generation of Nuclear Power Technology* (Sec. 6, pp. 2-6). Cambridge: Massachusetts Institute of Technology, Program for Advanced Nuclear Studies.
- Smith, D. (2004). For whom the bell tolls: Imagining accidents and the development of crisis simulation in organizations. *Simulation & Gaming*, 35(3), 347–362.
- Smits, S. J., & Ally, N. E. (2003). “Thinking the unthinkable – leadership’s role in creating behavioral readiness for crisis management. *Competitiveness Review: An International Business Journal Incorporating Journal of Global Competitiveness*, 13(1), 1–23.
- Snyder, C. R. (2002). Hope theory: Rainbows in the mind. *Psychological Inquiry*, 13(4), 249-275.
- Suddaby, R. (2006). From the editors: What grounded theory is not. *Academy of Management*.

- Sweeney, P. J. (2010). Do soldiers reevaluate trust in their leaders prior to combat operations? *Military Psychology*, 22(S1), 70-88.
- Sweeney, P. J., Thompson, V., & Blanton, H. (2009). Trust and influence in combat: An interdependence model. *Journal of Applied Social Psychology*, 39(1), 235-264.
- Thach, L. (2012). Managerial perceptions of crisis leadership in public and private organizations: An interview study in the United States. *International Journal of Management*, 712-725.
- 't Hart, P. (1990). *Groupthink in government: A study of small groups and policy failure*. Swets & Zeitlinger Publishers.
- Taleb, N. N. (2010). *The Black Swan: The impact of the highly improbable*. Random House Trade Paperbacks.
- Thomas, G., & James, D. (2005). Reinventing grounded theory: Some questions about theory, ground and discovery. *British Educational Research Journal*, 32(6), 767-795.
- Thompson, R. C., & Hunt, J. G. (1997). The Thompson/Hunt flight plan revisited. *Academy of Management Review*, 22(2), 333-334.
- Tremoliere, B., De Neys, W., & Bonnefon, J. (2012). Mortality salience and morality: Thinking about death makes people less utilitarian. (report). *Cognition*, (3), 379.
- Turner, N., & Gray, G. C. (2009). Socially constructing safety. *Human Relations*, 62(9), 1259-1266.
- Turner, B. A., & Pidgeon, N. (1978). *Man-made disasters*. London: Wykeham,
- Turner, B. A., & Pidgeon, N. F. (1997). *Man-made disasters*. Oxford: Butterworth-Heinemann; 2nd ed.
- Useem, M., Cook, J. R., & Sutton, L. (2005). Developing leaders for decision making under stress: Wildland firefighters in the South Canyon fire and its aftermath. *Academy of Management Learning and Education*, 4, 461-485.
- Vaughan, D. (1997). *The Challenger Launch Decision*. University of Chicago Press.
- Vendelo, M. T., & Rerup C. (2009). Weak cues and attentional triangulation: The Pearl Jam concert accident at Roskilde festival. *Academy of Management Meeting, Chicago, Illinois, August 7-11.*, 1-38.
- von Lubitz, D. K. J. E., Beakley, J. E., & Patricelli, F. (2008). 'All hazards approach' to disaster management: The role of information and knowledge management, Boyd's OODA loop, and network-centricity. *Disasters*, 32(4), 561-585.

- Voogd, H. (2004). Disaster prevention in urban environments. *European Journal of Spatial Development*, 12, 1–20.
- Wachtendorf, T. (2009). Trans-system social ruptures: Exploring issues of vulnerability and Resiliency. *Review of Policy Research*, 26(4), 379–393.
- Waldrop, M. (1992). *Complexity: The emerging science at the edge of order and chaos*. Book, NY: Simon & Schuster.
- Weeks, M. R. (2007). Organizing for disaster: Lessons from the military. *Business Horizons*, 50(6), 479–489.
- Weick, K. E. (1999). Sensemaking as an organizational dimension of global change. *Organizational Dimensions of Global Change*, 39–56.
- Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty*. Jossey-Bass.
- Weick, Karl E., Sutcliffe, Kathleen M., Obstfeld, David. (2005). Organizing and the process of sensemaking. *Organization Science*, 16(4), 409.
- Weick, K. E. (1987). Organizational culture as a source of high reliability. *California Management Review*, 29(2), 112–127.
- Weick, K. E. (1988). Enacted sensemaking in crisis situations. *Journal of Management Studies*, 25(4), 305.
- Weick, K. E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative Science Quarterly*, 38(4), 628–652.
- Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks: Sage Publications.
- Weick, K. E. (2001). *Making sense of the organization*. Malden, Mass.: Blackwell Publishing.
- Weick, K. E. (2008). On the Fireline: Living and dying with wildland firefighters. *Administrative Science Quarterly*, 53(4), 774–777.
- Weick, K. E. (2008). Trust: A bigger picture. *Academy of Management Review*, 33(1), 271–274.
- Weick, K. E. (2010). Reflections on enacted sensemaking in the Bhopal disaster. *Journal of Management Studies*, 47(3), 537.
- Weick, K. E., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity*. San Francisco: Jossey-Bass; 1st ed.
- Wicks, J. (2002). Table for six billion, please. *Focus on Leadership: Servant-Leadership for the 21st Century*, 269–287. Wiley, New York.

