

RESEARCH

Leonie Looser

Upper Echelons' Naturalistic Decision-Making and Top Management Team Macro cognition in a High Reliability Organization

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Dissertation Technische Universität Chemnitz, 2023

ISBN 978-3-658-44072-5 ISBN 978-3-658-44073-2 (eBook)
<https://doi.org/10.1007/978-3-658-44073-2>

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*Yesterday is history
Tomorrow is mystery
Today is a gift
Eleanor Roosevelt*

Acknowledgements

First I would like to thank my supervisor Prof. Dr. Peter Pawlowsky for his continued support, engagement and the numerous inspirations throughout the research process. Apart from his scientific advice, his trust, encouragement and kind words greatly helped the completion of this project. I would also like to thank Prof. Dr. Jan Hagen who agreed to join as second supervisor and whom I had crossed paths with early on in this process- I am especially grateful for the advice he gave me regarding choice of supervision and institution.

Furthermore, I would like to express my sincere gratitude to the executives who participated in the research interviews—for their time and especially their candid and open answers. I would also specifically like to thank Lufthansa's Emergency Director at the time- without his openness, this venture would not have been possible.

I would also like to thank my friends and colleagues and especially my fellow doctoral students at the TU Chemnitz who supported this work with their continued interest, support, discussions and valuable feedback: Teresa, Nina, Mareike, Stephanie, Verena, Michael and Sebastian, I really appreciate your help!

Last but certainly not least I would like to thank my family. My parents who always supported my interest in learning and who encouraged me in anything I had set my mind on. My utmost gratitude goes to my husband who gave me the freedom to embark on this venture, who supported me in the good and the better days of this process and who always had my back. Finally I would like to thank my son, who joined the process halfway and whose presence never fails to remind me of what matters most in life.

Abstract

The present work intended to understand, analyze and potentially improve an operational top management team's crisis decision-making in the context of a High Reliability Organization. It set out to provide a detailed understanding of naturalistic team cognition during COVID-19 crisis management decision-making, to identify related learnings and success factors as well as to detail relevant concepts and their intertwinement through a joint analysis. Combining the researcher's ethnographic perspective on the operations of a major German airline with a literature review, the author identified Top Management Teams, Upper Echelons Theory, High Reliability Theory, Naturalistic Decision-Making, Team Macrocognition, Diversity and Ambidexterity as suitable concepts to be jointly applied in a wholistic analysis aimed at closing associated research gaps as well as at providing findings relevant for practitioners and management.

Conceptual starting point for the present research are the idiosyncrasies of Upper Echelons and decision-making in top management teams under naturalistic conditions (Hambrick, 2007; Hambrick & Mason, 1984; G. L. Klein et al., 1993; Neely et al., 2020). Because of their relative inaccessibility, research findings regarding top management team decision-making and the relations with mediating and moderating concepts remain inconsistent (Roh et al., 2019). Another finding with regard to top management team cognition is the lacking consideration of the respective context and its influence on decision-making (Neely et al., 2020). To contribute to a better understanding, the decision-making of an operational airline top management team during its COVID-19 crisis management is analyzed. For this analysis, contextual influences of airlines as High Reliability Organizations as well as contextual influences associated with Naturalistic Decision-Making and their influence on the team's decision-making are considered (G. L. Klein et al., 1993). Traits of high reliability in this regard are represented through the

dimensions of organizational mindfulness as introduced by Weick et al., while the naturalistic decision-making context considered is constituted by the eight properties identified by Orasanu and colleagues (Orasanu & Salas, 1993; Weick et al., 1999).

