

The sea within: embodied sensemaking among seafaring leaders

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Abstract

Embodied sensemaking has the potential to cause catastrophic loss of life at sea. However, paradoxically, it can enable seafaring leaders to save lives, protect the environment and create order from chaos in complex and high-risk work contexts. Yet, embodied sensemaking remains unexplored within contemporary maritime human factors (MHF) literature. MHF's prevailing paradigms of Cartesian dualism and reductionist research methodologies are inadequate for engaging with the complex and interconnected nature of living and working at sea.

This doctoral thesis pursues the question: ***How do seafaring leaders make sense of critical events that confront their practice?*** In particular, it explores the degree that sensemaking is an embodied phenomenon. It does so via a research method that is novel to MHF studies; a phenomenologically attentive narrative interpretive approach.

This research design involved semi-structured interviews with twenty seafaring leaders (master mariners and chief engineers). Denzin's *interpretive interactionism* (2001) was employed to generate thick descriptions of seafaring leader narratives, which were then interpreted to arrive at impactful insights into the nature of sensemaking, revealing it to be a deeply embodied phenomenon. These interpretations were then theoretically examined to validate and extend upon these insights.

This thesis concludes that there is a "bottom-up", neurobiological dynamic that shapes the way seafaring leaders make sense of critical events, as well as their every-day professional practice. This dynamic is based upon commonly shared neural populations that bodily integrate perceptions, actions, emotions, sensations, and thoughts in a mind/body sensemaking system that is enmeshed with its environment.

Additionally, there is a "bottom-up", sociological dynamic that also shapes the way that seafaring leaders make sense of critical events. This sociological dynamic, conceptualised by Bourdieu as *habitus*, is scaffolded and reinforced by the neurobiological dynamic described above. As such, it too is an embodied phenomenon. Both these neurobiological and sociological forms of sensemaking are largely hidden from the conscious awareness of seafaring leaders.

As such, this thesis makes a number of original academic and practice-based contributions, such as;

- applying a holistic, interpretive approach to examining embodied sensemaking among seafaring leaders.
- connecting embodiment, phronesis (or practice wisdom) and habitus in a comprehensive and theoretically validated manner.
- developing a set of practice-based recommendations, including pragmatic tools and techniques designed to bring embodied sensemaking within the awareness of seafaring leaders.

This thesis concludes with a *call to action* for the broader maritime sector to integrate embodied sensemaking within its theoretical paradigms.

Publications

Roberts, B 2018, 'Recasting Odysseus: embodied sensemaking among seafaring leaders', *Australian Journal of Maritime & Ocean Affairs*, vol. 10, no. 1, pp. 19-34.

Roberts, B 2018 'In the shadow of Odysseus: Impermanence and imperfection in the world of seafaring leadership', Conference paper: *Standing Conference on Organisational Symbolism (SCOS2018)* August, Meiji University, Tokyo, Japan.

Roberts, B 2019 'Husserl's *epoche* and the art of the sword: Pathways into phenomenological inquiry', *Qualitative Research Journal*, Vol. 19 No. 4, pp. 391-402.

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Declaration

This thesis contains no material that has been accepted for the award to the candidate of any other degree or diploma, except where prior permission to do so has been received by the ADRD, and with due reference made about this in the text of the examinable outcome.

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A handwritten signature in black ink, appearing to read 'Bradley E Roberts', with a large, stylized flourish at the end.

Bradley E Roberts

29th July 2019

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Acronyms

COLREGs	Collision Regulations
CPP	Controllable Pitch Propeller
DP	Dynamic Positioning
IMO	International Maritime Organisation
IR	Integrated Rating
MET	Maritime Education and Training
MHF	Maritime Human Factors
SA	Situation Awareness

Chapter one: Introduction

Embodied sensemaking remains a potential hidden killer in the maritime sector that, paradoxically, can also work to save lives, protect the environment and sustain order in increasingly complex and high-risk work contexts. Yet, this aspect of maritime human factors has remained unexplored within scholarly literature until now.

One poignant example of embodied sensemaking is the *Piper Alpha* gas platform explosion of 1988. Located in the North Sea, this gas platform exploded, killing 167 people (O'Byrne 2011; Roberts 2018). During this disaster, the majority of the sixty-two people who survived were on deck. As such, they were able to see the fire and smoke, and feel the heat (Hull, Alexander & Klein 2002; O'Byrne 2011). These survivors bodily engaged with the crisis in a way that those indoors did not. They threw themselves into the North Sea to escape the fire. Based on survivor interviews and injury reports, it appears their embodied sensemaking informed them that this was an extraordinary situation that compelled them to take charge of their own survival and escape as best they could.

However, the 167 people who perished were largely sheltering inside the accommodation area. As such, they were not as exposed to the flames, smoke and heat to the extent that those who jumped into the sea were. These people decided to wait for formal instructions from management to evacuate via helicopter. As such, this group predominantly made different sense of the situation and unfortunately perished (O'Byrne 2011 p.90).

Therefore, it appears in this case that life and death was largely influenced by embodied sensemaking. It is likely that the sensory experience of the flames, heat and smoke influenced the sensemaking of those individuals who jumped to safety, whereas the absence of these extreme sensory phenomena did not influence the sensemaking of those individuals who later perished while waiting for rescue in the accommodation areas (O'Byrne 2011). As such, developing a nuanced understanding of the nature of embodied sensemaking will benefit seafaring leaders in their aims to resolve critical events.

My research project answers the question: ***How do seafaring leaders make sense of critical events that confront their practice?*** It does so by adopting a research method that is novel to maritime human factors studies; a phenomenologically attentive narrative interpretive approach. This introductory chapter describes the importance, and urgency, of studying embodied sensemaking in maritime contexts. It provides an overview of the current maritime human factors (MHF) perspective, and the literature undertaken since the turn of the 21st Century into maritime accidents. Lastly, it provides an overview of the research I have undertaken, including the interpretive conclusions that have been theoretically validated, and the recommendations I have developed to implement a practice-based approach to embodied sensemaking within the maritime sector.

Defining key terms

There are a number of key terms within the primary research question and with the thesis title itself that require defining at this introductory point; namely, sensemaking, embodied sensemaking, critical event, and seafaring leader.

Sensemaking

In his seminal work on sensemaking, Weick (1995 p. 4) simply defined sensemaking as “the making of sense.” He then described several properties of sensemaking that added nuance to this basic definition; stating that sensemaking is grounded in identity construction, is retrospective, social, ongoing yet triggered by extracted (noticed) cues, and driven by plausibility (p. 17). As such, sensemaking concerns itself with questions of *What is going on?*, *Why?*, *What may happen next?* *What to do about it?* and, retrospectively, *Why were these actions necessary?*

Sensemaking is distinct from, but interlinked with, the process of decision making. Klein, Calderwood and Clinton-Cirocco, in their study of decision making under time critical fire ground scenarios, “define decision making as the selection of one option from a set of two or more options” (p. 186 2010). Sensemaking concerns itself with deriving meaning from the events that prompted the decision making, as well as deriving meaning from the decision itself, such as in the form of justification. The

relationship between sensemaking and decision making is explored in greater detail in the following literature review chapter. However, throughout this thesis, sensemaking will be defined as being distinct from, but closely enmeshed, with decision making.

To facilitate a fresh examination of the concept of sensemaking, I will return to Weick's simple definition by defining sensemaking **as the multifaceted ways that individuals and groups make sense of their experiences and their lifeworlds.**

Embodied sensemaking

This broad definition of sensemaking allows for a particular subset of sensemaking; namely embodied sensemaking. Cunliffe and Coupland (2012) describe *embodied narrative sensemaking*, stating "that whether we are aware of it or not, we make our lives and ourselves 'sensible' through embodied (bodily) interpretations in our ongoing everyday interactions."

I expand upon Cunliffe and Coupland's definition by acknowledging and incorporating the dimensions of embodied cognition (Adams 2010; Johnson 2013). As such, **embodied sensemaking encompasses all the embodied, extended, affective and enacted dimensions that shape, or constitute, sensemaking.**

Critical events

Critical Incident Technique has a long history of application within human factors as a means of analysing success and failure in techniques (Webster 2007 p. 75). However, I was keen to avoid focusing solely on incidents, so that I could explore the lived experience of seafaring leaders to a greater degree. Using the term "incident" in a maritime sense would have limited the narratives of seafaring leaders to reportable accidents only.

According to Webster (2007 p. 77), critical events are those that have a profound effect on the narrator, bringing about radical change in the person. Webster stated that critical events are "unplanned, unanticipated and uncontrolled." He also observed that critical events are frequently a "change experience", where the

narrator “encounters some difficulty in integrating their worldview with the reality of their experience” (p. 75). As such, I have utilised the term critical event as per Webster’s definition of **a transformative event that has a profound impact on the person involved.**

Seafaring leaders

Whilst the Nautical Institute (2015 p. ii) states that master mariners are the primary leaders onboard a ship, I have focused my research on the senior officers of the two professional streams of contemporary seafaring – navigation and engineering (Grech, Horberry & Koester 2008 p. 12). As such, I define the term seafaring leader within this thesis as **seagoing master mariners and chief engineers.**

Having established the key definitions that underpin the research question, I now present an overview of the lifeworld of seafaring leaders as context for the chapters that follow.

Exploring the lifeworld of seafaring leaders

Masters and chief engineers, as seafaring leaders, should be considered as professionals in their roles. Professionals are noted as providing a societal good, drawing upon a unique body of knowledge, language and behaviour, and are held to higher standards of conduct and performance by society (Higgs 2016c). Seafaring leaders fit this description by providing global access to manufactured goods and commodities that make our twenty-first century world possible. They perform their roles according to internationally codified seafaring training standards (International Maritime Organization 2011). Their societal contribution is acknowledged each year on the 25th June, the International Day of the Seafarer (International Maritime Organization 2018). As such, seafaring leaders are very much within the definition of professionals.

The seafaring leaders I interviewed were deployed on medium sized ships (see figure 1.1) with crews of around 22 seafarers. These ships service oil and gas

platforms, both resupplying them and towing them to new locations, in some of the most remote locations on Earth. The masters and their crews conduct intensive, round-the-clock operations for periods of five weeks at a time, making their practice intensive, complex and challenging.

Figure 1.1: Offshore vessel and oil rig conducting cargo transfer.

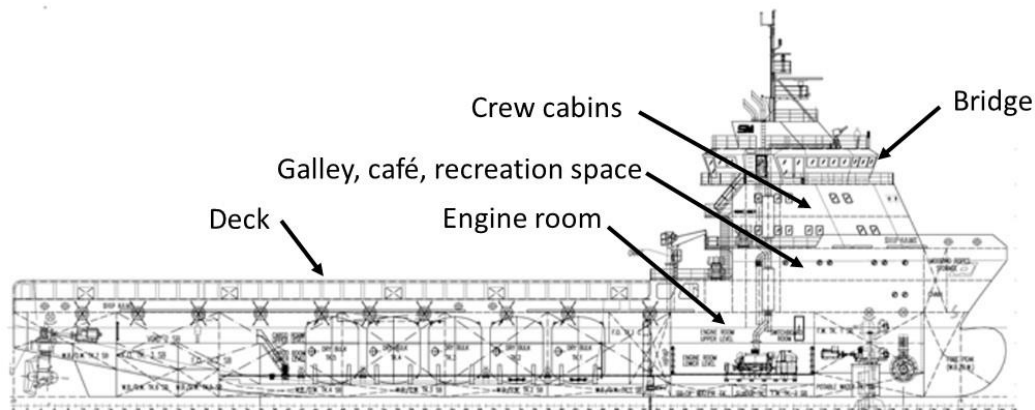


Seafaring leaders must contend with a staggering range of technical and regulatory knowledge. This ranges from vessel and equipment operating tolerances, and how to operate sophisticated electronic systems that control a modern vessel, through to regulatory frameworks that set the standards for safe working within the maritime sector. The maritime sector is one of the most highly regulated industries, with comprehensive sets of regulations and standards aimed at ensuring safe operations at sea. This includes the International Maritime Organization's conventions of Safety of Life at Sea (SOLAS), Maritime Labour Convention (MLC), Standards of Training, Certification and Watchkeeping (STCW) and Maritime Pollution (MARPOL) (Freeth, 2015). These standards are supported by professional maritime associations such as The Nautical Institute, whose aim is to provide "the strongest possible professional focus" for the occupation and its practice (Freeth, 2015 p. 1).

It is important to consider that seafaring critical events take place at sea on ships. This is a lifeworld of extreme isolation, with limited assistance available from shore-based resources and support. Based on my field observations sailing on such vessels, the sense of isolation becomes palpable the moment that the last mooring line is slipped from the wharf and the vessel becomes cocooned from outside aid

and recourse. It was disconcerting to see the land disappear; its structures and features made doll-like, then insect-like, then gone. It seems that this transition hones a seafarer's self-sufficiency and resilience. The crew are largely on their own, living and working in an environment that is more machine than home or workspace (see figure 1.2, below).

Figure 1.2: Blueprint of an offshore supply vessel



Source (Fujian Ship Building)

As such, working and living at sea is a unique occupational context in many regards. However, paradoxically, seafaring leaders share many commonalities with leaders in all occupations, as will be revealed in the narratives to come.

Motivation for this research

My research project extended critical examination into the ways in which leaders in high risk work contexts, such as the maritime sector, engage with their environments to maintain safety and performance. As such, it paid particular attention to embodied ways of sensemaking. Additionally, it pursues this topic using methods that are robust and yet novel to the MHF domain.

In societal terms, this research provided practical, pedagogical recommendations aimed at saving lives, preserving the environment and reducing major loss due to improved sensemaking within a high-risk industry.

Personally, my interest in this research extended from my earlier service in the Royal Australian Navy, which provided me with an insight into life at sea.

Additionally, reading the account of the *Piper Alpha* explosion, in which embodied sensemaking seemed to play such a pivotal role for those who survived and those who perished, further compelled me to explore this tantalizingly unresearched aspect of seafaring leadership.

However, it was a specific case that I encountered in my professional role that cemented my intention to explore this research topic. This is described in the following *researcher reflection*.

Researcher reflection: A collision at sea.

The following case study, drawn from my personal experience, highlights my interest in exploring sensemaking among seafaring leaders. At the early phase of my PhD research I was the Learning and Development Manager for a Shipping Company. I was privy to investigations into minor accidents which, when mechanical faults were ruled out, quickly focused on human error and the fault of the operator.

On one occasion, a Chief Officer onboard a ship was maintaining the vessel's position a few metres away from an oil platform using the ship's dynamic positioning system (an automatic system that maintains a vessel's stationary position at a particular point on the ocean by automatically adjusting the vessel's thrusters). Cargo was being unloaded by crane onto the platform. The Cargo Officer working beside him did not know how to do his job, so the Chief Officer reached over to assist him. As he did so, his elbow depressed a button on the console that switched off the DP system. Within seconds, the ship had drifted into the legs of the oil platform. Whilst the impact did little more than scratch the paint, it was classified as a collision and (quite rightly) treated as a serious incident.

I noticed that even prior to the investigation process, senior management had formed a view that the Chief Officer was at fault. I recall one executive exclaiming in a rhetorical manner "What was he thinking?!" I took that question to heart. What was he thinking? How did this person make sense of what he did?

Having reviewed the literature around sensemaking and MHF, I was able to guide the General Manager Operations to the conclusion that there might be other,

organisational factors that contributed to the collision. For example, the shore-based Human Resources function (and culture) that put the Cargo Officer at sea in spite of poor performance reviews because he ticked all the qualification boxes and they urgently needed to fill the role. Additionally, I indicated the strong culture of satisfying the customer at all costs may have driven the Chief Officer to attempt to do the job of the Cargo Officer as well as his own.

I proposed an alternative, yet plausible meaning to the event. From a sensemaking perspective, the Chief Officer may have thought “In our company, it is vitally important that we meet our customer’s requirements. Right now, this means transferring cargo to that oil and gas platform. The Cargo Officer does not know what he is doing, and since we must meet customer requirements, and since I do know both his job and my job, I need to step in and assist.” As such, the accident may have been due to an unsuccessful attempt at upholding our Company’s values of meeting our customer’s requirements.

As an alternative, how the Chief Officer perhaps could have made sense of the situation was “It is vitally important that we meet our customer’s requirements. One of those requirements is safety. I need to meet this requirement by doing my job of controlling the ship to my full capacity. If the Cargo Officer on watch cannot do his job, then we need to stop the operation until one of the other crew who is competent in cargo transfer can step in. To do otherwise is not delivering on our customer’s requirements.”

This event confirmed for me on a personal level the pragmatic benefit and importance of studying how seafaring leaders made sense of critical events. It was a compelling call to action for me to explore, in a robust manner, how seafaring leaders make sense of critical events in the context of their roles.

In addition to these scholarly, academic and personal motivations for my research project, a comprehensive review of the literature on maritime human factors further convinced me of the importance of my research project. The current research perspectives on sensemaking, drawn from my extensive literature review, are summarised next.

Current Research Perspectives

Research into sensemaking within the maritime sector is particularly important, since 80-85% of shipborne accidents worldwide are due to human errors (Wu et al. 2015), and the majority of these human errors are due to a loss of situational awareness (Grech, Horberry & Smith 2002; Saeed et al. 2016).

This reality is reflected in the *Piper Alpha* gas platform explosion described above, as well as in the three case studies presented below. Each of these examples reveal dimensions of embodied sensemaking that fundamentally, and catastrophically, shaped the outcome of these maritime incidents.

The Herald of Free Enterprise sinking

The *Herald of Free Enterprise*, a roll on-roll off ferry, sank in the North Sea in 1987 (Radley 2012; Roberts 2018). Before it sank, the First Officer saw the Assistant Bosun walking away from the bow door area just after the ferry had left port. The First Officer made sense of what he saw and concluded that the Assistant Bosun had just closed the bow doors, without thinking further on the matter. However, the Assistant Bosun was merely walking back to his cabin to rest. As such, the ferry headed to sea with its bow doors open, causing it to sink. This error, therefore, was caused by sensemaking rather than sight (the First Officer saw the Assistant Bosun clearly) or rational thinking (the First Officer did not rationally process his perception). In this case, the sensemaking of the First Officer, based on pre-conscious perception, resulted in the sinking of the ferry, killing 193 passengers and crew (Radley 2012).

The *Bourbon Dolphin* capsizing

The anchor handling vessel *Bourbon Dolphin* capsized while towing an oil platform in the North Sea in 2007. This tragedy claimed the lives of eight people, including the vessel's Master and his son, who was onboard to experience what life at sea was like (Lyng 2008; Sweeney 2009).

At the time of the tragedy, the *Bourbon Dolphin* was less than 12 months old, was defect free and was captained by an experienced master mariner. However, evidence from survivors highlight that embodied sensemaking played a key role in this tragedy. Firstly, while the Master was highly experienced, he was physically unfamiliar with this vessel. He failed to allocate any time before taking command to physically familiarise himself with the vessel, and bodily acclimatise to how the vessel operated. Secondly, there were strong, tangible indications that the *Bourbon Dolphin* was struggling to perform its assigned task, despite it being rated for the work and being a new vessel. Yet, the Master did not stop the work, even after an initial, severe tilt of the vessel should have indicated there were critical stability issues associated with the work the vessel was performing on the day.

Thirdly, the Tow-master on the oil platform made a suggestion regarding the configuration of towing equipment on the *Bourbon Dolphin*. An eye-witness who survived the capsizing testified that the Master was visibly uncomfortable with this proposed towing configuration, and yet he implemented it as if following an order (as opposed to a suggestion). Within moments of this action, the weight of the towing line shifted abruptly to the ship's port side, and an irretrievable "tipping point" was reached where seawater cascaded over the side and the vessel capsized (Lyng 2008).

At the time of the tragedy, the *Bourbon Dolphin* was technically complying with all aspects of maritime regulation. However, it appears to have not occurred to the master to insist on additional familiarisation time, to stop the job when it appeared to be going wrong, and to distinguish the difference between a suggestion and an order from his customer, being the Tow-master. These suggest difficulties in making sense of the gravity of the situation, and of understanding nuances between the relative roles between vessel master and tow-master on the rig.

The underpinning cause of the *Bourbon Dolphin* catastrophe may well rest in the Master's capacity to grasp embodied signals regarding his vessel's precarious situation, while failing to make sense of nuances between his role and that of the Tow-master. Furthermore, these failures of sensemaking appear to have embodied elements, such as lack of physical familiarity with the ship, inability to distinguish between an expressed suggestion and an expressed order from the Tow-master,

and failure to act upon the internal discomfort that the Master appeared to have regarding his final adjustment to the towing equipment. This case study further highlights that sensemaking at sea can have life-and-death consequences.

The *Skandi Pacific* fatality

Embodied sensemaking appears to have played a role in a fatal accident onboard the *Skandi Pacific* in 2015. In this incident, an Integrated Rating crew member (IR) was crushed to death by shifting cargo when a series of waves washed over the deck (Australian Transport Safety Bureau 2016). At the time of the accident, the vessel had moved away from the oil platform due to deteriorating weather. The Chief Mate ordered the two IR's on deck to secure the cargo. The Chief Mate could only see the two IR's on deck through closed circuit television (CCTV) screens, but otherwise his view of these workers was obstructed by a blind spot from the bridge windows. In the accident report, The Chief Mate said "I thought they were almost finished as they were both out of sight and I could see the chains tightening." As such, he did not think to observe the IR's on the CCTV screens, as he had (incorrectly) made sense of the situation based on seeing the tightening chains from the bridge window. The remaining crew members also demonstrated diminished vigilance once the vessel moved away from the platform. The Second Officer stopped looking out and started preparing the passage plan for their return to port, leaving the Chief Mate to control the vessel while supervising the IR's. Also, the only other IR on deck wandered into an equipment store with the only radio that was in contact with the bridge. As such, the IR was unsupervised, alone and out of radio communication in the moments before he died.

This diminished vigilance can be explained in the way offshore seafarers make sense of being alongside an oil and gas platform. When an offshore vessel is alongside a platform, this means the crew adopts a high level of vigilance. As such, moving away from the platform usually means the crew relax their vigilance. It appears this practice, and underpinning sensemaking, may have become deeply embodied and reinforced within this sector over time. This unspoken, embodied, yet collective, sensemaking would explain the crew's relaxed vigilance in the face of a continued threat due to hazardous weather.

These three cases, along with the *Piper Alpha* disaster described previously, highlight a compelling need for a nuanced perspective on sensemaking, developed via the lens of embodied cognitive theory (Adams 2010 p. 619; DeBruin & Kästner 2012; Colombetti & Roberts 2015). However, a comprehensive review of the MHF literature revealed that this crucial aspect of seafaring performance had not been rigorously explored. Instead, the MHF community of practice and research has primarily focused on exploring technical maritime issues through quantitative methodologies.

Current Literature

My research commenced with a comprehensive review of MHF articles published between 2000 and 2018, yielding a list of 208 peer reviewed articles. In terms of methodologies employed, 53% (111 articles) applied quantitative methods while only 14% (29 articles) applied qualitative methods. These results show the dominance of quantitative research methods across the field of MHF.

In terms of subject matter, technical topics featured across 49.0% of articles. These results show where the focus of research within MHF is primarily directed. Risk (33.2%), training (23.6%) and human error (22.6%) all feature regularly across the literature. However, sensemaking was featured in only 1.9% of journal articles. As such, it is significantly underrepresented in MHF literature.

Additionally, the topic of embodied sensemaking featured in only 0.48% of the literature. This consisted of only one article, that I wrote as a proposal for this research project (Roberts 2018). This analysis demonstrates that the topic of embodied sensemaking has not been researched in terms of maritime human factors. Instead, it has examined the technical dimensions of seafaring via quantitative approaches.

Cartesian divide and techno-rationalism

The literature review highlighted a prevailing and persistent attachment within the MHF domain to a Cartesian/Newtonian worldview. This worldview privileges a reductionist, techno-rationalist approach, as well as entrenchment in the Cartesian divide that separates mind from body and mind from environment. This results in a dichotomy of mechanical failure/human error that attributes many accidents to human error as a singular, stand-alone cause.

Furthermore, this Cartesian divide and techno-rational paradigm persists despite the recent adoption within MHF of conceptual models that acknowledge the complex interconnectedness of aspects within a multifaceted socio-technical system (Grech, Horberry & Koester 2008 p. 21). Therefore, reductionist, quantitative approaches continue to dominate this field despite a call for more integrated and holistic forms of research (Dekker 2004a; Schröder-Hinrichs et al. 2013 p. 10), such as the project I embarked upon.

The primary theory for accounting for failures of sensemaking in maritime incidents is Endsley's (2015) Situation Awareness (SA). However, a critical review of SA theory revealed it is lockstep, linear and cognitive in its conceptualisation. As remarked by Klein (2015), it does not represent how people make sense. SA appears to have been developed through, and therefore limited by, the prevailing Cartesian divide and techno-rationalist mindset that has shaped MHF. A full critique of SA as an alternative to the sensemaking perspective is conducted in the literature review.

Whilst MHF had achieved an admirable reduction in the rate of ship losses over the past decades, many writers foreshadow that it has reached the limits of its capacity to generate further improvements in safety via its current paradigm. Dekker (2004a p. 10), Grech, Horberry and Koester (2008 p. 18), and Schröder-Hinrichs et al. (2013) call for holistic ways of exploring human factors that depart from Cartesian thinking and reductionist methods. My research responds to their call for holistic examination of the phenomenon, delivered via a phenomenologically attentive narrative interpretive method.

Sensemaking

Many scholars have expanded upon Weick's initial definition of sensemaking as described previously. However, Sandberg and Tsoukas (2015) noted that the prevalence of a cognitive and discursive framing of sensemaking has limited its conceptualisation to a largely intellectual phenomenon. They point out that sensemaking perspectives outside of this narrow conceptualisation are under-researched. Additionally, Danielsen (2018) noted that Weick's sensemaking was primarily conceived as a language-based phenomenon.

My research intends to reinvigorate and expand upon Weick's (1995 p. 4) sensemaking by returning the concept to his original and simple definition of "the making of sense". Also, I apply the theoretical lens of embodied cognition (Adams 2010; Johnson 2013) to generate new insights into the nature of sensemaking.

Sensemaking studies have frequently focused on critical incidents at the expense of the lifeworlds of the living people involved in those incidents. Hernes and Maitlis (2012 p. 29) observed that the sensemaking literature focuses on sensemaking at the expense of the sensemakers. For this reason, my narrative interpretation will focus on the seafaring leaders primarily; being sensitive to those epiphanies that transform their identities, their practice and their sensemaking (Denzin 2001 p. 147). The rarity of research that focuses on sensemakers as opposed to sensemaking events (such as the Mann Gulch fire, the Tenerife air disaster, and the Bhopal gas leak disaster) adds a further element to the original contribution of this research.

As such, focusing my research on seafaring leaders as sensemakers, rather than on specific critical incidents, further expands the study of sensemaking into an under-researched, yet valuable area – the sensemakers themselves.

Critical events, not critical incidents

Critical Incident Technique has a long history of application within human factors as a means of analysing success and failure in techniques (Webster 2007 p. 75). However, I was keen to avoid solely focusing on the maritime incidents themselves, as I was keen to explore the experiences of the seafaring leaders. Using the term

“incident” in a maritime sense would have limited the narratives of seafaring leaders to reportable accidents only.

Webster’s definition of a personal critical event, as stated previously, parallels Das’s (1996 p. 5) anthropological definition of “transformations in space by which people’s lives have been propelled into new and unpredicted terrains.” Referring to the French revolution, Das comments “After the events, new modes of action came into being which redefined traditional categories” (p. 6). It was this transformational and radical experience that I was interested in exploring from an embodied sensemaking perspective.

Webster’s definition of a critical event does not necessarily equate to a critical incident, since a critical incident (a particular maritime accident) may not constitute a critical (transformative) event for the seafaring leader. However, a critical event that challenges their professional identity may not involve a formal, reportable critical incident at all. This is an important distinction to make in terms of my research project.

The four case studies mentioned previously - the *Piper Alpha* disaster, the *Herald of Free Enterprise* sinking, the *Bourbon Dolphin* capsizing and the fatality onboard the *Skandi Pacific* - all reveal dimensions of embodied sensemaking that shaped the outcomes of these events in catastrophic ways. While MHF has been instrumental in reducing the overall rate of shipping accidents in recent decades, its prevailing research paradigms of Cartesian dualism and reductionist research methodologies are inadequate for engaging with the complex and interconnected nature of reality proposed by socio-technical systems.

Within these complex and interconnected contexts, catastrophic maritime events continue to occur. This demonstrates that the prevailing consensus about how seafaring leaders make sense of critical events must be challenged. My research project has responded to this need via a research approach that is novel within MHF. An overview of my research is presented next.

Researching embodied sensemaking among seafaring leaders

In order to shift consensus regarding the framing of sensemaking within maritime human factors, I needed to conduct a holistic and robust qualitative analysis.

Situated in an ontology of intersubjectivism (Frie 2013; Gallese 2014), and adopting an interpretivist epistemology (Saunders, Lewis & Thornhill 2012p. 137), I conducted a narrative inquiry that explored how seafaring leaders made sense of critical events.

I adopted Denzin's interpretive interactionism (Denzin 2001), due to its holistic capacity, phenomenological attentiveness (Finlay 2013), and compatibility with an intersubjectivist ontology in which an individual influences their environment and others, while at the same time being influenced by them as well. As a narrative-based approach, interpretive interactionism is underpinned by thick descriptions of the phenomenon leading to thick interpretations that can then be examined and validated via contemporary theory.

As previously mentioned, my primary research question was: ***How do seafaring leaders make sense of critical events that confront their professional practice?***

This research question was underpinned by the following operational questions (Josselson 2013 p. 51; Saunders 2009 p. 54):

- How do leaders within the marine offshore industry, as an example of a high reliability work context, go about making sense of critical events that occur in the context of their daily work that could result in high risk or danger if they do not notice and resolve these situations?
- What is their commentary on the experience of applying sensemaking to deal with critical events?
- What is the nature of sensemaking as a phenomenon?
- How do these leaders learn to do this? How do they develop this capacity in others?

The following theory-based questions were considered after developing my interpretation of the thick narrative descriptions (Caracciolo 2012; Webster 2007 p. 103):

- What would help these leaders do this better?
- What theoretical perspectives inform my understanding of their practice and lived experience?
- What theoretical questions emerge from interpreting their thick descriptions?

I conducted semi-structured interviews with twenty seafaring leaders, employing a phenomenological discipline to ensure I captured as much detail as to *what it was like* to make sense of critical events. I augmented this data set through field observations while sailing onboard an offshore support vessel. I then extracted the narratives from the interview transcripts, curating these storied accounts into thick descriptions of their sensemaking practices. I then conducted a second, interpretive reading of these thick descriptions, applying my understanding to the participants words, resulting in two chapters of thick interpretation.

Returning to the literature, I applied a number of theoretical lenses to my interpretation. I applied the lens of embodied cognition (Adams 2010; Johnson 2013), which refers to the ways in which minds and bodies are integrated with their environments (Clark & Chalmers 2016). Claxton (2015b ch. 1) described embodied cognition as “a view of the human body as a massive, seething, streaming collection of interconnected communication systems that bind the muscles, the stomach, the heart, the senses and the brain so tightly together that no part – especially the brain – can be seen as functionally separate from, or senior to, any other part”.

I also applied Bourdieu’s concept of the *habitus*. (Bourdieu 1972; Joy, Game & Toshniwal 2018) to provide a theoretical validation and explanation of my interpretations. *Habitus* was described by Bourdieu as “‘a system of lasting, transposable dispositions ... integrating past experiences, functioning at every moment as a matrix of perceptions, appreciations, and actions’ (1972 pp. 82-83).

Lastly, I applied the lens of practice wisdom, which involves knowing in a way that requires insight, discernment of moral outcomes and the ability to choose between options with sound judgement, and foresight, drawing upon experience, learning, reflecting, critical dialogue, and making and testing hypotheses (Higgs, 2012; Klein & Bloom, 1995). This last lens enabled me to develop practice-based recommendations for individual seafaring leaders, their organisations and the

maritime sector as a whole. The outcomes of this theoretical and practice-based approach are discussed later in this chapter.

In writing the research project as a PhD thesis, I modified a conventional thesis structure (Saunders, Lewis & Thornhill 2012 p. 600) to accommodate the iterative nature of the interpretive readings (Denzin 2001p. 73-78). The thesis structure is outlined in table 1.1:

Table 1.1: Thesis chapter outline, aligned to conventional thesis structure

Conventional thesis	Corresponding chapters in this thesis
Introduction	Chapter one: Introduction
Literature review	Chapter two: Literature Review
Method	Chapter three: Methodology Chapter four: Researcher Reflections: Disclosing my values
Findings	Chapter five: Thick descriptions - part one Chapter six: Thick descriptions - part two
Discussion	Chapter seven: Interpretation - part one Chapter eight: Interpretation - part two Chapter nine: Theory: Sensemaking at sea, alternative lenses Chapter ten: Theory: The seafaring habitus.
Conclusions	Chapter eleven: Practice wisdom for the maritime sector Chapter twelve: Embodied Sensemaking as Practice Wisdom

Chapter one is the introduction currently being read, while chapter two consists of a structured literature review. Chapter three comprises a justification of the methodology and a detailed description of the research approach. Chapter four is a brief chapter in which I apply a structured approach to reflecting upon, and disclosing, my personal values as researcher. This chapter is an important element of an interpretive study, and contributes to the validity of this research project.

The next two chapters constitute the first reading of the narratives to arrive at thick descriptions of the sensemaking of seafaring leaders, in their own words. Chapter five focuses on crises while chapter six focuses on unfolding events. These chapters correspond to the results, or findings, section of a conventional thesis.

Chapter seven commences the second, interpretive reading of the narratives, including:

- shapeshifting and melding,
- the strength of emotion, and
- multiple zones of attention.

Chapter eight concludes the second, interpretive reading by exploring:

- authority and relationship in sensemaking,
- the interaction of systematic diagnosis and action/interpretation, and
- grasping patterns, finding the line and denouement.

Chapters nine and ten comprise the theoretical examination of the interpretive chapters. Chapter nine discusses the bottom-up, neurobiological processes that underpin embodied sensemaking among seafaring leaders. Chapter ten discusses the bottom-up sociological processes that underpin embodied sensemaking among seafaring leaders. These chapters provide theoretically grounded answers to the research question: ***How do seafaring leaders make sense of critical events that confront their professional practice?***

Chapter eleven develops a series of practice-based recommendations for the maritime sector, aimed at integrating embodied sensemaking into professional practice, and practice wisdom. Chapter twelve, as a conclusion, poses a call-to-action for the maritime sector and the maritime human factors community of research to integrate embodied sensemaking into their theoretical frameworks, and adopt a practice-wisdom pedagogy for seafaring leadership.

Research Conclusions

This thesis concludes that there is a bottom-up, neurobiological dynamic that shapes the way seafaring leaders make sense of critical events, as well as their every-day professional practice. This dynamic is based upon commonly shared neural populations (networks of nerves) that bodily integrate perceptions, actions, emotions, sensations, and thoughts in a mind/body sensemaking system that is enmeshed with its environment. This embodied sensemaking readily extends itself

into the environment, as well as extending itself through others via biological systems such as mirror neurons. I have used the analogy of “a sea within” to describe this mind/body interconnectedness. Embodiment in this form was shown to shape, if not constitute, sensemaking among seafaring leaders. However, having biologically evolved as a bottom-up, “competent-without-consciousness” process (Dennett 2017 p. 57), it is largely hidden from the awareness of seafaring leaders; likely placing it outside the scope of professional practice development. Chapter nine presents extensive evidence to support these conclusions.

Additionally, my thesis concludes that there is a bottom-up, sociological dynamic that also shapes the way that seafaring leaders make sense of critical events. This sociological dynamic, conceptualised by Bourdieu as *habitus*, is scaffolded and reinforced by the neurobiological dynamic described above. As such, it too is an embodied phenomenon. However, having culturally evolved as a bottom-up system of “unthought knowns” (Silva 2016 p. 85), it is also largely hidden from the awareness of seafaring leaders, and therefore also likely to fall outside the scope of professional practice development. I extend upon the “sea within” analogy by suggesting, in sociological terms, that “this sea touches many shores”. Chapter ten presents extensive evidence that support these conclusions.

As discussed above, neither embodied cognition or the *habitus* of seafaring leadership appears in contemporary maritime human factors (MHF) literature. Yet, as the seafaring narratives and the catastrophic case studies presented previously show, these dynamics play a pivotal role in shaping how seafaring leaders make sense of, and resolve, critical events.

This thesis presents a set of practice-based recommendations for the maritime sector, encompassing the individual, organisational and industry levels. As an example of how these insights can be practically applied toward improving safety and performance, I developed pragmatic tools and techniques that can be applied to bring embodied sensemaking within the awareness of seafaring leaders, enabling them to make wise choices regarding their professional practice, including in the midst of critical events themselves.

Therefore, this thesis makes a number of original contributions to both research and practice within the maritime sector:

- Firstly, it has applied a holistic, interpretive approach to examining embodied sensemaking among seafaring leaders. It has done so in a strongly phenomenological manner, paying close attention to the experiences and perceptions of seafaring leaders as they make sense of critical events. The literature review highlights that such an examination within the maritime domain has not been published to date.
- Secondly, Jenkins and others (2019 p. 4) note that while embodiment in general has received considerable scholarly interest over recent times, “the unique connection of embodiment to phronesis (or practice wisdom) is only in the early stages of consideration.” As mentioned above, this thesis provides a comprehensive and theoretically validated link between embodiment, habitus and phronesis which has not been explicated to this degree before.
- Thirdly, this research project has developed a practicum for implementing a practice wisdom pedagogy within the maritime sector. This multi-level plan is integrative of the individual seafaring leader, his/her organisation as well as the overarching maritime sector as a whole. No such pedagogy or practicum currently exists.

As such, my research is the only scholarly work that applies an intersubjective ontology to the topic of seafaring and seafaring leadership. In this way, the thesis has broken new and fertile ground for future research.

This thesis concludes with a *call to action* for the broader maritime sector to integrate embodied sensemaking within its theoretical paradigms. My intention is not to disparage the theoretical efforts of the maritime human factors domain, but to “lovingly disturb” (Linnell & Horsfall 2016) its Cartesian, techno-rationalist conceptions (Dekker 2004a p. ix) in order to shift consensus (Grant & Pollock 2011) towards a holistic, embodied and integrative conceptualisation of sensemaking as a component of professional seafaring practice.

This consensus shifting begins with my comprehensive review of the MHF literature, which is the subject of the next chapter.

Chapter two: Literature review

The introduction to this thesis explored the significance of accidents and potentially damaging incidents in seafaring. I was fascinated to find out in more detail how these situations have been explored in the literature, particularly in terms of understanding how human beings behave when they are in these circumstances. I quickly realised that scientific and technical perspectives, framed around the role of human factors in decision-making, have dominated much of the literature and significantly influenced the regulatory frameworks developed for the industry around the world. In more recent times, other perspectives have emerged and are being taken up in some high-risk industries, although less noticeably in the maritime domain. However, these developments open up some interesting possibilities for how the decision making of seafarers might be better understood through the lens of *sensemaking*.

The interpretive inductive approach to research inquiry that I chose to guide my inquiry right from the outset, takes a particular view of how literature is most helpfully used over the course of a study. Like most cultures of inquiry, literature is used to position the study, to focus questions and to suggest methodologies. Indeed, a systematic literature review is vital for deconstructing the phenomenon under examination (Denzin 2001 p. 72) to reveal the current consensus in scholarly thinking regarding the matter at hand. The role of literature review in the research design will be explained in greater detail in the methods chapter to follow.

However, an interpretive inductive approach does not involve asking narrowly defined or closed questions, aiming instead to pose generative questions with unpredictable answers (Denzin 2001 p. 34). The researcher is asked to be open to surprise, and to be humble in assuming what they know – or what, indeed, can be *known* (Moustakas 1994 p. 85). As a protocol, this requires transparency and truthfulness (Roberts 2019). The researcher is asked not to pretend knowledge in advance, which means that a thesis should not be retro-fitted or cleaned up so that everything appears as a logically and explicitly planned journey, with a road map, a plan and a driver in control at the wheel. The journey should be described as it happened, and I have attempted to do this.

One result of this is that literature reviewed at the start of the thesis cannot and should not try to incorporate ideas that emerged later in the journey. Great store is put on how participants in the study present themselves, and care is taken to differentiate that presentation from the interpretation or *readings* created by the researcher. On the basis of what participants present, the entire initial framing of the study, including the initial literature review, might seem inadequate or even irrelevant in part. Nonetheless, it will have served its purpose in helping to create the possibility for what emerges through the study itself (Denzin 2001 p. 34). In the culture of inquiry used here, the researcher is then asked to keep an open or clear mind as to what the study will reveal, so as not to limit the possibilities for what can be presented and how it is interpreted (Roberts 2019, Moustakas 1994 p. 85). The literature is then revisited to throw additional light on how things might be understood. Surprises in what is presented can take the researcher down unanticipated paths in the literature.

This chapter transparently reveals how my initial reading of the literature influenced the research question I developed. As explained in the introductory chapter, my decision to focus on seagoing masters and chief engineers was a pragmatic one. It was driven by my perception and experience as a seafarer of many years' standing, that asking people of less seniority to participate in my study could make them feel vulnerable, given the dynamics around authority and power that have characterised this industry for a very long time. But I was also keen to speak with people who had significant seafaring experience. My approach to sample selection will be discussed in more detail in the methodology chapter.

As a result, this review did not consider literature specifically focused on leadership during critical incidents at sea. As will become clear, however, all of the literature reviewed grapples with the key notions of how people make decisions that *impact and influence others* under conditions of uncertainty and risk, and the processes they use to make sense – for themselves and others - of the situations they are in.

The absence from this initial literature review of material on the sensemaking of seafaring leaders – or leaders in any other industry - under conditions of uncertainty

and risk, turned out to be a blessing. I went into my conversations with seafaring leaders without any expectations from literature of what I might hear, or intentions of what I wanted to hear. I was ready to be surprised.

In adopting a systematic literature review on Maritime Human Factors (MHF), I searched the literature from 01st January 2000 to the current date in August 2018. I conducted a search of databases within the Swinburne University of Technology library, followed by searches of the primary global maritime industry journals of:

- The Journal of Maritime Affairs
- The Journal of Navigation
- Maritime Policy and Management
- The Australian Journal of Maritime and Ocean Affairs.