- Wolfe, R. A., Gephart, R. P., & Johnson, T. E. (1993). Computer-facilitated qualitative data analysis: Potential contributions to management research. *Journal of Management*, 19(3), 637.
- Yammarino, F. J., Mumford, M. D., Connelly, M. S., & Dionne, S. D. (2010). Leadership and team dynamics for dangerous military contexts. *Military Psychology*, 22, 15-41.
- Yanagisawa, K., Kashima, E. S., Moriya, H., Masui, K., Furutani, K., Nomura, M, Ura, M. (2013). Non-conscious neural regulation against mortality concerns. *Neuroscience Letters*, 552(0), 35-39.
- Yannopaulo, N. (2011). Media amplification of a brand crisis and its effect on brand trust. *Journal of Marketing Management*, 27, 5–6, p. 530–546.
- Yin, R. K. 1994. *Case study research: Design and methods* (2nd ed.). Newbury Park, CA: Sage.
- Yukl, G. A. (2006). *Leadership in organizations*. Upper Saddle River, NJ: Pearson/Prentice Hall, 6th ed.
- Yukl, G. (1994). *Leadership in Organizations*. New Jersey: Prentice Hall.

## APPENDIX A – Table of Unified Extreme Event Characteristics

<b>List of Unified Extreme Event Characteristics</b>			
<b>Researcher(s)</b>	<b>Characteristic</b>	<b>Discussion</b>	<b>Summary</b>
Chatterjee and Hambrick (2007)	Non-linearity as a “threshold” effect	Concepts like trust may be linear up to the point where life and death consequences or decisions are involved. Beyond an undefined threshold, the concepts take on completely new meanings.	Discusses how the threshold effect impacts the way researchers might measure concepts.
Hannah, et al. (2009)	1. Intolerable magnitude 2. Preparation time as a non-characteristic 3. Probability 4. Ambiguity of cause, effect, and means resolution (leaders fail)	1. Such threats must reach the threshold of “intolerable magnitude” (Hannah, et al. 2009, p. 898) where goals are imperative such as life and death and require a level of leadership much beyond that of a routine crisis. 2. Extreme events can be slow in inception or lengthy. 3. “Probability” as an ingredient but not necessarily a stand-alone characteristic. 4. Organizations may find themselves in an extreme crisis with the capacity to respond but may not be able to execute the capacity adequately or may become hampered by ineffective decision-making.	Leadership is differentiated in a routine crisis and extreme event.
Taleb (2010)	1. Confirmation biases narrative fallacy 2. Lack of human imagination 3. Signal theory (missing signals), 4. Ludic fallacy (tunnel vision)	Lack of planning for Black Swan events or one does not recognize the possibility of an impossible catastrophe. He focuses on the human element that often ignores the possibility of Black Swan events.	Humans have blind spots.
Vendelo and Rerup (2009); Weick (1990) & Dunbar and Garud (2009)	1. Risk context 2. Incubation period 3. Pluralistic ignorance 4. Collective sensemaking 5. Team trust 6. Panic 7. Length of disaster	Situations where threats are low; perceived low risk environments but risks can incubate. There is a period where latent weaknesses are present but yet unobserved or active.	Latent conditions go unobserved.
Boin (2009)	Transboundary effects 1. Tightly coupled systems 2. Extends cross-functionally and cross-nationally 3. Transcends time boundaries	Describes the “escalatory power” of a transboundary crisis. Because globalization makes the world flatter small perturbations may have drastic consequences. A	Events cascade, escalating the consequences dramatically through coupling.

	<p>4. No defined beginning, end, or ground zero</p> <p>5. Escalates quickly in unforeseen directions exploiting linkages</p> <p>6. Causes unfathomable damage</p>	<p>coupling of systems extends this issue by creating the “highways for failure.”</p>	
Wachtendorf (2009)	<p>Transboundary social ruptures</p>	<p>National and transnational system vulnerability to and resiliency.</p>	<p>Describes events that reach beyond societal boundaries and disrupt multiple social systems across nations.</p>



## APPENDIX B – Summary of Extreme Leadership Concepts

Throughout this dissertation, I discuss the need to identify leadership “concepts”. Those concepts are characteristics and actions that may constitute “leadership” and enable the systematic examination of leadership (Campbell, Hannah & Matthews, 2010). Section 2.1 of this dissertation describes the relationship between the characteristics of extreme events and the concepts of leadership. That relationship is important because the unique characteristics of extreme events, e.g., intolerable magnitude, cascading, transboundary nature of extreme events, necessitates a very different type of leadership needed in these events. Remember the points made by Dynes (1974); Dynes and Quarentelli & Kreps (1981), that the abilities of leaders are second only to the cause of the event itself in determining the outcome of a disaster. Thus, concepts that formulate leadership must be considered in the study of extreme events. This section consolidates the concepts identified throughout the dissertation. This consolidation is useful in identifying all of the elements in extreme event leadership.