To close these research gaps, Upper Echelons team cognition is assessed through Team Macrocognition, a context-contingent approach to team cognition which emanated from the Naturalistic Decision-Making school. It focuses on knowledge building in a complex problem-solving context and new knowledge as the product of collaboration by examining cognitive processes in real life (Fiore, Smith-Jentsch, et al., 2010, p. 254; G. L. Klein & Wright, 2016, p. 3). To provide an accurate understanding of a top management team's cognition in the chosen real-life context, related team cognition concepts such as Transactive Memory Systems, Trust and Psychological Safety are considered together with the influence of diverse team characteristics on decision-making (Ashleigh & Prichard, 2012; Edmondson, 1999; Lewis, 2003). Additionally, the concept of ambidexterity, an organization's and its members' capability to balance exploitation and exploration, is conceptually integrated into Team Macrocognition (Fiore, Rosen, et al., 2010; March, 1991). Ambidexterity has frequently been researched in the context of Upper Echelons and is deemed a vital for organizational success, however is also context-contingent and has not yet been considered with regard to top manager's decisions under naturalistic conditions (Kassotaki, 2022). Additionally, ambidexterity manifests through knowledge seeking and sharing behaviors and can hence be integrated into Team Macrocognition through this conceptual link (Mom et al., 2007; Schnellbacher & Heidenreich, 2020). In addition to the research gaps already outlined, the conceptual links between mentioned concepts have not yet been jointly considered nor have the detailed conceptual relations been explored, hence constituting another gap the present research aspires to close.

The chosen top management team's Team Macrocognition and identified influences as well as the conceptual connections were assessed through semi-structured interviews using the Critical Decision Audit as a technique, a hybrid interview method associated with cognitive task analysis (Borders & Klein, 2017; Crandall et al., 2006). Empirical findings underline the importance of internalized team knowledge as represented by Transactive Memory Systems under the given conditions, and furthermore point to the importance of their establishment prior to an actual crisis. Also, the relevance of distributed expertise and the variety of perspectives is highlighted—it has however proven to be dependent on the types of expertise and their respective constellations in the team, resonating with the different functional and educational backgrounds of its members. In terms

of externalized team knowledge, the critical role of knowledge externalizations for the decision-making process as well as decision outcomes is emphasized. Disciplined preparation and structured processing of expert information and cues in turn represent the backbone of team knowledge building, together with the development of individual decision heuristics by the team allowing for different combinations of recognition-primed, intuitive and analytical decision-making. This combination seemingly also allowed for the seeking of efficient and effective solutions of both exploitative as well as explorative nature. Individual knowledge building played a comparatively minor role, supposedly because of team members expert status, but once more portrays differences in exploitative and explorative knowledge sourcing dependent on functional backgrounds. Finally, a strong contextual influence of both the naturalistic decision environment as well as the highly reliable organizational context could be identified and are represented within the Team's Macrocognition as well as through the identified detailed connections.

The present research paints a detailed picture of an operational top management team's decision-making under naturalistic conditions, herewith providing valuable detail to applications of Upper Echelons Theory and top management team cognition as well as it contributes novel empirical insight through the combination of concepts and an Upper Echelon's perspective of Team Macrocognition. Another theoretical contribution is the conceptual integration of ambidexterity into a naturalistic team cognition setting of top management team members. Finally, the present work provides insight valuable for other top management- and high-ranking expert teams who operate under naturalistic conditions and are tasked with solving complex problems in highly reliable environments.

Keywords: Airlines · Upper Echelons · Top Management Teams · High Reliability Organizations · Naturalistic Decision-Making · Team Macrocognition · Transactive Memory Systems · Diversity · Ambidexterity · Crisis Management · COVID-19 · Polycrisis

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Abbreviations

ACTA	Applied Cognitive Task Analysis
AMB	Abbreviation for Ambidexterity
CDA	Critical Decision Audit
CDM	Critical Decision Method
C&EM	Crisis & Emergency Management
CEO	Chief Executive Officer
CERM	Crisis and Emergency Response Manual
CMB	Code Matrix Browser
COVID-19	Coronavirus Disease 2019 (SARS-CoV-2)
CRM	Crew Resource Management
CTA	Cognitive Task Analysis
EASA	European Air Safety Agency
ETK	Externalized Team Knowledge
EU	European Union
FFH	Fast and Frugal Heuristics
FOG	Flight Ops Group
FOR-DEC	Facts, Options, Risks and Benefits - Decision, Execution, Check
HB	Heuristics and Biases
HRO	High Reliability Organization
HRT	High Reliability Theory
ICAO	International Civil Aviation Organization
IKB	Individual Knowledge Building
ITI	Incident Timeline Interview
ITK	Internalized Team Knowledge
KAI	Knowledge Audit Interview
MS	Management Seismograph