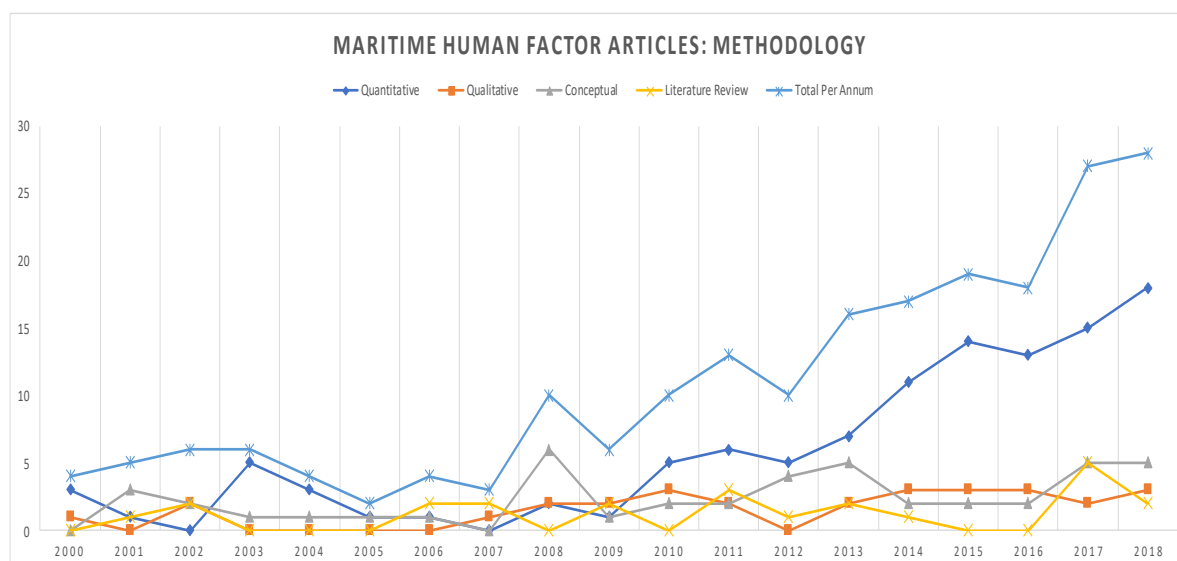
I used the search terms of *maritime/shipping* plus *human factors/ergonomics* from the 01st January 2000. There were substantial duplicates between these searches, which I removed. However, this was necessary to ensure comprehensive coverage of the field of MHF.

I then conducted targeted searches of Swinburne University of Technology library's databases, using the search terms of *maritime/shipping* and key words of *situation* analysis, embodied cognition, sensemaking and embodied sensemaking*. After removing duplicates and confirming that the article fell within the intended criteria, the search yielded 208 articles. These are listed at appendix E.

I analysed the articles in terms of their methodologies, noting that 53% (111 articles) applied quantitative methods, 14% (29 articles) applied qualitative methods, 22% (45 articles) were conceptual in nature and 11% (23 articles) were literature reviews. These results show the dominance of quantitative research methods across the field of MHF.

Furthermore, I analysed the publication rate of each of these categories over time. The results appear in figure 2.1, below:

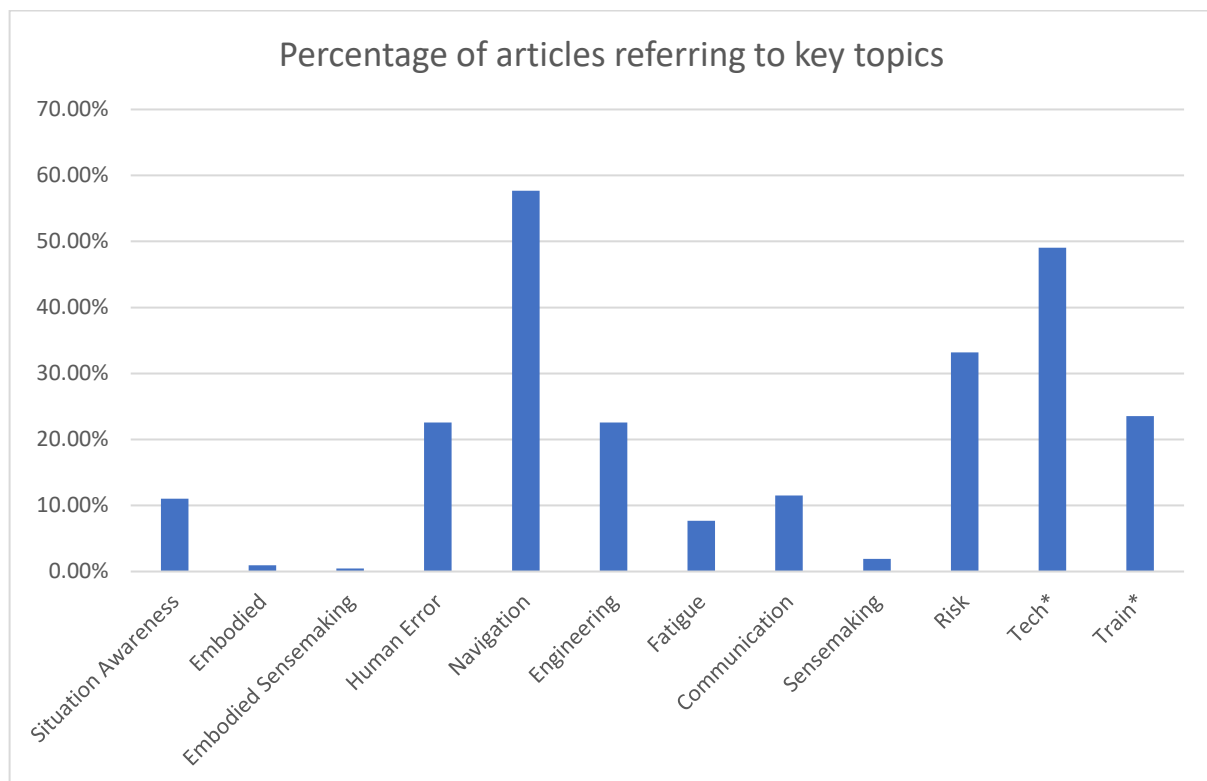
Figure 2.1: Maritime human factor articles by methodology over time.



This graph shows a significant increase in MHF articles since 2010. However, this trend is primarily due to continued dominance of quantitative methods within MHF. Whilst qualitative methods, such as conducted in this research project, has largely plateaued across the same period, along with conceptual articles and literature reviews. From a methodological perspective, it can be concluded that qualitative research has been underapplied in examining MHF.

In terms of specific topics or foci within this body of research, I searched for articles containing a set of key words that seemed most relevant to this research project. These key topics were *situation awareness*, *embodied*, *embodied sensemaking*, *human error*, *navigation*, *fatigue*, *communication*, *sensemaking*, *risk*, *tech** (covering technical, technology, etc.), and *train** (covering train, training, etc.). The percentage that these terms appeared across these articles (within the title or abstract), is plotted in figure 2.2, below.

Figure 2.2: Percentage of articles referring to key topics.



These results show that the topic of navigation (the purview of master mariners) appears in 57.7% of articles, as opposed to engineering (the purview of chief engineers) at 22.6%. Tech*, including technology, technical and technique, features across 49.0% of articles. These results show where the focus of research within maritime human factors is primarily directed. Risk (33.2%), training (23.6%) and human error (22.6%) all feature regularly across the literature. Situation awareness (11.1%), a body of theory that seeks to explain how individuals become aware, make decisions and resolve events, will be discussed at length later in this chapter. However, sensemaking represented only 1.9%, and is significantly underrepresented in the MHF literature. The topic of embodied sensemaking represented 0.48% of the literature. This consists of only one article that I wrote as a proposal for this research project (Roberts 2018). This analysis demonstrates that the topic of embodied sensemaking has not been researched in terms of MHF. Instead, MHF has examined the technical dimensions of seafaring via quantitative approaches.

This literature review will include a critical examination of maritime human factors. It then moves on to critically review the popular concept of situation awareness as an alternative explanation for the sensemaking of seafaring leaders. Sensemaking, as proposed by Weick (1995 p. 4), is compared and contrasted with Endsley's (2015) Situation Awareness as competing theories that both attempt to explain how seafaring leaders contend with unexpected, critical events. Lastly, the move towards high reliability organisation is discussed in light of several persistent and problematic conceptual paradigms that limit the effectiveness of maritime human factors in addressing the complex seafaring environment.

However, to provide a contextual foundation for reviewing this literature, I will commence with the underpinning notion of human error.

The focus on human error

Both industry and academic literature have been focused for a long time on the assessment and management of safety and reliability in industries and occupations that operate under conditions where human life, material and financial assets, and the environment are at risk. Oil and gas exploration, mining more generally, transport, construction, aerospace, nuclear technologies, and health care are obvious examples. In all these industries, the combination of factors such as uncertain physical environments, sophisticated technology, complex procedures, workers with different skills, multiple stakeholders and financial pressures, present many possible avenues for research. There have been many and varied studies exploring the rate and nature of accidents and near misses, and the role of human factors, including decisions-made, attitudes, illness, drug and alcohol abuse, leadership and team behaviour. There have also been studies of the success of safety campaigns, risk assessment, safety regulations and prevention through design.

It is worthwhile examining the concept of human error in terms of sensemaking, since there is a significant body of research conducted on cases where sensemaking has been faulty or ineffective (22.6% of all maritime human factors articles, as mentioned previously). Baker and McCafferty (2005) note that the

majority of maritime accidents are caused by human error and that failures of situation awareness make up the majority of these human errors. As such, while the research on human error appears to be limited to the occasions where sensemaking fails, it can reveal considerable insights into sensemaking, as well as how this phenomenon has been conceptualised to date.

Within the maritime industry specifically, the potential risks in terms of personnel safety and environmental impact can be of catastrophic magnitude (Binci & Cerruti 2012). As noted previously, the *Piper Alpha* platform explosion in 1988 claimed 167 lives (O'Byrne 2011), while the Gulf of Mexico's Deepwater Horizon explosion in 2010 (Lekka & Sugden 2011) killed eleven people and caused the biggest oil spill in US history. However, given the magnitude of maritime disasters in general, such as the sinking of the *Herald of Free Enterprise* ferry in 1987 (Schröder-Hinrichs et al, 2013; Radley 2012), much can be learned from the performance of the maritime industry more generally. Within that industry, human error has been a major focus of interest.

Human error has been defined by Grech, Horberry and Koester as “an inappropriate or undesirable human decision or behaviour that leads to undesirable outcomes or has significant potential for such an outcome” (2008, p.18). Grech et al also cited a 1993 US Coast Guard report that stated 80% of maritime accidents were caused by human error (p. 8). Baker and McCafferty (2005) conducted a global meta-analysis of maritime accident databases, including the Marine Accident Investigation Board (UK), the Transport Safety Board (Canada), the Australian Transport Safety Board, the Marine Accident Reporting Scheme (The Nautical Institute) and the World Offshore Accident Database (Det Norske Veritas) (2005). Their review found that, while global shipping accident rates are steadily declining, 80-85% of *all* shipborne accidents were initiated by, or associated with, human error. Additionally, they concluded that failures of situation awareness and situation assessment “overwhelmingly predominate” the causal factor in maritime accidents related to human error.

Grech, Horberry and Smith (2002) cited the International Maritime Organisation's (IMO) conclusion that 75% of maritime accidents are due to human and organisational errors. Additionally, Duanfeng and Song (2013), in their review of

human factors within the maritime system, concluded that 84-88% of tanker accidents, 89-96% of collisions and 75% of ship fires and explosions were contributed to by human error. They catalogue a range of human error sources, including:

- Loss of situation awareness
- Fatigue
- Inadequate communication
- Inadequate general technical knowledge
- Decisions based on inadequate information

(Duanfeng and Song, 2013)

Situation awareness, fatigue and communication will be discussed later in this chapter as examples of human factors approaches aimed at addressing these sources of human error.

Significant research has sought to quantify the contribution of human error in maritime accidents. Celik and Selcuk (2009) applied a Human Factors Analysis and Classification System (HFACS) methodology to conduct an in-depth analysis of a specific case involving a boiler explosion on a bulk carrier. They concluded that human error was the primary cause for this particular marine accident. Kristiansen (2005 p. 314) points to numerous studies that indicate that 75-90% of accidents are “rooted in human error”, but claims that the term human error has little value unless it is described in a broader context. Kristiansen, therefore, highlights the value of studying human error in a holistic manner within the context of the critical events themselves.

Tzannatos and Kokotos (2009) conducted a quantitative analysis of 268 shipping accidents involving Greek flagged vessels between 1993 and 2006, comparing accidents before and after the introduction of the International Safety Management Code (a quality management style safety system approach introduced globally in 1994 [Freeth, 2015p. 42]). They found that human error accounted for 63.9% of accidents before the ISM code was introduced, and 51.7% after the ISM code was introduced.

Erol and Başar (2014) analysed 1,247 maritime accidents within the Turkish search and rescue area (a particularly intensive maritime region) between 2001 and 2009 using a decision tree method to determine that 60% of these accidents were due to human error, noting that “it is pointedly seen from the research up to now that the most important ground of maritime accidents is human error”. Additionally, Ugurlu, Erol and Basar (2015), conducted a study of 850 serious marine accidents within the Turkish Straits between 2001 and 2010. They concluded that the primary cause of shipping accidents in the Turkish Straits was human error related to navigation (chart application errors, inefficient use of navigation equipment such as radar, and lack of communication between vessels) and manoeuvring (unsafe speed, and plotting errors). These errors occurred despite implementing traffic separation schemes that designate one-way lanes for vessel transit within the region.

These studies, and many others, point to the prevalence of human error within maritime accidents. Indeed, Schroder-Hinrichs, Hollnagel and Baldauf (2012) compared the sinking of the Titanic in 1912 and the Costa Concordia in 2012 in terms of human error, concluding that these two accidents, separated by 100 years, indicated a lack of learning on the part of maritime safety, particularly in understanding of how complex organisational dynamics contribute to “drifts” into failure (p. 156). This deficiency is discussed at length later in this chapter.

Ugurlu et al (2015) highlight the costs of maritime incidents in terms of loss of life and injury, as well as economic loss and environmental impact. However, Grech et al (2008 p. 18) observed that human error itself is not a cause, but rather a symptom of “deeper trouble”. As such, they caution it should not be the conclusion of an investigation, but the starting point for deeper analysis. This pursuit of “deeper trouble” both challenges and vexes contemporary practices in MHF, as will be discussed next.

The research on human error reveals the magnitude of its impact on safety at sea, both in terms of the frequency and consequences of maritime accidents. It highlights the importance of research into improving maritime safety. However, the growing consensus that human error is caused by underlying complex issues (“deeper trouble”) emphasises the need to examine human error in maritime contexts in innovative ways, such as through the lens of sensemaking. As such, it is

necessary to examine and critique the way in which human error and sensemaking have been conceptualised within contemporary Maritime Human Factors.

Human Factors in the Maritime Context

Human factors has been defined by Grech et al (2008 p. xi) as “a scientific, theoretical, and applied discipline dealing with psychological, physical and organisational aspects of the interaction between humans and systems (e.g., technology), primarily in occupational contexts”. Österman, Rose and Osvalder (2010 p. 156) noted that the terms human factors and ergonomics are used interchangeably, but also noted that MHF predominantly has focused on physical ergonomics and health and safety issues (p. 1530). MHF divides work tasks into five primary groups, namely; navigation, propulsion, cargo handling, vessel and vessel system maintenance, and ship management (Grech et al., 2008 p. 12). These work tasks are subject to impacts on human performance from sources such as human error (as described above), crewing numbers, new technology, crew demographics and social factors (Grech et al., 2008 p. 13).

Human factors within the transportation sector traces its origins to fighter plane cockpit design during World War II, based on the principle that a critical examination of the system in which people work will enable the anticipation and mitigation of the errors that will occur (Dekker, 2004 p. viii). In the maritime sector, human factors began with the US Navy’s research into diverse watch (work/rest) schedules and their impact on recruits in the 1950’s (Grech et al., 2008 p. 5). However, despite the growing promise of human factors as a “psychology of pragmatics” (Dekker, 2004 p. iix), it did not achieve prominence in maritime safety until after the sinking of the *Herald of Free Enterprise* in 1987 (Radley, 2012) and the 40 million litre oil spill from the *Exxon Valdez* supertanker in 1989 (Holden, 2006). These events were turning points in the uptake of human factors within maritime safety (Schröder-Hinrichs et al., 2013), validated by the US Coast Guard’s 1993 report (Grech et al., 2008 p. 7), attributing 80% of maritime accidents to human error.

In 1997, the International Maritime Organisation enshrined human factors within its regulatory architecture via Resolution A.850(20), *Human Element Vision, Principles*

and Goals for the Organisation. This resolution acknowledged “the need for increased focus on human-related activities in the safe operation of ships, and the need to achieve and maintain high standards of safety and environmental protection for the purpose of significantly reducing maritime casualties.” Furthermore, it stated as a principle:

The human element is a complex multi-dimensional issue that affects maritime safety and marine environmental protection. It involves the entire spectrum of human activities performed by ships’ crews, shore-based management, regulatory bodies, recognized organizations, shipyards, legislators, and other relevant parties, all of whom need to cooperate to address human element issues effectively.

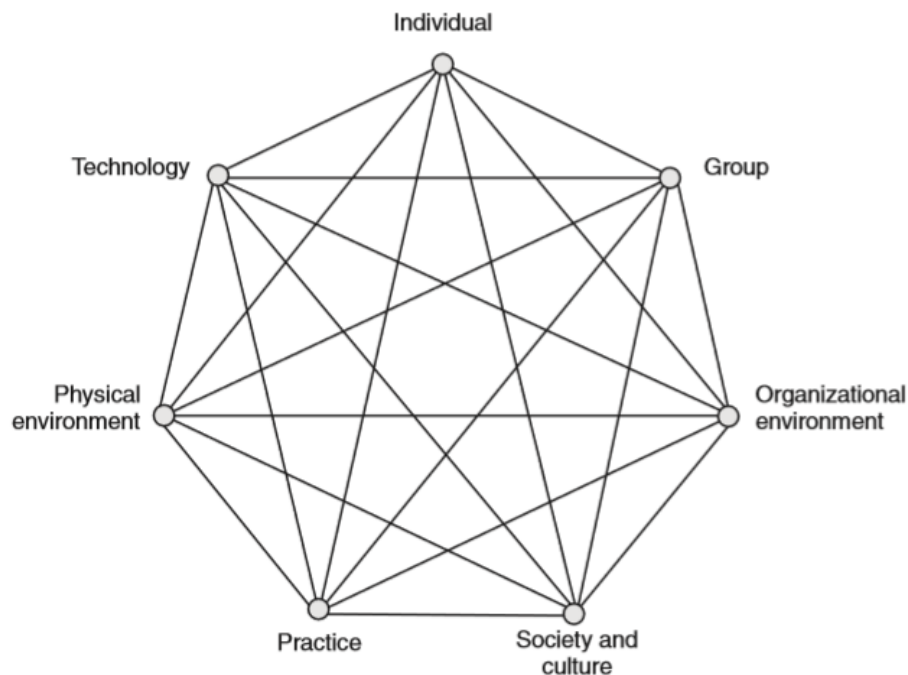
Amongst its goals, this resolution committed to the following:

- to have in place a system to discover and to disseminate to maritime interests studies, research and other relevant information on the human element, including findings from marine and non-marine incident.
- to provide material to educate seafarers so as to increase their knowledge and awareness of the impact of human element issues on safe ship operations, to help them do the right thing.

(International Maritime Organization, 1997)

The IMO’s Human Elements vision suggests a need for holistic approaches to understanding and mitigating human factors. In keeping with this expanded and complex scope, the human factors community of practice adopted the Socio-Technical system (STS) model, which proposes the integration of seven interdependent sociotechnical elements into a comprehensive model (see figure 2.3, below) (Grech et al., 2008 p. 21). Grech et al (2008 p. 137) comment that the STS model was developed specifically to incorporate societal, cultural and organisational interaction into the human factors discipline.

Figure 2.3: The Socio-Technical System Model



(Grech et al., 2008 p. 21)

A useful guide to the scope, or the espoused terrain, of contemporary human factors can be seen in the table of contents of the influential text, *Human factors in the maritime domain*, in which Grech et al seek to integrate relevant human factors knowledge within a maritime context and within one single volume (2008). Its list of factors includes:

- Individual factors: Psychological capabilities and limitations (including human senses, perception, cognition and behaviour).
- Task interaction factors (including work and rest, mental workload, physical workload, musculoskeletal disorders, workstation design, stress, illness, concerns, anxiety and pressure).
- Communication and teamwork (including closed loop communication, mutual understanding, social role and power, transactional analysis and leadership styles).
- Work environment (including noise, vibration, lighting, climatic conditions, accommodation, ship motions and physical environment standards)

- Interacting with technology (including human-machine interaction, maritime equipment design, warnings and alarms, and crew responses to technology).
- Organisation, society and culture (including organisational failure, drift into failure, maritime sector culture, safety culture, maintenance failure and practice).

The volume also includes a history of human factors within the maritime domain, methods for human factor data collection, and a chapter that explores future trends in maritime human factors.

The components of the STS model can be seen as reflected in the curation of the chapters within Grech et al's text (2008), making it authoritative and comprehensive. However, it is worth noting that out of its 185 pages, only 26 are devoted to organisational factors, 5 pages are devoted to organisational drifts into failure and only one page - a mere 465 words - is devoted to professional practice.

Organisational sensemaking is not covered at all. The fact that these elements fall within the scope of the STS model but are so tellingly underrepresented in the volume's contents suggests these are relevant areas, but they require further research and conceptual development. As Grech et al (2008 p. 155) comment, "It is now more important than ever that human error analysis considers the impact of organisational as well as cultural and social influences on human behaviour. This actually entails looking beyond the direct causes of human error and focusing on the underlying organisational factors that give rise to these conditions."

One example of a significant focus area in MHF is fatigue. For example, Akhtar and Utne (2014) applied a Bayesian network method to 91 accident reports to determine that a fatigued operator on the bridge of a large vessel raises the probability of it grounding by 23%. Additionally, Chauvin, Lardjane, Morel, Clostermann & Langard (Chauvin et al. 2013) applied a Human Factor Analysis and Classification System (HFACS) method to analyse the accident investigation reports of 27 maritime collisions, determining that fatigue played a role in only 12.86% of these accidents. This interest in fatigue as a human factor has been instrumental in influencing the regulation of hours of work and rest at sea. These minimum standards are incorporated into the Standards for Training, Certification and Watchkeeping

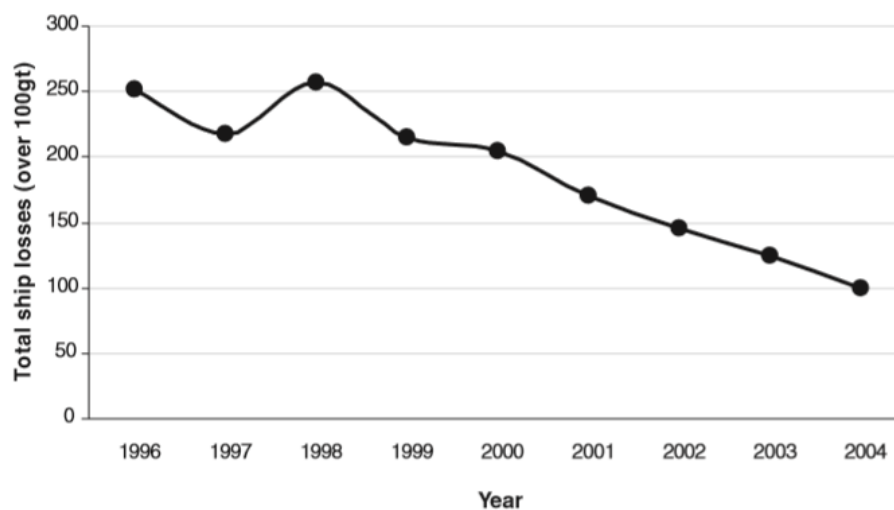
(STCW) established by the IMO (2011). These standards limit work on ships to ten hours in a twenty-four-hour period, with a maximum of 77 hours in a seven-day period. This regulation was implemented in response to human factors research into fatigue and human error (Grech, Horberry & Koester 2008 pp. 57-58). However, Grech (2016) highlights the limited effectiveness of a purely prescriptive, regulatory approach; advocating for the introduction of a risk management methodology applied at an organisational level to proactively manage fatigue risks using a multi-factorial approach. Grech considers this more effective than merely adhering to the global minimum standard of rest. Grech (2016) notes that there are ongoing breaches of these standards because the prevailing seafaring culture expects seafarers to work while fatigued. This observation suggests to me a root cause for fatigue that lies within the “deeper troubles” associated with organisational factors, as mentioned previously.

Another focus for human factors in the broader transportation context has been the improvement of operational communication, commencing with the introduction of Cockpit/Crew Resource Management (CRM) in the aviation sector in the 1980's. This approach to crew training was derived from social psychology, particularly group process, and was developed to include “full mission” training simulations (Barbara, Robert & Jose 2010 ch. 1). CRM principles were largely directly imported into the maritime domain as Bridge Resource Management (BRM). Accidents such as the 1977 Tenerife air disaster, in which a pilot's misheard intentions resulted in the collision of two passenger jets and the death of 583 people (Weick 1990), highlight the value of improving communication on ship bridges and in aircraft cockpits. However, both CRM and BRM appear to focus on the technical skills and knowledge of the onboard crew (Grech, Horberry & Koester 2008 p. 176; O'Connor 2011). They do not appear to incorporate the complex organisational dynamics that give rise to “deeper troubles” (Grech, Horberry & Koester 2008 p. 18; Schröder-Hinrichs et al. 2013). Additionally, O'Connor (2011) notes there is scant research into the effectiveness of BRM training in maritime contexts, and his own study found negligible differences in terms of knowledge and attitudes regarding human factors in pre- and post- training participants. Grech et al (2008 p. 148) state that BRM has not kept pace with the evolution of CRM in the aviation sector, noting that BRM

remained “reductionist” and focused largely on the individual and human error instead of complex organisational aspects (p. 155).

Overall, contemporary human factors, underpinned by the IMO’s Human Element focus, has contributed to a significant decline in maritime incidents, as shown in figure 2.4 below.

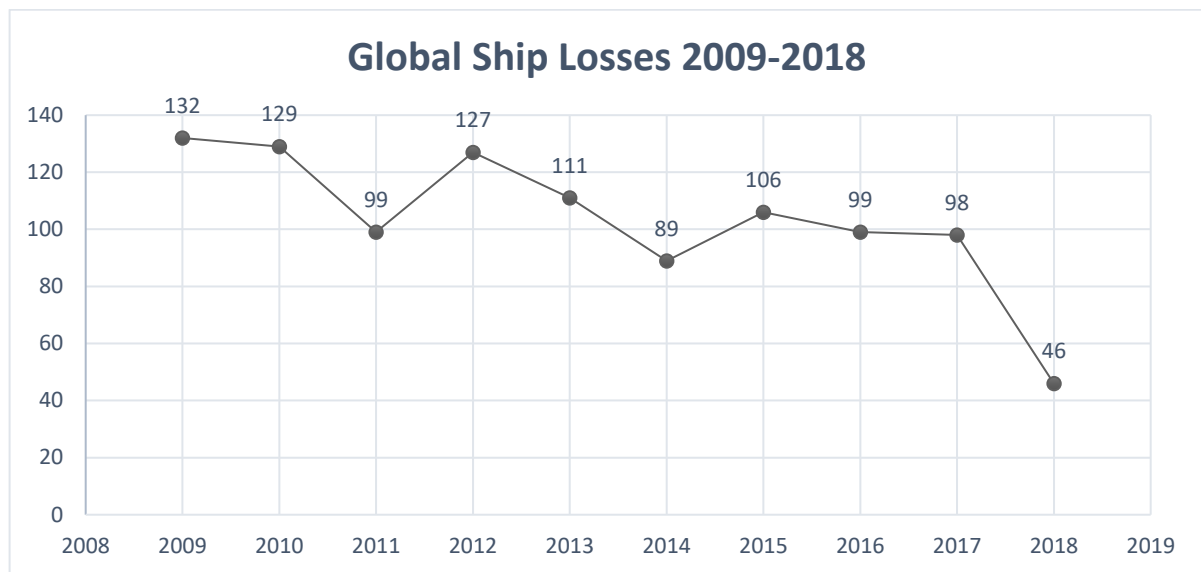
Figure 2.4: Total ship losses by number (ships over 100 gross tonnes)



(Grech et al., 2008 p. 13)

This decline in ship losses can be seen to continue over the past decade, as shown in figure 2.5. However, it is worth noting that while the years between 1996 and 2004 saw a steady decline from 250 to 100 vessels lost per annum, this rate has significantly plateaued at an average of 110 ship losses per annum between 2009 and 2017. Allianz states that the significant decrease to 48 ship losses in 2018 may be an outlier, caused by unusually benign weather conditions for the year and the fact that not all vessel losses have been officially confirmed for that period at the time of publication (2019 p. 9). Additionally, whilst the number of vessel losses declined significantly in 2018, the number of shipping incidents remained stable (p. 14). Growth in shipping volumes and ship capacities over the past decades means that larger vessels bring bigger losses, and the impacts from the accidents are increasing in magnitude (p. 20). As such, there is much more at stake in each accident, regardless of the accident rate.

Figure 2.5: Annual global ship losses between 2009-2018 (over 100 Gross Tonnes)



(Allianz 2019 p.14)

Overall, the decline in ship losses highlights the effectiveness of maritime human factors over several decades. However, while the IMO's Human Elements vision and the STS model appears to call for a holistic approach to address complex maritime safety issues, there has been negligible evolution in human factors practice to meet this need (Schröder-Hinrichs et al. 2013). As Dekker observes regarding human factors "Our past successes are no guarantee of continued future achievement" (2004 p. xiii). Catastrophic maritime disasters continue to occur, such as the capsizing of the *Bourbon Dolphin* in 2007 (Lyng, 2008), the *Deepwater Horizon* platform explosion and oil spill (Lekka and Sugden, 2011), the collision of *USS Fitzgerald* (involving 7 fatalities) and *USS John S McCain* (involving 10 fatalities) with merchant vessels in 2017 (Office of the Chief of Naval Operations, 2017), and the Iranian oil tanker blaze off the coast of China in 2018 (involving 32 fatalities) (Rebellato et al., 2018). Furthermore, these contemporary maritime disasters appear to involve causes that are rooted in those "deeper troubles" of organisational complexity (Grech, Horberry & Koester 2008 p. 18).

MHF continues to be a key factor in the frequency and cost of maritime accidents. Allianz, in analysing 15,000 insurance claims between 2011 and 2016 found that 75% of accidents were attributable to human factors, which was equivalent to \$1.6

billion USD in losses (2019 pp. 30-31). This is driven by emerging technological impacts of overreliance of technology such as electronic chart displays, distraction from information and communication technology such as mobile phones. This trend highlights the blurring of human, technological, social and organisational dimensions of maritime safety, requiring holistic rather than reductionist perspectives on MHF. As such, it is necessary to critically review the existing human factors approach, particularly within the maritime context, in order to deliver on the IMO's Human Elements vision and achieve further improvements in maritime safety.

A critical examination of Maritime Human Factors

As previously mentioned, human factors is a “scientific” and “applied” discipline (Grech et al., 2008 p. xi). According to Dekker, it is underpinned by a “Cartesian-Newtonian view of science and scientific method” which seeks to reduce phenomena into its basic parts in order to arrive at scientific descriptions of their constituent components (2004 p. ix). This leads to an analytic, techno-rational conceptualisation, in which:

the *mind* is understood as a box-like construction with mechanistic trade in internal representations, *work* is broken into procedural steps through hierarchical task analyses, *organisations* are not organic or dynamic but consist of static layers and compartments and linkages.

(Dekker, 2004 p. ix)

Indeed, my personal observation as I review this literature is that the key word in human factors is *factors*, which implies a focus on discrete elements in lieu of a holistic understanding of what Waterson, Robertson, Cooke, Militello, Roth and Stanton (2015) described as “increased complexity and interconnectivity between systems and their elements”.

Higgs (2012) has written of rational *professional hegemony*: an over reliance on particular frames that come to dictate the appropriate ways in which phenomena may be considered within a particular community of practice. Traditional human factors approaches to understanding and articulating critical incidents in the

maritime sector might well be thought of as a form of professional hegemony. For example, Dekker (2004 p. 6) states that a result of the Cartesian-Newtonian paradigm is the dualistic separation of human error from mechanical failure. This shapes accident investigations via the hegemonic assumption that, in the absence of an identified mechanical failure, an accident must be caused by human error. Schröder-Hinrichs et al. (2012 p. 162) suggest that this scientific rationalist approach results in investigations that provide technical and/or administrative solutions that fail to address deeper, complex causes. They further observed (2012 p. 164):

It is far more convenient to deal with direct causes than with indirect ones. It is first of all easier to propose concrete responses, whether they are of a technical or administrative nature.... It also requires less investment of time and resources to address a clearly defined cause than to deal with a combination of factors and conditions.

These conclusions highlight the gap between current human factors practice, as a persistent form of professional hegemony, and the holistic and complex perspective required by the IMO's Human Elements vision and the STS model discussed above. They also suggest that maritime investigations would be more effective if they adopted a multifactorial approach framed within broader contexts (Kristiansen, 2005 p. 314).

The other underlying dualism that Dekker highlights is the Cartesian divide between mind and body/environment, where the *res cogitans* (realm of mind) is separated from the *res extensa* (realm of matter) (Dekker, 2004). Indeed, Österman, Rose and Osvalder (2010 p. 156), in defining maritime human factors, divides the topic into physical ergonomics and cognitive ergonomics, further highlighting the cartesian divide at the core of MHF theory. This paradigm of a rational mind that controls the body and its environment is consistent with the mind-as-computer paradigm (Otoom, 2016). However, it is significantly out of step with contemporary cognitive theories that conceptualise the mind as embodied (Adams, 2010, Rowlands, 2010), extended (Clark and Chalmers, 2016), and embedded in its environment (Rowlands, 2010). These cognitive theories will be discussed at a later point in the thesis, but it is worthwhile considering the limitations that cartesian

dualism impose upon the conceptualisation of maritime accidents as complex, enmeshed events, as suggested by the STS model.

Whilst the STS Model offers the possibility for considering organisational complexity and interdependency, the underlying paradigms within human factors discipline appear to remain reductionist and techno-rationalist. Dekker comments that “Human factors and systems safety are stuck with a language, with metaphors and images that emphasize structure, components, mechanics, parts and interactions, cause and effect” (2004 p. 9). Kristiansen (2005 p.315) states that, despite the breadth of the STS model, “we still seem to take a more narrow view”. Additionally, while Fenstad, Dahl and Kongsvik (2016) highlight the benefits to safety from studying crews, ship owners and regulators together, most studies only consider one level within the sociotechnical system. As such, there is a gap between MHF’s proposed STS model and the prevailing research methods and practice of MHF.

A dynamic that problematises MHF is the rate of change and complexification within the maritime sector. Realisation that the industry itself is changing in ways that might both mitigate risk and increase it, is reflected in a number of commentaries. For example, replacing paper navigation charts with Electronic Chart Display Information Systems (ECDIS) on maritime vessels increases knowledge of where the vessel is in relation to its surroundings, due to the ability to filter the electronic chart information. It is an additional source of information but it must be made sense of by human operators in order to be useful (Baylon & Santos 2013). Additionally, complex new technologies can create a false sense of confidence that may, paradoxically, result in an increase in the acceptance of risk (Schröder-Hinrichs et al., 2012).

Another rapid change associated with new technology has been the improvement of communication. Information and Communication Technology (ICT) now offers the possibility of communicating with a vessel regardless of where it is and what time of day (Palmer, 2011 p. 7). Previously, according to Gerstenberger and Welke (2002), the vessel’s master had sole autonomy and responsibility of the vessel and had to make most decisions in isolation from external stakeholders. Now, via satellite telephone, email, video conferencing and ship-to-shore data sharing, these diverse stakeholders can intrude upon the attention and autonomy of the master to

collaborate and engage with what was traditionally an isolated working unit at sea. This technology also means that personnel with no experience at sea are actively engaging with the logistics of the vessel (Gerstenberger and Welke, 2002). This rapid change has complexified the relationship between seafaring leaders and their stakeholders (Freeth, 2015 p. 17, Fenstad et al., 2016), while problematising the traditional role of the seafaring leader (Gerstenberger and Welke, 2002).

A further source of rapid change has been the combined rise in trade and containerisation of cargo (Hetherington, Flin & Mearns 2006). An increase in global trade and “just in time” customer demand has fuelled both growth and competitive pressure (Kristiansen, 2005 p. 5, Palmer, 2011). Competitive pressure has caused shipping organisations to optimise the efficiency/thoroughness trade-off (ETTO) (Schröder-Hinrichs et al., 2012 p. 161) to balance vessel safety and operational performance (Kristiansen, 2005 p. 6, Palmer, 2011 p. 9). Palmer (2011 p. 11) notes that while the transition from sail to steam power allowed for a “gradual and measured” evolution in shipping, the shift towards containerisation (the use of standardised twenty-foot containers for global cargo transport) has been “unexpected and rapid”, resulting in commodification and competitive pressure in maritime sectors.

While the interdependent nature implied by the STS model would appear to accommodate the increasing complexity described above (Grech et al., 2008 p. 21), it seems that the MHF community of practice continues to adhere to its techno-rational roots of deconstruction, dualism and structuralism (Dekker, 2004 p. 2). This renders it unable to contend with the “complex interactions of factors and components in socio-technical systems” (Schröder-Hinrichs et al., 2012). As such, the advocacy of the STS model has not produced deeper insights into organisational “drifts into failure”, because human factors and maritime accident investigations “have traditionally looked for one or more distinct causes and tried to address them one by one, as if they were independent of each other” (Schröder-Hinrichs et al., 2012). Fenstad et al. (2016) report that they have yet to identify quantitative research that simultaneously considers how external actors and internal conditions influence safety evaluations, as proposed by the STS model, concluding that “most studies only consider one level of such socio-technical systems.” Dekker

(2004 pp. 9-10) states that the level of complexity in contemporary transport operations means that the “neat, mathematically pleasing” separation between “human and mechanical cause, between social and structural issues, has blurred”.

Schröder-Hinrichs et al. (2013), reviewed the effectiveness of the IMO’s approach to human factors by analysing 380 peer reviewed articles on the topic that appeared within leading maritime journals between 1973 and 2012. Quoting William James, they concluded that, despite the robustness of the STS model, human factors approaches cannot contend with the “blooming, buzzing confusion made up of countless interconnected systems” that typifies contemporary maritime operations. They also state that a reactive, “accident-driven” approach to improving maritime safety will not address the increasing complexity associated with the maritime industry. According to Dekker (2004 p. 10), what is required is a “holistic, organic integration.... A new form of analysis, sensitive to the total situation of an organised sociotechnical activity”.

It is valuable to consider why, given the integrative and comprehensive scope of the STS model, that human factors within the maritime sector continues to be constrained by a reductionist, techno-rational and hegemonic epistemology that manifests in deconstruction, dualism and structuralism. Perhaps it is that traditional human factors emerged from the military during World War II (Grech et al., 2008 p. 5, Dekker, 2004 p. iix). The merchant marine sector has always had a military dimension (Palmer, 2011 p. 4), including serving alongside the Royal Navy officers on armed merchant cruisers during the Great War, facing threats from enemy ships, U-boats and mines (Fisher, 2016). Schroder-Hinrichs et al (2012) point to a “semi-military” structure and culture onboard vessels, which is evidenced by maritime symbols of rank, where gold uniform bars indicate the rank of captain/master and chief engineer. It seems reasonable that such a community of practice would eagerly adopt concepts that emerged from the military, particularly from naval sources.

Additionally, the maritime sector appears to evolve slowly, due to the legacy of its significant heritage and rich traditions that span centuries (Grech, Horberry & Koester 2008 p. 136). As Palmer (2011) states, seafaring had evolved slowly in the transition from sail to steam, up until the rapid wave of complexity from technology,

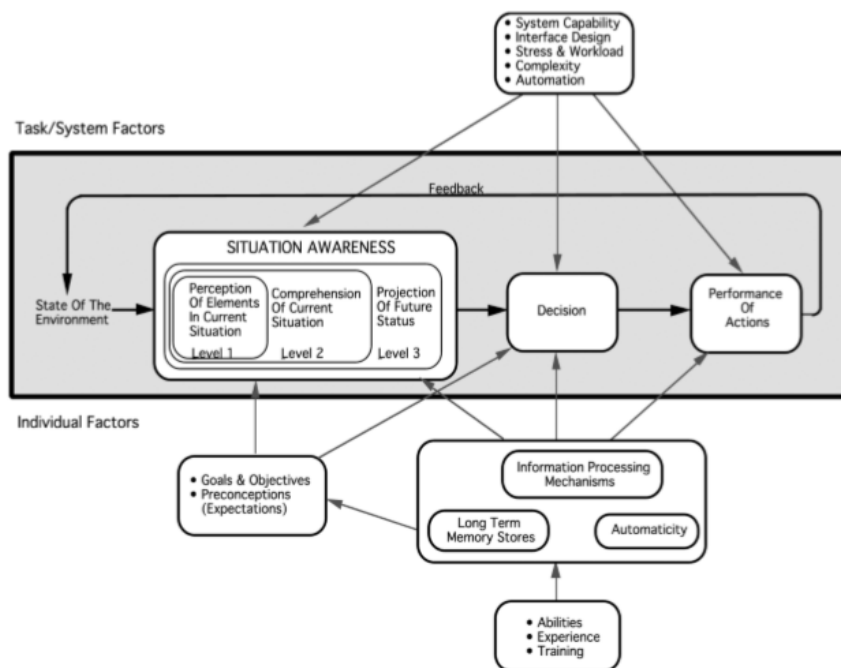
communication and commercialisation. One further reason for the endurance of traditional human factors in the face of rapid change and complexity is that these techno-rationalist approaches had been so successful in driving down the rate of vessel loss over previous decades (Baker and McCafferty, 2005, Grech et al., 2008 p. 13). As such, there are some compelling explanations as to why the MHF community of practice would not readily adopt the holistic and organic approach proposed by Dekker. Indeed, it has the hallmarks of a professional hegemony that persists despite advances in the conceptualisation of human error and maritime disasters, such as the STS model.

The chapter next focuses on the theories employed within human factors for maintaining awareness, making sense of, and contending with critical events. Situation awareness and sensemaking are critically evaluated from a maritime perspective.

From situation awareness to sensemaking

In the context of human factors analysis, over the last 25 years there has been growing usage of the theory of *Situation Awareness* (SA) framework in analysing responses to critical events (Endsley, 2015). This is a framework that has broadened the focus on human factors from examination of human *responses* (actions and decisions) to critical events to a perspective that explores how people try to *understand* these events, particularly in terms of broader, organisational terms. It has been defined as “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future” (Tenney and Pew, 2006). Its creator, Endsley, worked closely with the United States Air Force in developing a model to explain the high number of fighter plane losses. As shown in figure 2.5 below, the SA model has, at its core, three levels of situation awareness (perception, comprehension and projection). These SA levels lead to a decision that then leads to actions. What is significant about the model is that it not only acknowledges that people need to make decisions and take action, but that in order to do so, they must be trying to understand what is happening.

Figure 2.6: Situational Awareness Model



(Endsley, 2015)

The view that the majority of human errors are attributed to failures of SA is supported by a range of contemporary human factors researchers. Grech et al. (2002) analysed 177 maritime accident reports from eight countries between the years 1987 and 2001 using text-based conceptual analysis to find that 78% of human error accidents were related to SA. Chauvin, Lardjane, Morel, Clostermann & Langard (2013) used the Human Factor Analysis and Classification System (HFACS) method to analyse the accident investigation reports of 27 maritime collisions between 1998 and 2012, concluding that the major factor among operators was loss of SA. Sandhaland, Oltedal and Eid (2015) performed a qualitative analysis of the accident reports of 27 vessel collisions in the North Sea offshore sector between 2001 and 2011. They concluded that 21 out of 27 accidents were caused by human error, and 18 of these 21 accidents involved failure of SA. Saeed, Wall, Roberts, Riahi & Bury (2016), claimed that 80-85% of maritime accidents were due to failure of SA, advocating that SA be included in maritime officer non-technical training. As such, SA appears to highlight a relevant causal factor for human error components of maritime accidents, as described at the commencement of this chapter.