Within this dissertation several sections identify leadership concepts. For example, in discussing the characteristics of extreme events, Chatterjee and Hambrick (2007) highlight “trust” in leadership and how trust can vary due to the threshold effect. Thus, when formulating the research design for this dissertation, leadership trust and the threshold effect are strong variables for consideration.

In discussing readiness theory, Voogd (2004) shared that command and control along with other readiness concepts have their limits. Extreme events are difficult, if not impossible, to predict; therefore, common leadership concepts such as training, roles and responsibilities, role knowledge, training, rehearsals, and standards for behaviors during crisis may be of limited value in an extreme crisis. In fact, training and simulation may cause blind spots. These thoughts are important in designing questions for this study.

A significant discussion of leadership concepts within this dissertation surrounds the sensemaking theory. Weick (1988) cautions us that leaders while trying to make sense out of a situation may actually change the event thereby making the situation worse. Weick (1988) concludes in his research that developing a “shared understanding” is essential for leadership success. Weick (1988) dissects shared understanding into three

components, i.e., commitment, identity, and expectations. Weick (1988) identifies another construct in wisdom. Weick (1988) tells us that the elements of wisdom are “updating and doubt”, and importantly, wisdom enables adaptation and innovation. Finally, in the section of this dissertation on sensemaking, there is a debate discussed between Weick’s (1988) belief that “felt emotions” can take away from sensemaking. While Maitlis and Sonenshein (2010) believe that negative felt emotions may actually promote sensemaking.

The last leadership construct discussed heretofore is that of Boin (2009) who identifies “executive tasks” for extreme event leaders. While these tasks are not technically a “leadership construct” these tasks do provide insights on the types of activities leaders must be capable of accomplishing. Those executive tasks are: 1. Preparing in the face of indifference, 2. Making sense of an emerging and evolving crisis, 3. Managing large response networks, 4. Offering credible answers, and 5. Learning under pressure. Given Boin’s (2009) description of the cascading and transboundary nature of extreme events, it seems reasonable for this study to focus on the tasks that Boin’s (2009) suggests will “make-or-break” leaders in extreme events.

Leadership Concepts Summary Table

Extreme Leadership concepts in Literature				
Reference	Construct	Description	Method	Results
Chatterjee and Hambrick (2007)	Trust	Measuring trust is difficult given the “threshold effect”	Testing Narcissistic CEOs	Consider testing for threshold effects and long-term effects of the threshold effect.
Voogd (2004)	Command & Control (readiness)	Challenges whether readiness can prepare leaders for extreme events	Case study Netherlands fireworks explosion	Common leadership concepts such as training, roles and responsibilities, role knowledge, training, rehearsals, and standards for behaviors during crisis may be of limited value in an extreme crisis. This dissertation discusses some problems with regard to disaster prevention policy in the Netherlands. In May 2000, a devastating fireworks accident in the Dutch town Enschede took place, destroying a significant part of the built environment of this town, with an investigation by an independent evaluation committee painfully highlighting the failure of the local and national authorities’ preventative policies. The Enschede disaster stimulated many new activities at various levels of government with regard to the need to improve disaster prevention and control. However, recent studies reveal that the lessons of Enschede have yet to be put into practice. This raises questions about the usefulness of a ‘command-and-control’ prevention approach.
Weick (1988)	Sensemaking	-shared understanding a. Commitment	Case study Mann Gulch	When faced with extreme conditions, people often revert back to fundamental training and fail to conduct “sensemaking”. Weick’s work is too

		b. Identity c. expectations -Wisdom -Felt emotions		extensive to fully discuss here.
Boin (2009)	Executive tasks & Transboundary	1. Preparing in the face of indifference, 2. Making sense of an emerging and evolving crisis, 3. Managing large response networks, 4. Offering credible answers, and 5. Learning under pressure	Qualitative piece – editorial	Transboundary and social rupture research and future directions. Discusses the escalatory power of transboundary events.
Boin (2009) Casto	Task Interdependency	Relationships between the five executive tasks	Qualitative	This is not discussed in Boin; however, it seems that there would be relationships between these tasks.
Samuels, et al. (2010)	Self-efficacy	Ability to remain calm and make tough high-stakes decisions	Survey of the Air Force Freefall and Soaring programs	Suggests that successful performance under anxiety-provoking situations that require personal mastery may increase self-efficacy in domains critical to leading effectively in extreme contexts.
Campbell, et al. (2010)	Effective leadership	Effectiveness across the individual, dyadic and team levels	Multilevel review of six research papers	Leadership effectiveness is enhanced by: <ul style="list-style-type: none"> <li>a. Shared mental models</li> <li>b. Leader creativity</li> <li>c. Affect management</li> <li>d. Creation of cohesiveness and positive climate</li> <li>e. Successful performance</li> </ul> Effectiveness hindered by: <ul style="list-style-type: none"> <li>a. Work overload at the individual level</li> <li>b. Stress at the individual and dyadic levels</li> <li>c. Conflict at the team and dyadic levels</li> </ul>
Hannah, et al. (2008)	Leadership efficacy	Development of a multi-level and multivariate construct	Longitudinal review of 20 studies	Development of a framework for leader efficacy and leadership efficacy. This framework differentiates leader efficacy from leadership efficacy. Leader efficacy: <ul style="list-style-type: none"> <li>a. Greater breath of generalization</li> <li>b. Self-motivation</li> <li>c. Domain-specific leader efficacy</li> <li>d. Leader though efficacy</li> <li>e. Generalization of efficacy and leader adaptability</li> <li>f. Efficacy and adaptable leadership styles</li> <li>g. Self-system</li> <li>h. Automaticity of leaders efficacy</li> </ul> Leadership efficacy: <ul style="list-style-type: none"> <li>a. Leader and follower bidirectional influence</li> <li>b. Collective efficacy</li> <li>c. Cross-level models</li> <li>d. Shared mental models</li> <li>e. Multilevel leadership efficacy</li> </ul>
Hannah and Avolio (2011)	Leader character as a locus	Characteristics of leaders character construct and how character and competence serve to foster sustainable leadership across contexts, cultures and challenges	Address the ontology by using a meta-framework distinguishing between locus, transmission, and reception of leadership and an epistemological perspective	The need for a research stream to discuss character and character-based leadership. Suggest that character is (if not the) critical component of leadership. Development of this construct is needed in the literature.