NASA	National Aeronautics and Space Administration
NAT	Normal Accidents Theory
NDM	Naturalistic Decision-Making
NFOG	Non-Flight Ops Group
ORA	Operational Risk Assessment
PS	Psychological Safety
QCA	Qualitative Content Analysis
RE	Resilience Engineering
RKI	Robert-Koch-Institute
RQ	Research Question
SARS	Severe Acute Respiratory Syndrome
SEAL	Sea, Air, Land
SMM	Safety Management Manual
SOP	Standard Operating Procedure
TCTA	Team Cognitive Task Analysis
TM	Transactive Memory
TMC	Team Macrocognition
TMM	Team Mental Models
TMS	Transactive Memory Systems
TMT	Top Management Team
TPSO	Team Problem-Solving Outcomes
UE	Upper Echelons
UET	Upper Echelons Theory
WHO	World Health Organization

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1.1 Problem Statement, Research Objective and Research Questions

The COVID-19 (Coronavirus Disease 2019) pandemic has shaken the airline industry to the core, strongly reinforcing a need for leadership- and management answers to extremely challenging conditions which result from operating in volatile, complex, uncertain and ambiguous (VUCA) environments. While especially the airline industry is well weathered in terms of managing different crises, the *intensity and multiplicity of the COVID-19 pandemic reached a yet unseen criticality* attributable to its mutually reinforcing combination of both *substantial operational and economic challenges* (Suk & Kim, 2021). To date, *little detailed insight on management responses to the COVID-19 pandemic* has been provided, and literally none has been provided with regard to airline management teams and their COVID-19 crisis decision-making (Lukić et al., 2020). However, the pandemic dramatically accentuated the *need for top managers to effectively handle a novel crisis constellation* and once again highlighted the need for crisis management readiness and managers' ability to successfully lead through both response and recovery (Julia Graham & Loke, 2022).

Departing from the author's *ethnographic insight*, the search for concepts and approaches to understand, learn from and potentially improve the crisis decision-making of a major German airline's operational top management has been a key motivator for this thesis. The present work specifically addresses an *operational*

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/978-3-658-44073-2_1.

top management team's decision-making during COVID-19 crisis management and herewith provides detailed insight relevant for other top- and crisis management teams as well as for consultants and executives seeking to set up teams for e.g. crisis response who decide under challenging and time-constrained circumstances with conflicting goals or who are tasked with managing a polycrisis. The author identified Top Management Teams or Upper Echelons, Naturalistic Decision-Making, Team Macrocognition, Transactive Memory Systems, Diversity and Ambidexterity as relevant concepts to provide a conceptual framework for the intended research, which shall be introduced in the following with regard to the identified research gap.

Even without considering the COVID-19 crisis context, to date, Top Management Team (TMT) cognition is deemed a *black box* for its *relative inaccessibility* to researchers and the resulting lack of comprehensive insight regarding cognitive processes and mechanisms which constitute the role of Upper Echelons (UE) and their idiosyncrasies as the *dominant coalition of an organization* (Finkelstein & Hambrick, 1996; Hambrick, 2007; Hambrick & Mason, 1984; Neely et al., 2020, pp. 1033–1037; Roh et al., 2019). Since its introduction by Hambrick and Mason in 1984, UE have received remarkable research interest, however still *no complete understanding* of top managers' idiosyncratic individual and team cognition, their operating context and firm or decision outcomes, and neither their relationships nor interdependencies has been reached, resulting in repeated calls for UE research with an *explicit consideration of context and attention to team cognition* (Bui et al., 2019; Neely et al., 2020; Roh et al., 2019; Sarala; Wilms et al., 2019).

Context in UE regard may be defined as *organizational, team cognition and situational or decision-making context* (Bui et al., 2019; Joshi & Neely, 2018): Beginning with the *organizational context*, so far no research contributions have been made which address Upper Echelon's cognition in a High Reliability Organization (HRO). HROs operate under often extremely challenging conditions and stick out, because they *manage risk and failure through five hallmark properties of organizational mindfulness: preoccupation with failure, reluctance to simplify, sensitivity to operations, commitment to resilience, deference to expertise and comfort with uncertainty*, which have repeatedly been proven to prevent them from failing (Cantu et al., 2020; K. H. Roberts, 1990b, p. 160; Weick & Sutcliffe, 2015; Weick et al., 1999). Both High Reliability Theory (HRT) as well as UE research suggest that a *HRO's Top Management cognition will be influenced by the dimensions of organizational mindfulness* since HRO's "*strive for reliability through processes of cognition as much as processes of production*" (Weick et al., 1999, p. 34).