The above examples highlight the impact of SA in providing a common language within the MHF and safety community, due to its popularity as an explanation for a majority of critical incidents at sea (Endsley, 2015, Tenney and Pew, 2006). As such, SA must be recognised for the important role it has played in MHF. However, there have been significant criticisms of the validity and effectiveness of the SA model, which will be discussed next.

Sorensen, Stanton and Banks (2011) claim that Endsley's three level model is lockstep and linear. They cite Klein's finding that "expert decision makers have what can be considered to be SA, without being able to explain what elements of a situation they perceive to build their understanding of the situation." Stanton, Salmon, Walker and Jenkins (2010) are critical of the linear progression of Endsley's three-level model (perception, comprehension, projection), stating that "it is unlikely that the packing and unpacking process of cognition occurs in reality." They identify the limitation that SA is an "individual psychological phenomenon that occurs in the minds of people." While Endsley (2015) proposed the notion of collective situation awareness, or Team SA, Stanton et al concluded that even with access to the same information, people and machines will have different representations due to linking information in "different ways to produce an information schema for each agent".

Millot (2015) concurs with Stanton et al (2010) that SA appears comprised of primarily cognitive functions. In terms of collective SA, Millot claims there is a lack of a definition, measurement methods and methodology to account for the phenomenon. Millot concluded that the use of SA in courts to determine culpability of operators was dangerous due to these theoretical deficiencies.

Stanton, Chambers and Piggott (2001) echo Millot's concerns regarding the popularity of SA despite a lack of academic consensus on its definition and underlying theory. For example, Endsley's definitions for SA vary from encompassing "meaning", (Stanton et al., 2001) to merely addressing "what is going on" (Millot, 2015). There appears to be a significant difference between *what* is happening as opposed to *why* it is happening, particularly in determining a *meaning* for a phenomenon. Salmon, Stanton, Jenkins, Walker, Young and Aujla (2007 p. 412) note the distinction between *what* and *why* is most salient within the concept of collective situation awareness, or Team SA. They argue that multiple agents looking

at the same information as to *what* is happening does not equate to collectively understanding *why* it is happening (P. 410).

Salmon et al (2007) highlight a further ambiguity with Endsley's SA concept, as Endsley defined SA as a *process* in some cases and a *product* in other cases, without offering an account of these alternative conceptualisations. As such, debate and confusion continue as to whether SA is a "cognitive process" or a "tangible product". Additionally, Salmon et al state that Endsley's model does not cater for the dynamic nature of situation awareness within complex environments, such as those suggested by the STS model.

Dekker, Hummerdal and Smith (2010) claim that SA research "typically follows the Cartesian tradition that sets the mind against the world", concluding that SA is inherently reductionist in its approach. Dekker (2004 p. xi) states that such concepts are "epitomised by the mentalist focus of information processing". As such, SA's limitations appear to parallel those of the broader human factors discipline; typified by deconstruction, dualism and structuralism (Dekker, 2004 p. 2). Dekker concluded that, while SA purports to be an empiricist model, its lack of definition and academic validation after twenty years of research suggests it is a "folk" model. Despite this, SA has been widely adopted by the human factors community of practice, perhaps due to its compatibility with the prevailing reductionist epistemology and the Cartesian division between mind/body/world (Dekker, 2004). In this way, the weaknesses of SA appear to be entwined with, if not symptomatic of, the prevailing weaknesses of the human factors movement that conceived it.

Central to Endsley's situation awareness model is the three-level stages of perception, conception and projection, which lead in a linear fashion to a decision, and then on to the performance of actions. The model depicts a linear sequencing of these three SA levels (Klein, 2015b). However, Øvergård, Sorensen, Nazir and Martinsen (2015) studied 24 critical incidents on ships that were using Dynamic Positioning systems (an automated system that maintains a vessel's position at sea). They found that in ten cases, operators did not progress through the three stages as depicted, but missed level 1 (perception) entirely. They conclude that high-level SA can occur without triggering low-level SA.

Additionally, the notion that SA sequentially leads to a decision that then leads to action is challenged by Weick (whose body of work will be discussed shortly), who stated:

The decision actually has already been set in motion before people declare that it has been made. The recent history is viewed in retrospect, with tentative outcomes in hand, to see what decision could account for that outcome. Outcomes develop prior definitions of the situation (1995 p. 184).

Weick's explanation of how decisions are retrospectively constructed problematises Endsley's linear SA model with respect to decision making. Klein (2008), in conceptualising naturalistic decision making (NDM), notes that such rational decision making fails to explain how people make decisions in dealing with real-world problems. For this reason, Klein and his colleagues decided to align their decision-making concept with Weick's notion of sensemaking instead of SA (Klein, 2015a). As stated in the previous chapter, Klein et al (2010) define decision making as "the selection of one option from a set of two or more options". As such, it appears distinct from, but inextricably linked, with concepts such as situation awareness (the degree of awareness of the event that prompted the decision to be made) and sensemaking (attempts to understand why the event happened, what it means, and (retrospectively) why the decision was the best option at the time).

Twenty years after the publication of her seminal work, Endsley (2015) responded to SA's main critics, including those cited above. She used the terms "misunderstandings" and "fallacies" to describe their criticisms; as if to imply that these critics had either misunderstood or misrepresented her theory. Endsley's response, however, appears to offer an invitation to integrate her original model more closely with contemporary theories, including Weick's sensemaking (p. 18). Situation Awareness has been human factor's attempt at a "universal explanation" for human error (Grech, Horberry & Koester 2008 p. 175). Nevertheless, while SA considers some of the ways in which people go about understanding the uncertain and risky situations they are in, the model could now be considered a relatively limited conception of how human beings act within complex and collaborative organisational contexts. Dekker (2004 p. 1) notes that language mediates the

worldview and as such limits our understanding of concepts such as situation awareness and human error. Therefore, the common language provided by SA thinking might well have shaped, and perhaps limited, the way SA and human factors are conceptualised in relation to critical events.

Certainly, the framing of SA predates interesting developments in thinking about how human beings make sense of things and reach decisions, such as the social, discursive, somatic and emotional turns (Cunliffe and Coupland, 2012, Kinsella, 2015). This section of the chapter next explores some of those more recent developments and how they have been applied under conditions of high uncertainty, risk and volatility.

Weick (1993) took a significant step by problematising our understanding of the ways people make meaning of critical events. Weick is described as being gritty and realistic in depicting the messy, non-linear and often fragile processes by which individuals and organisations make sense of their world (Manning, 2013). He described, in sometimes confronting detail, what happens when sensemaking unravels in his examination of disasters such as the Tenerife air crash, the Mann Gulch wildfire (Weick, 2001 p. 107, Weick, 1993) and the Union Carbide chemical leak in Bhopal (Weick, 2010). In those examples, Weick examined situations that involve *sudden losses of meaning* (Weick, 1993). It was the inability of the participants to make or re-build any sense of what was happening in these situations that led him to question the focus on decision-making that has been part of the human factors framework. Human errors frequently mean errors of judgement that have been analysed in techno-rational terms. But when things no longer compute, traditional descriptions of decision-making are less satisfactory.

Weick shared with others (Klein, 2015b, Øvergård et al., 2015, Manning, 2013, Blatt et al., 2006) a growing realisation that decision-making, even under much less extreme circumstances, is a far messier business than previously acknowledged; that the linkages between decisions and actions are loosely coupled and interactive rather than linear; that the past is notoriously unreliable as a guide to the present or the future; and that decision-making and influence are socially constructed and negotiated, (Weick, 1993). His own exploration of how organisations are constructed

though talk and action, in keeping with other social constructivist thinking, implied a move from the idea of *making decisions* to that of *creating meaning*.

Weick suggested that examining the stories people tell to describe their experiences reveals much about how they go about making sense of things, individually and collectively. He describes them as ‘shuttling’ between experiences, memories and current opinions, in ways that blur and stretch connections rather than making them transparent or logical (Weick, 2001 p. 269, Weick, 1995 pp. 127-131).

Weick’s prodigious and influential body of work on sensemaking is strikingly empty of linear theoretical diagrams, reductionist examination of human factors, and the certainty of concepts such as “situation” and “decision”. In fact, Weick declares his objective as priming “people to be more self-conscious about some things they and their associates do automatically when they are puzzled” (1995 p. 182). This associates sensemaking with the development of wise practice in a holistic sense (Higgs, 2012) rather than the rational analysis and control of human factors associated with SA. While Endsley focused on knowledge and rational cognition (Flach, 2015), Weick offers professional/managerial wisdom (Klein and Bloom, 1995, Cheung, 2015).

In critiquing Weick’s work, it’s fair to point out that he initially conceptualised sensemaking at a time prior to the uptake of the somatic/corporeal turn of embodied cognition (Kinsella, 2015, Sheets-Johnstone, 2015). Danielsen (2018) notes that Weick’s sensemaking was primarily conceived as a language-based phenomenon. While Weick did not discount the notion that sensemaking could have an affective or embodied aspect, these elements of sensemaking were not explored by him in any significant depth (Cunliffe and Coupland, 2012). The creation of meaning becomes more central, too, when the world is understood as more uncertain, more complicated and more dimensional than techno-rational descriptions have admitted. Seen from these perspectives, a seafarer, even when physically alone, is as much part of a socially negotiated reality as anyone else. Enmeshed in the social and power dynamics of influence, with crew and external stakeholders, and increasingly expected to be plugged into the virtual world of technology, arguably seafarer’s work in maritime services needs to be understood in terms of *sensemaking*, rather than situation analysis.

Sensemaking has been criticised for focusing on critical events rather than examining the lifeworlds of the living people involved in those events. Hernes and Maitlis (2012 p. 29) observe that the sensemaking literature focuses on sensemaking often at the expense of the sensemakers. They cite Czarniawska's claim that sensemakers "are made" by the sense they make, not the other way around. For this reason, my narrative interpretation will focus on the seafaring leaders primarily, being sensitive to those epiphanies that transform their selves, their professional practice and sensemaking (Denzin 2001 p. 147). The rarity of research that focuses on the sensemakers as opposed to sensemaking events (such as the Mann Gulch fire, the Tenerife air disaster, and the Bhopal gas leak disaster) adds a further element to the original contribution of this research.

There are other perspectives on sensemaking that are emerging in the literature on high risk industries that further encourage this shift. One of them is the interest in high reliability organisations (HROs), a focus initially taken by La Porte (1996). This is a focus on collective practice and wisdom that builds on the framing favoured by Weick: an understanding of human sensemaking and action as a web of socially constructed and negotiated activities among many players. This chapter concludes with an exploration of this important development.

The focus on high reliability organisation

The conceptualisation and development of HROs over the past thirty years has been an attempt to take a whole-of-organisation perspective, prompted by the very high reliability and safety of some industries, notably air traffic control and aircraft carriers (Sutcliffe 2011).

There is no single agreed definition of an HRO, partly because it has been difficult to find a consensus definition of reliability. However, La Porte (1996) one of the early thinkers about HROs, defined them as organisations that operate with nearly accident-free safety records, despite operating in hazardous and complex environments as part of their normal work. Similarly, Lekka and Sugden (2011) define HRO's as organisations that are able to maintain excellent safety records over extended time periods despite operating in high risk and hazardous

environments. However, they point to a shift in the research from what *is* an HRO to what processes lead to *high reliability organisation*.

While Normal Accident Theory (NAT) posits that accidents are an inherent element of operations and cannot be completely eliminated, HRO theory adopts the principle that exceptional levels of reliability can be sustained (Leveson, Dulac, Marais and Carrol, 2009; Fujikawa, 2017). Leveson et al. (2009) further claim that HRO principles can be integrated with a systems approach to improve reliability and safety in complex environments.

Sutcliffe (2011) noted that HROs share some common features. Their day-to-day operations are conducted in environments full of hazards and uncertainty. Because they do not have the luxury of being free to learn from accidents, they are always preoccupied with failure and its consequences, and to avoid failures they use complex processes to manage complex technologies. While the potential to fail is very high, in practice they rarely do.

Weick turned his attention to this phenomenon in later work, in company with others. In keeping with his interest in the social dynamics of sensemaking Weick et al (2007) suggested the concept of *organisational mindfulness*, a frame that considers sensemaking as a collective process. Mindfulness, as a concept, suggests five factors that are present in HROs: preoccupation with failure, reluctance to simplify, sensitivity to front-line operations, commitment to resilience and their deference to expertise. These principles were developed from accounts of effective practices in HROs and reports of accident investigations.

Preoccupation with failure involves proactive practice with concern about unpredicted circumstances. Searching for mistakes, linking mistakes to possible larger errors, identifying warnings and acting on them, can all prevent a major incident. *Reluctance to simplify* operations means not making life easy by downgrading or hiding near misses and incident reports. Fear of blame, job loss and entitlements can be incentives to take short cuts and not make a fuss. *Sensitivity to operations* means holding a bigger and more realistic picture of current operational status. It discourages learning by risky experimentation, focusing on the present rather than the past, and avoiding generalised interpretations based on hindsight

and collective entrenched memory. This approach to learning encourages people to act on feedback immediately. It is designed to be effective both in teams and crews that are constantly changing, and in temporary multiple groupings of stakeholders, where there is little shared history and in teams that are stable and liable to 'group think'. *Commitment to resilience* is about containing and bouncing back from failure or mishap, before things escalate and destabilise effort. *Deference to experience* is the principle adopted in many military situations, where decision-making in a crisis or emergency rests with the people with the most relevant experience rather than rank.

What is very striking about this piece of work is that applies a *sensemaking* frame – that of *mindfulness*. Mindfulness may prove to be a fruitful dynamic that enables a more nuanced and pragmatic understanding of collective organisational practice.

In a very recent review of HRO theory and application in the construction industry between 1990 and 2017, Enya, Pillay and Dempsey (2018) have concluded that the concept has great relevance to the construction sector. They particularly noted the relevance of the mindfulness factors of operation management and resilience. Binci and Cerruti (2012) studied high reliability organisation in an Italian energy company, highlighting that resistance to implementing HRO practices can still be beneficial to overall implementation. Lekka and Sugden (2011) applied a qualitative case study approach towards a UK oil refinery, concluding that HRO principles were beneficial in balancing production and safety goals and associated trade-offs. Fujikawa (2017), in her study of Japanese nuclear power plants' response to the Fukushima nuclear disaster, highlights the importance of social controls, such as "strong collective mind", in addition to formal, structural controls in maintaining high reliability.

However, research using the concept of HRO in the maritime sector is negligible, being absent from several contemporary maritime reviews and articles (Berg 2013; Jianjun & Shengchun 2013; Muirhead 2002; Pawlik & Wittig 2013). Despite this, offshore marine vessels servicing oil and gas platforms at sea have all the characteristics of workplaces that are high risk and hazardous. As such, there is much that can be gained from exploring sensemaking as a key component of high reliability organisation within the maritime sector.

The implications of this literature review

This review of the literature was extremely helpful to me in focusing my interest in the way seafarers engage with the uncertainties of high-risk environments. The literature impressed upon me the significant contribution that the human factors discipline has made upon the accident rate within maritime contexts. However, despite the adoption of progressive and encompassing concepts such as the Socio-Technical Systems model, MHF continues to be limited in responding to complex maritime safety issues through an overly reductive, techno-rational approach underpinned by Cartesian dualism between body and mind.

Dekker and others propose that this prevailing human factors approach has reached its limits in impacting safety, as it fails to account for the “deeper troubles” of complex organisational environments that give rise to drifts into failure. Additionally, SA, human factor’s attempt at a universal explanation for human error, appears limited by the same reductionist perspective that pervades contemporary human factors methods. There is a need for a nuanced understanding of how seafaring leaders make sense of their practice, both in the immediacy of critical events and in the broader, unfolding of organisational dynamics that could be leading to a drift into failure. These conclusions have encouraged me to pursue, as Dekker (2004 p. 10) advocated, a holistic method of inquiry in order to explore how seafaring leaders make sense of critical events. This method is described in detail in the next chapter.

Reviewing the literature also gave me confidence that it was worth going into the study with the purpose of exploring sensemaking, not just decision-making or situation awareness, and with the conviction that approaches that privilege rational and cognitive processes are not the last word on the story. I also wanted to keep an open mind in generating and interpreting what is commonly referred to as ‘data’. I did not want to test a model that limited the conversations I had or the way I understood them. As Linnell and Horsfall (2016, p. 84) propose, I aim to “lovingly disturb” these traditional approaches and perspectives in order to provide fresh insights into complex phenomena. In this way, it is possible to build upon those underdeveloped, yet increasingly relevant, dimensions of the sociotechnical systems model, namely; practice, society and culture, and organisational environment.

As I explain in the methodology chapter that follows, my initial reading of the literature also gave me insight into how I might create useful material that could possibly add to the conversations already going on in industry and the academy, particularly by adopting a holistic interpretive approach. The literature I reviewed suggested a number of different approaches: analysis of reports of special inquiries, of routinely generated accident reports, of case studies and of firsthand accounts. But my review left me keen to have conversations with seafarers about their own behaviour in critical incidents. And I was keen to do it under conditions that were not related to processes of investigation. I wanted participants to feel totally free to enter, leave and speak as they chose. And I especially wanted to avoid a focus on events that had been officially labelled by others as accidents or critical incidents. These take outs from the literature that influenced my research design are described next.

Chapter three: The methodology

This chapter describes the research method I employed in exploring how seafaring leaders make sense of critical events. It includes a comprehensive justification of the methodology I selected, and a detailed description of the research process I implemented. It concludes with a discussion of validity, reliability and limitations of this research project.

One of the most salient conclusions from the literature review was the dominance of quantitative methodologies within maritime human factors, with its prevailing focus on technical topics. To use a seafaring analogy, the current literature appeared to follow well-established sea-routes that hugged familiar coastlines (both quantitative and technical); whereas I proposed to depart from these routes to discover uncharted territories (embodied sensemaking among seafaring leaders). Such voyages are not without peril and uncertainty. Nevertheless, I concluded my literature review with a strong commitment to exploring seafaring leadership through methodologies (narrative interpretation) and topics of enquiry (sensemaking) that were novel to the domain of maritime human factors.

However, I was keen to choose wisely from the extensive array of qualitative research options available. This required considerable reflection (Katzman 2015) upon often nuanced variances between methods (Creswell 2013). I dwelled with some options for extended periods to sense if they were congruent with my values as a researcher, and used creativity to imagine how these methodologies would unfold over time and impact upon my vision for the research itself. I also explored potential synergies and compatibilities between qualitative approaches, discussing these with my supervisors at length. My reading enabled me to immerse myself in rich cultures of inquiry, using imagination and foresight to project the way my research would unfold under each methodology.

The benefit of this reflective process was the prudent selection of a methodology that, while novel in its maritime context, was robust and effective for the research project itself. To extend my seafaring analogy, when departing from well-established sea-routes (existing research literature) to explore uncharted waters (my research topic), it is wise to ensure the seaworthiness of the vessel (research

methodology) to embark within. The following section justifies the methodology I selected for this research journey.

Selecting the methodology

An overarching determinant in selecting a research methodology is situating the inquiry within an ontology, or the nature of reality in which the research will unfold (Saunders, Lewis and Thornton (2012 pp. 130-132). I ultimately situated my research within an ontology of *intersubjectivism*. Intersubjectivism posits that self and others are not separable, but co-evolve through the recursive processes of social experience and dialogue (Frie 2013).

Saunders, Lewis and Thornton (2012 pp. 130-132) propose only the duality of *objectivism* (reality as scientifically verifiable) and *subjectivism* (reality as personally perceived) as an ontological dichotomy (Bradbury & Lichtenstein 2000).

Objectivism, the perspective that reality can only be considered from a scientifically verifiable perspective, underpins the scientific and technical approach that has been found to be insufficient in addressing the full range of human error related critical events at sea, as discussed in the literature review.

Subjectivism initially seemed to me to be the most appropriate ontology out of these two alternatives, as it examines the individual meaning that people create regarding their jobs and the way they consider the job should be done (Saunders 2009 p 132). However, I reflected that subjectivism becomes problematically solipsistic in that it implies the perspective of the sensemaker is the only one that can be certain to exist or considered valid (Walker 2009). This tendency towards solipsism offers little pragmatic value in terms of professional practice development. Additionally, subjectivism does not account for the way in which sensemakers shape their lifeworlds, including other actors, whilst at the same time being shaped by them (Salvatore & Freda 2011). Therefore, as Bradbury and Lichtenstein (2000) point out, the dichotomisation between objectivism and subjectivism significantly limits the ontological capacity to explore relational dynamics such as knowledge versus power and knowledge versus action. This appeared to be germane to the exploration of

sensemaking, and the dynamic between knowledge, power and action is explored in detail in chapter eight.

I therefore concluded that intersubjectivity recognises that the subject and their lifeworld, including others, are enmeshed through “recursive processes” of social experience and dialogue (Frie 2013). Intersubjectivism provides a relational perspective that encompasses what Buber described as “the space between” people and phenomena (Bradbury & Lichtenstein 2000).

Intersubjectivism is relevant to studies of sensemaking as it transcends the distinction between the subject and object (Bradbury & Lichtenstein 2000), and by doing so, transcends subjectivity and objectivity. As an ontology, it acknowledges an objective “real world” that is subjectively perceived in ways that shape the perceiver, while acknowledging that the subjective perceiver in turn shapes that objective real world. As my research progressed through its various stages, I often reflected upon the wise choice of ontology, as intersubjectivity was validated in my interviews with seafaring leaders, in the interpretive readings of their narratives, and ultimately in the application of theory to these insights. My ontology became my North Star on my voyage of inquiry; a reassurance that I was on course.

Epistemologically speaking, the source of knowledge ideally suited for exploring sensemaking is interpretivism, given that sensemaking concerns itself with the interpretational activities of social actors (Saunders 2009 p. 137). Therefore, an interpretive approach is valuable in its ability to distil meaning from seafaring narratives that are embedded in the “blooming, buzzing confusion made up of countless interconnected systems” that typifies contemporary maritime operations (Roberts 2018; Schröder-Hinrichs et al. 2013). Interpretation as an epistemology acknowledges the value of exploring personal experiences and perceptions as a way to describe, make meaning of, and change the world (Denzin 2001 p. 27). These experiences take the form of narratives that are storied (Cherry 1999) and performed (Sergi & Hallin 2011) in ways that thickly describe these experiences and interactions (Ponterotto 2006).

Interpretivism posits that these narratives can be methodically interpreted through qualitative methods such as Denzin’s *Interpretive Interactionism* (2001). According

to Denzin, “interpretive interactionists interpret and render understandable turning-point moments of experiences, or epiphanies, in the lives of ordinary individuals” (p. 119). Denzin further states that interpreters translate the unfamiliar into the familiar... [by] giving meaning to experience” (p. 119). This objective is entirely consistent with Weick’s concept of sensemaking as being socially constructed, grounded in the “identity construction” of the sense makers themselves, while being driven by plausibility rather than by accuracy (Weick 1995 p. 17). As such, there is a high degree of compatibility between sensemaking and interpretive interactionism. It was also important to select an interpretive method that fully accommodated the intersubjectivist ontology described above. Therefore, I selected Denzin’s interpretive interactionism because this holistic method acknowledged that meaning emerges through interactions that involve interpretations, and these interpretations are therefore inherently intersubjective in nature.

This interpretive source of knowledge provided a counterpoint to the objectivist and reductionist scientific approaches that have dominated maritime studies in hegemonic terms for decades, as described in the previous chapter. Therefore, interpretivism was likely to provide fresh insights by illuminating aspects of seafaring practice that have remained hidden from scientific and technical exploration, particularly in explaining how seafaring leaders make sense of critical events.

According to Jones and Fenge, “narrative is the bread and butter of qualitative work”, allowing for data that is temporally unfolding in a way that reveals *interactional* dynamics that might otherwise be obfuscated (2017). Furthermore, a narrative interpretive approach enables the researcher to be accountable for participants’ “struggles for self-representation” while being sensitive to the “violence of objectification” that can be wrought on participants when their stories are turned into information for analysis (Lather 1995). An example of how this was achieved is by representing the seafarers’ performances of their own stories (including their words, emotions and gestures) (Denzin 2001 p. 100) in the thick description chapters without reducing these to glossed accounts (p. 13) that would have rendered the participant as a stylised object. Specifically, when participant #3424 described a time when he cried, which caused him to cry in the interview, I let his

unglossed account respectfully stand as a thick description of his experience, along with his own struggles to self-represent his experience.

Oh, I have tears in my eyes, mate. I can still... I was kneeling, looking into a manhole that was overflowing, water just coming out like that, and I just... I get on the phone, and geez, I give him shit... I sent him home, "You can go home, we'll get someone else up" (# 3424).

As such, narrative interpretation as a culture of inquiry was both a valuable and ethically responsible methodology for exploring human experience.

Whilst significantly under-represented in the literature, qualitative interpretive methods have been successfully applied within the maritime sector (Roberts 2018). Examples include O'Connor, O'Dea and Melton's critical event interviewing of US Navy dive teams (2007), Simon and Fernandez's phenomenological examination of piracy (2016), and Lundh, Lutzhoft, Rudstedt & Dahlman's study of working within engine departments on Swedish ships (2011). Despite the value of these qualitative studies in explaining seafaring phenomena, my review of the maritime human factors literature reveals their rarity (14% compared to quantitative human factor studies (53%). As such, this research approach offered a valuable, yet rarely utilised, methodology to extend on theory in a relevant area of maritime practice.

I was also attracted to the benefits of a phenomenological lens in exploring the experiences and perceptions that underpin sensemaking. The following section describes how I was able to integrate phenomenology as a philosophy that augmented the narrative interpretive process to achieve a *phenomenologically attentive narrative interpretation*.

Phenomenologically Attentive Narrative Interpretation

There are a number of complementary attributes between sensemaking theory and the philosophy of phenomenology (Finlay 2013; Macann 2013 p. 54; Merleau-Ponty 1964 p. 15). This section explores those intersecting attributes, and justifies the role

of phenomenology as a philosophy within the narrative interpretive methodology (Roberts 2018).

Saunders et al define phenomenology as a philosophy concerned with socially constructed phenomena, aimed at generating meanings and gaining insights into those phenomena (2009 p. 677). Phenomenological methods approach research questions, participants and qualitative data with an open mind that is free from preconceived judgements. As Moustakas states, “Whatever or whoever appears in our consciousness is approached with openness, seeing just what is there and allowing what is there to linger” (1994 p. 85). This open-mindedness, or bracketing out of preconceived views, is known as the phenomenological *epoche* (Macann 2013 p. 51). This epoche was highly advantageous to me in research activities such as interviewing seafaring leaders (Webster 2007 p. 71), as well as curating their narratives (Cherry 2008) to generate thick descriptions (Freeman 2014 p. 827; Merriam 2009 p. 16) of their sensemaking processes (Cunliffe & Coupland 2012 p. 64).

Phenomenology involves, in Heidegger’s terms, a sense of *Dasein*, or “being there” (Macann 2013 p. 60), which indicates that phenomenological inquiry is able to bring interview participants back to critical events (Webster 2007 p. 73) where the nature of sensemaking can be vividly recalled and recorded. *Dasein* includes the manner in which an individual exists within, and interacts with, their life world in phenomenological terms. Likewise, Merleau-Ponty (1964 p. 4) described a highly situated, intersubjective phenomenology by stating “We are no longer present at the emergence of perceptual behaviours; rather we install ourselves in them in order to pursue the analysis of this exceptional relation between the subject and its body and its world.” Both Heidegger’s *dasein* and Merleau-Ponty’s bodily situated phenomenology demonstrate a deep congruency between phenomenology and intersubjectivism as an ontology. As such, phenomenology as a philosophy has much to contribute towards the exploration of a lived experience of seafaring leadership under both every-day and exceptional conditions.

Furthermore, I was keen to observe the sensemaking behaviour of the interview participants in as rich a form as possible, and this included non-verbal content (Denham & Onwuegbuzie 2013). I anticipated the performative nature of the

participant interviews (Sergi & Hallin 2011), which included far more than just their words – I sought to capture their emotions, their bodily movements, their gestures and their facial expressions. I wanted to take these seafaring leaders back to their narratives to know, as best as I could, what it was like for them. Such intentions were deeply phenomenological (Finlay 2013).

Van Manen suggested that phenomenological inquiry is best suited to describing the “essential nature” of lived experience “in a hitherto unseen way” (1997 p. 39). This approach is complementary with the research question of exploring the nature of sensemaking. However, it raises uncertainty as to whether it is possible to grasp the original *essence* of phenomena from narratives, since the events have been storied and re-storied (and performed and re-performed) numerous times by participants (Bamberg 2012; Caracciolo 2012; Sergi & Hallin 2011). To claim that a narrative contained the essence of the experience seemed to me to overstep appropriate epistemic humility about what can actually be asserted (Kidd 2016). Also, an intersubjective ontology, where meaning is co-created, left little room for universal phenomena such as *essences*.

Additionally, this research project sought to move beyond description to interpretation of the phenomena in order to yield practice-based improvements. Van Manen distinguished between a descriptive aspect of phenomenology, as in “what is it like?”, as opposed to an interpretive, hermeneutic aspect of phenomenology, as in “what does it mean?”, stating that Husserlian phenomenologists acknowledge description and not heuristic interpretation within phenomenology (1997 pp. 25-26). He went on to combine both description and interpretation under the unified term “description” (van Manen 1997). Van Manen’s approach, therefore, creates uncertainty as to whether a phenomenological *essence* can be extracted from narrative accounts, and ambiguity as to whether phenomenology allows for interpretation rather than mere description.

In order to be transparent about *interpreting* the lifeworld of seafaring leaders instead of merely *describing* their experiences, and in order to avoid claims of *grasping the essence* of an experience from a narrative account, it seemed prudent to frame this research project as *phenomenologically attentive narrative interpretation*. That is, the research was guided by phenomenology as a philosophy

while it followed a narrative interpretive methodology that generated pragmatic, practice-based recommendations for improving safety and performance within the maritime sector. The intellectual consideration of these points allowed me to apply my methodology with a finer degree of precision and with vastly increased confidence. As such, methodological reflection was a valuable investment during the research design phase.

Thick description and thick interpretation

The ability to conduct holistic and phenomenologically attentive narrative interpretation depended upon thick descriptions of the seafaring leaders' lifeworlds. Originally coined by Rile as referring to "context" (1971), and developed into an interpretive method by anthropologist Clifford Geertz (1973), thick description has become a tool for anthropologists, psychologists, sociologists, educators, and (as I will demonstrate in the practice chapter) practitioners. In outlining his approach to thick description, Geertz observed "that man is an animal suspended in webs of significance he himself has spun" (1973). Geertz thus sought a method to "keep the analysis of symbolic forms as closely tied as [he] could to concrete social events and occasions, the public world of common life, and to organize it in such a way that the connections between theoretical formulations and descriptive interpretations were unobscured by appeals to dark sciences" (1973).

Ponterotto (2006) distinguished between "thick" description and "detailed" description. Whilst thick descriptions can often be detailed, the "thickness" associated with this approach refers to its level of *context* and *meaning*. Ponterotto described the essence of thick description as accurately describing social situations within contexts, in a way that captures thoughts, emotion and a "web of interactions". He noted that thick descriptions are so well described that the reader "experiences a sense of verisimilitude", or the sense of truth in the account (p. 542).

As an example of thick narrative description, the following is the famous ichthyologist JLB Smith's account of first seeing a modern specimen of a coelacanth (an ancient fish thought extinct for 200 million years) in 1938. This account appears in Dawkins (2009 p. 163):

We went straight to the museum. Miss Latimer was out for the moment, the caretaker ushered us into the inner room and there was the – Coelacanth, yes, God! Although I had come prepared, that first sight hit me like a white-hot blast and made me feel shaky and queer, my body tingled. I stood as if stricken to stone. Yes, there was not a shadow of doubt, scale by scale, bone by bone, fin by fin, it was a true Coelacanth. It could have been one of those creatures of 200 million years ago come alive again. I forgot everything else and just looked and looked, and then almost fearfully went close up and touched and stroked, while my wife watched in silence. Miss Latimer came in and greeted us warmly. It was only then that speech came back, the exact words I have forgotten, but it was to tell them that it was true, it was really true, it was unquestionably a Coelacanth. Not even I could doubt anymore.

Smith provided a visceral, embodied account (Cunliffe & Coupland 2012) as to what it was like to first see a specimen of this living fossil. He described bodily interacting with the coelacanth by touching and stroking it, engaging with the fish's own anatomy "scale by scale, bone by bone, fin by fin". His wife, as a silent participant in his experience, looks on but also contributes to the sensemaking with her silence as a performative act (Sergi & Hallin 2011). This account suggests a liminal phase (Denzin 2001 p. 39) between Smith's eagerness for, and terror of, confirmation. Smith emerges from this embodied reverie upon the arrival of Miss Latimer. Perhaps significantly, Smith has forgotten his actual words in this event, but all else is significant and vividly etched in his story. This last point casts into doubt the importance of actual words in terms of meaning. Lastly, note the passage's capacity for "verisimilitude" to transport the reader to the museum in 1938, where we too encounter the enigmatic coelacanth through his narrative. Clearly, this is far more than a "glossed account" (Denzin 2001 p 104). It is contextual, meaningful and embodied thick description (p. 99).

I pasted this brief vignette into my research journal as an exemplar of the thick descriptions I wanted to elicit during my interview process (p. 72-3). It continued to be a valuable yardstick when curating the interview transcripts into thickly described

narratives, encouraging me to be sensitive to preserving the “thickness” of their storied accounts.

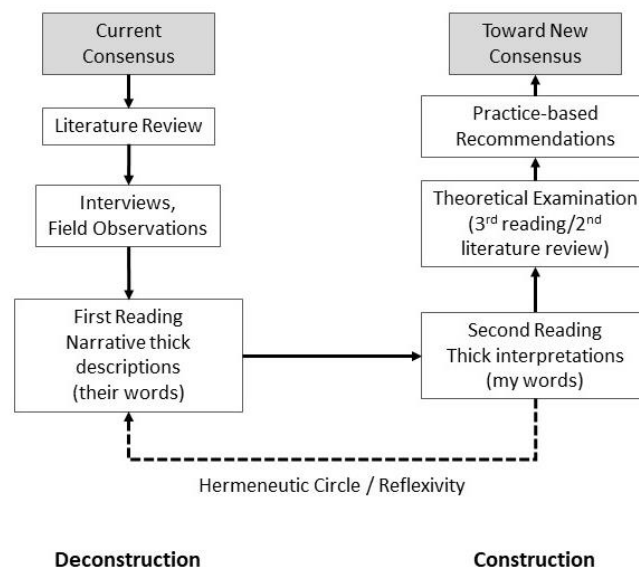
Denzin (2001) integrated thick description into his method of interpretive interactionism, devoting an entire chapter to the topic within his text. Denzin extends the principle of thick description to include thick interpretation. Ponterotto (2006) noted that thick interpretations depend on thick descriptions, and that thick interpretations are necessary for thick meaning. This dynamic enables holistic forms of interpretation.

My research aimed to provide a thick, holistic interpretation of the sensemaking of seafaring leaders. As such, thick description and thick interpretation were fundamental components for my research approach. The chapter next describes the method I designed and followed in this research project.

Research Method

The following section outlines the research design that I followed in conducting this phenomenologically attentive narrative interpretive study (Merriam 2009 p. 15). It consists of a deconstructive phase, where prior conceptions and narrative descriptions of a phenomenon are critically examined and “laid bare” (Denzin 2001 p. 72), followed by a constructive phase where meanings are “put back together” into a coherent whole (p. 78). This research method is summarised in figure 3.1.

Figure 3.1: Conceptual model of the research method



Firstly, the current consensus of MHF was critically examined during the literature review. This consensus was typified by Cartesian duality that separates mind from body, and mind from environment, as presented in the previous chapter. The literature review shaped the formation of interview questions and the interview process based on a defined sample population of seafaring leaders. Field observations were also conducted to gain additional contextual data of life and work at sea.

The narrative content was extracted from the interview transcripts as thick description. This constituted a first reading of the data. These narratives were curated in a way that laid the narratives bare and examinable by the reader. As a second reading, I constructed thick interpretations in my own words of the thick descriptions of the seafaring leaders.

A hermeneutic circle was engaged in which I reflected my interpretations back onto the thick descriptions themselves, to test and refine my interpretations. Ezzy described the hermeneutic circle as a “dance in which the interpretations of the observer and the observed are repeatedly interwoven until a sophisticated understanding is developed” (2002 p. 25). This takes place by moving iteratively

from the holistic to the granular and back to the holistic to ensure correct, or truthful (in terms of verisimilitude), understanding of life.

My interpretations of the narratives, organised into six motifs, were then subjected to an examination using a series of theoretical lenses, to validate and further explain the phenomenon in light of contemporary theory. Lastly, I developed practice-based recommendations for the maritime industry, with the view of establishing greater insight, and integration, of embodied sensemaking within the professional practice of seafaring leaders.

I intended that this research process and its outcomes lead toward a new consensus as to the nature of sensemaking as conceived by MHF and the broader maritime community of practice.

This chapter now presents a detailed description of each of these process steps.

Framing the research question.

A foundational piece of research design was the development of a set of research questions, consisting of a primary question followed by a series of operational questions that pragmatically scaffolded my subsequent research design. My overarching research question was framed as follows:

How do seafaring leaders make sense of critical events that confront their professional practice?

This research question was underpinned by the following operational questions (Josselson 2013 p. 51; Saunders 2009 p. 54):

- How do leaders within the marine offshore industry, as an example of a high reliability work context, go about making sense of critical events that occur in the context of their daily work that could result in high risk or danger if they do not notice and resolve these situations?
- What is their commentary on the experience of applying sensemaking to deal with critical events?
- What is the nature of sensemaking as a phenomenon?

- How do these leaders learn to do this? How do they develop this capacity in others?

The following theory-based questions were considered after developing my interpretation of the thick narrative descriptions (Caracciolo 2012; Webster 2007 p. 103):

- What would help these leaders to make sense of their roles and critical events?
- What theoretical perspectives inform my understanding of their practice and lived experience?
- What theoretical questions emerge from interpreting their thick descriptions?

These concise bullet points belie the number of false starts, iterations and refinements that I undertook in developing them. However, once I had crystallized them to a sufficient level of clarity and granularity, I largely set them in place as a foundation for my study. At this point I was already deeply interested in the *embodied* dimension of seafaring practice, but wanted to hold that possibility at bay in order to bracket it out and allow it to emerge (or not) as the interviews unfolded.

Establishing the participant group

Due to the defined scope of the research questions, I used purposive, homogenous sampling to select participants (Saunders, Lewis & Thornhill 2012 p. 287). This meant selecting a specific group of seafaring leaders, comprising master mariners and chief engineers, as the participant group.

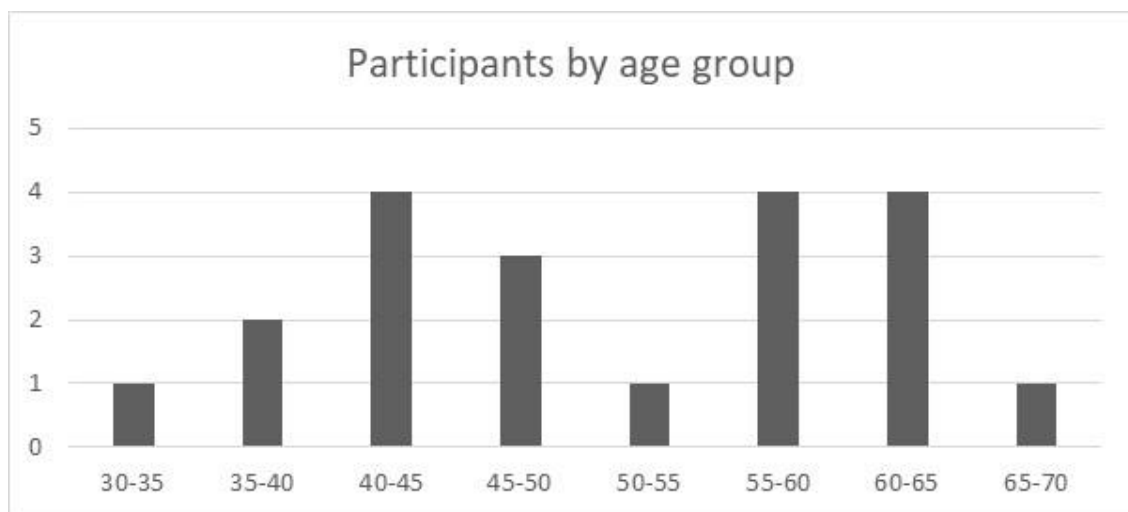
Limiting the group to seafaring leaders in lieu of seafarers in general achieved three aims:

- Firstly, it further focused the scope of the research project.
- Secondly, it captured a significant leadership component of sensemaking without necessarily limiting the scope of research to leadership itself.
- Thirdly, it solved a potential problem of power imbalance between researcher and participant which may have influenced the responses if I had included lower seafaring ranks. At the time I was conducting the interviews, I was a

training manager within a shipping company, where chief engineers and master mariners were of a higher seniority than my organisational level.

Whilst the sampling strategy was homogenous, I endeavoured to make this finite sample group as diverse as possible (p. 287). I selected participants to represent a spread of age groups (see figure 3.2 below) and a diverse range of ethnic backgrounds, where 35% of participants were from nations of origin outside of Australia. In terms of gender, I was able to include 100 percent of female seafaring leaders in the Australian offshore marine sector. Whilst this remains a significantly small number, it was highly worthwhile in terms of the richness of the sample group. In terms of specifics on gender and nationality of the participants, I have avoided discussing specifics in these demographics in case this in any way compromises the anonymity of those participants.

Figure 3.2: Interview participants by age group



I included both successful and less successful seafaring leaders within the sample group, intentionally including seafaring leaders who had experienced performance issues and professional setbacks. For example, I interviewed one seafaring leader who was currently on stress leave due to the cumulative impact of a number of major set-backs in his role. Intentionally adding such participants was an example of extreme case, or deviant sampling (Saunders, Lewis & Thornhill 2012 p. 287); yet it added significant richness to the research data that enhanced the interpretive process.

There was a minor degree of snowballing, or referral of volunteers, in terms of data sampling as the seafaring leaders I spoke to nominated interesting people for me to talk to (p. 289). Additionally, other seafaring leaders heard about the research and asked if they could participate. It was a novel and popular research project, and word had circulated as to why I was interviewing seafaring leaders. Many of them felt a personal stake in the research project, and consistently referred to it as *the* research instead of *my* research, which I believe indicated their belief that the research was collectively co-owned as being *ours*. This reassured me that I had effectively harmonised any researcher-participant power imbalances (Galuppo, Gorli & Ripamonti 2011).

Interviewing seafaring leaders

The research explored the sensemaking processes of twenty seafaring leaders (masters and chief engineers). Semi-structured (Josselson 2013; Merriam 2009 p. 32), critical incident interviews were conducted (Webster 2007 p. 71) to provide thick descriptions of sensemaking.

Seventeen interviews were conducted primarily in meeting rooms within the shipping companies offices, with three conducted and recorded via telephone. Due to my interest in capturing any embodied aspects of their narratives, I intentionally avoided telephone interviews. Where possible, I sat diagonally from them instead of opposite them, with the recording device between us in a common, neutral ground. I was sensitive to the relational body geometries between participant and researcher that might inadvertently introduce a semiotic power imbalance between us (Hopwood 2015).