Quick and Wright (2011)	Character-based leadership, context and consequences	Investigate the link between morality and character	Literature review response to Hannah and Avolio (2011)	Is character the locus of leadership? If so, what are the locus, transmission and reception linkages? Character is not personality; character is not values. Character-based leadership is a general construct not tied to leadership style. Context and consequences – leader-in-practice – successful leaders complement their knowledge of leadership through the mastery of hands-on practice and experience. Is character developable? Yes, but need self-awareness to develop
Hannah, et al. (2010)	Contextualized leadership in extreme events	Call for Multilevel focus and systems approach to dynamic leadership processes	Proposal for relevant concepts at each level	Multilevel – Micro – a. Emotions b. Meaning-making c. Cognition and danger d. Individual differences and danger e. Physiological effects f. Motivation and danger Dyad – a. Leader-member relationship quality b. Effective leadership style Meso – a. Group/team type b. Group processes c. Group complexity d. Social networks e. Group prototypes Macro – a. Organizational adaptability b. Organizational structure and systems and adaptability c. Professions and professional ethics d. Ethos
Baran & Scott (2010)	Ambiguity	Social process by which groups make effective sense of the hazards while avoiding catastrophic mistakes	Grounded method - Analyzed 100 reports of “near-miss” situations in which fire fighters escaped	Integrates interdisciplinary perspectives of sensemaking, ambiguity, and high-reliability organizational theories. The fundamental process of organizing ambiguity-and its subprocesses of framing, heedful interrelating, and adjusting leads to goal attainment.
Fisher, et al. (2010)	In Extremis leadership	“Bright” leadership competencies and shadow influences	Single case study Australian Army Training Team Vietnam	Themes – trust, mateship and training “Bright” competencies – a. Physical courage b. Adventurous/risk-taking c. Learning organization d. Caring ethos e. Leading by example f. Level of experience g. Stamina h. Expertise/control i. Self-reliance j. Humor “Shadow” Influences – a. Highly stressed b. Violent credo c. Corruption Other considerations – role of mateship and training as a buffer and facilitator; limits to the amount of stress that can be tolerated; in extremis environment exposes leader to powerful and subversive forces. Thus, before assignment, leaders should be assessed for their character, psychological makeup, and required skills.
Yammarino, et al. (2010)	Interdisciplinary, multilevel model of leadership and team dynamics.	Pragmatic leadership at the individual level, individualized	Proposal for experimental studies, interviews, surveys and	Twelve key multilevel propositions and five multilevel exploratory ones are derived from the model. Leadership approaches: a. Pragmatic at the individual level b. Individualized Leadership: A Dyad-Level

		leadership at the dyadic level, and shared leadership at the team level provide an integrated core for the approach.	archival data	<p>Approach</p> <p>c. Shared Leadership and Team Dynamics: A Team-Level Approach</p> <p>Yammario, et al. propose that the integration of three models of leadership and team dynamics (i.e., <i>pragmatic</i>, <i>individualized</i>, and <i>shared</i>) that operate at multiple levels of analysis (i.e., individual, dyad, and team, respectively) are the most beneficial for understanding the dangerous military environment, and these approaches form the core of a model of concepts that operate at multiple levels of analysis and involve team formation and assembly (i.e., coming together of a group of individuals for a common purpose; which result in leadership and team dynamics, which in turn yield team performance and maintenance (i.e., analysis and monitoring of task and socio-emotional demands (p. S19)).</p>
Sweeney (2010)	Trust	The purpose of this exploratory study was to investigate whether soldiers reevaluated trust in their leaders prior to combat operations and, if so, identify conditions that would prompt it and assess the impact of any reevaluation on the level of trust in the leader-follower relationship.	Seventy-two male soldiers, ranging in rank from private to lieutenant, participated in the study through questionnaire.	Soldiers do reconsider trust many times. From training into combat operation and in new contexts soldiers reconsidered trust based upon role requirements. Soldiers seemed to place the most importance on the leader's trait(s) that upheld their greatest dependencies or reduced their greatest vulnerabilities. In the case of combat, soldiers' welfare, especially at the platoon and company levels, depends greatly on the competence of their leaders. The data suggest that soldiers reevaluated their leaders' abilities to manage stress, respond to problems, demonstrate technical and tactic proficiency, be honest and candid, and take care of group members' needs during the deployment and preparation phases to extrapolate whether they could trust their leaders to lead in the new context of combat. In the cases where reconsideration did change, it increased the level of trust in the leader. this study found that (a) the majority of soldiers did reconsider trust in their leaders prior to following them in the new context of combat; (b) soldiers' concerns about their leaders' competence to meet role requirements in the combat context seemed to initiate the trust reconsideration process; (c) for over half the soldiers, the trust developed in peace time appeared to carry over to the combat context; and (d) for the soldiers for whom trust changed, the majority experienced an increase in the level of trust in their leaders. The results imply that leaders can leverage the trust reconsideration process that results from preparing to lead a group into a new context, especially ones that increase the vulnerability or risk to group members' welfare.