Furthermore, both *processes of production* and *processes of cognition* have been identified to be influenced not only by organizational, but also by the *decision-making and task context* (Ilgen et al., 2005; G. L. Klein et al., 1993; Peltokorpi, 2008; Schraagen, 2018). While of course all different kinds of decision-making are present in HROs, the *specific field of naturalistic decision-making* (NDM) has been investigated by researchers who tried to shed light on “*cognition in the wild*” through investigating decision-making under especially trying naturalistic conditions represented by *ill-structured problems, an uncertain and dynamic environment, shifting-, ill-defined and competing goals, action- and feedback loops, time stress, high stakes and the influence of organizational goals and norms* (E. Hutchins, 1994; G. L. Klein et al., 1993, 1993; Orasanu & Conolly, 1993). Consequently, NDM takes place in *real world settings* and is strongly associated with the decision-making of *experts and practitioners* (Hammond et al., 1987; G. L. Klein, 2011; Montgomery et al., 2004). Building from NDM roots, research on the associated team cognitive constructs has led to the *emergence of Team Macrocognition (TMC) as a set of individual- and team processes and emergent states* identified in a team’s NDM (Fiore et al., 2008; Fiore, Rosen, et al., 2010; Fiore, Smith-Jentsch, et al., 2010). TMC examines cognitive processes in complex contexts encountered in the work environment and focuses on knowledge building during problem-solving as well as knowledge as a product of collaboration (Fiore, Smith-Jentsch, et al., 2010, p. 254; G. L. Klein & Wright, 2016, p. 3).

Following developments in general team research together with Hambrick and Mason’s original idea that top managers’ idiosyncrasies influence decision outcomes brings the *likely influence of team composition and diverse team attributes on a TMTs macrocognition* into play (DeChurch & Mesmer-Magnus, 2010a; Del Triana et al., 2021; Salas et al., 2008; van Knippenberg & Schippers, 2007; van Knippenberg et al., 2013; Wildman et al., 2014). Much like UE research, findings on direct influences of diverse team members’ attributes have yielded *inconsistent findings*, similarly leading scholars to call for dedicated assessments of diversity as moderators of/mediated by aspects of team cognition (Del Triana et al., 2021; Martins & Sohn, 2022). One other concept has been of significant research interest in the context of UE teams which is the concept of *ambidexterity*, an organization’s and its member’s capability to balance exploitation and exploration (Heavey & Simsek, 2017; Junni et al., 2013, 2013; Kassotaki, 2022, 2022; March, 1991; Raisch & Birkinshaw, 2008; Tushman & O’Reilly, 1996). *Ambidexterity and the balance of contradicting exigencies is deemed compulsory for top managers to consider* as it is deemed vital for organizational success, yet it represents another context-contingent phenomenon which has not yet been

considered with regard to top manager's decisions under naturalistic conditions (Floyd & Lane, 2000, p. 164; Kassotaki et al., 2019; Kiss et al., 2020; Wilms et al., 2019). Yet again however, *context contingent approaches* as well as *team cognition-based approaches to individual and team level ambidexterity* are still in their infancy (Fourné et al., 2019; Heavey & Simsek, 2017; Pertusa-Ortega et al., 2020; Schnellbacher & Heidenreich, 2020). Only recently, ambidexterity was identified to manifest in team cognition, more specifically through knowledge seeking and sharing behaviors and can hence be integrated into Team Macrocognition through this conceptual link (Pertusa-Ortega et al., 2020; Schnellbacher & Heidenreich, 2020).

To hence summarize the current research status and resulting **research gaps**, *TMT cognition has not yet been fully understood* because of its relative inaccessibility as well as related *findings from both UE theory (JET) and diversity research* have proven to be *inconsistent* for not explicitly considering team cognition and context, provoking researchers' calls to close this gap. Regarding context, *no research on TMTs in a HRO context making decisions under NDM conditions* has been performed to date. Furthermore, ambidexterity has not been considered in naturalistic contexts nor in terms of TMC. In addition to the research gaps already outlined, the *conceptual links between mentioned concepts have neither yet been jointly considered* nor have the *detailed conceptual relations* been explored, herewith constituting another gap which present research aspires to close.