I developed and applied a protocol for enacting the phenomenological *epoche* (Macann 2013 p. 51), or bracketing of preconceived views of their lived experience (Latham 2001 p. 44) during the interview, which was underpinned by an empathic listening approach (Josselson 2013 p. 81). This was highly valuable when conducting the interviews, as well as curating their narratives (Cherry 2008) to generate thick descriptions (Freeman 2014 p. 827; Merriam 2009 p. 16) of their sensemaking processes (Cunliffe & Coupland 2012 p. 64). Moustakas's description

of the phenomenological *epoche* encouraged me as interviewer to enact the following practices prior to conducting each critical incident interview:

- Spending ten minutes prior to the interview to generate an open and reflective mental state.
- Applying diaphragmatic breathing and counting of breaths to ensure as clear a relaxed state.
- Mindfully preparing voice recorder, consent forms, interview notes and the interview room to ensure that focus was grounded in the present.
- Adopting an attentive, open body posture and warm facial expression.
- Ensuring my perception was attentive, but not fixed on any particular point.

This list of activities became a protocol that I applied in all interviews (Roberts 2019). The protocol enabled me to maintain a consistent state across multiple interviews (Josselson 2013 p. 96) over several months. This in itself reduced variability in terms of interview conditions and contributed to the reliability of the research data.

Additionally, the phenomenologically inspired protocol achieved a consistent state that *externally* provided a relaxed and empathic demeanour (Rubin 2012 p. 80), while *internally* provided calm, observant and open-minded orientation (Josselson 2013 p. 81). It achieved this through mental preparation (generating an open and reflective mental state) and physical/bodily preparation (adopting an attentive and open body posture, diaphragmatic breathing) (Roberts 2019). Furthermore, this *epoche*, the open-minded suspension of preconceptions, lent itself to each stage of the interpretive process (Moustakas 1994 p. 13; Wertz 2011 pp. 132-133). This embodied discipline enabled me, as researcher, to return afresh to the narratives at multiple points of the research process (Moustakas 1994 p. 86).

A specific, pragmatic, example of this bracketing occurred when participants such as #0675 and #0768 mentioned that I would know what an experience was like because I had been a seafarer too. I was prompt in saying “Yes, but explain it to me anyway. What was it like?” The bracketing discipline gave participants the space to inscribe their stories upon a receptive and empathic “*tabula rasa*”, where I was merely the facilitator and conduit trying hard to keep my experiences out of the way.

This bracketing was by no means a perfect means of erasing my experiences and values, as I needed to interpret what they were saying in order to direct the interview. However, the bracketing protocol vastly improved the capacity to preserve the integrity of participants' narratives while allowing me greater control and transparency of when I entered into interpretive phases of my research at a later date.

Interview Questions

The following interview questions were prepared as a guide for commencing and probing during the interview. They were incorporated into the ethics application (appendix b), and approved by the ethics committee as a means of inquiry (appendix a):

- How would you describe your role? What are the things that are important for success in the role?
- Would you describe an example of a time when you had to work hard to identify and resolve a particular issue or problem that if you hadn't spotted it, it may well have caused a danger of critical incident to occur?
- How did you sense that something was not as it should be?
- Put yourself back into the situation as it is happening, as completely as you can. What is going on in the environment? What are you conscious of, or are sensing?
- What happened, and what did you do? How did you react?
- How did other people react to the situation? Who did you involve in the situation, and why?
- What were the outcomes of this event?
- What were the emotions that you experienced? What do you recall most strongly about being in the situation?
- How did you learn how to handle situations such as this?
- What makes it difficult for you, or your colleagues to do this?
- What would be your advice to others who may face uncertain or ambiguous situations?

However, aside from using the opening few questions to embark upon the interviews in a standardised way, the participants were able to provide rich narratives with little prompting from the remaining probing questions.

The interviews were transcribed in part by me, and by an independent transcriber (Oliver, Serovich & Mason 2005) using a randomly assigned numeric designator to ensure anonymity of the research participants. Additionally, I retained my interview notes where I recorded in writing my observations of bodily performance that the participant displayed during the interview, including gestures, body posture, facial expression, drawings and tone of voice (Sergi & Hallin 2011), discreetly noting the time of these occurrences as shown on the digital recorder. I then incorporated these components back into the interview transcripts where they occurred (Denham & Onwuegbuzie 2013). This further enhanced the thickness of description I was able to capture (Geertz 1973).

Field observations on an offshore vessel

To provide additional context to the seafaring narratives, I sailed as observer on board an offshore vessel (figure 3.3 below) for four days. This experience involved, as Denzin described, “living my way into and through the lives of others” (2001 p. 138). Bailey (2007 p. 3) described field observations as *naturalistic inquiry*, that “provides a more holistic picture of people and their lives”.

Figure 3.3: The offshore vessel on which I conducted field observations



By sailing on an offshore support vessel as it serviced several oil rigs off the coast of Australia, I ate with the crew, attended their operating watches, and even took part in some of the work, such as safety walk-arounds of the vessel to identify hazards in their workplace. As such, I became a participant observer (Bailey 2007 p. 80). I was careful not to jot down field notes in the company of the crew (which would have been an awkward distraction for both of us). Instead, I periodically stepped into my cabin and wrote my observations and experiences as thickly as possible. I took with me, in my field journal, a list of observational prompts suggested by Bailey and Bailey (2007 p. 84), including spaces, objects, actors, activities, events, time, goals and feelings.

A sample of my field observations appears below:

6.52 am – Off Kingfisher B

I get up at 3.30 am to see the first delivery. Heading to the bridge under red lighting (to preserve night vision), I see the massive expanse of the rig, twice our length - and our bridge reaching only to the first level above its legs. To me, in the darkness so far from shore, the rig has a homesick and sentinel feeling about it that is juxtaposed by the cheery gas flame (for safety) flickering in the night.

We are now in Dynamic Positioning (DP) mode, and so are eerily stationary in a heavy swell. The Chief Mate guides us in using the joysticks and the system adjusts and balances the thrusters to glide gracefully alongside. We adjust to approach from the starboard side, where the swell and the wind conspire to make the DP system work much harder. I see numbers jump on the readouts, but I can also hear the changing pitch of the various drives and thrusters. I feel the slap of the swell against the blunt stern, causing a crunch that reverberates; shuddering the ship.

Undertaking an immersive field observation expedition on an offshore vessel provided data that enhanced my understanding of operational and physical working

conditions (Ponterotto 2006). This context augmented the thick descriptions of sensemaking among seafaring leaders, which is discussed next.

First Reading: Curating thick descriptions

As Denzin (2001 p. 118) noted, “thick description rescues the meanings, experiences and effects that have occurred in problematic situations”. This was precisely my goal in converting the interview transcripts into curated thick descriptions that were presented in a sufficiently representative, succinct yet meaningful format for the reader to engage with.

I conducted a first reading of the “raw” interview transcripts to extract the narratives from the other general statements and opinions of the participants. I identified passages that related to a specific account of an event, where the description contained a *beginning*, *middle* and *end* (Perinbanayagam & McCarthy 2012). Fortunately, seafaring leaders proved adept at storytelling, and so their narratives were often of an impressively thick quality, yet they were sometimes fragmented in the telling and interspersed with observational anecdotes and opinions. My focus was to extract the narrative from the interview while preserving the participant’s voice, as a primary concern, and maintaining narrative flow for the sake of the reader (Lather 1995). This resulted in a set of 27 narratives out of the twenty interviews.

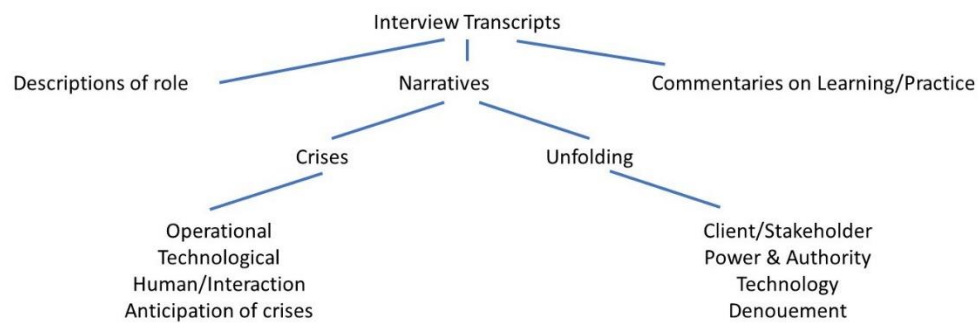
I then commenced a curation phase to arrange these narratives into some order in which to present these results to the reader. I was careful to minimise the degree of my own interpretation I was applying at this stage of analysis (Cherry 2008). However, any such activity of structuring the narratives of others can be seen as a form of interpretation in itself. I divided the narratives into crises (critical events involving a high degree of threat, urgency and surprise) and unfolding (critical events that were slower to emerge, whilst still having significant potential impact). This resulted in 20 crises and 7 unfolding narratives (see table 3.1, below).

Table 3.1: Narratives from the Participant Interviews

Crises
A towed fishing boat flipped over, leaving eight people in the water
MUA crew storm the bridge and insist the vessel is stopped for union action
Bunch of bastards on deck
Crane on the wrong side while coming along wharf
Verbally attacked by a crewmember in a meeting
High temperature alarm
Maximum power required but almost overheats the engines
While transiting the Singapore straits, a vessel may have potentially collided,
Officer on previous watch did not have his gyro compass turned on
Stuck CCP while engaged with the rig
Fire in the engine room
Injured crew member
Vessel sinking
Ship blacked out under tow - Gill jet
Near collision with a cable ship
Like Event - Responding to a fatality, on falling
Like event - Rescue of sailors on a stricken yacht
Saltwater cooling pump failure
Subordinate feared lost in a tank flooding
Hole in the hull of the ship
Unfolding Events
Fuel on the way to Singapore
Client did not do as they advised they would, which created an unsafe situation.
Rough weather at sea during retrieval of anchor buoys
Major engine fault - engines hunting
Random engine power spikes
Major system fault on a new ship
Not getting the updates he needs at sea (highly intellectualised)

My next phase of thick description curation was to further divide the narratives into their apparent causes or sources (figure 3.4). This resulted in crises being divided into groups of operational, technical and human origins, and anticipation of crises. I divided the unfolding events into events involving client/stakeholders, technology, power and authority, and a group for denouement (those that involved a pursuit for a final resolution, explanation or closure for a critical event).

Figure 3.4: Curation of Interviews into Thick Description Thesis Chapters



As such, the narrative thick descriptions listed under “crises” became the curated content for chapter 5, while the narrative thick descriptions listed under “unfolding” became the curated content for chapter 6.

For each thematic group, I selected a primary narrative to represent the theme (Cherry 2008; Ponterotto 2006), supported by vignettes (Sergi & Hallin 2011) from other narratives to enhance the primary, representative narrative. I used the analogy of a setting of gem stones in a ring; where a central, larger stone is enhanced by surrounding smaller stones to create a whole setting. These narratives were used to construct two chapters (chapters 5 and 6) of thick descriptions; describing the lived experience of seafaring leaders as they made sense of critical events (Merriam 2009 p. 16; Sergi & Hallin 2011 p. 191).

These chapters represent the conclusion of my first reading of the data, leading to the construction of thick descriptions arranged into a set of themes. I preserved the narrative voice of the seafaring leaders by abstaining from my own interpretations of their accounts during this phase. However, it is important to note that even this curation process involves some degree of interpretation on my part, and the storied accounts from the participants represent their own “native” interpretations of their stories (Denzin 2001 p. 127). The participants’ interpretive contents were valuable windows into their sensemaking.

The first reading resulted in a deconstruction of the critical events in terms of their causes, descriptions and native sensemaking phase (Denzin 2001 p. 72). The next

phase - constructing and introducing my own interpretations of their thick description (p. 78) - is discussed next.

Second reading: Creating thick interpretations

The thick description chapters and my immersion in the lifeworld of seafaring leaders provided me with the language, context and meanings to embark on a holistic, yet robust, interpretation of their experiences (Denzin 2001p. 122). This process constituted my second reading of the narratives.

Intentionally bracketing out existing theory (Moustakas 1994 p. 86), I was prepared to see their thick descriptions afresh, without recourse to “glossed” categorisations, conceptualisations and labels. Denzin (2001 p. 104) refers to such language as “experience-distant, second-order terms.” This theoretical bracketing took significant discipline and practice to achieve. It was difficult and frustrating at first to set theoretical concepts aside, yet it was vital for achieving my research goal of grasping new insights from the narrative thick descriptions. For me, it was an iterative process of writing, reflecting, rewriting until the interpretations flowed thickly and with a minimum of theoretical contamination.

In maintaining a holistic interpretive approach, I focused on more than just the recurrence of key words in the texts. That approach struck me as being reductionist. Instead, I dwelled with the thick descriptions over several weeks (Finlay 2013); looking for patterns in meaning and significance while paying attention to all aspects of the narratives (such as gestures, expressions, tone of voice) rather than just the textual words. I also considered what was not said, and what remained hidden in their narratives. I sought out salient elements of the narratives, highlighting these as markers without pulling them out of their thickly described contexts. I identified eighty-one salient elements, using a quote from the narratives to signify each element while not constraining the meaning of the element just to the words themselves.

I then scanned across the narratives, forming linkages with other aspects across the narratives as I considered how they connected, and what phenomenon may be responsible for the connection I was perceiving. This was a process requiring a

deep dwelling with these tentative threads, as I sought to construct meanings and patterns that were more intuitively grasped than analytically quantified.

This holistic construction of meaning yielded six phenomena that I referred to as motifs (to distinguish them from the initial themes of the thick description process). I was able to describe these motifs in initially simple terms (thin interpretations) and provide quotes from the narratives that support the motifs. The six motifs are listed in table 3.2 below.

Table 3.2: Motif summary of interpretation process

Motif 1: Shape-shifting and melding
<p>Descriptor:</p> <p>Merging of me and the ship: making sense of things through one's physical human body but extending my "reach" to the size of the ship. The interplay of senses, motor skills & bodily actions in sensemaking.</p>
<p>Sample Quotes</p> <ul style="list-style-type: none"> • Oh, we felt it (#0897) • He was quick to grab a hammer to hit the valve, to open it up (#0114) • I just ran (#0768) • Cause when you're a master, even in your time off you can hear the engines just <vhruur, vhruur> and you're always thinking ..."Jesus!" (#0361) • He disappeared, like, almost into the lever. (#0675) • You're hanging onto those sticks, putting as much power down as you can (#0768). • There's a snowballing effect where it can get out of control (#0114). • You've got to be on firm footing before you make big decisions like that (#0068). • And that's all I did for three days, for eighteen hours a day, until I was fried (#0254).

Motif 2: The strength of emotion in the midst of leadership sensemaking and action

Descriptor:

The interplay of affective content (mood and emotion) on sensemaking.

Sample Quotes

- Oh, I had tears in my eyes, mate (#3424)
- I was furious - absolutely furious (#0768)
- Straight after the event you are all buzzing - and then all of a sudden, it's a big low period (#0404)
- So, four engines flat out - and then you're just hoping (#0768)
- You feel like you're in a black hole and you can't get out. (#0361)
- I tried the delicate approach. I tried the sterner approach. Then the frustrated approach came on. (#0361)
- I need a break or else I'm going to go down that hole and I'll never come out. (#0361)
- I'll be honest, I reacted more as an individual than as a skipper (#0520)

Motif 3: Multiple zones of attention

Descriptor:

Traditional isolation and focus on an immediate physical/sensate space versus the electronically connected immediacy of multiple stakeholders.

Sample Quotes

- The whole world shrinks (#0190)
- The captain of the ship would get a telegram, and he would run everything (#0897)
- He had nobody to go to for advice (#0897)
- Oh God. I feel like... can't they just leave me alone for a bit? (#0190)
- It becomes that the master is not out there on his own at sea, contemplating what he's about to do and what is going to happen. (#0768)
- Well, you've got to make sense of it. You've got to keep a number of people well advised (#0806).

Motif 4: Authority and relationships in sensemaking and decision-making: Me-ness, them-ness and working together.

<p>Descriptor:</p> <p>The tension between “We’re connected. We have to work together” and “As long as I’ve got those stripes on my shoulder”.</p>
<p>Sample Quotes</p> <ul style="list-style-type: none"> • As long as I've got those stripes on my shoulder, nobody comes onto my bridge and talks to me like that (#0520) • If he says black is white, whether you agree with it or not... It's his engine room (#0395). • I'm the guy with the ticket. You should be listening to me (#0068) • They always try to push it more (#0361). • It's like an hourglass in both directions (#0535). • Once I had realised that what they had told me... was lies! (#0068) • I'm being challenged. They're challenging me (#0190). • He refused to come back <sotto voce> refused to come back with me (#0361). • Now, if I bow down to this guy, everybody has got no respect for me at all (#0361).
<p>Motif 5: The interaction of systematic diagnosis and problem solving with action, pragmatism and improvisation/ingenuity</p>
<p>Descriptor:</p> <p>The tension between “It’s like chess moves” (being clever/shrewd) and being resourceful (intuitive/ingenious).</p>
<p>Sample Quotes</p> <ul style="list-style-type: none"> • You're continuously reasoning what to do, how to do it, and if this goes wrong or that goes wrong. And so, it's like chess moves (#0768) • Everything is black and white in this industry. You either do it right or wrong (#0768). • And if this fails, what am I going to do? There's so much you're thinking about (#0768). • I split the system in half (#0675). • So, it was using the resources you’ve got (#0404) • Just get me the gill jet (#0768) • I just had to take action, so I just went full ahead on four engines (#0768)

<ul style="list-style-type: none"> You know how you get that gut feeling that something's going to go wrong? This boat had that feeling (#0254).
Motif 6: Grasping patterns, finding the line and denouement
<p>Descriptor:</p> <p>Learning to recognize patterns - in real time and in retrospect.</p>
<p>Sample Quotes</p> <ul style="list-style-type: none"> But where do you draw the line? (#0361) I know it's going to die at 99. But I've made up my mind, when it gets to 96, that's the end of it (#0993). So, I redraw the line -I'm now back in an equilibrium that I'm happy with (#0353). "Jeez, we're in strife here." But then it was like - "Well - Okay".... We're still safe (#0675). And that could have been the first hole in the Swiss cheese (#0068). So, the fact that I didn't anticipate that, and it happened, pissed me off (#0768). Because you always look back (#0404) And I found out afterwards it was all about money (#0068). I'm not coming back into the field until I understand what happened on that ship (#0768). You're left not knowing what the Hell is happening. And up to this day I don't really know what the outcome is (#0395).

Having defined these motifs and clustered these supporting quotes, I set out to thickly interpret each motif to construct “coherent wholes” of the sensemaking motifs (Denzin 2001 p. 78). After interpreting each motif in terms of the meaning I perceived, I noted any questions arising and sought to make further meaning of the motif by reflecting these questions back on the initial interpretation and the thick descriptions themselves.

As such, I employed a hermeneutic circle (p. 77) that achieved further depth of interpretation via a reflexive, iterative delving into the motifs.

The thick interpretations developed during my second reading of the narratives appear as chapter 7 (motifs 1,2 and 3) and 8 (motifs 4, 5 and 6). These chapters also identified any final questions that remain from my interpretations. They yielded thick interpretations of six motifs that emerged from the thick descriptions. These six motifs provided interpretive insights into the nature of sensemaking as enacted by seafaring leaders in their daily roles. My interpretations also highlighted a number of perplexing and paradoxical tensions associated with contemporary seafaring leadership. The next phase of analysis was to examine these interpretations, and the questions arising from them, in light of contemporary theory. This stage is discussed next.

Theoretical examination of the interpretation

The first reading yielded thick descriptions in the words of the seafaring leaders themselves. The second reading represented my own interpretation of these thick descriptions, in my own words. I then returned to the literature to theoretically examine these interpretations in what could be considered a third reading of the narratives, and a second literature review. This situated the constructed meanings from the narratives back into the domain of theory, to ensure robust scholarly examination of these fresh insights (Denzin 2001 p. 83).

In the first theory chapter, *Sensemaking at sea: alternative lenses*, I applied the theoretical lenses of embodied cognition (Adams 2010; Hutto 2013; Katzman 2015) and neurophenomenology (Gordon 2013; Rupert 2015; Varela 2010) to explore the nature of sensemaking that was evident within the narratives (motifs 1, 2 and 3). In the second theory chapter, *The habitus of the seafaring leader*, I applied the sociological lenses of *habitus* (Bourdieu 1972; Joy, Game & Toshniwal 2018; Lizardo 2013) and Jungian archetypes (Mills 2014; Robertson 2016) to explore the paradoxical tensions arising from traditional ways of making sense of seafaring leadership, and the forces of liquid modernity impacting on the maritime sector itself.

I was able to provide a theoretical explanation for the interpretations that highlighted a bottom-up neurobiological process and a bottom-up sociological process that significantly shaped sensemaking and yet remained largely hidden from conscious

examination. I then turned to the task of developing practice-based recommendations from these theoretical insights.

Practice-based recommendations

At this point in the research process, I had theoretically validated my interpretations of the ways that seafaring leaders make sense of critical events. It was clear that seafaring leaders faced significant challenges due to the changing dynamics of seafaring leadership, yet the embodied processes by which they made sense of these dynamics lay beyond their conscious examination.

However, given that this is a practice-based PhD, I was keen to develop practical, pedagogical recommendations for the maritime sector. I applied the lens of practice theory (Jenkins, Kinsella & DeLuca 2019), including practice wisdom (Higgs 2016b), in order to develop a comprehensive “prescription” for the maritime sector that integrated the micro- (seafaring leader), meso- (shipping organisation) and macro- (maritime industry) levels.

I then developed a set of practice-based techniques for seafaring leaders; comprising of an embodied sensemaking debrief session (facilitated by an educator/coach), and an embodied sensemaking scan that could be applied by a seafaring leader on their own at sea. In developing these practice-based techniques, I again returned to the data and adapted two narratives as examples of possible embodied sensemaking debrief sessions to illustrate how such a session would likely unfold.

Ethical Considerations

Ethical considerations have guided the design of this research method throughout, and the research design has passed the rigorous examination of Swinburne University’s ethics committee, as evidenced by the project’s ethics application (appendix B) and formal approval (appendix B). These documents describe the specifics of the ethical considerations and their mitigations in detail. However, three

specific ethical concerns are briefly discussed in this section; participant autonomy, confidentiality, and safety and wellbeing.

Participant autonomy was achieved by providing each of them with a detailed information statement outlining the purpose of the research (appendix C), and by formalising their consent via an informed consent form (appendix D), that offered them the opportunity to withdraw from participation at any time, including post interview. This was essential for ensuring the voluntary nature of participation and the right to withdraw (Saunders et al 2012 p. 231).

Autonomy was further assured by selecting a participant group that was senior to me in formal position within the organisation, and in which participants and I were in different organisational departments. This addressed any concerns of power imbalance that may have indirectly impacted participant autonomy (Galuppo, Gorli & Ripamonti 2011).

Confidentiality and anonymity were ensured by conducting interviews discreetly in private meeting rooms. In booking meeting rooms, I did not state the purpose of the meeting or list the participant I was meeting with. I also maintained strict confidentiality between participants in what they had shared. I also followed a protocol of anonymising the interview transcripts, assigning them randomly generated numbers, in which there is only one separate spreadsheet that lists both participant details and the assigned interview number. Interview transcripts and audio files are safeguarded by password access on my laptop as well as my digital back-up retained by Swinburne University as per their ethics protocol.

Anonymity was further preserved, given the fact that there was only one female available within the sample group, by reducing the use of gendered pronouns where this might inadvertently reveal the identity of the participant. As such, I frequently use the gender-neutral pronouns of “their” and “they” when referring to participants in order to draw a veil over the gender of the participants where this might inadvertently reveal their identities. Since major maritime incidents might be identifiable by the names of ships and the geographic areas they occurred in, I anonymised these aspects as well.

Psychosocial hazards were possible during interviews in which participants retold and reflected upon critical events. As such, I incorporated the organisation's external Employee Assistance service as a mitigating control towards wellbeing and safety (see appendix B part A7). Additionally, I had received training as a mental health first aid officer, which assisted me in monitoring the wellbeing of participants during the interviews. My organisation's Employee Assistance provider agreed to provide counselling and support services to interview participants. Only in one interview did I observe such a noticeable indication of psychological distress in a participant that I referred them to this service. As such, the Employee Assistance service ensured the avoidance of harm, or non-maleficence, for participants (Saunders et al 2012 p. 231).

Validity, reliability and limitations

There are a number of limitations associated with this research method which warrant noting. Firstly, a deep study of phenomena through a holistic interpretive process necessitates limiting the number of semi-structured interviews that can be effectively interpreted via this method. In the case of this study, the number of interviews was twenty. Additionally, these participants came from the Australian offshore marine sector, which is one element of a broader maritime domain.

Additionally, Denzin (2001 p. 51) noted that all interpretations remain "incomplete and unfinished", in that there is always more to be gained from re-examining meaning from thickly described accounts. He noted that interpretations require "willing readers" to enter into the rich lifeworlds of the researcher's texts. Readers bring their own experiences and meanings to such texts (p. 147). However, these tentative, impermanent dynamics are essential for achieving deep understandings of the lifeworlds of others.

Given these limitations, I focused on augmenting the validity and reliability of this research project by intentionally building the following elements into the research design. Firstly, the phenomenological *epoche* described earlier was applied when interviewing and when reviewing qualitative data. This ensured a bracketing of preconceptions and a "clearing of mind, space and time" to see "just what is there

and allowing what is there to linger” (Moustakas 1994 p. 86). This addressed Polkinghorne’s concern of producing texts that the researcher expected, as well as creating trust in the interviewer that I have not filtered out undesirable parts of the narrative (2007 pp. 481-2).

This bracketing was also applied to the structuring of the thesis chapters, to be explicitly clear as to which chapters involved the words of the seafaring leaders themselves, which chapters involve my interpretations of their words, and which chapters involve theoretical examination of those interpretations. Whilst Ronai (1998) proposed layering these dimensions within narrative analysis, I have kept seafaring narratives, my interpretations and the theory of others segregated to maintain transparency of interpretive process.

Validity was also augmented via purposive sampling; constraining the sample group to senior officers within the offshore marine sector (masters and chief engineers) while maximising diversity of age, gender and ethnicity within this tightly defined sample group (Saunders, Lewis & Thornhill 2012 p. 284).

Lastly, validity was considered within its original sense of being “a well-grounded conclusion” (Polkinghorne 1988 p. 175) to establish verisimilitude, or trustworthiness, of the interpretation of the narratives (Polkinghorne 1988 p. 176; Webster 2007 p. 99). Verisimilitude required that the narratives resonate with the researcher in a plausible manner, and that their truthfulness is confirmed through comparison with other, “like” events (Webster 2007 p. 99). I applied thick description as a means of enabling verisimilitude (Ponterotto 2006 p. 542). Additionally, the hermeneutic circle between thick description and thick interpretation provided, as Lather (1995 p. 53) described, “a multivalent text, a questioning text that signals tentativeness and partiality”. However, such interpretive texts “elicit testimony which exceeds the testifier’s own awareness to bring forth a complexity of truth which, paradoxically, is not available as such to the very speaker who pronounces it” (p. 50). Such is the paradoxical capacity of interpretive methods to achieve validity through verisimilitude while remaining partial, tentative, and always open to re-interpretation.

Reliability, ensuring the replicability of research results, faces unique challenges within interpretive research. However, the reliability of my research has been augmented by providing this detailed account of my research process, and making explicit the rationale that guided my choice of methodology. This chapter documents a transparent and repeatable process of data collection and analysis (Saunders, Lewis & Thornhill 2012 p. 382). This will ensure that future researchers can replicate the research process with a high certainty of reliability.

Generalisability, or the application of conclusions from a limited study to a broader context, is an aspect of reliability that has inherent limitations in inductive studies due to limited sample sizes (Saunders, Lewis & Thornhill 2012 p. 383). However, *transferability* can be achieved in qualitative research. Transferability refers to the degree that research results can be “transferred to other contexts and situations beyond the scope of the study itself” (Jensen 2008 p. 886). According to Jensen, transferability can be achieved by ensuring participants closely link to the context being studied. This has been achieved through the purposive sampling of seafaring leaders as described previously in this chapter. Jensen also states that providing a detailed description of the contextual boundaries of the findings in a transparent manner that “paints a full picture” for the reader to follow (p. 86). This research addresses the challenge of transferability by providing transparency of the descriptive, interpretive and theoretical analyses within the methodology described in this chapter. As such, it generates “well-grounded and supported” conclusions from the data (Polkinghorne 1988 p. 175).

Therefore, whilst acknowledging the limitations associated with validity and reliability within inductive studies (Polkinghorne 2007; Webster 2007 p. 90), the above measures mitigate concerns sufficiently to provide a robust and valuable body of research.

This chapter has made explicit my justification of a phenomenologically attentive narrative interpretive approach to exploring how seafaring leaders make sense of critical events. It describes in detail the research methods employed throughout the

project, and concludes with a frank discussion of limitations, validity and reliability within the study itself.

One final measure of ensuring validity was achieved by disclosing my personal values as a researcher for the reader's consideration prior to presenting the thick description and interpretive chapters to come. As such, the next brief section, an interlude within the thesis, provides a disclosure of my personal values that may influence and shape this research process.

Chapter four: Researcher reflection - disclosing my values

In an interpretive research project such as this, the researcher becomes an instrument that shapes the research outcomes. This is particularly so with respect to the researcher's values, and how these interweave with his/her interpretation of the narratives to form meaning (Saunders, Lewis & Thornhill 2012 p. 139).

As such, some level of insight, or disclosure, of the researcher and his/her values becomes a critical element in the validity of these research outcomes (Bailey 2007 p. 7). With this in mind, I now aim to make some disclosure of my self and my values with respect to the topic of how seafaring leaders make sense of critical events. Such an endeavour requires examining myself as a researcher and practitioner, but also as a person. Furthermore, it is an opportunity for me to make some sense of my own self in relation to my research, and this provides an opportunity for professional insight and growth via critical reflexivity (Bailey 2007 p. 7; Cherry 2008).

In order to provide additional structure to this self-examination, and to alleviate my concerns about self-indulgence, I employed a method based on Moustakas's Heuristic Research (1990). This method takes the form of a structured self-dialogue; an "indwelling" that can illuminate tacit knowledge and intuition through an internal frame of reference (Moustakas 1990 pp. 16-27). Alongside Moustakas's heuristic approach, I employed Fish's "four strands" approach, as demonstrated by Denshire and Ryan (2001) as a means of linking personal and professional domains of the self. This method comprises four elements; a *factual strand* where the story is briefly told, a *retrospective strand* that looks back at the events for any patterns or meanings, a *substratum strand* that explores assumptions, beliefs and values, and a *connective strand* that relates these insights to the "wider world of practical situations".

Factual Strand

I came from a childhood home that, at best, could be described as chaotic. There was no ready-to-hand set of norms to blindly follow. It became essential for me to

question and make sense of how things could be the way they were. Also, I became a keen, somewhat vigilant, observer of the unpredictable world around me. These skills have always served me well, and not having a handed-down set of values to follow allowed me to create my own. This, I have come to understand, is a rare gift in life.

Like any child, I had aspirations of what I wanted to be when I grew up. I recall dreaming of becoming an astronaut, a scientist, and a writer. My older sister, a born teacher, taught me to read before I commenced school, and this too was a precious gift. My advanced reading ability opened a vast realm that I dove into with both feet.

I changed schools frequently, I became highly skilled at making new friends – I just happened to change those friends every few months. In truth, I recall having a lot of fun. One thing I noticed was that each school was different in ways that I had no words to describe at the time, but these differences were often reflected in both the teachers and the students. The blur of schools I attended seemed to shift me out of phase, and I became able to look at what was going on in those environments and see things – actually see things - from the outside. With my capacity to observe and question, I was a tiny anthropologist of sorts.

I wrote well, and read widely, and so was ahead of the curve in terms of English and social studies. However, my fragmented schooling meant that I missed out on a lot of mathematics, which convinced me for most of my life that I had no aptitude in that regard.

I graduated high school with surprisingly good marks and was accepted into an Arts degree at Monash University. However, I concluded that an additional three years at home was untenable. I had applied to join the Navy. My acceptance to the Navy and to Monash Uni arrived on the same day. I knew I wanted to serve my country. The Navy offered money and independence - and a ticket out! I settled on the quick fix, perhaps for all the wrong reasons, and joined up.

I loved the Navy and I garbed myself in its identity like a warm pea coat. It gave me someone to be in a way that, at the time, I did not feel I had in myself. Since I did not have sufficient mathematics I did not join as an officer, but my language skills and aptitude enabled me to become a communications sailor – a signalman. I would

have loved to have slipped into the Navy's ways – subsumed into their deep traditions - but my earlier years of observing and questioning and being “outside looking in” had meant that I was immune to its spell. Even so, I found the Navy, with its traditions and tribes, endlessly fascinating. Like the primary schools before them, it became my organisational “laboratory”.

On my first assignment to a ship, I noticed that equipment and fittings didn't often fit to my small stature (I am 161 centimetres, or five-foot three inches tall). For example, I was far too short to use the sighting scope fixed to the top of the ten-inch signal lamps. I improvised by using a heat exchange fin running along the base of the signal lamp to aim it, looking underneath it as I worked its shutters to send messages in Morse code. Likewise, I was too short to reach into the bins containing the signal flags that we would hoist as coded signals to other ships to coordinate our manoeuvring at sea. I developed a method of vaulting up and balancing with my rib cage on the rim of the bin, as I leaned over and clipped the sequences of flags together. My legs would swing freely while I did so, before I would flex my abdominal muscles to spring backwards, clip the tail end of the halyard (a rope that hauls things up) while hoisting the flag signal to the top of the yardarm. While I managed these tasks with fluid ease, it became a daily, bodily message to me that I did not naturally fit. I could not rely upon the conventional ways that others in the Navy did things, and if I wanted to serve to the best of my abilities, I would need to find my own ways to get things done.

I travelled widely, performed well, and eventually the Navy and I came to a peaceful truce where I used my independent thinking to help them find unconventional solutions within their regulations and standards. I became involved in a raft of reforms that sought to positively change the culture and systems of this highly traditional organisation.

I also started my own family, and was particularly keen to provide them with the resources, stability and care that was not always present in my childhood. That caused internal conflict between my duties to the Navy and my duties to my family, but that is often the lot of military families.

I was given a rare gift while serving on a ship at sea. Part of my role was to train new seafarers in how to drive warships. One particularly clear and moonless night I was at the helm of a frigate, steering a course, when I noticed I could only see the silky night and the expanse of the milky way out of the bridge windows. There were only the stars outside, and the glow of the instrumentation from the bridge of the warship, and it was as if being among the stars, on my childhood spacecraft, travelling to some distant world. I decided that I had come close enough to becoming my childhood ambition of an astronaut, and I suspected that my childhood ambition might have steered my life to this exact point. This gave me a deep sense of completeness.

I had played a small role in reforming Australia's military, and we had "won" the Cold War with the dissolution of the Soviet Union (while the long and bloody War on Terror had only begun with the first Gulf War). Shortly after this, having served ten years as a seafarer, I joined the civilian world of business.

In leaving the Navy and joining the "real world" of work, I was certain I would not succeed, and that my family and I would promptly starve. This was not the case. My career, along with my salary, skyrocketed. My corporate employers surmised that my military background would guarantee discipline, grit and "can do", and I tried not to shatter that illusion. I returned to Monash Uni to complete a business degree, followed by an MBA, surprising myself that I had a latent aptitude for mathematics (now rebadged as quantitative methods). I worked in operational and training roles, progressing up the corporate ladder at what seemed a dizzying rate. I gravitated towards organisational development, where I could employ my ability to observe an organisation from the outside and the inside at the same time. I was passionate about learning and development, and helping others achieve their full potential.

Fifteen years in the commercial world went by quickly, until I found myself working as the Asia Pacific Learning and Development Manager for an offshore marine organisation with a fleet of twenty-eight ships. This was an eerie homecoming, in which the seafaring world came back into sharp focus. Around this time, I applied for the Practice-based PhD programme at Swinburne University of Technology. When considering a research question, I was keen to focus on a topic that would be of most practical value to these seafarers, as well as peel back some of the mystery

around their most pressing problems. I started academic writing, enjoying the crafting of words, and was thrilled to have a peer-reviewed journal article published. This reminded me of my childhood aspiration of being a writer, and I again felt the subtle guidance of my childhood on my adult life.

I quickly settled on the research topic of exploring how these seafarers made sense of their lifeworld. My chosen research method allowed me to integrate the anthropological leanings I had secretly carried forward since my early childhood. I did not want to approach my research from the arrogance of imposing my own ideas onto their world. I wanted to listen to them, and carry their wisdom towards these solutions. I wanted my research to be as robust as possible, so that it would stand as credible social science in its own right. I realised this also harkened back to my childhood aspirations of being a scientist, working to discover things and help others.

In interviewing these seafarers, I was startled at how they referred to me as a seafarer, and included me naturally in that category. I had assumed I had left that role behind long ago, and had ceased to think of myself in that way. I felt I had no right to the kinship that being a seafarer implied. And yet, they offered it freely – generously. I listened to their stories, which contained their triumphs, their problems, their fears and their unquestioned view of the world. Instead of being cynical of their certainty of their traditions, and their autocratic approach, I found myself compassionate. I was thrilled at the prospect of distilling some insights for them and being of some help.

Reflecting on this story, I realise I have become that astronaut, that sailor of starry skies. I have become that writer, and I am fast becoming that social scientist I dreamed about. Such is the power of childhood dreams! I appreciate the gifts that my childhood has provided me; my questioning and observing nature. Lastly, as I integrate back into the world of the seafarer as well as forward into the world of the Academy, I have a deep sense that I am at last learning to belong.

Retrospective Strand

The *retrospective strand* provides a second reading of the above narrative with the view to identifying themes. Performing this reading, I am rather shocked to see how starkly some themes emerge from the narrative. These include:

- Belonging, and being the “other”.
- Observing life from the outside of the way things are.
- Setbacks that turn into strengths.
- Questioning authority, and the way things are done.
- Professional identity.
- Serving your country, serving others, helping people.
- Finding your own ways of practice.
- Unconventional practice that challenges tradition.
- Warriorhood, military service, fighting worthy battles.
- The sea, and life at sea.
- Escape, escapism, “sailing starry skies”.
- Science, and the certainty of knowing things.
- Denouement, coming full circle and, finally, belonging. Moving towards a “happily ever after”.

There are certainly a number of themes that I was not aware had been running through my personal narrative. Some themes intersect with the subject of my research project, and this strand confirms that I was correct in the need to disclose my background as researcher.

The next phase of self-examination identifies values and assumptions that underpin these themes.

Substratum Strand

Reviewing the themes of the *retrospective strand*, I was able to identify the following values that I uphold and operationalise. This comprises the *substratum strand*, as a statement of personal values (Saunders, Lewis & Thornhill 2012 p. 139), shown in table 4.1:

Table 4.1 Personal Values & Their Potential Dark Sides

Helping others	<p>It is important to help others, and to be of service in meaningful ways. Liberating others is worthwhile and achievable.</p> <p><u>Potential dark side:</u> I sometimes think I know what people need best, when I don't. Also, this can lead to martyr-like behaviour.</p>
Questioning traditions	<p>I value examining traditions to understand where they came from and whether they are still beneficial. I value change and the ability to meet emergent challenges.</p> <p><u>Potential dark side:</u> I can be needlessly iconoclastic, and cynical regarding established methods of practice.</p>
Questioning authority	<p>I am mindful that authority is used wisely and ethically. I critically examine power and its sources to understand their broader, long-term impacts.</p> <p><u>Potential dark side:</u> I can be a rebel, and anti-authoritarian. I despise bullies and will take significant steps to bring them to heel.</p>
Persevering in the face of setbacks to achieve goals	<p>I believe that goals can be achieved in the face of significant odds; given sufficient commitment, ingenuity and support. It is always possible to turn a situation around. Never give in.</p> <p><u>Potential dark side:</u> Not everything ends up as a perfectly "happy ending", and sometimes forcing it to do so can make things worse. Also, I judge others harshly for not rising above their circumstances.</p>
Science and intelligence	<p>I value the capacity for science and knowledge to answer questions and to significantly help others. I believe in being intelligent and clever, and the value in a valid, evidence-based conclusion.</p>

	<p><u>Potential dark side:</u> Not everything is feasibly knowable, and some things are just plain senseless. Sometimes, I intellectualise or deconstruct a situation to make it less threatening. I can show off being clever at times at the expense of being effective.</p>
Respectability	<p>It's important to do the right thing and develop a respectable livelihood. This is about being ethical, upright, conscientious, and successful. Being a good person.</p> <p><u>Potential dark side:</u> I can care too much about how I look and what people think of me. Also, does having a doctorate add to my respectability? Will such things ever be enough?</p>

Clearly, there is the potential for these personal values to influence my research, particularly my interpretation of the narratives of seafaring leaders (Saunders, Lewis & Thornhill 2012 p. 139). These aspects are then considered in light of the connective strand, which is discussed next.

Connective strand

The connective strand links the insights from the previous strands to the wider world of practice. In this case, to the context of the research approach described in the methodology chapter.

Clearly, there are many positive aspects to my values, and the experiences in which they have formed. For example, the desire to help (even liberate) others, and the value placed on robust intellectual effort to achieve beneficial outcomes. There is also the positive belief in persevering, and never giving in. Additionally, my value of being curious and questioning regarding traditional ways and forms of power will be

beneficial in examining the layered narratives of seafaring leaders. Ultimately, I will want my research to be a force for good in the world.

However, there are potential dark sides to these values that I will need to be mindful of when interpreting the narratives of seafaring leaders. For example, am I being too critical of traditional approaches within the maritime sector? Am I judging autocratic leaders too harshly in their need to impose command and control? Additionally, am I merely showing off my intellectual capabilities, or progressing towards effective, practice-based insights? Lastly, will my belief that every obstacle can be overcome encourage me to put an expedient “band-aid” on an irreconcilable problem and declare it “fixed”?

The solution lies in mindfully reviewing my interpretations in light of these six values to ensure that they do not unduly hold sway in terms of my process. Polkinghorne cites Nietzsche as saying that an “admirable self” comprises a set of “powerful and conflicting” tendencies that the individual is able to harmonise (1988 p. 154). As such, this list of values, including their potential dark sides, will be applied as an additional “sieve” on my conclusions and solutions, to further improve the validity of the research (Saunders, Lewis & Thornhill 2012 p. 139).

Additionally, I encourage you, as reader, to be mindful of my back-story, its themes, and my personal values, as you consider my interpretations and practice recommendations. As a matter of validity, I present this disclosure as a gauge to the extent that these values have influenced my research, and to understand how these personal factors have shaped the research that follows (Polkinghorne 2007).

Over the previous chapters I have discussed the focus and motivation for this research. I have reviewed the literature in order to determine the importance of the research and the appropriateness of the proposed research method. I have provided a detailed description of the methodology that will be employed, and I have made a comprehensive and structured disclosure of my own self as researcher, highlighting the values that are likely to influence the research moving forward. I now turn to the analytical phases of the research, commencing with the thick descriptions of critical events at sea.

Chapter five: Thick descriptions - crises

Perhaps the most powerful descriptive tool available to interpretive researchers is the narratives of those directly involved in the lived experience (Andrews 2013; Blix, Hamran & Normann 2013; Caracciolo 2012). As discussed in the previous methodology chapter, the intention is to utilise the rich narratives of the seafaring leaders as they thickly describe critical events (Denzin 2001).