## APPENDIX – C Research Threads Identified in Extreme Event Paper

#	Author(s)	Nature of the Thread	Description of the Thread	Consequences or Benefits
1	Mikusova (2011)	Methodological	Many researchers simplify the research by studying more routine events such as first responders and then attempt to extrapolate their insights to extreme events.	Limits insights (validity)
2	Mikusova (2011)	Methodological	Scientists from many disciplines have added to the research of crisis management studying it from their perspective with their own context, language, theories and approaches.	Fails to facilitate integrated theory
3	Thompson and Hunt (1997)	Methodological	Characteristics of extreme events have implications on the concepts used to investigate crisis leadership. For example, a mere “crisis” might involve a threat to the achievement of a corporate goal or layoff of workers. That threat is much different from a threat experienced under extreme conditions, which might include life and death situations; therefore, this implies that concepts such as trust, or followership, among others, can be non-linear.	Common leadership concepts take on an entirely new meaning in extreme crisis versus a routine crisis and the difference will affect the research methodology. For example, in quantitative leadership research, the construct of “trust” is commonly included as the leadership variable. In extreme events, beyond the threshold of life and death, a survey or even an experiment cannot duplicate the stress of a life and death situation and therefore that research method would be less valid than a deeper study based in the grounded approach that actually studies an extreme event. Thus, knowing the specific characteristics of an extreme event becomes important not only in defining the concepts but also in how one approaches the research methodology.
4	Lettieri (2007)	Context	1 - few researchers have delved into “transboundary” effects of crisis 2 – Limited to USA & Canada	Limits scope of findings and insights.
5	Hannah, et al. (2009) & Taleb, (2010) Casto	Context	This review could find no unified list of extreme event characteristics. Some researchers have identified their own unique descriptions of the characteristics for extreme events.	Limits consistency in the research - These characteristics are important considerations in developing the concepts associated with extreme events and are a foundation for the research.
6	Sementelli’s (2007)	General Leadership Theory	There is little in the way of theory development in literature. Mostly the literature applies theory but does not add to it. Specifically for the leadership theories, he concludes that they are “heavily examined yet poorly understood” in this context	Developing a theory that integrates the existing literature would be a valuable expansion of the extreme crisis leadership theories.

7	Smits & Ezzat-Ally's (2003)	Readiness Theory	Readiness theory adds little theoretical development to extreme crisis management. Considering that Voogd (2004) identifies command and control limitations of the theory, Smith (2004) adds the challenges of decentralization and Quarentelli (1988) concludes extreme events necessitate adaptations	Knowing the important concepts associated with extreme event leadership could enable organizations to better inoculate themselves against the uncertainty of extreme events through improved readiness.
8	Mirvis (1996)	Complexity Theory	Complexity Theory tends to <u>require</u> that people behave outside of norms in responding to a crisis. This requirement is counterintuitive to most administrative theories of org behavior.	Most organizations want to limit uncertainty and they do so by building procedures and processes that constrain individuals to behave in predictable ways for predicable events. The concern then becomes for individual and organizational behavior during unperceived events. Typically, when people behave outside expected norms, the organization seeks to return the behavior to those within norms.
9	Nutt (2004)	Normal Accident Theory	NAT has yet to explain everything about the escalation of accidents. If accidents are "normal" then, the question is why do most organizations avoid them? Not every organization experiences accidents; therefore, perhaps most organizations have learned to become safer. It could be that they learn to de-couple their processes or it could be that they have just become more reliable.	Are accidents inevitable?
10	La Porte (2011) and La Porte and Rochlin (1994)	Normal Accident and High-Reliability Theory	Weick and Sutcliffe (2001) insist that organizations can merge culture and organizational structure into a Highly Reliable Organization. While La Porte (2011) and La Porte and Rochlin (1994) agree with the basic HRT theory, they somewhat disagree with Weick and Sutcliffe (2001). La Porte (2011) and La Porte and Rochlin (1994) challenge the ability of organizations to combine culture and structure to limit events.	Resolution could break the deadlock between the two theories, NAT & HRT. Current research does not integrate these two theories (HRT and NAT) with complexity theory. My research may shed some light on this integration. It might be helpful in resolving the deadlock to consider whether embracing complexity helps move the debate forward. Through the investigation of extreme events, perhaps my research can shed light on the argument and settle the deadlock.
11	Maitlis and Sonenshein (2010)	Sensemaking	Not explicitly discussed among the three themes of sensemaking is the role of "felt" emotions in sensemaking. i.e., "felt" emotions such as panic, on sensemaking	Investigation would strengthen the understanding of more characteristics of sensemaking.
12	Landau and Chisholm (1995)	Sensemaking	Argue that pessimism, with the failure-avoidance organizational perspective that it entails, can actually mitigate a crisis.	Better understanding of the implications of optimistic bias and pessimism on sensemaking.