Since research *context* and the difficult access to managers as research subjects been accentuated in this introduction, both shall be mentioned and considered for the research questions: The present thesis seeks to contribute to closing or at least reducing identified research gaps by *detailing concepts and connections* through a joint literature review. More importantly though, it provides the empirical investigation of *an airline's operational TMT's NDM and TMC during COVID-19 pandemic crisis management*. Airlines and their operations are examples of highly reliable organizations and have been shaken to both their operational as well as their economic core during the COVID-19 pandemic, with a *magnitude and multitude of complex problem dimensions* yet unseen by an industry which was already well-weathered with crisis management experience to begin with (Baker et al., 2006; Hynes et al., 2020; Kiracı & Çalıyurt, 2022; Lloyd-Smith, 2020; Suk & Kim, 2021; Trump & Linkov, 2020). COVID-19 crisis decision-making was hence considered suitable and relevant to provide an empirical example for the intended research. This assumption was both backed by both the author's research activities as well as by her professional involvement in airline operations; it was the *ethnographic insight* to the topic which had originally sparked

the researcher's academic interest as well as it facilitated access to the respective TMT (Neely et al., 2020, pp. 1033–1035; Roh et al., 2019).

To guide the present research, the following research questions (RQs) have been derived from the author's ethnographic research interest and in combination with contemporary research findings to close the identified research gaps:

RQ1: *How do a High Reliability Organization's Top Management Team Macro-cognition and Naturalistic Decision-Making function in the context of COVID-19 crisis management?*

RQ2: *What are the conceptual connections between Upper Echelons Theory, High-Reliability Theory, Naturalistic Decision-Making, Team Macro-cognition, Diversity and Ambidexterity research for the given context?*

RQ3a: *What are success factors and limitations of a Top Management Team's decision-making in this context?*

RQ3b: *Which learnings can be derived from this case?*

As described, it is the overarching **aim of this research** to understand a TMT's TMC under consideration of UET, diversity and ambidexterity in the highly reliable operating context of an airline under conditions of NDM. In terms of **theoretical contributions**, the present undertaking contributes to close research gaps through detailed insight on TMT (macro)cognition as well as it introduces a novel implementation perspective for both TMC in terms of UE and ambidexterity in terms of naturalistic contexts. It also provides a novel conceptual integration of ambidexterity into TMC. Furthermore, detailed conceptual connections between UE, HRO, TMC, NDM, ambidexterity and diversity are shown, closing some research gaps as well as providing a baseline and direction for further research in this area. In terms of **practical contributions**, the present research analyzes an example of top management team crisis management and naturalistic team decision-making in a major German airline, herewith providing valuable insight for other crisis- and top management teams regarding naturalistic types of decision-making encountered in other settings of TMT and HRO decision-making. A dedicated summary of managerial findings is provided to allow for an immediate transfer of research findings to naturalistic practice.

1.2 Structure of the Thesis

As shown in Figure 1.1 the thesis is generally divided into two parts, a theoretical and an empirical section as marked in the above figure. After an introduction in *chapter 1*, the different levels of context relevant for the intended research are introduced: *Chapter 2* is devoted to the organizational context of HROs and the associated concept of HRT. *Chapter 3* introduces the collaborative context, more specifically UET, selected aspects of team cognition, diversity theory and the concept of ambidexterity. *Chapter 4* focuses on the decision-making context as represented through NDM and TMC. *Chapter 5* combines the findings of previous chapters and introduces the preliminary explanatory model derived from the literature review and used for empirical research as well as it summarizes high-level conceptual connections between TMTs, HRT, UET, diversity, ambidexterity, NDM and TMC. *Chapter 6* is the methodological chapter and is dedicated to research design and strategy, the research subject, methods of data collection and data analysis as well as a critical evaluation on the methodology. The following *Chapter 7* is the heart of the empirical analysis and discusses findings from the HRO and NDM context as well as aspects of diversity. It also analyzes the team's macrocognition in detail together with ambidexterity and finally introduces the revisited explanatory model together with detailed conceptual connections identified in empirical findings. To close, key findings are summarized and discussed in *Chapter 8*, while *Chapter 9* carves out theoretical and practical implications, limitations and an outlook for future research.