This approach poses the challenge of curating the narratives from the interviews with concern for authenticity and efficiency, while ensuring representativeness of the broader data-set of interviews (Cherry 2008). My concern as a researcher was also to minimise the degree of premature interpretation that can enter the curation process, as applying structure to the narrative representations tends to shape the meaning of the narratives.

As discussed, the narratives have been divided into those events that present as crises, and those that present as unfolding and emerging events. The crisis narratives are presented as thick descriptions within this chapter, while the unfolding/emergent events are thickly described in the next chapter.

The narratives have been curated in order to represent the phenomena, removing extraneous technical descriptions that fall within the category of technical reporting rather than story telling (Denzin 2001 p. 104). These thick description chapters comprise a master narrative in detail, selected for their representativeness, and supported by briefer narrative vignettes (Sergi & Hallin 2011) that augment the description. An analogy used to describe this method is a setting for a ring, where a primary gemstone is supported by a series of complementary gems to provide an integrated setting.

The purpose of this chapter is to provide thick descriptions of sensemaking behaviours undertaken by seafaring leaders who find themselves in the teeth of crises; those expanding and unexpected events that emerge rapidly from the flow of their work and challenge established procedures and responses. However, I begin by presenting seafaring leaders' descriptions of how they perceive their roles.

Descriptions of the seafaring leader role

In order to provide context for sensemaking among seafaring leaders, it is valuable to explore how these seafaring leaders describe their roles in the course of their narratives. The following commentaries begin with descriptions of the role of the master, in their own words.

To describe one's role, in any endeavour, is an act of sensemaking in itself. This is true also for the seafaring leader. One master, with seven years' experience in that role, offered the following commentary on their role:

The Master is an extension of management. He's the ultimately, the responsible person for the vessel, the crew, the crew safety, the environment, and the actual operation and service provided by the ship. So, the buck stops with him in every respect. So, he has to ensure that the vessel is run in accordance with the company values, policies, procedures and expectations. He still has the over-riding authority, so irrespective of what instructions may be issued or given to him, he can override that authority. To me it's a position which, over the years, has probably tended to be watered down a little bit, and that's probably been due to the fact that - well, several reasons, really. Because of the ease of communication that everybody wants to get their opinions across, everybody wants to get their instructions across, and it becomes that the Master is not out there on his own at sea, contemplating what he's about to do and what is going to happen. He's got everybody in his face every five seconds, saying "do this, do this" and "what about that?" sort of thing. So that's made things a little bit more difficult (# 0768).

Another master divided the role into three areas of focus, while retaining the total responsibility for these three areas:

What it means to me is basically that I am responsible for the crew. I'm responsible for the assets that the company has put under my control, and I'm responsible to the client that we are contracted to (# 0190).

Some draw the comparison with business leadership, as in

The way I try and perceive my role is I am more <pauses> like a Company CEO. I've got people to do various roles and I'm there to manage them (# 0124),

and,

I see the role as the master as a CEO. That's it. You're there, you've got a client to look after, you're business people role, your employer. That's how I see it. You're CEO" (# 0361).

This perspective is further described in the following comment:

It's just such a massive job, it encompasses everything on board, because as captain you are the point of contact for everybody; everybody comes to you and everybody expects things to come from you. It's like an hourglass in both directions. You've got everybody offshore pointing at you and everybody on board pointing at you, and you've got to filtrate the information, you've got to analyse the expectations and produce results (# 0535).

These dimensions of the role are accompanied by a level of unquestionable authority, as described by one master in commenting on towing operations:

I'm the guy with the ticket. I'm the guy in charge of the tow. You should be listening to me. You shouldn't tell me how to do my job. Because at the end of the day I'm the one responsible for the safety of the crew and the ship. If something goes wrong, it comes back at me. So, you've got that at the back of your mind (# 0068).

However, when he felt his authority was not respected by management or the client in the narrative, he commented:

What's the point in having a Master? (# 0068).

There is an expectation that this authority must be respected at all times:

As long as I've got those stripes on my shoulder, nobody comes on the bridge and talks to anyone on the bridge like that – it's as simple as that (# 0520).

Some masters highlight changes to the role over time, such as the following observation from a master with 34 years' experience in the role:

That's the difference in the maritime industry since thirty years ago. The captain of the ship would get a telegram, and he would run everything. He would get a telegram changing the port you were going to, or changing your instructions or asking for a query, but basically, he's the sole man onboard. He had nobody to go to for advice. You had to manage everything (# 0897).

Additionally, there is frequently a gentleness expressed in the way these leaders describe aspects of their role. One master described their role as

You are a mother (# 0897),

while another recounted his mindfulness and duty of care on night watch while his other shipmates were sleeping (# 0540). Another master, on discovering an injured crew member, commented:

It was confronting. And she was crying and in pain, and I thought "Oh no..."
Yeah. That's confronting when you hurt someone (# 0190).

Chief engineers also hold leadership or command roles within the maritime sector. Their commentaries on their roles reveal a more technical, and often more articulated, structure of responsibility:

The chief engineer from a technical point of view is responsible for the technical side of the ship. That would be in the engine room, but also deck equipment or navigation systems as much as possible, like the Dynamic

Positioning system or electronic charts we have limited experience, limited knowledge, but we have to cover all the technical aspects of the ship as much as possible. We cannot divide deck and engine room, because from an operational point of view we are connected; we have to work together to transfer, receive load, or load the ship, unload the ship, pass the material to the rig. So, from an operational point of view strict cooperation with the mates to carry out operations (# 0711).

Another chief engineer described the role in a similar structured way:

I suppose in hindsight management of an asset, the asset being the vessel, and the management component would be vessel maintenance, scheduling repairs of various systems, people management, planning, negotiations, system investigations, risk assessments, the safety aspects there (# 0114).

Another commonly expressed aspect of the chief engineer role is its communication and liaison dimension:

It's a responsibility that you have as Chief, to have very much a component of, your liaison in interacting with the office. And if the company do it right then they integrate both the shore-side requirements for being a chief and the seagoing requirements obviously as one. You do wear two hats, but seamlessly; when you're at sea, you are representing the engineering aspect directly to the company (# 0806).

However, there are still strong indications of an authoritarian element to the role:

Really, he runs the show. If he says black is white, whether you agree with it or not. It's his engine room. It's his head on the chopping block (# 0395).

As such, the commentaries of both masters and chief engineers provide an insight into how they make sense of their roles in general terms. I now present their

narratives of critical events that arise suddenly in the course of performing these roles – the phenomenon of crises.

Operational Crises

One narrative, provided by a master with 40 years of maritime experience, was highly representative of narratives involving a crisis arising from operations at sea. This master described his actions in avoiding another vessel that suddenly headed at his ship at speed. I conducted the interview in his office. The participant was casually leaning in his office chair, feet pointing apart in an open and relaxed posture beside his desk.

Now, I was alongside a platform, and I was right up close. I was about two metres off this platform, and we had an ROV, which is a remote operated vehicle - a little submarine, down and it was looking at flow lines. And the Chief Officer I had at the time came running up to the bridge and said "Have a look at that!" and I looked up and it was a pipe-lay vessel. It is a great big vessel with a huge reel. And the vessel was heading straight at me, and it had an enormous bow wave – it was full power. And I'm thinking, uh, I am in a real situation because I've got this submarine over the side, I've got this ship which is probably, it may have missed me but I wasn't sure, and I didn't know if there was anybody on its bridge. I did call them but I didn't get a response. So, then I just had to take action, so I just went full ahead on four engines, and just powered away from the rig. And it was a horrible situation, so I just kept these four engines power on, and then I put my stern to him and tried to run away from him.

At this point of the interview, I notice the participant and I have gradually gone from sitting in relaxed poses on a diagonal, to sitting face to face with feet pointing directly at each other and only a few feet apart. There is an intensity, and urgency to his expression.

As it turned out, the guy on the bridge of that ship, I think has had a seizure, or a moment of some description, and he's gone full ahead, and it wasn't until the electrician on that ship went up and activated all their thrusters to thrust

them away from us. But that was a situation where I think I would have been, had my Chief Officer not come up and told me, I think we would have been t-boned and would have been a major, major disaster. So that was awful. And the follow up from that was terrible. Because when I got away, and got the ship to safety, and everybody calmed down, I then got on the radio and said that this was a major incident.... It had huge potential.... And I'm not coming back into the field until I understand what happened on that ship and what is being put in place to stop this happening again. And I got totally... it was very, very poor, the response I got. So, I sat out there for nearly a day, until they said "You've gotta come back in". and I said "Well, where's the cable ship?" and they sent the other vessel away and we came back in. And I never really got a full understanding or an overview of what had occurred. So, um....<reflective pause>

Interviewer: So, what was it like being in that situation?

Oh, terrible, because it was one of these moments when you are... <deep intake of breath> okay, you've realised there's an issue. You know that that ships about to plough into you. I mean it was close, we got close. So, four engines, flat out, and then you're just hoping. I called the engine room and said "I'm going to use full power right now. I can't afford to black out, and then get yourselves out of the engine room." The crew were all out on deck. And it just happened that quick. But it was a very frightening, yeah, very frightening position

As soon I had movement on the ship, I then turned the ship to face the stern so that if he did hit, well, I was a bit further up. See, what he was trying to do, I think <pause>, people on deck of this ship saw "Oh, shit, there's going to be a collision", so they went...<pause> the electrician was the first on the bridge on this ship and he just powered up all the thrusters, and I could tell because there was an enormous black smoke coming out of these funnels at the forward end. So, I knew someone was trying to do something, but the ship started to sort of track more my way. I'm trying to get away – so we're almost sort of....<pause>. I had no idea that he... that there was going to be some

mitigating action, I just had to get out when I saw what was happening, so then, I pulled off and then swung around and then just ran away.

But as I said, it happens slowly. You know, your engines are ramped up and you can see the massive thrust coming out of the stern, and you are doing this type of thing, <hands to head, moans in a worried manner>. You know, there's nothing more you can do. You've taken your action, the engines are doing their job, and all you are doing now is just seeing how effective that was. And once you commit, you can't stop. You can't say "Oh, that was stupid, I'm now going to go backwards." Too long.

Had it not been for my Chief Officer, I wouldn't have even seen it. Because I'm facing aft <the back of the ship>, monitoring the platform, I'm two metres away from it, and I'm just keeping the ship, just making sure I can see that thin line of sea between us, and I'm just maintaining that, and just watching and knowing there's an ROV down there, and where the crew are.

Interviewer: So how did it feel afterwards?

I was relieved, relieved that we were able to get out of there. I was thankful I was on a ship with four main engines, and that I was relieved that I had the engineers down below that I did, because these guys would make sure I didn't lose an engine, or black out. As I went full ahead, I'm knocking the thrusters off, to take the load off the alternators and the shaft alternators to try to get more power to the propellers. So, whatever I could to try and get that ship out of there as quickly as possible. That's where you are going "Blackout. No, I don't want to black out. I've got thrusters going – Off, off, off! Shut 'em down, bang!" So, your mind races of course when this is happening, but once you've done it, there's nothing more you can do.

Interviewer: Jeez. So, what's it like now? Because you still don't know exactly what the issue was, as you said.

I think the guy had, um, I do know that he had <pause> they told me over the rail that the guy had, um, I don't know it some sort of, I don't know, it's not

some kind of medical condition, but he just froze. Panic, and didn't, just couldn't, um....

Interviewer: Just locked up?

Yeah, after that, he just should have considered doing something else (# 0768).

This master also provided an example of unexpectedly losing all power on his vessel while he was at the helm, and while the vessel was towing an oil platform weighing several thousand tonnes:

The engineers were in the engine room, so I got them straight on the phone and I said "If you can't get me two engines, get me one engine. If you can't get me one engine, get me the gill jet. But whatever is going to be quicker, get that for me". So, they said okay. We still don't even know what's happened to these engines. Why we've lost power. So, I said "Just get me the gill jet", and they did. So, I just put it straight astern and then I used the gill to give me directional stability so that I could always just keep myself ahead. And I could have done that for hours. I was out of danger, then, provided this didn't fail. But I knew I was okay (# 0768).

Fire is another crisis that is particularly critical onboard a ship. This criticality arises from the lack of a place to retreat to at sea, where the alternative to fighting the fire is to abandon the vessel itself. I interviewed a Chief Engineer in a board room setting. The Chief Engineer related a story from his time as a First Engineer, about encountering and fighting a fire at sea. In this scenario, the vessel was not able to shut off fuel to both engines as they needed to keep one engine running while in close quarters with an oil platform. As such, one crew member had to walk into the fire with a fire suit and manually isolate the fuel at the burning engine itself.

So, the chief with the fire suit and breathing apparatus on walked up and shut the two valves, and then it stopped. We didn't want to stop the other engine because we were close to the rig and we didn't want to drift into them or the

other boat or whatever, so we didn't want to do that unless it was absolutely necessary.

And I'll tell you one thing. No matter how many drills you have, when it comes to actually fighting a fire you will see who panics and who doesn't. There were people coming up to me, saying "Come on, come on – leave the engine room, leave the engine room!" and I said to him "Just go and do your boundary cooling." You have to be very, very calm. We put the fire out obviously. Once we shut the valve it had starved the fuel; the source of fuel was over, so that stopped (# 0395).

Not all crises from the narratives were successfully resolved. One, in particular, described what it was like to be in command of a vessel as it sank after a collision. I interviewed a senior master with fifty years of maritime experience. He was dressed in a plain button shirt and chinos, as he was on leave at the time. He seemed extremely calm and thoughtful throughout the interview. After some preliminary background questions, I asked him for his story of a critical event at sea. He smiled through his full beard and said "I sunk a ship. That's pretty big." His story of that sinking follows:

Interviewer: So, when were you first aware that something was wrong?

Oh, we felt it. We felt the contact, and then the engineers immediately rang and said we were taking on water. So, then we pulled off, and we were going to beach it, but we didn't get to the beach.

So, what did you do next, and what was your reaction to it?

Emergency muster. Standard drills, then. Mustered everybody. Discussed the situation. Looked at ways to tackle it. One team went off to tackle it. The other team went 'round securing things like, assuming we can't stop the water coming in, let's make the remaining water tight integrity as much as we can. Another one on the radio, giving a "Pan", you know, an emergency... so, all those things just kicked into place, basically.

What was it like for the crew?

Oh, it was pretty traumatic for them, for everybody when you think about it. At the time, nobody had any problems at all. It was just the next day, in the hotel, that's when it started to hit people. I think it was different for everyone. From me down to the Cook. I mean, the cook was angry because he'd lost his wallet and radio and whatever. For me, it could have been a catastrophic, career-ending event, you know. Um, engineers it would have been frustration with being able to see the problem, knowing what to do, being so simple but not being able to achieve it. Um, so, everyone would have had a different response.

How did you know, as you said, when it was unsalvageable? When you knew it was going to sink?

Well, actually we didn't know it was going to sink. We knew we had to get out of the engine room, so we shut everything down because the pumps couldn't keep up with the water. That's when the forward bulkhead failed. There was this massive *bang*. Because she was just sitting there, and then all of a sudden there was this massive bang, and then she started to list. That's when the water, when the bulkhead split, and then the water rushed into another compartment, and then she sank about half an hour after that. So, we had to jump over the side (# 0897).

In another example of a hole in a ship's hull, one Chief Engineer described fixing the hole.

So, it was using the resources you got. We had a couple of big baking trays we used in the big ovens onboard, so it was big enough – the hole was probably about as big as that <taps an A4 size folder> so we cut the edges off a big baking tray so we had a big flat piece to cover it. Covered it with Sikaflex <silicone>, created a lee for it so it wouldn't take any water in, so <slaps a palm onto his other palm> over the top. And then we just got bits of wood we had lying around and shored it from the deck head. Put a bit of hardwood over the top, and nailed it all together. And that got us from just outside of Tahiti back to Australia. Thirty-five days. (# 0404).

Perhaps encapsulating the phenomenon of a crisis at sea is the following narrative vignette, from a Master who describes the temporal nature of the phenomena. He described the disconnect that often comes between the initial actions and when the physics of the situation ultimately plays out.

Look, on a ship, things happen a lot slower, but, because you've got a mass of metal and this thing is moving and it's got momentum, it just happens in slow motion. And, you know, sometimes, you see yourself being pushed or being dragged into somewhere, and you're thinking.... and you're hanging onto those sticks, putting as much power down as you can without blacking that engine out, and you're just thinking "Gee, come on, come on, come on, come on!"

Interviewer: So, what is it like to be in those moments?

Well, <sighs> you don't really have time to think about... I think what it is, is that you are constantly questioning yourself as to "Is this going to do it? What else have I got? And if this fails, what am I going to do? And if that fails, what am I going to do then?" So even though you are in a very uncomfortable position, say, and things aren't going the way you expected them to, and you're then taking mitigating action to get yourself clear and out of it, you are thinking about... there is so much that you're thinking about (#0768).

Technology-based Crises

Offshore marine vessels are among the most dynamically complex and interdependent technological systems in the world. Along with this dynamic complexity comes the likelihood of crises that are difficult to make sense of and resolve. This is particularly so in crisis situations. I interviewed a Chief Engineer via telephone, who related a critical event in which the failure of a cooling system resulted in a system failure cascade.

I called the first engineer and second engineer, they came down to the engine room within about 30 seconds, I explained the situation, and what was funny I remember is that the second engineer understood and comprehended, but the first engineer seemed to have a panicked look on his face. He could not understand what was pretty clear, and then I think his reaction was to panic, and then to start looking at other areas within the fault that weren't related; he was what they would call probably grasping at straws.

Interviewer: So, if you have a seawater pump that's got a hole in it, what's the impact of that?

Well, the impact to the vessel is that we're alongside the rig at the time. We lost half of the system on board the vessel. And to see the ship slowly shutting down as critical equipment failed just added more panic or urgency to the situation, and the constant alarms that were coming up because things were overheating.

It seemed to grow in panic and urgency. What happens when the main engine shuts down and the shaft generator shuts down, which means that half your air-conditioning fails and then half your freezer fails, and then everything else that's running off that particular electrical producer. There's a snowballing effect, where it can get out of control if you... And if you look at the bigger picture, saying "Jeez – this is getting bigger and bigger and bigger!" you can really be snowed under, that you've really got to understand that the main issue is repairing that seawater cooling. Start from the bottom, repair that, and then we can go forward and then carry out those repairs and fixes and resets.

Interviewer: What do you think was the difference between how the first engineer and the second engineer reacted?

He <the First Engineer> was definitely frantic, and he was yelling... he was yelling at a level that was above what was required in the engine room. He was definitely showing signs of panic, his eyes were the size of saucepans, and he was quick to grab a hammer or any sort of tool, to... to hit the valve, to open it up, when really what it required was a bit of a delicate touch of

pushing a bolt out and pushing a new bolt in. And he was difficult to communicate with; he didn't really want to hear anything, he... Yeah, he thought he knew perhaps, I think. Look, he showed clear signs of panic really.

We talked about how did it go technically straight afterwards, how did it go personally, or how did it go in how we reacted didn't happen until a couple of days later as I recall, and then the first engineer apologised then. Or I wouldn't say apologised, he brought to light that he didn't act as perhaps how he should have, and how he panicked a little bit. And that was interesting to hear from him, that he'd noticed that himself, that he didn't act as well as he should have (# 0114).

Another example of a technological crisis is described by a Chief Engineer who was confronted with a stuck controllable pitch propeller (CPP) while in close quarter engagement with an oil platform. He related this career-changing incident while pausing frequently to reflect on his narrative throughout the interview.

As a chief engineer you get taught fault-finding skills, but to be able to use them when there is huge, huge pressure.

Interviewer: Was there huge pressure?

Yes. The rig was desperate and we were sitting there, completely stuck, with one leg <propeller> completely gone. In that situation when you have people on the phone saying "When are we going to get going? What's the deal?" You know, the ability to I guess think clearly and deflect the pressure.

But it's like when I got down there, I was like "What have you been doing? <speaking to the engineer on duty>" <He said> "I've just been trying the lever". And I remember just going "Jeez, we're in strife here". But then it was like, "Well, okay". And you know it seemed like he was, yeah, like didn't know the answer and was unsure which way to go about it. Even though he knew the technicalities of the control system for the CPP, but he was just like "I can't do anything". He disappeared, like almost into the lever. He was just

operating the lever and the CPP would just come to a point and then stop, and like, the problems not the lever, mate. And you keeping on going is not just suddenly going to make it fix itself.

I remember at one stage thinking, “We’re still safe. We still have one leg that we’re driving on”. But it’s like, I knew the ship wasn’t in danger, but I thought “I’m not frigging going off hire on my first stint as Chief”, <laughs>. You know, I refused to. So, we were very conscious of that, when you’re on an old clunker you become very conscious that you don’t want to have a fault that puts you off hire.”

Interviewer: So, it was an added incentive to get in and to it because it’s my shift.

Yep, people are going to rip me up. I was Chief and I will not go off hire on my first go as Chief.

Interviewer: What happened?

I split the system in half. I went, “I know it’s either in the propeller shaft or in the hub. That’s guaranteed. So, come back up and go “Okay, how do I separate those two? I don’t think I can. I’d have to think about it some more. And then I was like looking at it and thinking about it and saying I think it’s in the hub, and so that’s like a dry dock thing.

So, it’s like, now I understand that, go and talk to the Master. This is the situation; you stay in this range and you’ll be right. If you aren’t then you’ll have the risk that it will pick up, yadda yadda. So, he got onto the rig and said this is my intention. Good, sweet. Did our job and went to town. (# 0675).

Not all technological crises can be resolved in the instance itself. Sometimes, it is necessary to manage the technological situation through the crisis. This narrative from a Chief Engineer describes not only defining an operational “line” or threshold, but also the process by which that line is maintained during critical situations. The Chief Engineer, quite senior in their career, spoke frankly about their engagement with key stakeholders in drawing and maintaining “the line” during critical conditions.

Recently I was in a situation where we were using maximum power on the ship, and the bridge wanted it for an hour, and... The cooling system couldn't handle it basically, and we were getting up—temperatures were climbing, alarms were starting to go off, and I was ringing the bridge and saying "Look, you can't sustain this." But they said "No – we need it, we need it!"

I kept thinking in my head "Well, this is what I think we get to, we're at 92 degrees." I know that the high temperature shutdown, which will kill the engines, happens at 99, for example. So, based on experience and knowledge I can say "Okay, we can keep going. Even though the alarms are going off, we can keep going up on the temperature another five minutes, another four minutes".

You know that the bridge only wants it for another five minutes, you're on the phone to them the whole time, and hopefully they're communicating with you what they want, they're usually pretty good. In your mind you'll say "Righty-oh – I know it's going to die at 99. We're at 92, maybe 93, and it seems to be levelling off a bit." But I've made a decision in my own head, that when it gets to 96 that's the end of it, and you make that decision in advance

You know, if you're a young bloke who didn't have that experience, and you're nervous about making that call, that would be a harder situation maybe – you don't want to blow up the ship. And you've got your whole career ahead of you, where you're trying to build a reputation for yourself maybe, as being a good engineer. That might not be so easy; you might err on the much more cautious side there and call it quits, and you then say "No, I can't do it – sorry, I can't have it." and then you wouldn't have got the job done, the charterer wouldn't have been satisfied. It's a trade-off, isn't it? Someone who might have called it quits earlier, it would have kept their own name clear. (# 0993).

Another technological crisis evolved into an interactional issue for a master who experienced an oil spill on the deck of his ship:

I mean, we had an oil spill on the hydraulic system for the winding gear. So, on the main deck, there's a spill there, and for no other reason other than the bolts were that big when they should have been that long, after eight years one of them finally gave away, and nobody knew anything about it, we had oil all over the place. We've got the ship away – safe, in DP – I left the second mate up there, I went down with a camera, with overalls, got in, helped the boys clean it up, understood what was going on. Within 10 minutes I get a phone—I told the rig that we had had a spill and that I'd get back to them as soon as we can; it was on a minor system but we still had to stop and get this sorted out “I'll get back to you with some information.”

I was on deck for no more than 10 minutes, we're already getting a phone call from the ship manager in the Perth office, because the rig has told their guys who has told the shore guys which has called the ship manager over in Perth, which... I mean, he's got nothing to do with it, he's the point of contact, then he's called the ship within 10 minutes (#0535).

Human/interactional crises

Some seafaring leaders described crisis situations that had primarily human origins at their root. These situations were, in most cases, just as challenging and confronting in the reckoning of the participant.

I spoke with one master, who related a situation where his unionised crew threatened strike action while at sea. The catalyst for this industrial action was an environmental sustainability initiative that had been implemented to reduce disposable plastic water bottles and rely upon bulk water containers and coolers to replenish crew water bottles. The unionised crew, members of the Maritime Union of Australia (MUA), interpreted this as withholding water from the crew, and confronted the master with the threat of strike action onboard the vessel.

They walked up, all the MUA members, like thugs, with their body postures and stuff, that “This is what we have been told, we are not going anywhere, we want to halt the ship.” As a skipper, regardless how mellow or how hyper you are, you don't want to hear those words.

I'll be very honest, I reacted more like an individual rather than a skipper. You do react as a human being, and that's what I did. I did lose my temper, and I told them to eff off from my bridge, and I called HR straight away and told him exactly what's happening. As a person, nobody comes on my bridge and challenges me – no, I'm not going to take it. Nobody disrespects my bridge or the people on the bridge. I mean, that's where I will not back down. As long as I've got those stripes on my shoulder, nobody comes on the bridge and talks to anyone on the bridge like that – it's as simple as that.

But again, it's one of those grey areas, which... You know, there's 50 shades of grey in there (# 0520).

The interpersonal dimension of seafaring life can provide a source of crisis due to the isolation of the crew over time. As one master describes the phenomena:

When you're at sea, after a period of time the whole world shrinks basically, especially after some time... And people tend to... people are... what's a good way of putting it... They are more reactive, they're a bit more sensitive. They don't put things in perspective quite as much as they would if they were at home. These things sort of grow, because, like I said, the world shrinks. Normally you wouldn't even think twice about it, but it's just those little niggly bits that start to get to people after a time. So, when things happen unexpectedly, I think quite often there's more of an overreaction. Just keep it in perspective and look at it for what it is (# 0190).

Another narrative from a master involved a conflict with a subordinate crew member who challenged his authority in a crew safety meeting onboard the vessel.

Because I knew it was coming. And it came to the safety meeting when everybody was there. That's when he made his attack on me. And he started calling me a c*%# and a b%&#@* in front of everybody, and I had to make a split decision. Now, if I bow down to this guy, everybody here has got no respect for me at all.

I went for him. Not physically. I walked up to him, finger pointing, because the red mist just descended. Because you can only take so much shit thrown at you. I stopped the meeting, and I said "You do not run the deck." About turned, walked up to the bridge console and said "Meeting closed". That was it. And then afterwards when the red mist went away <sotto voce> "Oh shit, I went too far". I went down to apologise. He's just "I don't want to know". Just like that. Now I was man enough to apologise, I knew I had overstepped the mark, because the red mist was there, but no, no. My friend overheard him talking <to a shipmate>. His friend said that maybe he should accept my apology. Because he knew he was wrong. But he said "Nah. I'm going to get the c*%#." And he did. And he got me. Hmm?

It does take a blow to your confidence, and you do get stressed, and that last swing when I had the time off, that's when I said "Nah, I need a break from anchor handling. I need a break, or else I'm going to go down that pit and I'll never come out (# 0361).

Not all narratives of human-based crises involved conflict. Some resulted from general misunderstanding and lack of clarity in a hazardous situation. The following narrative comes from an experienced Master, who intervened when his crew were confronted by a "bunch of bastards", or a tangle of chain links on the deck with significant stored energy that posed a hazard to the crew if the tangle was not handled safely.

There was a lot of headless chooks running around and a lot of noise, and a lot of... just basically... bullshit. And you sorta sum the situation up and I had a clear view in how I wanted it done. The Chief Officer was just talking crap, so I just shut him down. I said "It's not happening that way." The second mate was carrying on and I said "You just drive the winch. I don't want it done that way. You just do what I tell you". I turned around to the Bosun and said "This is what I want out on deck and this is how I want you to do it". And the two IR's, I said "Listen to what I am about to tell you. We'll do it this way and this is the way it's going to happen" (Interview 0124).

Perhaps in counterpoint to the above narrative, the following account is from a master who described the difficulty of resolving human factors while in a command situation, such as coming alongside a wharf:

I try to keep cool, but when it gets to a point, I know, when I would have told that officer <through gritted teeth> “Just fuck it!” And maybe it’s not the right way, but that’s my DNA I’m afraid. One example was coming into the port, and I give this Chief Mate a chance to drive alongside. And one of the Integrated Ratings I saw that instead of taking the crane inboard, he went outboard. And I’m going “Get the crane up! Get the crane up!” and he couldn’t hear me. So, I said “Stop! Just stop there!” He didn’t hear me either, as I’m standing on the bridge wing, so I’m trying to call out to both these people at once. I said to the Mate “Stop the boat! Right now!” I said “Get the fucking crane up! Get it up!” Yeah? So, I could see a potential, we could damage a crane, we would be off-charter, damage to the wharf, damage to the company’s reputation, and all this. All running through my head at the same time. And maybe I acted a wee bit... maybe hyper? That was the quote. But that’s the vision I had of what was going to happen. (# 0361)

A poignant example of a human-based crisis was the injury of a crewmember under their leadership. One Master related their experience of an incident in which a crew member was injured while on the job at sea.

She was, I think, in a bit of a shock, and obviously in quite a lot of pain. As soon as we got her into port, I had to get her off. I lost contact so I didn’t actually have any sort of contact with her, which is a shame really, and I think now... Yeah, maybe I should’ve followed up on that too. I just know that she was in pain, and I think definitely in a bit of a shock. It was confronting. And she was crying and in pain, and I thought “Oh no...” Yeah. That’s confronting when you hurt someone (# 0190).

From an engineering perspective, I interviewed a Chief Engineer, who recounted a story where he thought a subordinate had lost his life in a workplace accident involving the flooding of a ship's tank with water during dry dock.

And I went rushing up there, because I saw the water on the deck; because it overflowed out the manhole, and I looked... It was a tag situation, people put a tag on when they went in the tank. One in my team, the mate, had his tag on it... I was in tears, because I personally knew him, his wife and his children, and I thought he was down there... Because I knew he couldn't get out, he was too big a bloke to get out that quick.

Interviewer: What was that like, being in that situation?

Oh, I was in tears... I still, nowadays, you know... And because it was late in the afternoon, I rang the master, he'd knocked off... I was the only idiot around, and he <the subordinate> was on the piss <drinking> with the master... I sent him home. I just... I was in tears, you know.

Interviewer: <notices that the participant has started to form tears in his eyes> It still seems to resonate with you... When you think of that...

Oh, I have tears in my eyes, mate. I can still... I was kneeling, looking into a manhole that was overflowing, water just coming out like that, and I just... I get on the phone, and geez, I give him shit... I sent him home, "You can go home, we'll get someone else up" (# 3424).

Anticipation of crises

Several seafaring leaders referred to impact on their sleep during their interviews. What follows is a representative vignette of the experience of anticipation of a potential crisis upon sleep.

Cause when you're a Master, even in your time off, you hear the engines just <makes vhruur, vhruur sound>. And you're always thinking <sotto voce> Jesus. You can't sleep, because you may be called to the bridge to help out,

so you're not really sleeping in your time off. So, you're always on edge, and you're always nervous all the time (# 0361).

Another Master recounted the prospect of having to undertake a high-risk towing activity close to shore over a ten-day period.

And I might be able to handle it, but then you've got the mate on watch, and others as well, you know? And it just wasn't worth that for ten days. I wouldn't have slept (# 0068).

Additionally, in the words of a Chief Engineer,

But I have been on ships, where you're lying there with one eye looking at that panel, that alarm panel in your cabin, expecting it to go off any minute, and when that happens, that's stressful (# 0993).

These accounts describe what it is like to anticipate potential crises that might strike at any moment during their professional practice.

This chapter contains the thick descriptions of seafaring leaders as they were confronted by crises. It represents, as much as possible, their own words in describing how they made sense of such dire circumstances. These crises arose from operational, technological and human/interactional sources. Lastly, I presented their descriptions of what anticipation of such crises is like for them.

The next chapter continues with thick descriptions from the seafaring leaders. However, the focus shifts to accounts of emerging phenomena and temporally unfolding events.

Chapter six: Thick descriptions - unfolding events

This chapter continues the presentation of narrative thick description, presented as much as possible in the words of the seafaring leaders themselves. However, the following core narratives and narrative vignettes involve emergent or temporally unfolding events rather than urgent crises.

It is important to note that these narratives were fewer in number than the accounts of crises (seven unfolding events as opposed to twenty crises). I make no attempt at this point of the research process to interpret the meaning of this ratio, but curate the narratives in this manner in order to present the thick descriptions in a manageable size and structure for the reader.

These thick descriptions have been curated into the following clusters, based on their sources; including those involving clients and stakeholders, those involving power and authority, and those involving technology. Lastly, I present a thick description of critical events that involve denouement, or progression over time towards closure.

I begin this chapter by presenting thick descriptions of unfolding events involving clients and other stakeholders.

Unfolding events involving clients and stakeholders

A significant number of critical events recounted by participants had their point of origin rooted in their engagement with clients and stakeholders of offshore marine operations.

As a representative narrative, the following story was related by an experienced master whom I had spoken with prior to the interview to request his participation. During the interview, he retold a story of engaging with a client, where significant discrepancies between what the client had advised him and what was operationally unfolding caused him to take significant measures to preserve operational safety.

We were working a Jack Up rig <an oil platform that can extend and retract its legs to affix them to the sea bottom>. The Jack Up had to be towed into Dampier. So, the rig was out at sea and we had a meeting onboard, and I asked the relevant questions about the tow and how it was all going to take

place, and I was happy with that. And we discussed it beforehand as to how it was going to take place, and that at the sea buoy there was going to be a second boat join us to tail the Jack Up Rig in, so we would be in front and they would be the brake boat. We got to the sea buoy and there was no brake boat. So, I said okay, we can proceed down the channel and you can get this other vessel before we make the turn into the channel. And we got down to almost the turn and there was no second vessel, and I had been asking about this all the way down, which was probably about an hour's tow. It got to the point where this vessel just wasn't around and I just called up the rig and said "Okay, I'm taking you back to sea". And then I asked the question about when you go in to the channel, how are you going to conduct this docking? Are you going to put the legs down? And they said "No, we're not now." Because this is what they told me the day before, that they were going to put the legs down and do the docking with the rig jacked down. And they said "No, you're going to stay on tow, throughout the ten days while the vessel is in the channel." And I said "No, well that's not going to happen. I am going to take you back out to sea. I'm not going to take you in."

One thing I've learned over the years, is that when a plan starts to go wrong, when you start changing things from an agreed procedure, your ears have to prick up. Because it's the first part of the holes in the Swiss cheese lining up and going wrong. When the plan starts to change from the agreed plan, you have to stop the job. And I was working through the process of deciding whether to stop the job, alright. I had a pilot onboard, and I had been bouncing ideas off him – they want to do this, they told me they would do that, what do you think? He said "Oh, yeah. I agree. You can't do that." And of course, when you do something as radical as interrupting a rig docking, or causing downtime, because the rig costs, you know, a hundred thousand dollars a day, there's ramifications in this part of the world. So, I called up the Operations Manager and told him what I was doing, and he said "Yeah, I agree with you." So, as soon as he said that, I said "Right, okay. I don't have to do what they're telling me to do.' And to cut a long story short, they put another vessel on hire like that <clicks fingers>. It tailed us in, and then they put the legs down. They weren't happy about it.

And I found out afterwards the reason that they didn't want to do it was that it was all about money. The contract said that if they put the legs down, then the rig went off charter and the client would have to cop the cost of the docking. If they kept the legs up, it stayed on charter to the third party. See, I didn't know that.

Interviewer: When did you first get an inkling or an idea about the legs being down, or that things were different?

Well, things started to go wrong when we got to the sea buoy and the second tow boat wasn't there, and then I started to, um, become aware that things weren't... that there was a change... that they weren't telling me the truth, in other words, and at the meeting the day before. There was also, and I just got this feeling that when I left the rig and the meeting that things just weren't quite right. Because I'd asked the question about the legs, and they were a little bit evasive about it. They said "Oh, the legs will be down", but it was sort of a brush off thing. There was no *procedure* written down, there was nothing in writing. There should have been written procedures and I suppose I should have demanded that there were written procedures, even before we started towing. Yep. But I didn't.

On a ship by yourself with your crew, you just stop the job. You can see what's happening, but you've got to make others understand. Or what's going to happen. And then it's just a process. How am I going to go about this? Who am I going to inform? You've got to try and get all those in a row and lined up, so that no one accuses you of doing something that you don't know about. So, you've got to be on firm footing before you make big decisions like that.

I knew I was on solid ground, and that comes from experience, yeah? I've been into a narrow channel, towing rigs and barges before, and so I know how difficult that is. And so, there was no way I was going to go and sit in that channel for ten days with a live tow. And so, the decision was actually quite easy. And the other thing as well, Brad, is that once I had realised that what they had told me the day before.... were lies... then, the decision

became a lot easier as well. They told me one thing when it was quite evident that they were going to do something else, therefore, I'm not agreeing to it <intense look, and frown, lips somewhat compressed, and the tone of voice and cadence is low and firm> and I wouldn't have agreed to it the day before had they told me, and I'm not agreeing to it now.

And this could have been taken all the way back to the meeting we had, where we didn't have any written procedures to sign off against. And that was probably my fault in not saying "Where are your written procedures? I didn't get those, and so it was a bit remiss of me to go into a situation which was a critical situation in towing a rig into a port without the procedures. So, I guess I was at fault as well, and that could have been, if you are looking at it, the first hole in the Swiss cheese (# 0068).

Another example of an unfolding critical event, involving finding and maintaining the line in operational safety and performance comes from a Master who discusses these boundaries in frank terms.

This last swing that I had, the tempo was incredible. Shallow water, three rig moves, all in five weeks, big heavy anchors, shithouse weather, in and out of port calls that weren't scheduled properly – massive. And this is where we have to fight ourselves all the time. Do we say "No, we can't do that." or do we just keep on pushing on because it's expected of us to do the job?

And it's those charterer demands – push, push, push, push – that really impact upon our abilities to make maybe the correct decisions. Sometimes you ask yourself "Why did I do that?" or "Should I be doing this instead because of their push-push?"

There was a time in last swing where we were tasked to go and pick up some pre-laid anchors, move to the rig and go back and pick them up. The weather had come up quite significantly during the very short passage between the positions... The weather was bad, I got the boys just to prep everything up, head into the weather and sit near the buoy, and then I sat there for about an

hour and just watched the waves, just assessed everything, because once we started picking this buoy up the danger was that we were going to pitch up and down and slap the stern right on top of the buoy and then damage the ship or the buoy. So, it was really a very slow assessment; not slow because we were slow but because we took the time.

Look, the line is always thinking that... Well, to find out where that line is, to establish that line, you'll look at "Why am I doing it? Why do I do this?" The ship is operational so I draw the line." My experience, my confidence in the systems and the training of the crew, the knowledge that the rig is ready and the crane is ready for me, and that the operation can go as quickly and as safely as possible, I know where that line is.

As soon as there's a change, such as crane driver's no longer available, I'm not going to sit alongside that rig anymore. I'll move away just far enough to be able to come back and continue the job, but I've moved away so that we can all relax a little bit. So, I redraw the line; no crane driver, therefore the line's moved, I'll move away – I'm now back in an equilibrium that I'm happy with. You're continually reassessing where you need to draw that line.

There is no stigma on me saying "No." Certainly in the most recent years we've been encouraged by all to do whatever we think is necessary for the safety of the crew in the ship environment. But, they <the client> ask because that's what they have to do. But, as I said, with all the different factors you draw your line, and when one of those factors change you draw the line again.

Interviewer: What makes it difficult though do you think?

Pressure from the charterer to get the job done, and that's where we will make mistakes on board. We are fully aware that it costs money to run that rig, and every time we delay it means that someone in the office is going to make a judgement upon us as to "What the hell is that boat doing out there?" Particularly when you've got two boats doing the same thing, and one can and one can't. We love it when we see <names several competitor

companies>.... We love it when they're out there, and they can't do it and we can (# 0353).

Not all such narratives resulted in positive outcomes for the storyteller. I interviewed a master who described extreme difficulty in navigating their role with stakeholders. I recall this individual seemed quite drained, almost grey in complexion, as they described their experience in navigating their role and requirements with their client:

There's a lot that comes in <emails> and there's demands from the rigs sometimes, and then you get asked questions from the office, which, are legit sometimes, but some will use you. To get that information. Why are you bothering me? I've got more important things to worry about. Because I'm busy doing other stuff. I could be in the middle of a rig move, or could be overseeing a junior officer driving, and I can't leave him by himself to answer the emails, so there's a whole lot of things to do with it.... That both sides should understand a wee bit.

The emails were flying back and forward, how much fuel do we need? How much? I don't know. They want to know how many cubes <cubic metres> of fuel I would burn from here to Broome. I could burn fifty cubes; I could burn seventy cubes. I just don't know. How far is the location from Broome to the rig? It's all things we don't know. So, I just said "From this point in time, three hundred. That should be minimum. Might need more. Go into Broome, the Chief said "We need an extra hundred cubes of fuel." "Ah, can't get it." "What do you mean can't get it?" "You only ordered three hundred".

The plan was to get fuel in Bali. That never happened. And I recently found out that it was in the contract that we can drop the tow any time to go and get fuel. But that wasn't the case in the real-life case, because I wanted to drop the tow on Friday at six o'clock at night to have enough fuel to get into Singapore, and still have enough for my stability and the rig over us said "No, no. Don't do it now because the other vessel will be here at midnight" <pause>. And I was told that I could drop the tow any time I want, but they over-rode it. So, I got into Singapore with fifteen cubes of usable fuel.

<At this point, interviewer is frowning and chopping his hands on the table at almost every sentence>

When you've got guys on the rig trying to tell you how to do your job. That gets below my skin because I'm the guy with the ticket. I'm the guy in charge of the tow. You should be listening to me. You shouldn't tell me how to do my job. I don't tell you how to do your job. But that whole rig move was quite stressful, so I was worrying about the fuel all the time. Because at the end of the day I'm the one responsible for the safety of the crew and the ship. If something goes wrong, it comes back at me. So, you've got that at the back of your mind.

Interviewer: What's it like being in that situation?

You feel like you're in a black hole and you can't get out. Every time you try, answer an email, ask for help, say "Look, this is going to happen", but...<pause> And you get nowhere. <hands flop on the table> You just feel <pause> as if you're in a black hole and go "What's the point in having a Master?"

So, if I said "No. Fuck it. Right, I'm not going to do it." Then they call the Company and then I get a reaming from the Company "Why aren't you doing this? You know the client, blah-blah-blah" I said "But where do we draw the line?" (# 0361)

Unfolding events involving power and authority

When seafaring leaders were asked to relate events that they considered as critical and trying in their nature, a number of them related unfolding events that had their origins in issues with power and authority.