13	Jennings & Greenwood, (2003)	Sensemaking	There is little research on the institutional effects of sensemaking in crisis, e.g., processes, mindset.	Deeper understanding of organizational failure, perhaps even latent org failure or incubation.
14	Casto (2013)	Sensemaking	While it is obvious that panic exists among individuals when a disaster unfolds, it would be interesting to find measures of organizational or leadership panic. (Table 1)	Very little, almost no literature on the consequences of leadership panic in extreme events.
15	Boin, (2009)	Transboundary	Few crisis management researchers have delved into studying transboundary effects. Including – executive tasks during transboundary crisis; relationship between risk, crises, and public management. Lagadec's (2009) focus on innovative thinking when in the throes of transboundary crises. Wachtendorf's (2009) social-ruptures	Transboundary effects are highly important concepts for this research. As the world flattens, extreme events multiply, and our ability to create fear around the world expands, most extreme events will take on the characteristics of a transboundary event.
16	Hannah, et al. (2009)	Leadership Context	Discuss the tensions between leaders who are adaptive versus those who are "administrative" during an extreme crisis. By "administrative", they mean classic authoritative or directive leadership. There exists a general tension between using adaptation during an event versus following the administrative, i.e., classic leadership route.	This tension needs much more development in the literature.
17	DeChurch, et al. (2011) Hannah, et al. (2009)	Leadership Context	A discovery of the unique interrelationships between leadership concepts and perhaps a discovery of the most important concepts in the extreme context.	recognition that extreme leadership research may not change the essence of leadership, or make leadership concepts invalid; however, they suggest that it could discover new relationships between concepts and necessitate advanced methodologies
18	Farazmand (2009) Casto (2013)	Extreme Event Context	There is a similarity between a transboundary crisis and an extreme event or an extreme event context. While there appears to be little, or no, literature in this area, these crises, events, and contexts appear to have similar characteristics.	Farazmand states this as a gap in the literature... discusses a perspective that all "grand failures" by governments have global implications.
19	Farazmand (2009) Casto (2013)	Surprise Management & Sensemaking	These two theories have roots in the same areas of chaos, complexity, and dynamic systems' theories. They clearly it have roots in Weick's "management of the unexpected" as well. Especially the characteristics of non-linear thinking	Finding the linkages between these theories (elements) would be helpful in establishing one integrated extreme leadership theory.
20	Yukl, (2006)	Adaptive v. Administrative Leadership	A fundamental tension exists between adaptive leadership and administrative leadership styles. Adaptive leadership consists of "improvisational" and "ambidextrous" leadership styles, which are styles that flex between exploitation and exploration. While administrative leadership styles are those of classic leadership, for example, autocratic or directive, the key to the success of this research is to uncover the relationships between leadership styles in extreme events. This tension is a very important insight for this research.	Understanding whether organizations need to be more improvisational or whether they need to be more ambidextrous will provide valuable insights for leadership. As this research progresses, further exploration of this tension is necessary.
21	Hannah, et al. (2009)	Context	One major limitation is how extreme event leadership can apply across many domains.	Are the leadership strategies identified for technical events applicable to information technology events, public health



				events, or other non-technical events?
22	Hannah, et al. (2009)	Readiness Theory	As the potential for extreme events spreads, more “naïve” organizations will face leadership challenges for which they may be unprepared.	The question arises as to how the leadership challenges vary across organization types, such as, the naïve versus the trauma organizations.
23	Hadley, et al. (2011)	Decision Making	Suggest that there is a need for greater precision in the measures of decision-making. Those measures must focus on “difficulty” and “confidence.”	Others suggest that a single measure, which might capture all of these considerations, is “self-efficacy.”
24	Santella, et al. (2009); von Lubitz, Beakley & Patricelli, (2008)	Decision Making	Authors suggest building “tools” for decision-making	OODA loop, etc. Out of scope for this study.
25	Parashevas (2006)	Decision Making	Suggests that decision-making should be a living and evolving system and that agents must understand their roles in this system. He suggests that researchers should use complexity science in researching the kind of leadership necessary to generate these realizations and behaviors.	Sometimes, a routine crisis escalates into an extreme event and this escalation could bring with it new considerations for decision-making. Parashevas (2006) highlights this escalation as an acute stage in the crisis where the organization reaches a “critical instability” point that might involve a “bifurcation point” or “phase transition”. This transition may become important because it often decentralizes decision-making.
26	Casto (2013)	Social Justice	Social justice influences on technical justice decisions or leader accountability is not well understood.	Understanding how social justice pressures create heightened accountability of political and crisis leaders could shed significant light on how decisions get made and the consequences of political pressures caused by social justice on the crisis leader.
27	Casto (2013)	Dangerous Contexts	Dangerous contexts are the next domain beyond extreme contexts. Dangerous contexts have unique leadership qualities. There is little or no literature that explores the commonalities or differences between these two leadership contexts.	Understanding how similar these two contexts are would inform our knowledge of leadership in both contexts.