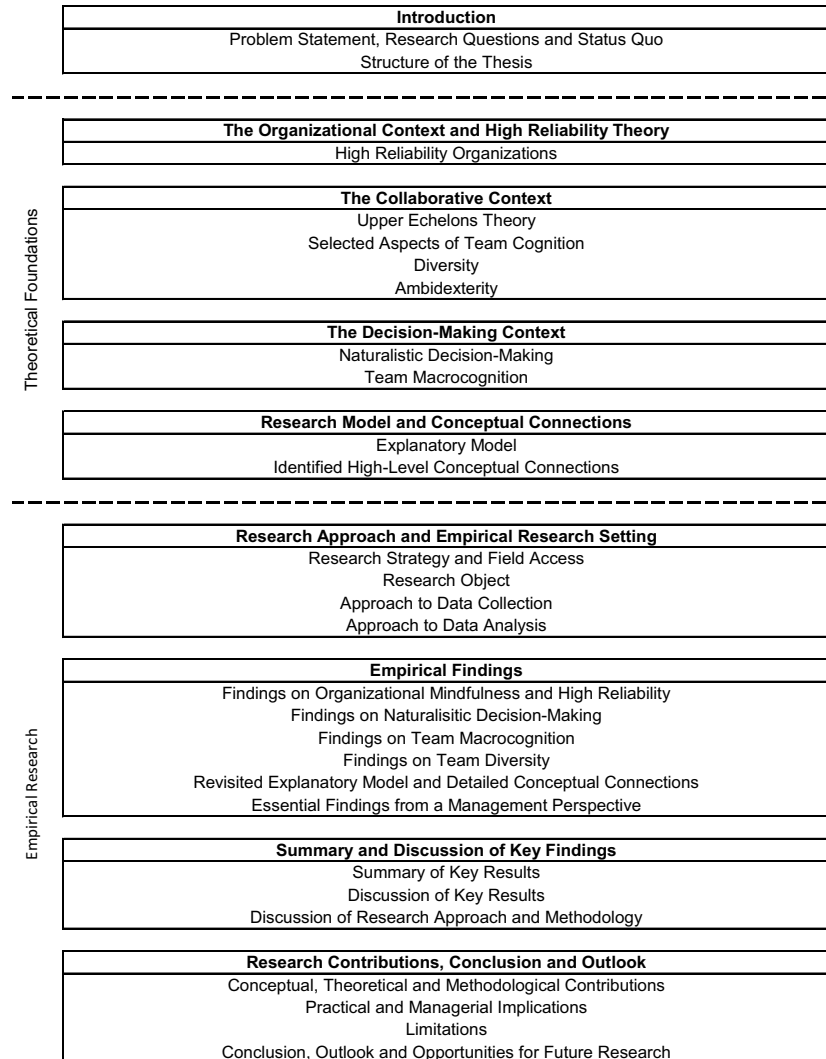


Figure 1.1 Structure of the Thesis (own design)



Theoretical Foundations: The Organizational Context and High Reliability Theory

2

The current chapter provides an overview of HRT as the relevant organizational context for the intended research. Section 2.1 defines HROs, whose distinctive properties are introduced in Section 2.2. Sections 2.3 and 2.4 detail the original five dimensions of organizational mindfulness in HROs, whose refinements and adaptations are then discussed in Section 2.5. Section 2.6 provides a conceptual demarcation from related concepts and is followed by a summary on HRT findings in Section 2.7.

2.1 High Reliability Organizations: Definition and Concept

The concept of HROs was introduced by Rochlin, La Porte and Roberts from the University of Berkeley, California in the late 1980s in their search for organizational aspects that appeared to allow for nearly error-free operations in selected organizations despite their particularly risk-bearing endeavors such as air traffic control, nuclear air carriers or companies in the oil and gas industry (K. H. Roberts, 1989, pp. 112–114; Rochlin et al., 1987). Research interest arose from investigating catastrophic or near catastrophic occurrences in different risk-bearing industries, such as the Diablo Canyon accident and the Three Mile Island incident, both nuclear power plants, or aviation in the case of the Tenerife air disaster, all accounting for operations under extremely challenging conditions (Schulman, 1993; Weick et al., 1999, p. 32). The concept has since been subject to continued academic interest in different high-reliability operating contexts