One extreme example of this was related by a master, referring to an event that occurred while he was a Chief Officer (the next level of authority down). It arose from significant conflict in leadership perspectives between himself as Chief Officer and the vessel's Master:

I was Chief Officer on a ship working in Bass Strait and I had a big argument with the crew. They went to the Master and said this mate has to do this, and I disagreed with the Master. I said “That’s not my job. I’m not going to do it that way. The master disagreed, but I still wouldn’t do it, because I knew it wasn’t a practice – and I was a pretty green first officer. And then I went on leave, and I got a call from the office, and I forget exactly who made the call but it was the Operations Manager at the time, and he said “The Master has asked you to be transferred. What’s your opinion of that?” I told him about the incident and the crew, and said “Give me a new Master and I’ll sort the crew out”.

Interviewer: What happened?

The master got transferred (# 0068).

Due to current industry demographics, there was only one female seafaring leader available for inclusion within the data set. This individual related the following narrative vignette within her interview that described her perception of authority challenge from a gender perspective:

One of the things that I found just from being female I think is when guys have challenged my decisions or someone’s challenged me on something, and... For the first few years my immediate reaction was “I’m being challenged, they’re challenging me.” and I would at times, not always, take it personally, and so that would sort of set me into a bit of a decline later. When I went into my cabin, I’d think “I’m not doing my job here, obviously I’m not doing it right.” and taking it personally.

Not every occasion, but most occasions I’m happy with the decision that I’ve made. I guess just one piece of insight that I would pass on would be that you’re not always going to be right and you won’t always have the perfect solution to any kind of problem. And if someone does challenge you, that’s okay, that’s fine. You’ve just got to be open to that and not take it on any personal level (# 0190).

Not all accounts of emergent critical events related to power and authority resulted in positive outcomes. The following narrative vignette was related by a master of mid-seniority.

I called up the GM of HR, and said "This guy's giving me hassle." He said "Well, do an appraisal on him." And I said "Right, okay. If I do an appraisal on him, which I think he deserves and which he does deserve. Because he's a lazy little so-and-so and he disrupts everybody. He's got everybody under his thumb, even the engineers, that's how much control he had. I said you won't like it, so you better guarantee me that he will not be on this ship when I do this review. Because if he is back on this ship when I do this review, my life's going to be a misery. Because he'll make my life a misery, I know he will. Because he's got everyone in his pocket on this ship, they'll make my life a misery, too." He said "Well, I can't guarantee that". I said "Well, the appraisal you'll get is the one that'll make my life easier." So, I did the appraisal, and then this incident happened. And then it was a case of like "You did well, then. You cracked a nut." I said "Yeah, but at what expense? At what expense to my name? So, that's the stress you don't need.

Interviewer: So, what was that like when you realised you had an issue there with the Mate?

I tried to do the best I can. I tried the soft approach. I tried the delicate approach. I tried the sterner approach. Then the frustrated approach came on.

Interviewer: So, what was the final outcome, after you'd taken that kind of approach?

Ahhh. Oh, he moved on. He refused to come back. <sotto voce> Refused to come back with me (# 0361).

Unfolding technological events

While unfolding events arising from human and relational origins were frequently confronting to seafaring leaders, unfolding events from a technical nature were also described by participants as vexing in themselves. One interview with a Chief Engineer brought forth a narrative involving an extensive fault-finding process onboard a newly constructed vessel, as it made its way from the shipyard back to Australian waters:

Okay, I'll give you one... I mean, this is an example of coming down in a brand-new ship, four weeks old. In this case, we had a frequency drive system shutdown. At the time it wasn't known whether it was the frequency drive, because the noises and the vibration and the general consensus of the shutdown was that it could've been mechanical, it could've been such that a fishing cable or a net had been wrapped around the propeller

And as it turned out, it was a loose screw on one of the printed circuit boards that come off and rattled its way through the printed circuit board, and shorted out a number of various tracks and controls as it went down.

Interviewer: So, what's that like? You've got the pressure of having to find it, and you're probably the key person.

Perceived pressure. [laughs] Well, you've got to make sense of it. You've certainly got to keep a number of people, and certainly the company ashore, well-advised, because they're actually commercially speaking to the company, to make sure that we can come up with the best possible date for that vessel to be reinstated into its contractual arrangements. So, there is a lot of pressure, and certainly... that doesn't go away, even if you knock off for the day, or you knock off for that particular period. You're thinking "Well, I better get something moving, or at least identify with communications, be it voice or on email or things like that."

There was a lot of physical communication on the telephone with the likes of the original equipment manufacturers and indeed the office, and there were various test routines that we were asked to do to ascertain whether it was a

control circuit, or whether it was something in the frequency drive. We even sent recordings of the noises and the operation of the unit.

And actually, for them to see exactly the data that we're seeing and to make recommendations – to interpret that data, which was the experience that those guys have got, it was a lot faster to actually engage those guys. From a chief engineer's perspective, it was comforting to make sure that they were actually looking at it as well.

I mean, a brand-new ship that's under warranty, so the yard wanted to know about it, the actual service engineers that installed it, commissioned it and verified that it was correct wanted to know about it. In addition to that, the customer the vessel was assigned to was concerned that such a new vessel wasn't up to the capabilities or had problems early on in the life.

Interviewer: At the end of the day it was a loose screw.

A loose screw, that's all it was (# 0806).

Another narrative involving fault diagnosis at sea was provided by a Chief Engineer who related a contrasting story involving a more intuitive approach:

We'd been towing for about six days, and you know how you get that gut feeling that something's going to go wrong?

Interviewer: Hmmm.

This boat had that feeling. For the six days prior to this we'd been shutting engines down or shafts down three times a watch, so something was going wrong which stopped us. All sorts of weird stuff all over the place, and it is the only time I've ever done it, I actually rang my ship manager and said "Look, we need to get off this. It's going really bad and we've got some big problems here." And we were just trying to hang on until the end. And in some respects, we were fortunate we had three days of the tow left, because that was how long it took.

It really stretched me electrically, and that's all I did for three days, for eighteen hours a day, until I was absolutely fried. Go to bed, get up, you even dreamt about it. It was painful. And in the end, it was underneath the engine console, a terminal strip, a wire was loose. Put it back in, tighten it up – perfect.

Interviewer: What was that process like to go through?

It fries me. It's probably still one of the biggest... biggest sense of achievement I've had as a seagoing engineer, particularly as Chief, because it was such a big problem with such a simple fix (Interview 0254).

The Chief Engineer then went on to describe his unfolding awareness of potential critical breakdowns and technical problems:

You almost just wait. You don't know where it's going to come from. And whether that gut feel is just a build-up of stress from multiple problems? Because every week something major would happen. And when that stopped for about three weeks, always - bang! It was a big one and it would stop the ship.

Interviewer: Is there a trigger though, that you think on some level you pick up on, just before?

I don't know. I don't think there's anything rational or sensible about it. You just think "What is going to happen? Where is it going to be?" And you can't put your finger on it.

Interviewer: How much do you listen to your gut feel when it starts pinging?

I do. I do. Very much so. I've learned to over the years, and I still do here. Because my wife calls it your spidey sense (# 0254).

Having made sense of the unfolding technical issue, there is often the need to describe its cause, impact and remedy to non-technical managers and stakeholders. The following vignette, from a Chief Engineer, relates to his interaction with the vessel master on reporting an engineering issue with the vessel:

I actually called it the walk of shame, had it happened once a week, and I never ever rang the Old Man on the bridge to say we are not going to be able to go under the hook. Or it's going to take us four hours to fix something, et cetera. You'd ring him up and say "We've got a problem. I'll let you know. Give me twenty minutes. I'll let you know." (# 0254).

Unfolding and denouement

Whether the critical events described by seafaring leaders begin as crises or as emerging events, there is an unfolding aspect of each that leads them over time to a place of denouement, or final sensemaking and resolution. The following narrative vignettes relate to the unfolding nature of sensemaking towards denouement.

A Master related his ongoing frustration and anger at not receiving an explanation for a near collision with his vessel.

Oh, I really pushed for it <an explanation for the incident>. And I think, to be honest, I think that they <the client> tried to squash it because it was such a high potential, it would have just shut the whole project down until such time as they worked out what had happened.

Everything is black and white in the industry. You either do it right or wrong. You're continuously reasoning what to do, how to do it, and if this goes wrong or if that goes wrong or if that goes wrong. And so, it's like chess moves. You've got all these things in your mind as to how you are going to react, and then if that happens, how are you going to react, and if that happens, how are you going to react? And yet, here is a situation where something that was totally out of the blue.

I mean if you said "Okay, if you put yourself sitting alongside the ship, would you expect another ship to come in at full power?" No way. No way, that would be impossible. So, I didn't anticipate it. So, the fact that I didn't anticipate that, and it happened, pissed me off. I was really disappointed to think, you know, how did that person get there in the first place? Because he

could have killed a lot of people. And the fact that nothing came of it at the end, that also really pissed me off.

I was furious. Absolutely furious, because, you know... I didn't get any warning. There was no warning from that ship to say, "Guys, we're in trouble. Look out. Try and get out of there if you can. We can't control the ship". Nothing! And they certainly had the time to do it. And the guy who was on the bridge was... I believe, just froze, and, um <pause> yeah, so to me I was extremely angry (# 0768).

One Chief Engineer related his experience of a post-incident investigation from his time as First Engineer, resulting from a fire onboard a vessel.

The chief actually said to me "Just sit down and write your thoughts down now, because you're going to be drilled like you've never been drilled before.", and that's exactly what happened. They went through everything like a dose of salts. And the worst thing... This is where I get really upset, because people who are doing investigations should not try and put words in your mouth; they should listen to you, and try and reason and rationale it, whether it makes sense or not.

They never came back to me on anything, neither from the company nor from the safety authority... the investigating guy, no. You're left not knowing what the hell was happening. And up to this day I don't really know what the outcome is (# 0395).

A master related their experience of undergoing a protracted investigation conducted jointly by the organisation and the client. This investigation unfolded over many months.

Well, there's always that "Oh God, I feel like... Can't they just leave me alone for a little bit?" There's that thought, but then... that sort of self-protection sort of thing I think really. But the fact is that you have to deal with that, because that's why you're there doing the job that you're doing, and if you're not going

to deal with it then you really shouldn't be there in the first place or not with that sort of responsibility. Because you can't walk away from that; you have to deal with it through to the end kind of thing. (# 0190).

Additionally, a Chief Engineer related their personal, post-crisis experience from a reflective point of view. He described his emotional state after an incident.

Self-criticism, I think, comes into it at the end of it. Because you always look back. You'll have that adrenalin high at the end of it, and then you'll get that low. And that low is when you start thinking "Shit, why did I do that. Why did I do this?" But certainly, that adrenalin high gets you all buzzing. Straight after the event you are all buzzing, and then all of a sudden, it's a big low period. And then it's not a real good area to make any sort of mental judgement in that sort of state. <speech becomes rapid and emphatic> You've just got to wait until it rides out and you're feeling better. Because you're at a real low point there. (# 0404)

Concluding the first reading, and the presentation of thick descriptions

Seafaring leaders identified a significant number of critical events that were unfolding in their nature. They provided thick descriptions in their narratives of their experiences within those events. This also extended to the unfolding sensemaking process of attempting to reach a final resolution, or denouement, of the critical event itself. This chapter also described the commentaries regarding how seafaring leaders learn to make sense of critical events at sea.

This chapter, along with the preceding one, presented thick descriptions of seafaring leaders' experiences with making sense of crises and unfolding events. These two chapters comprise my first reading of the research data. Aside from curation, I have minimised my interpretive impact on their accounts.

In the two chapters to come, I will present my second, interpretive reading of the narratives. In these chapters, I present thick interpretations, in my own words, of the thick descriptions.

Before embarking on interpretive phase of the research, I present the following researcher reflection (Cherry 2008), as a brief interlude, to set the scene for the thick interpretations that follow. The following vignette presents my reflexive thoughts on the interpretive process that occurred to me at this point in the research process. It involves a story from several years prior, when I was living and working in Helsinki, Finland, and it involves my hobby of Japanese ink painting (sumi e) and my attempts to depict Nordic birds.

Researcher Reflection: Interpreting the Sumi e Bird

Perhaps my most striking insight into the process of interpretation comes from reflecting on a sumi e ink painting I made of a small bird in Finland some years ago.

When working in Helsinki on a two-year change management assignment, I took up Japanese sumi e ink painting to occupy myself during the long, white winter. By spring I began to focus on local Finnish birds as they returned to the forests. I concentrated on applying the ink to accurately depict the birds I observed, improving in technique with each successive creature. I was quite pleased with the bird in figure 6.1. I captured it accurately and with detail; such as the claws on its feet, the pattern of scales on its legs, and its fluffy, post-winter plumage.

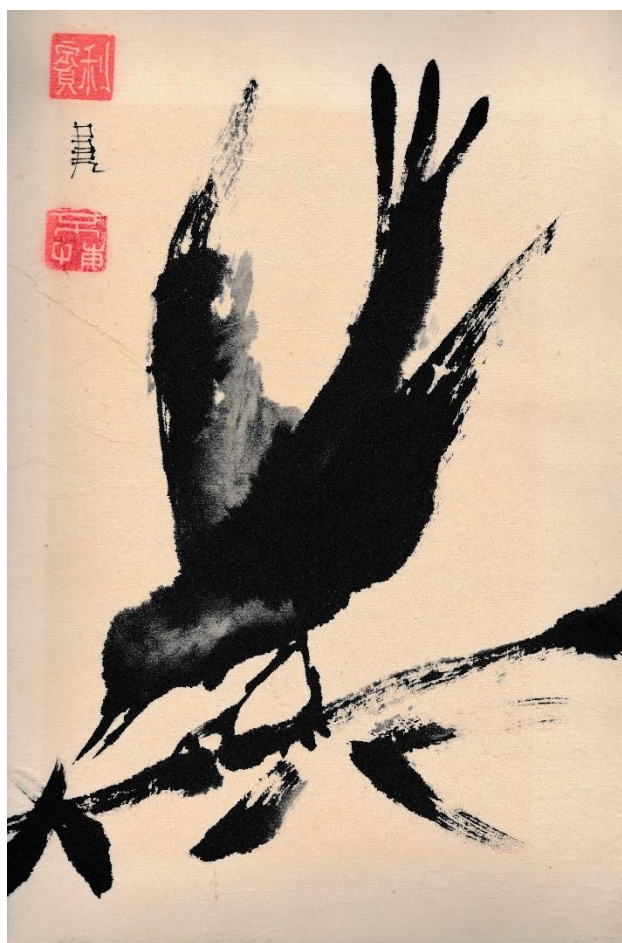
Figure 6.1: Sumi e painting of sparrow



(Author's composition)

One day, while walking in the nearby forest, I was startled by a bird, possibly guarding its nest. Despite its small size, it made quite a belligerent ruckus. I hurried home, grabbed my paints and attempted to capture the experience of being startled by the bird in the forest. I tried to capture the raw ferocity of the tiny bird as it attempted to drive me away. As I painted, I recalled the dark of the forest. The result of this attempt appears in figure 6.2.

Figure 6.2: Sumi e painting of a black bird



(Author's composition)

Since painting these two birds, I have often considered that the first bird has far more detail and accuracy. It is diagrammatic and anatomical in its depiction, and yet to me it appears quite static. It seems to say little about the bird itself despite the detail with which I had captured depicted it. Furthermore, it suggests little about myself as I painted it.

The second sumi e bird is far less detailed, recorded with crude brush-strokes and with the ink bleeding into the rice paper in places. Yet it appears to capture to a far greater degree the inherent bird-ness of the creature. It is alive in a way that the first image is not. To me, this latter image speaks the truth of the experience, for the bird and for me, with rich verisimilitude, despite the rough, imprecise brush-strokes. I suggest that the second painting is an interpretation that captures both the bird and myself as we experienced each other in that moment in the forest. In this way, it is

almost multivocal, as it tells a story of the bird and myself. While I am no artist, I consider this a successful interpretation that holds the ring of truth in the way the first painting does not.

However, there is a mystery with the second sumi e bird if you consider its right-hand side. To this day I cannot tell which is the wing and which is the tail. Even to myself, the same person hunched over his brushes and rice paper, it defies any ultimate reconciliation. As such, this richer-flawed-truer interpretation remains in part forever tentative. Sometimes I try to see one as a wing, but the certainty is forced and never holds. In rare moments, I can accept that both are wing and tail, and that this is something that does not need resolution. The sumi e bird continues to defy and elude me, as it did on that spring day.

How does this small bird relate to the group of seafaring leaders whose thick descriptions have just been curated? Both have a visceral “ring of truth” to them, aiming to richly capture experience as opposed to accurately depict events. Both are captured in imperfect ways. With sumi e, once the ink hits the rice paper it is part of the painting. There is no “eraser” or “undo” function that can be applied. This is also true in the recording of the seafarer’s narratives during their interviews. Perhaps most significantly, the second sumi e bird highlights the tentative nature of interpretive work, where absolute meaning always remains subject to further examination. The phenomenon is never fully graspable, as I have attempted to convey in the following tanka form poem.

*Guarding precious eggs,
Your bird-ness and your fury
Captured in black ink*

*Yet my grasp is tentative
Transfixed ‘tween your wing and tail*

Reflecting on these sumi e birds during my research has taught me much about interpretation; particularly the difference between detail/accuracy and richness/truth. While I have drawn on the wisdom of many narrative researchers and phenomenological scholars (as discussed in the methods chapter), my interpretations of seafaring leader narratives that follow derive deep lessons from the sumi e bird.

The above researcher reflection brings the theoretical considerations of phenomenologically attentive narrative interpretation (presented in chapter three), into a personalised and meaningful context for myself as researcher. I have shared it here, in this liminal space between description and interpretation, in keeping with my commitment to transparency regarding my researcher reflections.

We are now ready to embark on the holistic interpretation phase of the research project that constitutes my second reading of the narratives. The following chapter presents the first three motifs that emerged through my interpretation of the seafaring leader narratives.

Chapter seven: Interpretation - part one

While Geertz championed the value of thick description (Ponterotto 2006), Denzin advocated for thick interpretation in order to derive meaning and understanding from the thick descriptions themselves (2001 p. 137). Thick interpretations contain rich, visceral content, and are contextual, interactional and multi-voiced (Denzin 2001 p. 133). As such, thick interpretations go beyond thin glosses and purely analytical interpretations of experience.

This chapter and the next provide a thick interpretation of the nature of sensemaking during critical events at sea. They comprise my insights, reflections and meanings derived from the words of the seafarers themselves. As such, these interpretations are never final, in terms of completeness or authority. They remain open for re-examination and reinterpretation of the phenomenon itself.

This interpretive process involved dwelling with the thick descriptions to distil the participant accounts into a series of motifs that emerged, via my interpretive efforts, as salient to the research question concerning how seafaring leaders made sense of critical events. As indicated in the Methodology chapter, I've used the word motif for the six clusters that I created to capture the sense I made of the words I heard in the interviews and saw on the pages of transcript. The word theme doesn't quite reflect the multiple stands that are represented in each of the clusters; and also suggests something found, rather than created. *Motif*, to me, is a reminder that the clusters are an artefact not a simple representation of something that already existed.

These motifs were then interpreted individually, as presented in the following two chapters. Each motif is accompanied by my reflections on my interpretation of the phenomena, in sections entitled "Making sense of the motif". In this way, meaning is constructed while maintaining transparency between the participant's words, my interpretations of those words and my initial theorizing of the interpretations.

I constructed six motifs from my second reading of the participants' accounts:

- Motif 1: Shape-shifting and melding: bodily aspects of sensemaking at sea
- Motif 2: The strength of emotion in the midst of leadership sensemaking
- Motif 3: Multiple zones of attention

- Motif 4: Authority and relationships in sensemaking: me-ness, them-ness and working together.
- Motif 5: The interaction of systematic diagnosis and problem solving with intuition, action and pragmatism
- Motif 6: Grasping patterns, finding the line and looking back

My interpretation commences with an exploration of the embodied nature of sensemaking (Motif 1), including the language of metaphorically melding with the vessel. The language of seafaring leaders is rich in bodily metaphors, describing their interaction with their physical world as they try to make sense of things. Motif 2 then explores the way seafaring leaders enact emotions in their practice of making sense of situations, making decisions and taking action. I conclude this chapter by exploring the multiple zones of attention that compete for the seafaring leader's focus (Motif 3). Interview participants describe the dynamics of maintaining their focus on the local environment of the ship, while attending to information and communication from a range of sources and people well beyond the ship, and even across the world, including disembodied stakeholders such as customers and Head Office.

Motif 4 builds on the previous motifs to examine the tension between maintaining an authoritative and clear leadership role, as seafaring leader, whilst managing stakeholders such as crew and customers who increasingly seek to challenge this authority and collaborate regarding operational outcomes on the vessel. An obvious question is how seafaring leaders understand and describe these tensions. A further question is whether the way seafaring leaders take up authority is influenced by the way they make sense of situations.

Given the tensions described in the earlier motifs, motif 5 explores the divergent approaches that seafaring leaders adopt in trying to make sense of things and solve problems. These approaches range from conscious, rational methods involving systematic diagnosis, through to pragmatic, action-oriented approaches involving improvisation and ingenuity.

Motif 6 draws upon the preceding motifs to explore how seafaring leaders seek out patterns in their experience of sensemaking and decision-making. This might take

the form of actively seeking some denouement or resolution of a series events or reporting on the way they now understand certain sorts of experiences that occur in their practice.

Throughout my interpretation of these motifs, consideration was given to the differing dynamics of critical events and crises that are time-constrained and situations that are emergent and unfolding in their nature. In this way, crisis and unfolding events were compared and contrasted in relation to the motifs, providing a further layer to the interpretive process.

The creation and exploration of these motifs draws upon the words of the participants but reflects my interpretation of their words. As discussed at length in the methods chapter, what follows is the researcher's own interpretive efforts to arrive at an understanding of how these participants go about understanding serious events that occur in their practice-world. The reader is invited to arrive at their own conclusions.

This chapter contains my interpretation of the initial three motifs, specifically:

- Motif 1: Shape-shifting and metaphorical melding: bodily aspects of sensemaking at sea
- Motif 2: The strength of emotion in the midst of leadership sensemaking
- Motif 3: Multiple zones of attention

I begin the interpretation with an exploration of the embodied nature of sensemaking, and how it manifests in shapeshifting and melding for the seafaring leader.

Motif 1: Shape-shifting and melding: bodily aspects of sensemaking at sea

One of the most striking things for me about the participant's stories is the abundance of bodily sensations and interactions within the thick descriptions. They brim with tactile engagement and kinaesthetic content. In their most extreme form,

these descriptions suggested to me a metaphorical ‘melding’ of the self with the vessel, or with tools, in a form of shape-shifting that appears to augment sensemaking.

Several of the accounts refer to the physical sensations they feel during critical events, and how they apply their bodies through their actions to contend with the critical event. This appears to involve a visceral engagement and tactile interaction with the environment. One master used the physical sensations to interpret what was happening on his vessel as it was sinking. He appears to combine these bodily sensations with his knowledge of the ship to build a three-dimensional picture of what was occurring throughout the vessel.

Oh, we felt it. We felt the contact, and then the engineers immediately rang and said we were taking on water. And then all of a sudden there was this massive bang, and then she started to list. That’s when the water, when the bulkhead split, and then the water rushed into another compartment, and then she sank about half an hour after that. (# 0897).

Many other accounts illustrate seafaring leaders becoming bodily engaged with the vessel. Their verbal descriptions suggested senses connecting with instrumentation to extend the sensoria to the edges of the vessel itself. There is a metaphorical merging of vessel and seafarer:

You’re hanging onto those sticks, putting as much power down as you can without blacking that engine out, and you’re just thinking “Gee, come on, come on, come on, come on!” (# 0768).

The language of some seafaring leaders in critical events also suggests an unconscious identification with the vessel. They describe what the ship is doing as what they, themselves are doing. For example, in the near collision, the Master said “I just ran” (#0768), instead of ‘the vessel propelled itself away’. Not only had the Master metaphorically become the vessel, but he anthropomorphically attributes legs to that vessel that are capable of running.

In addition to the embodied aspect of the events themselves, I observed sensorimotor “replay” during some of the more visceral segments of the interviews. During interview #0768, the Master’s hands moved to levers that he controlled at the time of the event, replaying the gestures with precise articulation. As they told their stories, fingers and hands operated controls that engaged with imagined rudders and thrusters and propellers of the vessel. These actions occurred unconsciously, at emotionally charged moments in their story. It seemed to me these movements were not part of a demonstration process to show the listener what was occurring at the time, given that the narrators made no attempt to determine if these gestures were understood by the listener. Indeed, the participants did not seem to be aware of their hand movements in these instances. The gestures appeared to be recorded as part of their recollections, replaying at specific points of their vividly performed stories.

A number of the stories fixated on physical objects; sights and sounds that are most prominent and close at hand. Their accounts imply what seemed to me to be a kind of “stickiness” that fixes attention on what is close to the seafarer. For example, the Chief Engineer confronted by a stuck controllable pitch propeller described the way his First Engineer repeatedly, and fixedly, worked the control to no effect:

He disappeared, like almost into the lever. He was just operating the lever and the CPP would just come to a point and then stop, and like, the problems not the lever, mate. And you keeping on going is not just suddenly going to make it fix itself (# 0675).

Another Chief Engineer confronted by a seawater cooling pump failure described his First Engineer who grasped a hammer that was not in any way appropriate for solving the problem.

He was definitely showing signs of panic, his eyes were the size of saucepans, and he was quick to grab a hammer or any sort of tool, to... to hit the valve, to open it up, when really what it required was a bit of a delicate touch of pushing a bolt out and pushing a new bolt in (# 0114).

Additionally, this chief engineer described his tendency to fixate on the clamour of alarms during a major mechanical fault:

... and the constant alarms that were coming up because things were overheating. It seemed to grow in panic and urgency. There's a snowballing effect, where it can get out of control if you... And if you look at the bigger picture, saying "Jeez – this is getting bigger and bigger and bigger!" you can really be snowed under (# 0114).

As such, these accounts describe the way these objects, sounds and sights shape the way the individual made sense of the situation and tried to resolve it.

There are also accounts of the vessel's impact on the seafaring leaders' own bodies. Seafaring leaders report a sensitivity to their physical environment that is constantly interacting with their awareness and sensemaking. One master described this phenomenon, and its resultant impact on his wellbeing:

When you're a Master, even in your time off, you hear the engines just <makes vhruur, vhruur sound>. And you're always thinking <sotto voce> "Jesus". You can't sleep, because you may be called to the bridge because you might be called to the bridge to help out, so you're not really sleeping in your time off. So, you're always on edge, and you're always nervous all the time (# 0631).

In another engineering example, a Chief Engineer spent three days systematically fault finding an engine fault. He describes the experience as follows:

It really stretched me electrically, and that's all I did for three days, for eighteen hours a day, until I was absolutely fried. Go to bed, get up, you even dreamt about it. It was painful (# 0254).

It occurred to me that these interactions are not always under the direct control, or notice, of the seafaring leader. Again, I noticed this phenomenon first-hand in my own field observations. On only my second day on an offshore vessel, I became aware that I was detecting changes in the engine state through the soles of my feet that suggested to me that something interesting might be going on. This prompted me to head to the bridge before I was fully aware of the thought process that had prompted me to do so.

Making further sense of the motif

The above interpretation posed deeper questions for me, requiring further sensemaking of this motif, particularly:

- How do the metaphors of shape-shifting and melding help us to understand the actions of seafaring leaders?
- Is this bodily engagement always under the control of the seafaring leader? Does it occur when they do not expect it, or when it is not wanted?

The descriptions of bodily engagement with the vessel were most strongly associated with crisis situations. In these situations, seafaring leaders extended their senses through instrumentation, while engaging with controls in a way that extended their musculature throughout the vessel in a corporeal way. This seems to significantly enhance their sensemaking capabilities in a highly dextrous and immediate way.

The prevalence of bodily actions and sensations throughout the stories strongly suggested to me an embodied aspect to sensemaking, from understanding what is happening, learning about the situation and taking action that informs as well as “solves”. Some accounts describe a high degree of sensorimotor integration, as if the seafarer is engaging with the vessel as they take action. As the naming of this motif suggests, I’ve understood this as a sort of metaphorical shapeshifting as a seafaring leader metaphorically melds with the vessel and its instrumentation to enhance their sensemaking capacities. This metaphorical melding is often so complete that the seafaring leader describes the vessel as themselves, even attributing the vessel with human limbs such as “legs” (#0675) that can “run away” (#0768). In fact, the language that seafaring leaders use suggests this phenomenon is unremarkable to them, as they naturally speak about the vessel and their selves in a highly integrated, enmeshed fashion. The melding is so natural and seamless that it is largely unconscious and unobserved by the self.

Actions and gestures, as part of this bodily engagement with the vessel, appear to be incorporated - perhaps encoded? - with the recollections of the seafaring leaders. For example, I observed hands moving to controls during the retelling of

highly visceral segments of the stories (#0768). These echoes of the bodily engagement were unconsciously made, and did not appear to be re-enacted for the benefit of the listener. It was as if these gestures were recorded as content; encoded along with the memory rather than an element of performance for the listener's sake.

I also wondered how the immediacy or proximity of objects seemed to shape the way they make sense of critical events and to how they respond to them. In those few cases involving less experienced seafaring leaders, it struck me that objects that are within grasp could become the focus of awareness and shape sensemaking. I described this as a “stickiness” that fixes attention and sensemaking on objects and sensations close at hand or at the fore of their awareness to the exclusion of other objects or solutions not in the immediate proximity of the seafaring leader. These “ready to hand” objects appeared to me to close off alternative options from consideration, and in this way prompted them to follow sensemaking pathways more limited in scope than if the objects themselves were not within grasp. In contrast, in the majority of cases, experienced seafaring leaders seemed able to overcome this proximal fixedness of “ready-to-hand” objects and solutions; drawing upon their experience and finely tuned senses to consider whether the natural attraction of the close-at-hand object/solution is indeed appropriate to the situation (as described in the interviews #0675 and #0114, above).

I considered the extent to which this bodily melding is under the conscious control of the seafaring leader. The metaphoric melding of self and vessel appears to include the intrusion of sensory information from the ship to the seafaring leader in subtle ways that are not always within the control of the leader. For example, sounds of the engines intrude upon the awareness of the leader, disrupting sleep (#0361), and after only two days at sea I myself became automatically responsive to changes in the vibration of the vessel. Protracted engagement with the vessel impinges on sleep and can leave the individual feeling “fried” (#0254). Often, the intrusiveness of the vessel upon the seafaring leader's awareness is subtle enough to influence – and trigger – sensemaking without the seafaring leader being aware of the

phenomenon at the time. As such, it seems to be a feedback system that is largely unconscious and, therefore, rarely considered in terms of its role in sensemaking.

Questions arising

Having made further sense of the phenomenon of bodily engagement, I was left with other questions that seem fruitful for further examination through theory and practice:

- What would explain the bodily metaphors that appear in the accounts of the sea-faring leaders?
- How does the use of these metaphors affect practice consolidation and development?

Motif 2: The strength of emotion in the midst of leadership sensemaking

This motif explores the role of emotion in the sensemaking of the seafaring leaders, particularly the impacts of emotional reactions on the way in which the person engages with and influences the critical event.

In one example of the affective aspect of sensemaking, a Chief Engineer believed a worker had drowned within a confined space. He initially responded with an intensity of sorrow, which turned into anger when the Chief Engineer discovered the sailor was alive. The sailor was in fact ashore drinking with the Master, but had neglected to remove his tag from the board to advise he was no longer in the confined space. The Chief Engineer was angry enough to send the sailor home, thus terminating his employment as a crew member. The account obviously retained a significant emotional charge for the chief engineer, because during the interview he had tears in his eyes as he recounted the story:

Oh, I was in tears ... I still, nowadays, you know... And because it was late in the afternoon, I rang the master, he'd knocked off... I was the only idiot around, and he was on the piss <drinking alcohol> with the

master... I sent him home. I just... I was in tears, you know. Oh, I have tears in my eyes, mate. I can still... I was kneeling, looking into a manhole that was overflowing, water just coming out *like that*, and I just... I get on the phone, and geez, I give him shit... I sent him home, "You can go home, we'll get someone else up" (# 3424).

Another master described the emotional impact on members of the crew after his vessel sank:

I think it was different for everyone. From me down to the cook. I mean, the cook was angry because he'd lost his wallet and radio and whatever. For me, it could have been a catastrophic, career-ending event, you know. Um, engineers it would have been frustration with being able to see the problem, knowing what to do, being so simple but not being able to achieve it. So, everyone would have had a different response. (# 0768).

Fear, sorrow and anger all appeared in the stories, in a range of nuanced ways. For example, there was a fear akin to the icy, "deer in the headlights" experience, when one Master used the terms "awful", "terrible" and "horrible" to describe a critical event in which another vessel almost collided with his vessel. There was also a fear that could be described as dismay, a fear laced with foreboding, anxiety or worry:

You're hanging onto those sticks, putting as much power down as you can without blacking that engine out, and you're just thinking "Gee, come on, come on, come on, come on!" (# 0768).

You know, your engines are ramped up and you can see the massive thrust coming out of the stern, and you are doing this type of thing, <hands to head, moans in a worried manner>. You know, there's nothing more you can do. (# 0768).

There was sometimes grief associated with critical events, including an immediate grief, an intense sorrow-in-the-moment. For example, when the Chief Engineer thought his colleague had drowned in a dockyard tank flooding accident:

And I went rushing up there, because I saw the water on the deck because it overflowed out the manhole, and I looked... It was a tag situation, people put

a tag on when they went in the tank. One in my team, the mate, had his tag on it... I was in tears, because I personally knew him, his wife and his children, and I thought he was down there (# 3424).

There was also a lingering grief, as reflected in one Master's sorrowful tone of voice when he described the moment when his vessel finally sank:

That's when the water, when the bulkhead split, and then the water rushed into another compartment, and then she sank about half an hour after that. So, we had to jump over the side (# 0897).

Grief can go hand-in-hand with remorse, as in the example where a crewmate was seriously hurt on the job:

It was confronting. And she was crying and in pain, and I thought "Oh no..." Yeah. That's confronting when you hurt someone (# 0190).

There are examples of acute emotional pain within the narratives. For example, there is the palpable sensations of pain, akin to dying, expressed by one Master: "You feel like you're in a black hole and you can't get out" (Interview 0361). Another Master pantomimed holding his head and moaning to describe their felt experience during a crisis (# 0768).

An emotion that frequently struck me while listening to and reading the critical events was anger. One dimension of this for me was the immediate anger at being challenged by others, such as when the unionised crew marched up to the bridge and confronted a Master with the intention to take strike action:

I'll be very honest, I reacted more like an individual rather than a skipper. You do react as a human being, and that's what I did. I did lose my temper, and I told them to eff off from my bridge (# 0520).

This is anger arising from a direct threat. Immediate and intense, it seemed to me to prime the body for confrontation, aggression and a display of power. It called to mind the primal fight and flight response.

However, there seemed to me to be a second variety of anger that came later in another crisis. I would describe it as less intense, but containing motivating grit, giving traction to pursuit of why the critical event arose in the first place:

So, the fact that I didn't anticipate that, and it happened, pissed me off. And, although it would probably never happen again, and just the fact that, how could this happen on another ship in our operation? I was really disappointed to think, you know, how did that person get there in the first place? And the fact that nothing came of it at the end, that also really pissed me off. I was furious. Absolutely furious. (# 0768)

Emotions are also sometimes described as prompting action, and therefore outcomes. For example, there is the galvanising emotional response that fuelled the resolve of a chief engineer confronted with a critical malfunction on his first voyage in the role:

I'm not frigging going off hire on my first stint as Chief. You know, I refused to (#0675).

Making further sense of the motif

In my interpretation of accounts of the emotional dimension of sensemaking, the following questions prompted a deeper exploration of their accounts:

- What does the vivid re-enactment of emotion suggest about its role in sensemaking processes?
- How do seafaring leaders themselves understand the role of emotions in their sensemaking?

Not only is the sensemaking of critical events imbued with bodily engagement, as explored in Motif 1, I'd suggest that it is enmeshed with emotional dynamics as well. The stories suggest that emotions, both during and after a critical event, are not a mere by-product of the situation. Rather, that they are an integral aspect of the sensemaking process itself.

It was confronting. And she was crying and in pain, and I thought "Oh no..."
Yeah. That's confronting when you hurt someone (# 0190)

Emotion is not easily calibrated in sensemaking, as illustrated by the Master who was angry at having crew members confront him on his bridge (#0520). Another described an angry outburst towards a crew member during a crew meeting:

And then afterwards when the red mist went away. “Oh shit, I went too far” (#0361).

I reacted more like an individual rather than a skipper. You do react as a human being, and that’s what I did (#0520).

Perhaps because emotion can be hard to control in real-time - and afterwards – it seemed to me that the seafaring leaders I spoke with were very aware of its significance in their behaviour. And I was particularly struck by the way emotion was expressed and re-enacted by several of the leaders during their story-telling, even when the events had taken place some time ago. Indeed, they were very vividly manifest during some of the accounts; bodily displayed in tone of voice, body posture, facial expression, gestures and physiological responses such as tears and blood flow to the face. These emotional elements seemed to be intertwined with the seafarers’ recollections as if recorded in the moment, inscribing the narratives with a detailed, and often eloquent, filigree of emotional texture. Like the bodily sensemaking described in Motif 1, the emotions were re-enacted in ways that seem to continue to give meaning to the critical events for them.

It might be, then, that re-enactment of emotions can underscore, or emphasise, key practice insights so that they might be more effectively communicated to others in terms of storytelling, and trigger sustained practice reflection for the individual themselves. While some participants did reflect on their intuitive grasp of situations, it seemed to me that they were often at a loss as to how to deliberately access this dimension, beyond trusting it when it appeared or using it as a warning sign. Since emotions, for many, were already in awareness, and open to review, they might be more readily accessible as entry points for reflection than intuitive or embodied dimensions of sensemaking.

At the very least, emotions appear to play a key role in both experiencing and making sense of critical events. Both the degree of intensity and also the nuance of

emotion mark them out as significant in their impact on sensemaking, which prompts the following questions.

Questions arising

- What is the untapped potential of emotion in enhancing the sensemaking of seafaring in real time, rather than just being a source of ongoing regret or guilt?
- How might the acknowledgment and re-enactment of the emotional aspects of sensemaking become a portal for professional development for sea-faring leaders?

Motif 3: Multiple zones of attention

This motif highlights the dynamic tensions between the traditional isolation of seafaring leaders and their focus on their immediate physical and social space, and the emerging reality of the electronically connected immediacy of multiple stakeholders.

On the one hand, many of the accounts speak of the seafaring leader being isolated from the wider world in ways that impact how they make sense of their work at sea, and how they deal with critical events:

The whole world shrinks down (#0190)

The captain of the ship would get a telegram, and he would run everything (#0897).

In this way, the accounts point to an aloneness – a separateness - in the way that seafaring leaders make sense of their roles in terms of the wider world:

He had nobody to go to for advice (#0897).

Such is the degree of this isolation, that one master described his world, reduce to the confines of the ship itself, in this way:

When you're at sea, after a period of time the whole world shrinks basically, especially after some time... And people tend to (be) more reactive, they're a bit more sensitive. They don't put things in perspective quite as much as they would if they were at home. These things sort of grow, because, like I said, the world shrinks. So, when things happen unexpectedly, I think quite often there's more of an overreaction. Just keep it in perspective and look at it for what it is (# 0190).

This comment suggests that isolation progressively influences the seafarer's perceptions, requiring conscious attention to maintain perspective in the absence of external, real world, reference points.

The seafaring leader is frequently described as assuming additional roles beyond that of the conventional line manager, such as:

You are a mother (#0897)

The way I try and perceive my role is I am more like a Company CEO (#0124).

I note that both the roles of mother and CEO would ordinarily be filled by other individuals who are not accessible to the crew in their state of "aloneness" from the world itself. This suggests a broad scope of authority and responsibility that seafaring leaders assume in their world of the ship at sea.

However, some accounts describe how the introduction of contemporary electronic communication technology such as internet and satellite communications, means that seafaring leaders are now much less alone than they have traditionally been:

It becomes that the master is not out there on his own at sea, contemplating what he's about to do and what is going to happen (#0768).

There appears to be a socially engaged form of sensemaking that goes beyond fellow crewmembers on the vessel itself. It increasingly extends across the globe via mobile phone and internet technology in a way that creates webs of collective sensemaking that are available as a resource for the seafaring leader.

Some Masters welcome this. One Chief Engineer describes the global network that he connected with to resolve a pressing mechanical fault:

Well, you've got to make sense of it. There was a lot of physical communication on the telephone with the likes of the original equipment manufacturers and indeed the office, and there were various test routines that we were asked to do. We even sent recordings of the noises and the operation of the unit. And actually, for them to see exactly the data that we're seeing and to make recommendations – to interpret that data, which was the experience that those guys have got, it was a lot faster to actually engage those guys. From a chief engineer's perspective, it was comforting to make sure that they were actually looking at it as well (# 0806).

This Chief Engineer described this socially extended form of sensemaking, involving experts from around the world who were able to collaborate in making sense of a critical malfunction using digital recording and internet technology, as “comforting”.

But not all welcome this sort of dynamic. The example above contrasts markedly with the perspective of a Master who is asked by the company head office to forecast his fuel usage on the way to an international assignment:

The emails were flying back and forward - How much fuel do we need? How much? I don't know. They want to know how many cubes <cubic metres> of fuel I would burn from here to Broome. I could burn fifty cubes; I could burn seventy cubes. I just don't know. So, I just said “From this point in time, three hundred. That should be minimum. Might need more. So, fuel was booked for three hundred. Go into Broome, the Chief said “We need an extra hundred cubes of fuel.” “Ah, can't get it.”..... When you've got guys on the rig trying to tell you how to do your job. That gets below my skin because I'm the guy with the ticket. I'm the guy in charge of the tow. You should be listening to me. You shouldn't tell me how to do my job. I don't tell you how to do your job.

In another example, a master complains that an oil spill at sea prompted a call from the head office within ten minutes of occurring, interrupting his efforts to deal with the event:

I was on deck for no more than 10 minutes, we're already getting a phone call from the ship manager in the Perth office, because the rig has told their guys who has told the shore guys which has called the ship manager over in Perth, which... I mean, he's got nothing to do with it, he's the point of contact, then he's called the ship within 10 minutes (#0535).

In these examples, socially extended sensemaking is seen as an imposition, a demand rather than an opportunity.

Indeed, one seafaring leader said that increased interconnectedness weakens the capabilities of seafaring leaders to make sense of and resolve critical events:

To me it's a position which, over the years, has probably tended to be watered down a little bit. Because of the ease of communication that everybody wants to get their opinions to get across, everybody wants to get their instructions across, and it becomes that the Master is not out there on his own at sea, contemplating what he's about to do and what is going to happen. He's got everybody in his face every five seconds, saying "do this, do this" and "what about that?" sort of thing. So that's made things a little bit more difficult (#0768).

As such, when this aloneness is removed through technological interconnectivity, it is described as weakening the role of the seafaring leader, and getting in the way of their work:

Oh, God. I feel like... can't they just leave me alone for a bit? (#0190).

and

Why are you bothering me? I've got more important things to worry about.... Because I'm busy doing other stuff. I could be in the middle of a rig move, or could be overseeing a junior officer driving, and I can't leave him by himself to answer the emails, so there's a whole lot of things to do with it.... That both sides should understand a wee bit (#0361).

Connectivity, then, can be both beneficial and threatening; comforting and bothersome. In summary, I interpreted the accounts of the participants as reflecting a tension between the focus upon the ship and its immediate concerns, and an

extended, often global focus beyond the ship towards the expertise of others and the concerns of stakeholders. How sea-faring leaders engage with these tensions struck me as being of very significant interest.