## APPENDIX D – Addressing Individual Research Threads

#	Research Thread (Context Only – not Methodological Gaps)	How the Thread is Addressed in this Dissertation Content
4	1 - few researchers have delved into “transboundary” effects of crisis 2 – Limited to USA & Canada	Will address in my results Section
5	This review could find no unified list of extreme event characteristics. Some researchers have identified their own unique descriptions of the characteristics for extreme events.	Unified List of characteristics developed – see Appendix A
6	There is little in the way of theory development in literature. Mostly the literature applies theory but does not add to it. Specifically for the leadership theories, he concludes that they are “heavily examined yet poorly understood” in this context	Will address in my results Section
7	Readiness theory adds little theoretical development to extreme crisis management. Considering that Voogd (2004) identifies command and control limitations of the theory, Smith (2004) adds the challenges of decentralization and Quarentelli (1988) concludes extreme events necessitate adaptations	Will address in my results Section
8	Complexity Theory tends to <u>require</u> that people behave outside of norms in responding to a crisis. This requirement is counterintuitive to most administrative theories of org behavior.	Research area – 1 is there a conflict between behavioral theory, e.g., rationality and organization theory during an extreme crisis?
9	NAT has yet to explain everything about the escalation of accidents. If accidents are “normal” then, the question is why do most organizations avoid them? Not every organization experiences accidents; therefore, perhaps most organizations have learned to become safer. It could be that they learn to de-couple their processes or it could be that they have just become more reliable.	Research area 2 – Which theories are the best fit for leadership during a Black Swan event?
10	Weick and Sutcliffe (2001) insist that organizations can merge culture and organizational structure into a Highly Reliable Organization. While La Porte (2011) and La Porte and Rochlin (1994) agree with the basic HRT theory, they somewhat disagree with Weick and Sutcliffe (2011). La Porte (2011) and La Porte and Rochlin (1994) challenge the ability of organizations to combine culture and structure to limit events.	Research area– See #9
11	Not explicitly discussed among the three themes of sensemaking is the role of “felt” emotions in sensemaking. i.e., “felt” emotions such as panic, on sensemaking	Research Area 3 – What is the role of “felt” emotions in extreme event leadership?
12	Argue that pessimism, with the failure-avoidance organizational perspective that it entails, can actually mitigate a crisis.	Research area – See #11
13	There is little research on the institutional effects of sensemaking in crisis, e.g., processes, mindset.	Research area – 4 Is sensemaking a crucial component of crisis leadership decision-making?
14	While it is obvious that panic exists among individuals when a disaster unfolds, it would be interesting to find measures of organizational or leadership panic. (Table 1)	Research area- 5 What impact, if any, does leadership panic play in extreme crisis management?
15	Few crisis management researchers have delved into studying transboundary effects. Including – executive tasks during transboundary crisis; relationship between risk, crises, and public management. Lagadec’s (2009) focus on innovative thinking when in the throes of transboundary crises. Wachtendorf’s (2009) social-ruptures	Research area – 6 As the transboundary effects of an extreme crisis accelerate, do the executive tasks of the crisis leader become more difficult?
16	Discuss the tensions between leaders who are adaptive versus those who are “administrative” during an extreme crisis. By “administrative”, they mean classic authoritative or directive leadership. There exists a general tension between using adaptation during an event versus following the administrative, i.e., classic leadership route.	Research area – See #8
17	A discovery of the unique interrelationships between leadership concepts and perhaps a discovery of the most important concepts in the extreme context. recognition that extreme leadership research may not change the essence of leadership, or make leadership concepts invalid; however, they suggest that it could discover new relationships between concepts and necessitate advanced methodologies	Research area– See #8
18	There is a similarity between a transboundary crisis and an extreme event or an extreme event context. While there appears to be little, or no, literature in this area, these crises, events, and contexts appear to have similar characteristics.	Research area – See #4 & #15
19	These two theories have roots in the same areas of chaos, complexity, and	Research area – See #11 & #13

	dynamic systems' theories. They clearly it have roots in Weick's "management of the unexpected" as well. Especially the characteristics of non-linear thinking	
20	A fundamental tension exists between adaptive leadership and administrative leadership styles. Adaptive leadership consists of "improvisational" and "ambidextrous" leadership styles, which are styles that flex between exploitation and exploration. While administrative leadership styles are those of classic leadership, for example, autocratic or directive, the key to the success of this research is to uncover the relationships between leadership styles in extreme events. This tension is a very important insight for this research.	Research area – See #8 & #16
21	One major limitation is how extreme event leadership can apply across many domains.	See my Future Research Directions Section
22	As the potential for extreme events spreads, more "naïve" organizations will face leadership challenges for which they may be unprepared.	See my Future Directions Section
23	Suggest that there is a need for greater precision in the measures of decision-making. Those measures must focus on "difficulty" and "confidence."	Research area – 7 Are there more precise measures of decision-making precision?
24	Authors suggest building "tools" for decision-making	Research area – See #23
25	Suggests that decision-making should be a living and evolving system and that agents must understand their roles in this system. He suggests that researchers should use complexity science in researching the kind of leadership necessary to generate these realizations and behaviors.	Research area – See #23
26	Social justice influences on technical justice decisions or leader accountability is not well understood.	Research area – 8 Is there a relationship between social justice and technical justice that influences political accountability and influences leader decision-making in significantly negative ways?
27	Dangerous contexts are the next domain beyond extreme contexts. Dangerous contexts have unique leadership qualities. There is little or no literature that explores the commonalities or differences between these two leadership contexts.	Research area – 9 What are the overlaps between extreme and dangerous event leadership?

## APPENDIX E – Generation of Leadership Interview Questions

Research Areas	Leadership concepts	National and Crisis Leadership Interview Questions	Social Leadership Interview Questions
Research area 1 – There are unique changes in normative leadership behavior from administrative leadership to authoritarian leadership during an extreme crisis.	Trust Self-efficacy Leader character as a locus Character-based leadership, context and consequences	What changes did you see in leadership behaviors from the normal mode of operation before the event and then during the event? As the event progressed, did you sense that your followers reassessed their trust in you?	Did the national and local leaders exhibit the proper leadership behaviors expected for an event of this magnitude?
Research area 2 – As Black Swan events, normal accident or high reliability theory does not apply to an extreme crisis.	Command & Control (readiness)	Was there a lesson of leadership from the event that if applied or known before the event would have improved the event outcome, i.e., were there leadership gaps identified as lessons learned?	What were your expectations prior to the event for the leaders? Were your expectations during the event consistent with your expectations prior to the event? Should the leaders have been more prepared?
Research area 3 – Felt emotions play a significant role in extreme crisis leadership decision making.	Leader character as a locus Character-based leadership, context and consequences	Discuss how your emotions affected your leadership effectiveness and the decisions that you made during the event. Was there a point or points during the event where you felt that your followers lost trust in you?	Discuss how your feelings of trust in the leadership changed throughout the event.
Research area 4 – Sensemaking is a crucial component of crisis leadership decision making	Sensemaking	Did you use any “framing” method or “big picture” mapping in your mind that helped you guide the event response? If so, describe how that method worked or did not work.	Were the leaders able to explain the situation clearly? Did you understand what was occurring and how it might affect society?
Research area 5 - In the face of an extreme crisis, there is an element of leadership panic that affects decision making.	Self-efficacy Effective leadership Leadership efficacy Ambiguity	Was there ever a point where you felt that the situation was out of control and you either hesitated in your decision-making or lacked for a decision?	Was there a point or points where you thought that the event conditions exceeded the capabilities of the leaders? Were at any point did they seem panicked?
Research area 6 – As the transboundary effects of an extreme crisis accelerate, the executive task of the crisis leader become more difficult.	Executive tasks & Transboundary effects	Discuss the effects of this event on other nations, infrastructures (information technology) or jurisdictions out of your control. How did that expansion affect your leadership or decision-making?	Explain the progression of the event with regard to the societal impacts. As the event progressed
Research area 7 – There are decision-making measures and tools that are specifically applicable to extreme event leadership.	Leadership efficacy	How did your leadership style, tasks, or decision making differ in this event versus other lesser events that you have led?	Were you satisfied with the style of leadership exhibited by the top leadership? Did they listen to the social needs, were they responsive to your demands and did they relate to you and society?
Research area 8 – There is a relationship between social justice and technical justice that influences political accountability and influences leader decision-making in significantly negative ways.	Contextualized leadership in extreme events	Were there political or social pressures that impacted your leadership abilities or decision-making? Discuss how those impacts influenced you. Did they cause constraints on your effectiveness or cause the event to have greater consequences?	Discuss your involvement in the event. Was it necessary for you to involve political leaders to get your concerns heard or addressed? Discuss in detail any involvement by political leaders in addressing societal needs.
Research area 9 – Some leadership concepts associated with dangerous context events apply to leadership in extreme contexts.	In Extremis leadership Interdisciplinary, multilevel model of leadership and team dynamics.	For this event, were there varying levels of leadership within your chain of command, i.e., how was leadership different in the different organizational levels? This is a hypothetical question, what if the situation had expanded to include dangerous situations, e.g., life & death for your or your teammates. How would that affect your leadership or decision-making?	Do you think that the leaders were “all-in” during this event? Did they approach the event as if their lives depended on success?