Making further sense of the motif

My interpretation of this motif gave rise to a number of questions relating to the way multiple zones of awareness impact the way participants go about making sense of things (where sensemaking as practice is broadly understood in the way I described at the start of this chapter):

- How must attention operate under pressure to incorporate both what is immediate and directly observable and data that is mediated by the input of absent others?
- How will this tension change as technology evolves?

These questions prompted me to try to make further sense of their accounts, as discussed in the following section.

In my own field observations sailing on board an offshore vessel, I was struck by the way the vessel became isolated from the world. For me, it was disconcerting to see the land disappear, its structures and features made doll-like, then insect like, then gone. I observed the crew settling into their work and routine, largely on their own, living and working in an environment that was largely a machine contained within the streamlined cocoon of the hull. I perceived the ship becoming a world unto itself, partitioned by an increasing expanse of sea.

This experience brought home to me just how ‘the world shrinks down’. Masters and crew are likely to make sense of their experiences in ways that are difficult for non-seafarers to appreciate without consciously factoring in the degree of concentrated focus that comes from being at sea for extended periods of time. As such, the lifeworld of the seafaring leader may be inherently difficult to understand for those who live and work on land. Grasping how they make sense of critical events at sea necessitates adopting a situated lens in which the world shrinks down, phenomena become writ large, and the tendency is to focus on the resources and information available to the leader on the vessel itself. This localised and concentrated zone of attention, combined with the authority invested in them, easily creates a default

setting that seafaring leaders rely first and foremost on their own capacity to understand situations, make choices, take action, direct others and account for their behaviour to stakeholders.

However, increasingly, electronic communication technology provides for richer forms of sensemaking, involving a diverse range of information sources and stakeholders. While this might be comforting for some, for others it is at odds with traditional perspectives of seafaring leadership. External guidance and support can be experienced as compromising leadership authority. Incorporating the input from disembodied “others”, whether they be from customers or Head Office management, can be experienced as time consuming, complex, and intrusive. It draws the zone of attention, and cognitive resources, away from the immediate focus of the ship, the situation, the crew and the leader. This time, and attention, consuming external focus is seen as a potentially dangerous distraction from a high-stakes, high reliability work context that demands their full attention and control. As such, this extended form of sensemaking conflicts with traditional, autocratic perspectives of seafaring leadership. The advance of information and communication technologies such as satellite-enabled emails and telephone contact seems to be disrupting traditional notions of leadership at sea, and the way that seafaring leaders make sense of their roles.

Questions arising

Having tried to make further sense of this motif, other questions arose that could be useful for further examination through theory and practice:

- What do the participants’ accounts suggest about the ways in which these leaders shuttle their attention between the data available to them on the vessel itself and the information and dialogue coming to them from stakeholders via electronic communication?
- Are there tensions in the way attention shifts or shuttles between the “here and now” and the disembodied and mediated ideas and inputs of those not on board?
- What might be the ways in which the deliberate focusing of attention might be more effectively managed through practice development?

Conclusion

The interpretation of the first three motifs has highlighted the complex nature of sensemaking within the seafaring context and revealed a number of tensions that confront the seafaring leader in their professional practice. Additionally, these motifs suggest that these forms of sensemaking are highly embodied and enmeshed in complex ways that shape, if not constitute, their sensemaking. These interpretations remain my own but will be subjected to further examination in light of contemporary theory in the course of this thesis.

Having conducted a thick interpretation of the first three motifs, I continue the interpretive process by exploring the remaining three motifs in the next chapter.

Chapter eight: Interpretation - part two

The interpretation process commenced in the previous chapter is continued in this chapter, as motifs 4, 5 and 6 are explored. As in the previous chapter, each motif contains my own attempts at deriving meaning from the thick descriptions, before articulating the questions arising from my interpretive efforts. The chapter concludes with a comprehensive review of the motifs, a comparison and contrast of crises and unfolding events in relation to the motifs, and a refinement of the questions arising to identify the questions that will inform my examination of sensemaking in light of contemporary theory.

The motifs explored in this interpretive chapter are:

- Motif 4: Authority and relationships in sensemaking: me-ness, them-ness and working together
- Motif 5: The interaction of systematic diagnosis and problem solving with intuition, action and pragmatism
- Motif 6: Grasping patterns, finding the line and looking back

I commence with an exploration of the paradoxical interplay between the authority of seafaring leaders and their need to maintain relationships in complex contexts.

Motif 4: Authority and relationships in sensemaking: me-ness, them-ness and working together

In framing this motif, I was trying to capture the dynamics and tensions that struck me as occurring between a seafaring leader's perceived need for authority and power, and the need to maintain relationships and collaborate with a diverse range of stakeholders.

There is a broad range of interactional approaches evident throughout the accounts, where sensemaking involves engaging with others. In one story, involving a crisis at sea, the Master described everybody proceeding with their duties with a high degree of autonomy and collaboration:

Emergency muster. Standard drills, then. Mustered everybody. Discussed the situation. Looked at ways to tackle it. One team went off to tackle it. The other team went 'round securing things like, assuming we can't stop the water coming in, let's make the remaining water tight integrity as much as we can ... so, all those things just kicked into place, basically (# 0897).

This account suggested to me that the Master and crew engaged with making sense of, and dealing with, a sinking vessel in a highly organised collective fashion. It seemed to me that sensemaking was taking place across the whole team, with the Master playing a coordinating role in the sensemaking as the event unfolded; acting as a hub around which the actions were collectively taken to resolve the event.

Additionally, one chief engineer described a collaborative approach to resolving a critical issue that drew upon the talents of multiple stakeholders:

And actually, for them to see exactly the data that we're seeing... it was a lot faster to actually engage those guys. From a chief engineer's perspective, it was comforting to make sure that they were actually looking at it as well (# 0806).

In another example of collaboration and consultation, a Master described his relationship with the client when in the process of declining to move in close to the oil platform when he considered unsafe to do so:

There is no stigma in me saying "No." Certainly in the most recent years we've been encouraged by all to do whatever we think is necessary for the safety of the crew in the ship environment. But, they (the client) ask because that's what they have to do (#0535).

These examples suggest to me the existence of a collaborative, consultative leadership approach towards stakeholders such as the crew, the client and diverse range of external agents such as head office management, component manufacturers, and maritime industry regulators. This style of engagement is perhaps summed up in the words of one master who described the relationship management aspect of his role:

It's like an hourglass in both directions (#0535).

Additionally, one chief engineer commented on his need to work effectively with his stakeholders:

We are connected. We have to work together. (#0711).

I also construed within some accounts an authoritarian, unilateral approach to leadership that was in stark contrast to the collaborative and consultative approach described above. One Master described his interaction with their crew upon discovering a tangle of chain, with a stored energy hazard present due to tension between the chain links (he referred to this tangle of chains as a “bunch of bastards”):

There was a lot of headless chooks running around and a lot of noise, and a lot of... just basically ... bullshit. And you sort of sum the situation up and I had a clear view in how I wanted it done. The Chief Officer was just talking crap, so I just shut him down. I said “It’s not happening that way.” The second mate was carrying on and I said “You just drive the winch. I don’t want it done that way. You just do what I tell you” (# 0124).

I notice in his description the coldly considered manner in which the situation was reviewed, the perspective that the master exclusively knew the right way of doing things, while all else appeared to him to be in floundering chaos. To my reckoning, the Master’s words – “I just shut him down” – reduced this seafaring officer to a malfunctioning unit that needed deactivation. Likewise, the captain then appeared to “programme” each crew member with a set of instructions, and the evolution is carried out safely as directed by the captain.

A similar, unquestionable and autocratic leadership approach was suggested as applying to chief engineers within the domain of their engine room:

If he says black is white, whether you agree with it or not... It’s his engine room (#0395).

Another example where the autocratic leadership of the seafaring leader seemed to be beyond question is where a delegation of crewmembers approached a Master on the bridge to complain about the limited amount of bottled water with which the vessel had been provisioned:

I did lose my temper, and I told them to eff off from my bridge. I mean, that's where I will not back down. As long as I've got those stripes on my shoulder, nobody comes on the bridge and talks to anyone on the bridge like that – it's as simple as that (# 0520).

This autocratic approach appears to be echoed in the ways that some seafaring leaders I interviewed described their roles. For example:

As long as I've got those stripes on my shoulder, nobody comes onto my bridge and talks to me like that (#0520)

So, the buck stops with him in every respect (#0768)

I see the role of the Master as a CEO (#0361).

And,

I'm the guy with the ticket. You should be listening to me. You shouldn't tell me how to do my job (#0068).

This autocratic concept of the seafaring leadership role is highlighted by the practice of referring to a vessel Master as "the Old Man" (#0254).

In reading these accounts, it struck me that this autocratic, unchallengeable leadership stance is increasingly challenged from a range of stakeholders. The interviews offered several examples of where this occurred, and where the Master's themselves were very aware of it:

I'm being challenged. They're challenging me (#0190).

He refused to come back (to sea) with me (#0361).

And,

They walked up, all the MUA (unionised crew) members, like thugs, with their body postures and stuff, that "This is what we have been told, we are not going anywhere, we want to halt the ship." (#0520).

One Master related a story from his time as chief officer, and the result of a disagreement he had with his Master at the time:

I disagreed with the Master. I said “That’s not my job. I’m not going to do it that way. The master disagreed, but I still wouldn’t do it, because I knew it wasn’t a practice –I got a call from the office, and it was the Operations Manager at the time, and he said “The Master has asked you to be transferred. What’s your opinion of that?” I told him about the incident and the crew, and said “Give me a new Master and I’ll sort the crew out”.

Interviewer: What happened?

The Master got transferred (#0068).

In the above example, the authority of the master is overridden by the Head Office. Whilst I don’t know whether this was ultimately justified as a decision, it highlights that the authority of the seafaring leader is increasingly open to challenge, and that challenge is even supported by senior management in some situations. However, some challenges from the crew seemed to take extremely aggressive forms that were not sanctioned by management:

Because I knew it was coming. And it came to the safety meeting when everybody was there. That’s when he made his attack on me. And he started calling me a c#@* and a b&@#\$\$% in front of everybody, and I had to make a split decision. Now, if I bow down to this guy, everybody here has got no respect for me at all. (#0361).

To me, the last sentence in the above vignette powerfully suggested what is at stake in the tensions between the concept of unchallengeable autocracy and the increasing challenges to this by crew members. It highlights a vulnerability and isolation that puts a poignant spin on the term “the Old Man.”

Customers, sometimes called charterers in the industry, appeared to me to be another source of challenge to the autocratic role of the seafaring leader. For example:

They always try to push it more (#0361).

And it’s those charterer demands – push, push, push, push – that really impact upon our abilities to make maybe the correct decisions (#0535).

And I was told that I could drop the tow any time I want, but they over-rode it (#0361).

On one occasion, an interaction with the customer uncovered deception:

Once I realised that what they told me... was lies! (#0068).

Whilst the accounts suggested to me that the seafaring leader does have the formal authority to override the directions of the customer for the sake of safety ("There is no stigma in me saying no [#0535]), it does not always appear to be straightforward. One Master said that, when deciding to act against the intentions of the client for safety reasons:

You've got to be on firm footing before you make big decisions like that (#0068).

There appeared to me to be secondary consequences for displeasing the client, even when acting in the interest of safety:

And they might say to (the company): "Your Captain doesn't know what he's doing. We want him off" (#0361).

When a customer is successful in overriding a seafaring leader, it could significantly impact their perceived role and sense of self-worth:

And you get nowhere. (Hands flop on the table). You just feel (pause) as if you're in a black hole and go "What's the point in having a Master?" (#0361).

The relationships between the seafaring leader and stakeholders such as customers and crew strike me as being highly complex and ambiguous at times. And the perceived autocratic authority traditionally associated with the seafaring leader is increasingly fragile and uncertain. In my interpretive process, I was intrigued by this tension and keen to make further sense of this motif.

Making further sense of the motif

My construction of this motif prompted the following further questions:

- How does the way in which seafaring leaders take up authority impact on their sensemaking, where sensemaking is understood as involving

understanding things through mind, body, gut, heart, imagination, social interaction and action, making implicit and explicit decisions, intervening in ways that affect and involve others, and taking responsibility for the intended and unintended outcomes?

- How do seafaring leaders try to resolve tensions between their own authority and the increasingly complicated relationships they have with crew and other stakeholders with interests?

It may be that the requirement for high reliability and the isolation of maritime operations has honed a leadership style that has traditionally been autocratic and unchallengeable – a command and control approach. At some point, perhaps over centuries, this autocratic leadership style has become embedded in the traditional role of the seafaring leader, which has become the archetype of “the Old Man”. The seafaring leader’s authority over their crew, as portrayed in many of their own accounts, would seem to be absolute in scope and certainty. However, while many describe their power in back-and-white terms, their accounts provide examples where that authority is successfully challenged by the crew, and where power between leader and follower may be more ambiguous and uncertain than initially described.

As mentioned previously, the increase in electronic communications and information technology provides customers with real time access to the seafaring leader on a day-to-day operational basis. This includes email, mobile phone contact, but also digital data in the form of telemetry and information system updates from the vessel and the oil and gas platform. I understand that clients are under economic pressure to manage their costs, and with a complex supply chain, seek to continually adjust their requirements of offshore vessels in a real-time sense. This appears to create tensions in terms of the need to maintain high operational reliability and preserve the unchallengeable and autocratic leadership style described above. In terms of optimising operational outcomes, returns are often traded off against increased risks. The interviews suggested that customers sometimes attempted to pass these risks downstream to the vessel operators, represented by the seafaring leader. Whilst seafaring leaders are mandated that they can stop the job if it is deemed by

them to be dangerous, they seemed concerned that this will reflect upon them, or that their decision to do so will be questioned if the ship goes off hire.

The accounts suggested to me that many seafaring leaders invoked a strong sense of how they saw themselves - and just as importantly - how they enacted their authority and agency, as they responded to critical events. It could also be the case that their understanding and enactment (whether conscious or not) of their authority and identity is intertwined not just with the way those events play out but what they construe as an event in the first place. A consultative leader who is not threatened by disagreement might not experience something as a crisis, but as just another relatively routine practice challenge. Seen in this way, these challenges to an autocratic leadership style, from stakeholders who seek to exercise power and influence the goings on at sea represent challenges to the identity of the leader.

One master described how a crew member he had disciplined was able to “refuse to go back” to sea with that master. This master related another tale in which a simmering tension with a crew member erupted into verbally aggressive conflict during a safety meeting in the presence the entire crew:

And he started calling me a c#@* and a b&@#\$\$% in front of everybody....
Now, if I bow down to this guy, everybody here has got no respect for me at all. (#0361).

It seems very clear to me that the seafaring leader experienced his identity as being directly and seriously challenged in this example.

Another master related a story (from when he was a chief officer) where he disagreed with his master on the way work should be done on board. After inquiries from Head Office were made, they replaced the master and kept the chief officer instead (#0068). Regardless of the merits behind the arguments, this example further highlights that a seafaring leader’s authority can successfully be challenged by the crew. Another master who would not back down while he had four gold stripes on his shoulder was ultimately forced, via the Human Resources Director, to negotiate with the crew to provide additional plastic bottled water, thereby undermining the environmental sustainability initiative to limit plastics at sea (#0520). These examples provide a stark contrast between the ways many

seafaring leaders have traditionally understood the practical reach of their agency, and the actual limits to that agency. Furthermore, the limits to their authority are made clear in ways that are very public and widely known in their practice world. The consequences can be very significant, in terms of how others perceive them and how they perceive themselves.

Others appreciate that their practice challenges can't just be seen and dealt with in black and white terms. Human interaction was described by some masters as being highly ambiguous, as expressed by the comment "There are fifty shades of grey in there" (#0520). A number of accounts suggested that challenges by the crew need not be catastrophic. As one master described her experience:

You're not always going to be right and you won't always have the perfect solution to any kind of problem. And if someone does challenge you, that's okay, that's fine. (# 0190).

In fact, frank and open discussion between seafaring leader and follower about what works and what doesn't can lead to improved outcomes, personal insights and professional growth:

We talked about how did it go technically straight afterwards, how did it go personally, and then the first engineer apologised then. And that was interesting to hear from him that he didn't act as well as he should have (# 0114).

I speculate that by taking up authority more lightly and flexibly, some Masters avoid investing their entire credibility and personal sense of authority in a rigid pattern of "I know it all" and "My way or the highway". But irrespective of how authority is taken up and negotiated in practice situations, if significant dimensions of professional identity and agency are implicitly or explicitly challenged, it is helpful to speculate what happens to a seafarer's intellectual, emotional, intuitive and enacted process for making sense of situations both in real time and over time.

Questions arising

Having applied an interpretive focus to this motif, the following questions remain to be pursued through further inquiry, theory and practice:

- How are the sensemaking efforts of sea-faring leaders best understood in terms of social interaction and authority relationships?
- What does their language suggest about this?
- How can seafaring leaders learn to accommodate and negotiate the tension between their own authority and identity, and stakeholder relationships, under conditions of increasing pressure?
- How can this tension be managed organisationally as workplace practices, technology and education change?

Motif 5: The interaction of systematic diagnosis and problem solving with action, pragmatism and improvisation

This motif compares and contrasts systematic diagnosis and rational decision making with examples of action-orientated sensemaking, pragmatic improvisation and improvisation suggested by the participant's accounts of critical events. It also explores potential interactions between these two sensemaking processes.

Across the narratives, there are a number of examples that are described in language that suggests rational decision-making processes to address critical events. This style of sensemaking is likened by one Master to the strategic game of chess:

You're continuously reasoning what to do, how to do it, and if this goes wrong or that goes wrong. And so, it's like chess moves (#0768)

The chess metaphor implies that a situational "chess board" is available in its entirety for consideration before a move is made. Rather more pragmatically, another Master suggests that there are clear rules to seafaring practice:

Everything is black and white in our industry. You either do it right or wrong (#0768).

Many other accounts speak of a rational, pragmatic appraisal of the physical reality of a critical event, such as the fact that if a vessel stops during a tow, the oil rig will run over the top of the vessel:

Well, you lose power when you're towing, the rig mows you over. So, you can't just shut down (#0254).

It was this pragmatic and reasoned approach that seemed evident to me in an account where a Chief Engineer donned a fire suit and breathing apparatus to enter a burning engine room to selectively isolate one engine so that the other one could keep operating. In reading this account, I thought about the level of discipline that would be required to take such a considered approach when confronted by a fuel fire in an engine room at sea (#0395). The account suggests that the one thing more dangerous than a fire at sea is losing propulsion during a critical vessel operation. This conclusion is arrived at despite the urgency of the intense heat, flames and smoke present within the engine room at the time.

There are other accounts couched in the language of objectivity and process. One Chief Engineer who was confronted by a stuck continuous pitch propeller described his approach in this way:

I split the system in half, it's hydraulically controlled, so you have a control system and then in the hub it has a piston that goes in and out to turn the blades (#0657).

This account suggested to me an objective and dissecting examination of the problem, where the seafaring leader distanced and separated himself from the problem itself in order to conceptualise where the fault might be. This description of "splitting the system in half" conjures for me the image of stepping back from the problem and the physicality of the ship in a bodily disengagement that is counter to the metaphorical melding described in motif 1. It suggests to me a surgeon-like detachment from the vessel-as-patient, that can be dissected and diagnosed from a detached and rational vantage point.

Additionally, two Chief Engineers described undertaking extended and meticulous fault-finding approaches that could be seen as highly rational in their sensemaking:

It could've been such that a fishing cable or a net had been wrapped around the propeller. That wasn't the case, but that was only determined as we walked through the steps of determining what it isn't (#0806).

At that point we had to prove what was happening. We couldn't start up anything until we could prove what was happening, and why it was happening (#0254).

Both of these accounts refer to a structured, rational approach that they seem bound to follow as a matter of discipline or requirement. It strikes me as interesting that this painstakingly structured approach made significant withdrawals, or drains, on their biological resources:

So, there is a lot of pressure, and certainly... that doesn't go away, even if you knock off for the day, or you knock off for that particular period (#0806).

And that's all I did for three days, for eighteen hours a day, until I was fried (#0254).

Although all these examples have suggested systematic and diagnostic approaches to sensemaking, that is not to say the events actually are black and white or that they can be approached like an objective chess game. And there are other descriptions which suggest very different reactions to the incidents, such as this description of the near collision with another vessel:

I had no idea that he... that there was going to be some mitigating action, I just had to get out when I saw what was happening.....I think the guy had, um, I do know that he had, they told me over the rail that the guy had, um, I don't know it some sort of, I don't know, it's not some kind of medical condition, but he just froze. Panic, and didn't, just couldn't, um (#0768)

Indeed, even the Master who used the term black and white struggled to account for what may have happened on the other vessel, suggesting that the event was far from "black and white", and that there was a high degree of ambiguity and uncertainty in this critical event. If this situation was indeed like a game of chess, it suggests to me a game-board where the sense-maker rarely has a perfect, top-down, view of the metaphoric chess board in which to apply a rational approach.

And in contrast to the rational, diagnostic appraisal offered for some critical events, there are others that seemed to me to be clear examples of improvisation in action. In these narratives, taking action seems to play a significant role in making sense of a critical event. And sometimes, decision making seems to come in the moment in an intuitive rush. For example, to avoid a larger vessel steaming towards their vessel:

So, then I just had to take action, so I just went full ahead on four engines, and just powered away from the rig (# 0768).

In another example of action-oriented sensemaking, a Master told a group of angry crewmembers to get off the bridge, as a way of dealing with a situation:

I'll be very honest, I reacted more like an individual rather than a skipper. You do react as a human being, and that's what I did. I did lose my temper, and I told them to eff off from my bridge. Nobody disrespects my bridge or the people on the bridge (# 0520).

There are examples of improvisation and bricolage (of making use of what is at hand), in the face of dire situations, such as responding to a loss of power on a vessel while towing an oil platform.

"If you can't get me two engines, get me one engine. If you can't get me one engine, get me the gill jet. But whatever is going to be quicker, get that for me" (# 0768).

In this example, the gill jet (a directional jet designed for manoeuvring and positioning the vessel) is repurposed as a means of propulsion, in order to keep ahead of the advancing oil platform. Such improvisation would require extraordinary confidence to exercise creativity under circumstances that are described by the master as "awful", "horrible" and "very frightening".

In another example of improvisation, a Chief Engineer fixed a hole in a ship using a baking tray:

So, it was using the resources you got. We had a couple of big baking trays we used in the big ovens on board, so it was big enough. So, we cut the edges off a big baking tray so we had a big flat piece to cover it. Covered it with Sikaflex (silicone) ...and then we just got bits of wood we had lying around and shored it from the deck head. And that got us from just outside of Tahiti back to Australia. Thirty-five days. (# 0404).

The need, and appropriateness of taking action in the moment, often in innovative ways, is underlined by the phrase “Just f@#* it!”, stating that whether this is the right way, it is the naturally occurring (“DNA”) mode (#0361). When such immediate action was taken, the seafaring leader appeared to be evaluating their action as it unfolded:

Well, (sighs) you don't really have time to think about... I think what it is, is that you are constantly questioning yourself as to “Is this going to do it? What else have I got? And if this fails, what am I going to do? And if that fails, what am I going to do then? (#0768).

To me, this suggests reflection on the action as it is unfolding, in a fluid chain of bricolage and assessment. However, sometimes this initial action seemed to irrevocably commit a seafaring leader to that course of action:

So, four engines, flat out, and then you're just hoping (#0768).

Akin to this action-oriented sensemaking, and in contrast to rational sensemaking, a number of accounts describe an intuitive grasping of the critical event. One Chief Engineer described his approach to sensemaking in this way:

You know how you get that gut feeling that something's going to go wrong? This boat had that feeling (#0254).

and, in describing the origin of the mechanical faults:

You almost just wait. You don't know where it's going to come from (#0254).

Additionally, one Master described how he became aware that a crew member would verbally attack him in a meeting:

Because I knew it was coming.... That's when he made his attack on me (#0361).

Making further sense of the motif

The creation of this motif prompted for me the following questions regarding the interaction of systematic diagnosis and action/improvisation in sensemaking:

- Are the tensions between these processes recognised by the seafaring leaders?
- Do they share their processes with others or is this solo work?

I was keen to consider further how these different sensemaking processes played out in their practice. Rational approaches to sensemaking are largely within the conscious awareness of the sense-maker and would be known to others, to varying extents, given formal structures and labels such as “fault finding”, “diagnosis” and “root cause analysis” that are codified and taught in engineering schools and maritime colleges. In contrast, there are examples of intuitive sensemaking that are less codified and less apparent to the sense maker. These examples may draw upon experience, “gut feel” or pattern recognition in ways that are less easily articulated, and described by one Chief Engineer as “spidey sense” (#0361). In using the term “spidey sense”, the Chief Engineer does not, or cannot, unpack the sensemaking process further, but privileges this form of sensemaking as a “superpower”, as symbolised in the Amazing Spiderman comic hero.

At the very least, the accounts suggest that action not only provides the seafaring leader with feedback but iteratively influences the event itself, and the other people involved in dealing with it. In terms of awareness, action provides information to the sense-maker in terms of confirming any initial working hypothesis as to the cause of the event, while determining the efficacy of action, as a best guess solution to the event. But action can also involve initial hunches that arise from intuition and, in

some cases, emotional and automatic responses such as fight or flight instincts. It certainly was more prevalent during crises than in the unfolding narratives, perhaps because of the perceived urgency of the events.

From these accounts it appears that, in the pressure of the moment, seafaring leaders convey their sensemaking process both by the directions they give and the questions they ask verbally, and by the actions that others observe. But when I spoke with them years or months after the events, some leaders were very able and willing to tell their stories of improvisation, often with pride. They told stories of virtuosity, of creativity and applied imagination under trying conditions, highlighting the finding of solutions and resources in uncommon ways. Likewise, stories involving swift initial action, where they succeed, become symbols of a leader's decisiveness and intuition. These forms of sensemaking are appealing from a storied and a practice perspective, particularly in the context of crises. There were fewer stories about unfolding events, perhaps because additional time permits a range of ways of understanding what is emerging over a longer period of time. It occurred to me, too, that intuitive sensemaking might also seem less acceptable when describing these sorts of events, given the high reliability work context. As such, the stories told might reflect professional social expectations of what an appropriate approach would be when events unfold over a longer period of time. Accounts of rational mastery, couched in professional protocols, could be preferred over more intuitive and improvised sensemaking in these circumstances.

I also considered the extent to which the seafaring leaders were aware of shuttling between different forms of sensemaking. It seems to me that, regardless of whether a rational or intuitive sensemaking approach was adopted, the commitment to using one or the other, or both, was made very quickly, and without notice by the sense-maker. It seems that moving between a rational, diagnostic approach on one hand, and intuition or action-oriented improvisation on the other, is made outside of consciousness so that the sense-maker does not describe and is likely not aware of. As such, it is an intriguing phenomenon in itself, prompting the following further question for inquiry through theory and practice:

Questions arising

- How can the use of intuition, action and pragmatism in sensemaking be further acknowledged, understood and communicated as practice in real time?
- How can the enactment and enhancement of practice be enhanced by doing this?

Motif 6: Grasping patterns, finding the line and looking back

The sixth, and final, motif concerns the ways in which the accounts of the seafaring leaders can be understood as in terms of finding resolution to the sensemaking process. These ways might include seeking out of patterns and finding equilibrium points in both critical and unfolding events. These equilibrium points are explored in the motif as points of balance between competing external demands, such as vessel safety and meeting customer requirements. But I realise now that they also could describe the ways in which the seafaring leaders engage with multiple and intertwined dimensions of rational, intuitive, emotional, embodied and enacted sensemaking. I had the sense that these seafaring leaders were describing these points as positions of professional security and psychological comfort. This is shown in terse, summary expressions such as “finding the line”.

For example, a number of the narratives refer to seeking patterns in the seafaring leader’s environment that may lead to a critical event. One Master who pieced together signs and indications that his client was about to put him, and his vessel, in an unsafe position described his reckoning as looking for what “could have been the first hole in the Swiss cheese” (#0068). Another referred to his piecing together the ongoing behaviour of a crew member in order to foreshadow that he would be attacked:

Because I knew it was coming. And it came to the safety meeting when everybody was there. That’s when he made his attack on me (#0361).

A Chief Engineer described how he intuitively attempted to sense breakdowns on an older, less reliable, vessel:

You almost just wait. You don't know where it's going to come from. And whether that gut feel is just a build-up of stress from multiple problems? Because every week something major would happen. And when that stopped for about three weeks, always - bang! It was a big one and it would stop the ship. I don't think there's anything rational or sensible about it. You just think "What is going to happen? Where is it going to be?" And you can't put your finger on it (#0254).

Inability to perceive patterns in critical events can give rise to strong emotional responses. For example, one master described his feelings when he did not anticipate a sequence of events that resulted in a near collision:

So, the fact that I didn't anticipate that, and it happened, pissed me off (#0768).

There are several accounts that mention finding "the line" between competing external factors. For example, one Master described his personal difficulty in balancing vessel safety and customer demands by lamenting "Where do you draw the line?" (#0361). Another talked of finding the line in their operational requirements:

So, I redraw the line – I'm now back in an equilibrium that I'm happy with. You're continually reassessing where you need to draw that line (#0353).

An interesting example of how rational and identity-based sensemaking interplay with finding the line struck me in this account from a chief engineer who was asked to maintain power output even though the ship's engine was in danger of overheating:

In your mind you'll say "Righty-oh – I know it's going to die at 99. We're at 92, maybe 93, and it seems to be levelling off a bit." But I've made a decision in my own head that when it gets to 96 that's the end of it (# 0993).

Whilst it might seem that an objective milestone has been determined, the Chief Engineer then goes on to talk about the subjective factors that he considered before taking this course of action in the first place:

You know, if you're a young bloke who didn't have that experience, and you're nervous about making that call, that would be a harder situation maybe – you don't want to blow up the ship. And you've got your whole career ahead of you, where you're trying to build a reputation for yourself maybe, as being a good engineer. That might not be so easy; you might err on the much more cautious side there and call it quits, and you then say "No, I can't do it – sorry, I can't have it." and then you wouldn't have got the job done, the charterer wouldn't have been satisfied. It's a trade-off, isn't it? Someone who might have called it quits earlier, it would have kept their own name clear (# 0993).

So, whilst the above example does involve objective measures such as engine temperature, the underlying factors that determine the sensemaking in this instance are described as more subjective, and very much based on determining how comfortable the individual would be in accepting the risk of taking action in terms of their professional identity.

The language used to describe identifying satisfactory positions sometimes made use of bodily metaphors. For example, one master described needing to be certain of his case when he over-rode the instructions of their customer by towing their oil platform back out to sea rather than continuing with an unsafe practice:

So, you've got to be on firm footing before you make big decisions like that. I knew I was on solid ground, and that comes from experience, yeah? (#0068).

His language in this case called to mind the sensation of feeling solidity under the soles of his feet, as a form of bodily reassurance in an otherwise uncertain and precarious position. It is interesting that he drew upon his experience as a means of finding this "firm footing".

Another way in which seafaring leaders seemed to be working with patterns appears to be in their efforts to achieve denouement in terms of critical events.

Denouement, as in the outcome of a situation when key aspects are made clear, can also be described as achieving closure. However, in terms of critical events described in these accounts, the denouement seemed to me to be sometimes unclear, or unsatisfying in its meaning. Causes, and the reason behind the actions

of others, were often never known, or could only be guessed at. In these cases, the individuals involved still seemed to be trying to make sense of critical events long after the events had concluded. In the words of one Chief Engineer, “You always look back” (#0404), and this seems to encapsulate the felt need for denouement.

Sometimes, an explanation did come to hand, but much later: In one striking case of denouement where a client had misrepresented their operational requirements to a Master in order to maximise their profits, he described the key piece of information that closed out the critical event for him:

And I found out afterwards it was all about money (#0068).

Another Master described being furious at not receiving an explanation for an incident in which another vessel almost collided with his vessel:

Oh, I really pushed for <an explanation for the incident>. And I think, to be honest, I think that they (the client) tried to squash it because it was such a high potential, it would have just shut the whole project down until such time as they worked out what had happened.

I mean if you said “Okay, if you put yourself sitting alongside the ship, would you expect another ship to come in at full power?” No way. No way, that would be impossible. So, the fact that I didn’t anticipate that, and it happened, pissed me off. I was really disappointed to think, you know, how did that person get there in the first place? Because he could have killed a lot of people. And the fact that nothing came of it at the end, that also really pissed me off. I was furious. Absolutely furious (#0768).

In some cases, there is simply no clear outcome, and no final closure, to a critical event:

You’re left not knowing what the Hell is happening. And to this day I don’t really know what the outcome is (#0395).

I’m not coming back into the field <of operational work> until I understand what happened to that ship (#0768).

Making further sense of the motif

A number of questions arose for me from these accounts of grasping patterns, “finding the line” and achieving denouement:

- What light does this motif shed on the ways in which the seafaring leaders engage with the multiple and interacting rational, intuitive, social, identity-based, emotional, embodied and enacted dimensions of sensemaking, before, during and after critical and unfolding events?
- How does their language capture this engagement, even for themselves? How can or do they communicate it to others?
- What is it like to achieve, and not achieve, denouement in terms of events?

I realised that sensemaking, in the practice world of the seafarers I spoke with, is a process that includes what is happening - before, during, immediately after and long after an event - whether the critical event is a crisis or one that unfolds over time.

While I had gone into the study with a keen focus on how they described the events themselves, it became clear very quickly that trying to identify patterns in what could lead to an event, and continuing to try to make sense of them long after the event, was a common practice in seafaring leaders. That is not surprising, given the significant stakes that are involved for them and for multiple others. But the ways in which they go about it intrigued me.

The cues as to what leads to events might often be subtle and ambiguous, certainly not obvious in terms of their relationship to each other, and complicated, even complex, in their contribution to cause and effect. They are more “like Swiss cheese” as one Master put it. I was struck by how the seafaring leaders used patterning in sensemaking work. Their description of “feeling” and “grasping for” patterns struck me as being particularly pronounced during unfolding events, which often lack the startling trigger of a suddenly manifested crisis. In the case of sudden critical events or crises, the leader might actually have had very few cues as to what is about to happen, and it is possible that in some case they have none at all. But even these cases, once an event is manifest, the work of thinking, feeling, intuiting, even literally grasping for patterns seems to come into play. It can continue as the leader reflects on, even seems to re-live and re-enact, events for a long time

afterwards. To me, most accounts do not describe assessments that can be easily communicated through well-defined rules. Instead, they seem to describe an ongoing process that is intuitive, felt in the gut, and sometimes tactile or embodied.

Many of them spoke in terms of metaphors like *finding the line*, that are both tersely or succinctly expressed and at the same time rich in the possibilities of what might be going on. These metaphors are useful when the patterns can't be encapsulated through conceptual, rational decision-making tools such as decision trees and fault-finding processes. Searching for patterns seems to allow seafaring leaders to find "the line", and achieve "equilibrium". They frequently describe their process for finding the line in bodily terms, such being on "firm footing" and "equilibrium", as well as emotional terms such as being "happy". In one case, although hard numbers such as engine temperatures, "the line" was finally drawn in other dimensions, such as whether it would reflect badly on a career or whether it would be the best balance between maintaining vessel safety and delivering on customer expectations. In all these circumstances, the examples of "finding the line", "equilibrium", and "firm footing" still used bodily metaphors.

I also thought more deeply on what it is like to not achieve denouement: a satisfactory explanation for an event. When it is achieved, there can be closure or resolution for the sense-maker regarding the event. However, until that point, it appears to me to be a strong tendency – perhaps emotional need? - for denouement that provides a motivation for the seafaring leader to keep trying to make sense of the critical event. The type of emotion associated with this drive for denouement is often a slow, smouldering form of anger (being "pissed off"). Finding denouement might allow leaders to find reasons for events that renders their lifeworld reassuringly explainable, and therefore more manageable. Or it might provide them with insights that can be deliberately incorporated into their practice and shared with others as practice wisdom.

Questions arising

At this point, I was very aware that my further reflection on the potential of this motif had barely scratched the surface of what it might yield. So, I returned to the questions I started with:

My further sensemaking of this motif gave rise to the following questions for examination in light of existing theory and practice:

- What light does this motif shed on the ways in which the sea-faring leaders recognise and try to resolve the tensions created by the multiple and interacting rational, intuitive, enacted, emotional, embodied, social and situated dimensions of sensemaking, before, during and after critical and unfolding events?
- How does their language capture this engagement, even for themselves? How can or do they communicate it to others?
- What is it like to achieve, and not achieve, denouement in terms of events?
- What insights are to be carried into the professional preparation and on-going development of sea-faring leaders, in the light of this motif?

Researcher Reflection: Bridging interpretation and theory

My interpretation of sensemaking among seafaring leaders, framed within the six motifs, suggested that it is a complex phenomenon consisting of many elements, or processes. This section provided a conclusion to the interpretive work of the six motifs that span the previous two chapters. It commenced with a summarised review of the motifs and the key interpretive insights. It compared and contrasted the nature of crises and unfolding events, as two sub-sets of critical events, as they relate to the six motifs. Lastly, I compiled questions arising from the interpretations that will holistically guide the theoretical examination of the sensemaking phenomena. I now reflect and summarise my interpretations of the six motifs.

I read the accounts of seafaring leaders as describing a metaphorical melding with the ship, which is the subject of motif 1. This metaphoric melding, or shapeshifting, is described in bodily terms, and appears to describe a sensorimotor engagement that feeds sensemaking on a kinaesthetic level that seafaring leaders are only partially conscious of. As such, this bodily engagement shapes sensemaking, with objects that are close-at-hand influencing the solutions adopted by seafaring leaders. The vessel provides strong sensory data that can even disturb sleep.

Whilst the metaphorical melding and shape shifting extends the sensemaking of seafaring leaders, the relationship with stakeholders such as customers and crew further extends and complexifies the lifeworld of the seafaring leader.

Threading through these embodied sensemaking aspects I construed an emotional dimension, as interpreted in motif 2. Emotions are evident in a range of hues that suggests a nuanced capacity for feelings during sensemaking. The narratives suggest to me that the feelings of seafaring leaders are not only by-products of their sensemaking but are enacted, and are the ways in which they make sense of their life world, particularly in terms of critical events that challenge their practice. As such, emotional repertoire seems to play a significant role in shaping the outcomes of sensemaking. For example, whether the seafaring leader feels “angry”, “furious” or “pissed off” influences both sensemaking and action during critical events. The participant interviews suggest that emotions appear to be very closely connected – even encoded - with the bodily experience of the critical event, and the emotions are recalled and acted out in the retelling of the narratives. Whilst emotions may be deeply inscribed into the experience, I speculated as to whether they are fixed, or whether they alter over time and with subsequent retelling and reframing of the critical events.

Considering motif 3, I’m suggesting that there are tensions between the multiple zones of attention that compete for significance in the sensemaking of seafaring leaders. On the one hand, the world of these seafaring leaders shrinks down and intensifies, forming a situated lens on the vessel itself. In this isolated world, it is little surprise that most of the narratives describe seafaring leaders solving problems on their own. On the other hand, with the advancement of information and communication technology, seafaring leaders are now contactable by global stakeholders who seek to collaborate and interact with them at sea. This has the effect, often unwelcome, of extending the zone of attention far afield to issues that are not immediately resonant with the immediate focus of the captain or chief engineer at sea. This dynamic results in significant tension for seafaring leaders, but also offers the possibility for richer, more productive sensemaking, as some of them appreciate. Authority and relationships are explored in motif 4, which interprets the tensions between the traditional and unchallengeable autocratic

leadership of the seafaring leader, and their relationship with stakeholders who seek to both challenge and collaborate with seafaring leaders in real time. These tensions challenge the sensemaking of seafaring leaders, both during critical events and in their later recounting of the events. In fact, many of the critical events cited have these tensions at their core. So confronting are these challenges to authority that they are described alongside events such as vessels sinking and near collisions with other vessels. The tensions between power and relationship are very powerful and as such they are a considerable focus for the sensemaking of seafaring leaders.

Following on from the tensions of power and relationship, motif 5 interprets the tensions between rational, systematic and diagnostic approaches to sensemaking and an action-oriented approach to sensemaking involving pragmatic improvisation and ingenuity. The narratives provide several examples where both methods are seen as being successful. However, I think that improvisation and action-oriented approaches tend to be employed during crises, where there is considerable urgency; while rational, systematic and diagnostic approaches occur during unfolding critical events where the time constraint is not as pressing. For example, tales involving improvisation and action are described with what sounded to me like pride, as examples of professional virtuosity and creativity under pressure. However, improvisation and action may be seen as being impulsive in critical events where there is ample time available. In these circumstances, and to my ear, perseverance of following a methodical diagnostic approach are also related with pride. Regardless of which approach is applied, the selection of the approach appears to be made in the moment with little or no conscious deliberation. Indeed, the narratives suggest the seafaring leaders are not aware that such a choice between options has been made. This may seem paradoxical that selection of approaches may be largely unconscious, and yet based on expectations as to what is appropriate. However, it strikes me that these expectations may be deeply internalised so that courses of action can be taken on a pre-conscious basis that the seafaring leader is not entirely aware of at the time.

Lastly, motif 6 explores the way that patterns can be sought out through sensemaking. These patterns seem to be used to identify points of equilibrium in

critical events that balance elements such as operational safety and achieving customer outcomes. These complex positions are described as “finding the line”, and are described in bodily terms that make them appear more grasped and felt for, rather than rationally decided upon. This grasping of equilibrium points and finding of “the line” occurs primarily in unfolding events rather than crisis situations. Another form of patterning lies in the efforts to achieve denouement in critical events as a final sense of closure or meaning to the event. The narratives suggest to me that denouement can take years to achieve and is by no means guaranteed.

My interpretations have compared and contrasted crises and unfolding events, as sub-sets of critical events. Both crises and unfolding events appear to have an embodied aspect (motif 1), and have a significant emotional dimension that extends beyond the event as it is recalled, retold and reflected upon (motif 2). Likewise, the need or desire for denouement is evident to me across both crises and unfolding narratives (motif 6). However, in terms of authority and relationships with customers and crew, I think these stakeholders tended to defer to the authority of the seafaring leader in a crisis situation, but to challenge this authority in the long term if they were displeased with their leadership, giving rise to many unfolding critical events (motif 4). Perhaps understandably, the narratives suggest that crises do tend to pull the zone of attention back to the immediacy of the vessel itself, more so than unfolding events (motif 3).

Also, as discussed in motif 5, action-oriented sensemaking and improvisation was more prevalent in crisis narratives, while rational, systematic and diagnostic approaches were associated with critical events that are not time constrained and were more unfolding in nature. One final point that is suggested by the narratives is that in unfolding events, the seafaring leader is following the signals that could lead to a crisis; while in a crisis, the seafaring leader has not grasped the leading signals and is confronted by the crisis that has already emerged.

The curation and interpretive processes have yielded many and varied treasures regarding the lived experience of seafaring leaders, and these have been captured in rich, visceral detail. I reflected upon my interpretations in light of the previous

literature review, and arrived at these insights from this comparison. Firstly, I was struck by the degree that seafaring leaders are embedded in complex work contexts, not only at the operational/vessel level, but at the organisational level as well (including land-based management, customers and regulatory institutions). This organisational level involves a higher degree of complexity, nuance and abstraction. Seafaring leaders must make sense of, and manage, this organisational level while attending to, and being physically embedded, in the operational/vessel level. The narratives point to dire consequences for them if they do not succeed in managing this multifaceted work context, particularly where organisational “drifts into failure” may arise. This complexity is consistent with the reality suggested by the Sociotechnical System (STS) model, that has recently been espoused by the Human Factors (HF) community of practice.

The vast scope of the STS model appears to encompass the sensemaking described by the seafarers, particularly the elements of practice, organisation and social elements. However, contemporary MHF approaches were shown by the literature review to be predominantly single-factored, techno-rational and reductionist. These approaches were persistently underpinned by a Cartesian divide that privileged rational, cognitive assessments of human nature. They focused on single-factored causes and solutions, despite the growing appreciation of the integrated multidimensionality of the maritime world, as suggested by the STS model. In contrast, my interpretations were grounded in the thick, narrative accounts of seafaring leaders themselves, that show a complex and interconnected lifeworld that appears to me to be at odds with the hypotheses and conceptualisations of the majority of MHF studies. As such, my interpretations highlight that contemporary MHF research and practices fail to account for, and address, the sensemaking and resolution of complex organisational issues that were described within the narratives.

The sensemaking represented in the narratives is described as embodied, multifaceted, and enmeshed. It appears to me to be an ongoing process that enters consciousness only when a significant gap between expectations and reality arise, or when the seafaring leader purposefully reflects upon the situation (a condition that was produced during the interviews themselves). This sensemaking appears to

contrast with the Situation Awareness (SA) model outlined in the literature review, in that it is not strictly linear, rational or confined within the resolution of the situation itself. The narratives suggest a sensemaking phenomenon that is more fluid, tentative, and at times recursive than SA allows for. The sensemaking of the seafaring leaders can at times continue long into the future, as they strive for denouement concerning frequently ambiguous events. Additionally, the sensemaking described by the narratives often “shuttles” between awareness, sensemaking and action until a point of resolution is reached in terms of the critical event.

This section has established the bridge between my interpretations, presented over the past two chapters, and the theoretical examination of sensemaking to follow. I now commence the first of two theory chapters by focusing on a theoretical examination of the first three motifs applying an embodied cognition lens.

Chapter nine: Sensemaking at sea: alternative lenses

This chapter uses a range of theoretical lenses to explore my interpretations of the stories and accounts offered to me by the participants in this study. First, the lens of embodied cognition is used to explain how seafaring leaders become bodily enmeshed with their environments and with others, and how this shapes their sensemaking. Secondly, the lens of constructed emotion is applied to examine the way seafaring leaders make sense of and emotionally enact their roles. Thirdly, the gestalt concepts of zones of awareness and figure-and-ground are used to examine the competing zones of attention that can make sensemaking problematic at sea. This provides a theoretically robust understanding of embodied sensemaking among seafaring leaders.

These lenses are focused on three motifs that seemed to me to be related to the ways in which participants were expressing how they make sense of critical incidents. These three motifs are: Motif 1, *shape shifting and melding*; Motif 2, *the strength of emotion in sensemaking*; and Motif 3: *multiple zones of attention*. They provide a richer way of understanding the words of the participants chapter and a theoretical basis for considering embodied sensemaking as a valuable, yet significantly underutilised concept for understanding human performance in maritime contexts. However, I begin this theoretical examination by revisiting a key finding from the initial literature review; the prevailing Cartesian divide within maritime human factors.

Cartesian Gravity

It is helpful to begin this chapter by revisiting the rational cognitive perspective discussed in the literature chapter. Theories of cognition and consciousness during the latter half of the twentieth century were underpinned by the paradigm of *the brain-as-computer* (Otoom 2016 p. 307). According to this paradigm, the body was relegated to being a somewhat unreliable and emotion-prone conveyance for the brain, which was primarily responsible for mental cognition/thinking (Claxton 2015a; McGilchrist 2011). This conceptualisation was deeply rooted in the Cartesian

separation of mind and body (Rowlands 2010). Furthermore, this rational cognitive paradigm shaped the scientific and technical perspective that underpinned the field of MHF (Grech, Horberry & Koester 2008 pp. 4-8), influencing the development of maritime regulation (Lyng et al., 2008 p. 134) and the investigation of maritime accidents (Dekker, 2004, p. iix) in what appears to be a tightly linked and reinforcing closed system of theory and practice.

The primacy of Descartes's *Res Cogita*, the thinking and rational mind (Dekker 2004 p. ix), is neatly echoed in William Ernest Henley's 1875 poem, *Invictus*:

I am the master of my fate:

I am the captain of my soul (Henley 2017 p. 67).

Henley's verse suggests the mind, representing the "I", is both separate from and dominant over its environmental circumstances (fate) and its emotional, affective aspect (soul). My own review of the MHF literature revealed how pervasive this Cartesian divide has been in shaping theory, research and practice within this field. Endsley's (1995, 2000) work on *situation awareness* and *situational assessment* translates it into a theoretical account of how humans react to critical events, and was intended to provide an account of the dynamics of human factors as they play out in industrial settings. As discussed in the literature review, Endsley's conceptualisation has been described as a lock-step and linear process that is primarily cognitive and rational in its approach (Dekker 2004b; Sorensen, Stanton & Banks 2011). Despite the introduction of interdependent, systemic and holistic concepts such as the Socio-Technical Systems model (Grech et al., 2008 p. 21), research continues to focus on rational cognitive processes and exploring maritime safety by developing algorithms that mirror this logical mode of thought (Akhtar & Utne 2014; Montewka et al. 2017; Psarros 2018; Riahi et al. 2013; Sotiralis et al. 2016). Mathematically expressed research within MHF research and accident investigation continues to focus on individual factors that are quantitatively analysed in isolation (Dekker 2004a p. 6). This results in an empirical, "god's eye view" (Webster 2007 p. 33) of risk that is computational and disembodied. Indeed, Badham described this techno-rational paradigm as "the exaggerated and mythological nature of the Western faith in rationality and the claims made on its

behalf" (2017), while Higgs described it as giving rise to a rational, professional hegemony (2012).

Indeed, its impact on policy and practice in the sector has been pervasive. It is encapsulated in the maritime sector's *Regulations for preventing collisions at sea* (COLREGs), which establishes international 'rules of the road' for all vessels (Sellberg, Lindmark & Rystedt 2018 p. 254). COLREGs were initially codified in 1865 (Belcher 2002), allowing for significant time for revision and fine tuning. In global terms, COLREG's authority is absolute, having been internationally implemented Standards for Training, Certification and Watchkeeping (STCW) (International Maritime Organization 2011), and they are drilled and assessed in realistic navigation simulations (Sellberg et al. 2018). However, Chauvin and others (2013) concluded that the largest number of vessel accidents (45%) were due to collisions. Belcher (2002) conducted a sociological review of the application of COLREGs and concluded that a) applying COLREGs requires a 'mutual, non-communicative, comprehension of the traffic situation', which would require a degree of mind-reading to achieve, and b) there are 'conflicts, tensions and lacunae' (gaps) in the regulations that cause them to become inherently ambiguous when there is more than two vessels involved in a situation. As such, even bastions of rational infallibility such as COLREGs remain problematic in their application to "real world" situations. The continued high rate of collisions, quantified by Chauvin et al. (2013; Danielsen 2018) testifies to its inherent shortcomings as a rationally derived technical construct. As noted in the literature review, it is particularly interesting that the maritime industry has remained firmly committed to the techno-rational paradigm while other transport sectors, such as arguably the more complex field of aviation, have taken up other perspectives (Grech, Horberry & Koester 2008 p. 148). Grech et al cite that the aviation sector has moved from a reductionist view of *resources* to include other dimensions such as procedures, air traffic control, ground staff and the aircraft itself. According to Grech and others, the aviation version of Crew Resource Management differs from its maritime counterpart in that it includes "such topics as understanding and awareness of the situation" (p. 148).

The American philosopher and scientist, Daniel Dennett, (2017 p. 368) coined the term "Cartesian gravity" to describe the pervasive and compelling attraction that the

mind/body partition has on a vast number of people (including scholars). He described it as a “distorting force” that, through its first-person orientation, is all but irresistible” (p. 20) and, like gravity, is particularly difficult to escape. Nevertheless, a growing body of thinking is challenging its primacy. Dekker, Hummerdal and Smith (2010) highlight the reductionist, Cartesian foundation of situation awareness, concluding that the concept “sets the mind against the world” (p. 132). They point to its mentalist focus on information processing as a key weakness of the model. Klein and others (2015) express significant doubts that situation awareness describes how professionals, such as those in the maritime sector, actually make sense of, and respond to, events as they unfold in reality.

The corporeal or embodied turn

Around the turn of the twenty-first century, a corporeal turn in thinking started to focus on the body’s role in cognition (Kinsella 2015). The corporeal turn can be described as a paradigm where mind and body are integrated and inseparable in terms of perception, cognition, emotion, action (Johnson 2013) and, thereby, sensemaking. It has been recently extended to the field of sensemaking (Cunliffe & Coupland 2012), which had been primarily conceived of as a linguistic and cognitive phenomenon (Danielsen 2018). Considerable support for the notion of embodied sensemaking has been generated through the emerging field of neurophenomenology.

Maurice Merleau-Ponty pioneered embodied cognition (Johnson 2013) as encapsulated in his statement “We are no longer present at the emergence of perceptual behaviours; rather we install ourselves in them in order to pursue the analysis of this exceptional relation between the subject and its body and its world” (Merleau-Ponty 1964 p. 4). However, embodied cognition gained significant traction through Varela’s conceptualisation of neurophenomenology (Varela 2010), which views the human mind as an experience organ that is inseparable from sensorimotor systems in an “extramental” sense (Froese & Fuchs 2012 p. 206; Laughlin & Throop 2009 p. 132). Claxton described neurophenomenology as:

A view of the human body as a massive, seething, streaming collection of interconnected communication systems that bind the muscles, the stomach, the heart, the senses and the brain so tightly together that no part –

especially the brain – can be seen as functionally separate from, or senior to, any other part (2015b ch. 1).

This explains the experiential, perceptual and interactive engagement that seafaring leaders have through their embodied cognition, as described throughout the narratives. It necessitates that sensemaking is not the rational, computational process that Endsley originally proposed in situational awareness, but is an embodied process (Cunliffe & Coupland 2012). It is a process in which the body is not just included or incorporated in sensemaking, but is indivisible and enmeshed in ways that are not consciously apparent to the sensemaker, and that our traditional means of conceptualising the mind does not accommodate (Kinsella 2015).

It struck me that this could be an extremely useful way of theorising the motifs that I drew out in my own interpretations of the seafarers' accounts.

Neurophenomenology attempts to integrate the fields of cognition, neurobiology and the phenomenological examination of human experience in order to clearly understand and illuminate human consciousness (Varela 2010). To achieve this, it seeks to reconcile the positivism of neuroscience with the interpretivism of phenomenology (Gordon 2013 p. 21) and thereby appears to enrich neuroscience and validate phenomenology in complementary ways. For example, while neuroscience can identify what segments of the human brain are activated when fear is experienced, phenomenology and narrative analysis can address the question of "What is it like to be afraid?" (Roberts 2018). Neurophenomenological research has identified the bodily linkages by which the interplay between mind, nervous system and neurochemical activity gives rise to an embodied self in biological terms (Gordon 2013 p. 115). One such example of this interplay is the link between the human gut microbiome (micro-organisms in the human digestive tract) and depression (traditionally viewed as a mental condition) (Leclercq, Forsythe & Bienenstock 2016). As such, neurophenomenology provides an extensive scientific basis for an embodied concept for perception, cognition and, thereby, sensemaking (Cunliffe & Coupland 2012).

It has been suggested that embodied cognition has been present in life forms since at least the Cambrian Period, progressively evolving via natural selection (Dawkins

2009 ch. 1) from what Trestman terms “basic cognitive embodiment” (2013) into humankind’s “biofunctional and psychological” fusion that underpins understanding (Soylu 2016) via embodied sensemaking (Cunliffe & Coupland 2012). Arguably, neurophenomenology provides a theoretical foundation that explains the ways that seafaring leaders engage the bodies they have (Sheets-Johnstone 2015) to make sense of their lifeworld; from grasping controls, to feeling vibrations through the soles of their feet, through to sensing changes in engine sounds while asleep. Embodied sensemaking also galvanises the body for action through processes such as adrenalin production in the face of crises. It also primes the body for aggression when confronted by hostile others.

It is important to note that while I now apply the theoretical lens of neurophenomenology and its underpinning research to examine my interpretive conclusions, my research methodology remains phenomenologically attentive narrative interpretation, not a neurophenomenological research project.

Seafaring leaders appear largely unaware of their embodied sensemaking, even though I perceived it in their words and gestures. Dennett (2017 p. 57) provided an explanation for this lack of awareness of embodied cognition. He noted that competence precedes consciousness, as evidenced by the vast number of organisms that have been shaped by natural selection to be highly competent in what they do to survive without being conscious of their competence. Dennett also described the “bottom up” evolution of human beings as integrated organisms that were competent in bodily engaging in their *Umwelt* (the behavioural environment containing all things that matter to the organism) (p. 165) long before they evolved comprehending and conscious minds (p. 57). In this way, humans have a rich history of embodied cognition, including sensemaking, that precedes our consciousness. As such, humans can be competent sensemakers without necessarily being conscious of all aspects of the sensemaking process.

The remaining sections of the chapter explore how the notions of embodied cognition and sensemaking help to make richer sense of the motifs I developed in my efforts to understand the seafarer’s accounts of critical events at sea.

Motif 1: Shapeshifting and melding

The motif of shapeshifting and melding arose from narrative accounts of seafaring leaders' bodily engagement with their environment; including tools, instrumentation and the vessel itself. This included an embodied, sensorimotor connectivity that I have described as metaphorically melding with the vessel as an extended and embodied phenomenon. These narratives also included languaged examples of metaphorically becoming the vessel. I have described these examples as shapeshifting. The use of such metaphors within the narrative were unremarkable to, and unnoticed by, the seafaring leaders. This suggests that the embodied and languaged components of extended cognition are automatic and unconscious phenomena. However, my interpretation of the phenomenon highlighted the complex nature of their bodily engagement with their environment, including the vessel itself.

Theories of embodied cognition have more recently been developed to include possibilities for the ways in which minds and bodies are integrated with their environments (Clark & Chalmers 2016). According to Rowlands, the *extended mind theory* posits that that mental processes “are not located exclusively inside an organism’s head but extend out, in various ways, into the organism’s environment (2010 ch. 1). Extended mind theory would explain the ways I perceived seafaring leaders engaging with their environment, including people, tools and systems, as extensions of their mind/bodies to make sense of their life-worlds in highly augmented ways. This theory has been supported by studies that show tool use can extend the peri-personal space towards the tip of the tool (Biggio et al. 2017; Holmes 2012), incorporating the tool into the awareness of the body. As Polanyi (much earlier) described this extended process, we make these tools “form part of our own body” through what he terms “subsidiary awareness” as opposed to a conscious “focal” awareness (1962 pp. 55-59). To further quote Polanyi on extended cognition and the use of tools, “We pour ourselves out into them and assimilate them as part of our own existence. We accept them existentially by dwelling in them” (1962 p. 59). This explains instances within the narratives involving sensorimotor engagement with the electronic sensors of the ship via instrumentation (and the sensed vibration of the ship through the soles of their feet), and their bodily engagement with controls, such as steering controls, that result in

the ship becoming an extension of their mind/body in a sensorimotor context. This supports the interpretation set out in Motif 1 that there is a metaphorical melding between the seafaring leader and the ship itself.

Another way in which cognition can be bodily extended is through others. King, in her study of fishing boat captains, suggested that the crew become bodily extensions - “prostheses” - of the captain’s will in the performance of fishing operations (2007). Examples of this form of extended mind can be seen in narratives such as the master who directed his staff in a highly autocratic way to resolve a hazardous tangle of chain on the deck (#0124). He effectively deactivated one crewmember by “just shutting him down”, while he reprogrammed the remaining crew to do exactly what he wanted them to do, when he wanted them to do it.

However, this socially extended mind is not only evident as a directive, “prosthetic” manner of engaging the world through others. Socially extended mind can also be observed from a sensory perspective, through the function of mirror neurons. Neuroscientific research has identified mirror neurons and described their capacity to activate in response to a corresponding activation in another person (Gallese 2014; Shapiro 2009). Gallese points to numerous studies employing different methodologies that demonstrate the “mapping” of “the perception of other’s motor behaviour”, sensations and emotions onto the motor representations of the observer’s brain (2014. p. 3). This nuanced ability to neurologically, and bodily, experience what another person is experiencing plays a powerful role in embodied sensemaking, through an empathic resonance in response to “emotional, personal, felt and sensed bodily experience embedded in words, gestures, facial expressions, ‘body language’” (Cunliffe & Coupland 2012). Therefore, the discovery of the existence, and function, of mirror neurons in the human brain gives rise to the notion of intersubjectivity as an ontology. Further challenging both the Cartesian divide and rationally-based situation awareness, this intersubjective and extended form of embodied sensemaking appears subconscious and automatic, resulting in an “innate capacity of experiencing what the other is experiencing” (Gallese 2014 p. 5). While Descartes and his proponents confined consciousness within our minds in disembodied, solipsistic isolation, the discovery of mirror neurons has revealed an

intersubjective reality in which meaning can be shared via embodied social cognition in a “we-centric space” (Gallese 2018 p. 42).

The mirror neurons of seafaring leaders extend their perception through the ability to pick up on subtle cues from others and integrate these upon their neurological body map. This neurological function vastly expands their sensemaking capacities across a wider network of individuals. For example, the master who sensed an imminent confrontation with a crew member said “I knew he would come for me” (#0361), while the master who observed an injured worker gained an immediate sense of the severity of a crew member’s injury just by looking at her (#0190). As Gallese comments, this “greatly reduces the mental gap supposedly separating us from others” (2014 p. 5).

The extended nature of the embodied mind can be problematic to sensemaking. A number of narratives highlight physical objects and stimuli that have the capacity to fix awareness on them in ways that influence their sensemaking of the broader situation. There are narrative accounts of engineers fixating upon working a lever repeatedly as if it was within grasping reach; of being overwhelmed by the sounds of multiple alarms during a major system malfunction; of the sounds of engines intruding upon the awareness of seafaring leaders attempting to sleep. Constantin’s empirical study of objects within peri-personal space (close to a person), indicates that these objects are seen in terms of their affordances, based on the speed of response to verbs (what the object can be used for) rather than nouns (what the object is observed to be) (2011). This perhaps explains the many occasions within the narratives where seafarers persisted in using levers, hammers and instrument controls that were within peri-personal space. This influenced their sensemaking, regardless of whether these were the best options at the time of the incident. This attraction to affordances in the immediate surroundings, or seafaring *Umwelt* (Dennett 2017 p. 98), can result in a tendency to “zoom in” in terms of the focus of awareness (Kanter 2011). Paradoxically, the external pull from objects and affordances in the peri-personal space can result in an embeddedness in terms of the seafaring leader’s zone of awareness. As such, the immediate environment and seafaring lifeworld calls to the seafaring leader and snares their attention in compelling ways that further embeds their awareness in their immediate

surroundings. Therefore, embodied and extended cognition can impact the sensemaking of seafaring leaders in ways that they currently do not understand or are not consciously aware of.

The melding made possible via embodied and extended cognition is a metaphorical shapeshifting when considered in terms of the language used to describe their bodily engagement with the vessel. The notion of shapeshifting involves transformation as well as the taking on of powers beyond the human individual, as encapsulated by literary depiction, where “shapeshifters know no bounds” (McMahon-Coleman, Weaver & Turcotte 2012 p. 1). For example, when a master needed to manoeuvre his ship away from an oncoming vessel, he described his actions as “I just ran”. Not only does the master metaphorically *become* the vessel in this description, but he attributes *legs that can run* to the vessel/self in an anthropomorphic metaphor. Additionally, when his use of the propulsion power of the vessel poses a danger of shorting out the electrical systems of the ship, he says “I don’t want to black out”. In his narrative, he has transformed himself into the vessel. In literature, such shapeshifting occurs during times of crisis (Youngs 2013 p. 3). Unlike melding, as described within extended mind theory, it would appear that shapeshifting within the narratives is metaphoric rather than ontic. However, such metaphors highlight a deeply embodied affinity, and synchronisation with their environment. This is particularly prevalent during times of crisis, where the seafaring leader metaphorically melds with the vessel. This deeply embodied engagement with the vessel further embeds the seafaring leader into their immediate environment (Dall’alba, Sandberg & Sidhu 2018).

Bodily metaphors, including shapeshifting, convey more significance than mere figures of speech or turns of phrase. According to the Neural Theory of Thought and Language (NTTL), bodily metaphors have a deeply reinforcing quality that appears to anchor sensemaking within the mind/body (Lakoff 2012). NTTL makes extensive empirical use of brain imaging to demonstrate that bodily processes are the basis for bodily metaphors (Gibbs 2011; Heracleous & Jacobs 2008). In NTTL, language itself becomes neurobiologically anchored within the body in highly reinforcing ways (Lakoff 2012; Stickles et al. 2016). For example, Matusitz and Olufowote identified the hand as a recurring bodily metaphor associated with

performing the will of Allah within Islamist extremism and terrorism (2016). They posit that such bodily metaphors can be deeply reinforcing, influencing the way in which sense is made of terrorist activities. According to NTTL, regions of the brain associated with the physical act of running would be activated when the seafaring leader above used the metaphor “I just ran”. This neural activation anchors the bodily action or experience with the words being used, in ways that reinforce both. Adams observed that “language comprehension is grounded in bodily action” (2010). Gallese explained that sensorimotor neural resources and language are closely linked because the neural architecture of the former has been *exapted* (using an existing function or trait for another purpose other than that which it originally evolved to serve) by the latter in an example of neural reuse (2018. P. 36). As such, a significant amount of embodied circuitry has been co-opted for language and articulation. This would explain the language of embodiment used by seafaring leaders to describe their sensemaking of critical events; in that language shapes action just as action shapes language. It is important to highlight here the powerful and mutually reinforcing linkage between body and language through the channel of bodily metaphors. This further problematises the Cartesian divide because, according to Gallese (2016 p. 307) “it is from Descartes that the idea comes that language has little to do with the body”.

Gallese proposed that language allows human beings to “fix and relive specific aspects of our bodily experience” (2016 p. 307). However, while language and the body are tightly enmeshed and reinforcing, there are limitations to the degree that seafaring leaders can verbally articulate their sensemaking. Embodied sensemaking, as discussed, is a bottom-up phenomenon that is largely subconscious and automatic, while language remains in the domain of the conscious and comprehending. This explains why the participants did not seem aware of their bodily actions that they replayed (often with a high degree of nuance) during the verbal retelling of their experiences. This gap between bodily sensemaking and verbal articulation supports Polanyi’s proposition that “we know more than we can tell” (1967 p. 4).

In summary, the relatively recent corporeal turn has opened up understanding of the ways that the mind/body functions as an indivisible and enmeshed experience

organ. Gallese and Sinigaglia described this capacity as “embodied resonance” (2018). Embodied cognition has provided an explanation for the role of the body in terms of perception as well as sensemaking. The emerging field of neurophenomenology is validating these theories via the integration of neuroscience and phenomenology. These theories support the interpretations of seafaring sensemaking, while scaffolding an understanding of the way that their sensemaking is extended through their environment (the ship) and others (the crew). Embodied cognition theory identifies a number of pitfalls for sensemaking, and these are evident in the participant narratives. The seafaring leaders within this research appear to have little understanding of the way in which embodied sensemaking impacts and interacts with their practice. Therefore, explicating embodied sensemaking, in itself, may provide substantial opportunity for improving seafaring sensemaking practice.

This chapter now moves from an examination of embodied sensemaking to the role of emotion within my interpretations.

Motif 2: The strength of emotion in sensemaking

Motif 2 emerged from the narratives in response to the significant emotional dimension of the seafaring narratives. Emotion was evident in two contexts. Firstly, the seafaring leaders described the emotions they felt during, and often after, the critical events that were core to the narratives. For example, one participant described their sorrow, and how they cried when they thought a colleague had died by drowning. The other emotional dimension was the emotions manifested by the seafaring leaders as they recounted their stories of critical events. For example, that same seafarer became upset and had tears in his eyes as he recounted the story of thinking his colleague had died. This led me to consider that emotion has relevance to sensemaking, not only at the time of the event, but in a long term, ongoing manner.

One of the hallmarks of the techno-rationalist perspective has been the view that emotions are undesirable and primitive by-products of the human condition. Plato viewed emotions as negative and irrational responses, aligned with uncontrolled lower impulses. Emotions were seen as opposing and impeding the rational intellect, in a struggle between “head” and “heart” that Plato likened to two horses

pulling in opposite directions. Plato's foundational view has been highly influential in terms of Western thinking (Luo & Yu 2015). Emotions, with their visceral manifestations, were considered to fall on the bodily side of the Cartesian divide, and it was the role of the rational intellect to keep these brutish impulses suppressed or banished for the good of civilisation and the individual. Lisa Feldman Barrett, the Canadian Professor of Psychology, described this divide as:

These mental categories symbolise a cherished narrative about human nature in Western civilization: that emotions (our inner beast) and cognition (evolution's crowning achievement) battle or cooperate to control behaviour. The classical view of emotion was forged on these ancient ideas (2017).

Indeed, there is strong evidence of this conceptualisation within the MHF, as discussed at length in the literature review. Rational thinking was highly privileged in influential conceptual models such as situation awareness, decision support, and the myriad of quantitative algorithms employed to categorise risks into carefully codified structures. Emotions were again relegated to the category of problematic fallibility, and a potential source of human error. This notion can be seen in the narratives, where a master who became angry when confronted by a hostile and militant crew admitted "I'm afraid I acted more like a person than a master" (#0520).

In management thinking, the rational mind held a privileged place during most of the twentieth century, as evidenced in highly influential books such as Kepner and Tregoe's *The Rational Manager* (Marty 1966), published in 1965, and reaffirmed in *The new rational manager* (Hussey 1983), published in 1981. However, thirty years later, a ground-breaking turn in management thinking occurred when Daniel Goleman popularised the notion of Emotional Intelligence (1996). Goleman's best-selling book claimed to explain why human emotion, rebranded as a form of intelligence, "can matter more than IQ". Underpinned by early attempts at neuroimaging, Goleman's framing placed emotions alongside intelligence in terms of their value in achieving organisational outcomes. However, Emotional Intelligence (EQ), in its popular application in leadership development, appears to be aimed at controlling or influencing the emotions of self and others (Fambrough & Kaye Hart 2008). Emotions became resources that could be harnessed towards rational, and often commercial, objectives and outcomes, in much the same way

that the wild and dangerous auroch of ancient times became the ox tethered to the plough. Fambrough and Hart (2008) argue that leadership development may have merely put emotions to pragmatic use in the pursuit of rational, “instrumental goals”. As such, the EQ movement can be seen as more of the domestication, rather than the liberation, of a leader’s emotions as well as the emotions of his/her followers.

Fuchs and Koch, in their review of the literature on embodied affectivity, quote William James, that “the body is a most sensitive sounding board in which every emotion reverberates” (2014; James 1884). Indeed, James foresaw contemporary neuroscientific conclusions that emotions are neurologically integrated with bodily, sensorimotor “brain processes” (James 1884 p. 188). I thought the seafaring narratives were laden with emotional content, not only as described in their storied accounts, but physically manifested during the telling of their stories. Fuchs and Koch refer to experiencing and expressing affective qualities as bodily resonance (p. 3), where the individual is “moved by” (experienced) and “moved to move” (expression) via their engagement with their lifeworld. An example is the Chief Engineer who had tears in his eyes as he described thinking that a colleague had drowned in a flooded workspace (#3424). This chief engineer described abruptly sending this person home when he discovered the person was not in the workspace but had gone into town drinking alcohol. Affective re-enactment, evidenced by tears in his eyes, accompanied his telling of the story. According to Gallese, emotions are inscribed in the embodied circuitry along with the language and memories used to encode the experience. Three aspects of human experience - sensorimotor, affect and language – are thought to share enmeshed neural connection that may have evolved through neural reuse and exaptation, as described earlier (2018 p. 36). Gallese’s notion of neural reuse concurs with Lakoff’s reinforcing neural linkage between language and the body (2012), and Barrett’s (2017) statement that “conceptually similar representations reuse neural populations (groups of nerve cells) during simulation” also supports this principle. These findings support my interpretation that experience and sensemaking are etched within the seafaring leader in languaged, affective and bodily formats that are inseparably intertwined.

Among the narratives there appeared to be an affective palette in which emotions are observable as nuanced hues of a definable emotion. For example, anger was

evident in varieties such as *annoyed* through to *pissed off* through to *furious*. Fear was described, and often re-experienced in the telling, as *dread*, *awe* or *shock*. Lisa Feldman Barrett claims that decades of empirical evidence suggest that humans categorise bodily sensations into emotions as they construct meaning of their engagement with their environment and based on their past experience (2017 p. 9). She terms this the constructive theory of emotion. As such, it is possible to develop an emotional repertoire by cultivating variety in the ways that emotions are articulated. For example, if a person only has a limited lexicon for anger, say *pissed off*, then this will limit the emotional response to a level of *pissed off*. She proposes that by developing a variety of conceptualisations and labels for emotions, such as “miffed”, “disappointed” or “seething”, they are actually able to increase the degree of nuance with which they respond to their experiences. This sensitisation of the languaged/affective/bodily “neural populations” may yield an emotional virtuosity that may enable more appropriate or proportional emotional responses to circumstances. It can be argued that such emotional virtuosity might well be of service in professional practice of seafaring leaders, in fostering a more nuanced articulation of emotional responses that allows greater variety in how individuals feel.

However, from an embodied perspective, emotions are more than mere by-products of experience. Emotions *are* the ways in which seafaring leaders enact their roles. Barrett states that, rather than emotions being reactions to external stimuli, they are part of an enacted predictive coding via which organisms (including humans) make sense of their world. She states that the brain creates a map of the human body as well as the relevant world in which the human lives (their *umwelt*, or meaningful world in which the organism exists). Then, using past experience as a guide, the brain constructs multiple scenarios, or simulations, of upcoming sensory events (both within the body and within their external environment) to determine the best action to deal with these “impending sensory events” (2017 p. 7). Barrett states that these constructs are “embodied, whole brain representations” that are engaged in predicting future states and adapting to these states in ways that include sensations and responses from the entire brain/body entity, including those sensations that are categorised as emotions. She further states that “For a given event, perception follows (and is dependent upon) action, not the other way around” (p. 7). Barrett’s

theory of constructed emotion, supported by extensive empirical research (p. 14) challenges the classical notion of emotions as a “stimulus-response” model. Additionally, it explains many narrative examples such as the expression of commitment and resolution by the Chief Engineer confronted by a major equipment breakdown on their first voyage: “I thought ‘I’m not frigging going off hire on my first stint as Chief’. You know, I refused to” (#0657). The Chief Engineer’s affective state was a necessary element of the way in which he made sense of his situation and how he engaged with it.

Barrett suggests that “emotions should be modelled holistically, as whole brain-body phenomena in context”, and in the service of achieving allostasis (a brain/body process of anticipating physiological needs and preparing to meet them before they arise) (2017 p. 16). This view is supported by Giovanna Colombetti, a philosopher of cognition, who described the imperative for allostasis as:

The organism’s “concern”, its “natural purpose”, is to keep on going, to continue living, to affirm and reaffirm itself in the face of imminent not-being (2017b p. 448).

Colombetti (2017b p. 447) suggests it is the “network of precarious processes” that constitutes an organism, such as a human, that prompts it to evaluate its *umwelt* (the world that is meaningful to the organism) in a manner that can be described as sensemaking. This sensemaking is both enactive (as described in the previous paragraph) as well as “intrinsically affective”. So, a person becomes “touched in a meaningful way by” an aspect of their *umwelt* that is perceived as “meaningful, relevant or salient” (p. 448). This *umwelt* offers “a landscape of valued objects” that prompts an organism to relate to them in a variety of ways, from the primal “attract” or “repel” responses in simple organisms such as microbes, to the diverse array of emotions constructed by humans as they make sense of, and enact, their lifeworld. As examples from the narratives, both interviews #0361 and #0520 involve a master being confronted by hostile crew members on the bridge. Both enact their authority by expressing anger, while drawing upon the bridge as a symbol to support and justify their anger:

I did lose my temper, and I told them to eff off from my bridge. I mean, that's where I will not back down. As long as I've got those stripes on my shoulder, nobody comes on the bridge and talks to anyone on the bridge like that – it's as simple as that (Interview 0520)

and

I stopped the meeting, and I said 'You do not run the deck.' About turned, walked up to the bridge console and said 'Meeting closed'. That was it. And then afterwards, the red mist went away (#0363).

Both examples are highly affective and enacted, where the hostile crew members are perceived as threats that need to be neutralised. Additionally, the bridge is perceived as a zone of power, if not safety, for the Master. The feeling, or sensation, of personal power that these masters derive from being on the ship's bridge, and the four gold stripes on their shoulders, shows that affect can be extended, where their emotion is constructed in part from affective affordances in their environment (i.e. being on their bridge as a "seat" of their authority) (Colombetti 2017b p. 451; Fuchs & Koch 2014). Their emotional acts embody their identities as seafaring leaders, through their justified anger at having their authority challenged. Through their expressed anger, they are bodily and emotionally engaged with their professional practice, both within their environment (the bridge) and with others (the crew) (Dall'alba, Sandberg & Sidhu 2018).

The affective impact on the Master of being on the bridge and feeling the power symbolised in that space (which reflects and is reinforced by the Master's own embodied authority) supports Colombetti's view that:

moods can include the experience that parts of the world are part of one's pre-reflective bodily self - where these parts also play a crucial role in making the moods in question possible (Colombetti 2017a).

In both cases, there is a space (Cunliffe & Karunanayake 2013) in which "the body I have" (experiencing physiological sensations such as raised heart rate, increased blood pressure, tension of muscles, etc.) becomes "the body I am" (where the seafaring leader enacts their identities in their professional practice) (Sheets-

Johnstone 2015). This has an emotional dimension because “oneself is affected” (Fuchs & Koch 2014). Indeed, Colombetti notes that a loss of self can lead to a depressed mood as an embodied, affective aspect of sensemaking (Colombetti 2017a). Therefore, both Masters made sense of the situation as it related to them, during the moment itself and also when explaining it to themselves and others after the event. This sensemaking, as demonstrated throughout this chapter, is embodied, affective and extended in its nature.

The emotional dimension of embodied sensemaking is made more salient given the role that mirror neurons have been shown to play in enabling an individual to perceive the emotions in others via embodied simulation. This embodied simulation leads to the sharing of meaning via a form of mind-reading within an intersubjective “we-space” that extends to others (Gallese 2018).

The enaction of anger in the examples above can be argued to be in the service of allostasis (Barrett 2017 p. 3; Colombetti 2017b p. 451), since the increased physiological arousal is enacted in anticipation of a threat (a hostile crew). Neutralising this threat allowed the masters to return to a state of external and internal control.

Motif 3: Multiple zones of attention

Many interview participants described the challenges of shuttling their focus across multiple zones of attention, both in their role but particularly in relation to critical events. As such, I selected it as a phenomenon worth interpretation as a key motif pointing to the way seafaring leaders make sense of critical events.

Some narratives highlighted the consequences of focusing on a particular zone when the critical event manifested within a different zone of attention. This often led to surprises, or delayed awareness of the unfolding critical event, resulting in crisis. Other narratives described the competing forces that problematise their zones of attention as constituting critical events/phenomena in themselves. These narratives highlight the criticality of multiple zones of awareness as an aspect of their professional practice. The following section applies the lenses of embodied cognition and gestalt theory to examine both the dynamics that prompt competition

between multiple zones of attention, and the ways in which seafaring leaders engage with, and manage, these multiple zones of attention.

Shifting focus is not solely a mental exercise. It takes physical energy to maintain, and to change, attention (Grech, Horberry & Koester 2008 p. 64). Information also consumes attention, and in information-rich work contexts such as seafaring, attention becomes a valuable and finite resource that must be managed economically (van Knippenberg 2015 p. 650). Additionally, if there is insufficient information or sensory stimulus available for the seafarer, boredom can trigger the deactivation of attention in order to conserve reserves of energy, resulting in a state often described as “lights on but nobody home” (Grech et al 2008 p. 46). Grech finds that contemporary maritime operations place high demands of seafarer mental effort, which can result in catastrophic lapses of attention (Grech 2016). These facts make the management of zones of attention critical for sensemaking in seafaring leadership contexts.

Motif 1 discussed the embodied nature of sensemaking that both embeds (or melds) the seafaring leader in their immediate environment (Rowlands 2010; Weick 1993) and extends their sensemaking (Clark & Chalmers 2016; King 2011) through channels such as other seafarers, the ship, instrumentation and information and communication technology. One of the impacts of the dual forces of embeddedness and extendedness, is informational competition between multiple zones of attention. Seafaring leaders described being pulled between different zones of awareness; of either focusing on the localised context of the vessel at sea and the issues it immediately faces, or having their attention drawn to broader, global issues by stakeholders from around the world. The narratives suggest that critical events can arise at any point on these zones of attention, making the management of these zones a wicked problem (Cherry 2014) that confronts professional practice (Higgs 2012). The paradox at the heart of this tension appears to be that seafaring leaders are both embedded in their environments, as well as extended in their sensemaking on an increasingly global scale.

Zones of attention are important channels for detecting the weak signals that would indicate a variance in the anticipatory systems (Cevolini 2016). In embodied sensemaking terms, this anticipatory system parallels the predictive coding

described by Barrett (2017), as often nuanced variations in the *umwelt* trigger increasingly conscious levels of sensemaking to confirm, understand and respond to an unfolding critical event. Such weak signals can come from either the immediate zone of the ship, such as the impending confrontation with a hostile crew member (#0361) or the subtle cues from the extended environment that a client was lying to the master about a safety-critical operational requirement (#0068). Where these weak signals of variance with predictive coding as an anticipatory system are not detected, they have the potential to manifest as crises, such as the master who narrowly avoided a collision with another ship:

Had it not been for my Chief Officer, I wouldn't have even seen it. Because I'm facing aft <the back of the ship>, monitoring the platform, I'm two metres away from it, and I'm just keeping the ship, just making sure I can see that thin line of sea between us, and I'm just maintaining that, and just watching and knowing there's an ROV down there, and where the crew are. (#0768).

As such, there can be dire consequences for failing to detect a weak signal across these multiple zones of attention. Cevolini (2016) posits that signals are only considered “strong” in hindsight after the critical event. However, prior to this, all signals may be weak in nature. This problematises the attentiveness of seafaring leaders to weak signals across multiple zones of attention, where focusing on one zone in a contingency-approach will mean missing weak signals within other zones of attention.

Gestalt theory provides a number of useful concepts for considering these zones of attention. Firstly, this body of theory proposes the existence of multiple zones of awareness, extending from within the individual in the way they perceive the world, to an outward interaction with the external world in what is termed “the zone of collaboration” (Sills, Lapworth & Desmond 2012 p. 28). This concept implies an intimate embeddedness within our bodies and an extended engagement with other bodies in the broader world, as a continuous spectrum rather than an either inside-or-outside dichotomy. It also implies that awareness of each of these zones is possible to achieve. Gestalt theory, with its focus on “wholes”, suggests these zones of awareness, extending from what the seafaring leader is perceiving, thinking, feeling and doing, is an inseparable part of an extended phenomenon of

the critical event and its far-reaching consequences and impacts (Sills, Lapworth & Desmond 2012 p. 71). This suggests that embeddedness and extendedness have deeply paradoxical roots in terms of interconnectedness across these zones of awareness. These zones expand outward, much like a Russian doll, from a deeply personal internal zone to a multivocal, collaborative zone that engages with the outside world. This has implications for managing attention in a more holistic manner than the contingency-based paradigm of either zooming in or out suggests (Kanter 2011).

Lewis and Smith (2014) claim that paradoxes such as these competing zones of attention can often be overcome by adopting an ambidextrous approach to polar opposites such as zooming in or zooming out. Whilst some situations may well benefit from an up-close or big-picture perspective, I propose a default disposition that is ambidextrous (Jules et al. 2014) in being both zoomed in and out at the same time. This is not, to use a photographic analogy, a matter of being equally unfocused towards the unfolding events at sea. Indeed, it is a process of maintaining *depth of field* that holds a broad range of scene depths (both near and far) in focus within an image at the same time (Kuthirummal et al. 2011). This requires an open-minded perception that is sensitive to what is unfolding in both the foreground and background of the seafaring lifeworld. In embodied terms, Munenori Yagyu, the seventeenth century Japanese sword master, encouraged an embodied and ambidextrous focus in this way:

If you stop thinking of some place to put it, your mind is bound to extend and spread all over and fill your whole body. Without putting your mind in any one place, you must let it serve wherever it is needed at each moment.

(Babin 2003 p. 72)

Munenori appears to be advocating an ambidextrous, depth-of-field focus that is both attentive yet broad, and that allows optimal openness to perceiving multiple dimensions of the *umwelt*. Such a default position provides the seafaring leader with an optimal level of attention to their complex environments, reducing the likelihood of being caught in inappropriate modes of focus when a critical event arises.

Additionally, I propose that a component of attention should also be directed inward. This internal zone of awareness would be receptive to the embodied sensemaking referred to above, and would facilitate the attentiveness required to appreciate the dynamic of these often-hidden processes upon perception and sensemaking during critical events. This internal focus, alongside an external *depth of field* attention, enables the holistic integration of multiple zones of awareness from the collaborative (external) zones of awareness and internal zones of awareness such as embodied dimensions of sensation, visceral reaction, emotion, action, thought and perception (Sills, Lapworth & Desmond 2012 p. 29). This attentional capacity enables these bottom-up, embodied dimensions to be made conscious and incorporated into sensemaking in real time as external phenomena unfold. Bleakley (1999) refers to this process of sensemaking as *reflexion-as-action*, and it provides pathways for developing awareness, understanding and mastery of embodied sensemaking in contexts such as *finding the line* (motif 6), which will be discussed in the following chapter.

Conclusion

During the twentieth century, and indeed in the centuries leading to it, the dominant paradigm in Western thinking has been the Cartesian divide which separated mind, body and the World. Descartes's maxim, "I think therefore I am", underpinned scientific thought and privileged techno-rationalist, reductionist explorations of causality in fields such as maritime services.

However, the corporeal turn in leadership and professional practice development, supported by empirical, neuroscientific research, means that embodied cognition now offers a robust explanation for the way professionals such as seafaring leaders enact, and make sense of, their roles. This theoretical exploration of my interpretations has unpacked the potential of Motif 1 (shapeshifting and melding), Motif 2 (the role of emotion), and Motif 3 (multiple zones of attention). This chapter has explored how embodiment, affect, language and extendedness arise automatically through the interaction of whole-of-body neural populations that have

re-used such networks for different purposes (visceral, sensorial, motor, affect, language and thought), in order to achieve states of equilibrium or allostasis (Barrett 2017 p. 16), with our particular lifeworlds.

Not only do our brains contain neural maps of our own bodies in order to make sense of our internal states, but we contain maps of other people that react to their actions and emotions via mirror neurons and the phenomenon of embodied resonance. This gives rise to the intersubjective reality of making sense of, and through, others in an embodied way that Gallese and Sinigaglia (2018) described as “we-ness”. Furthermore, the brain contains maps of our *umwelt* (the world as relevant to us). This allows us to extend ourselves into our environment, melding with ready-to-hand affordances, particularly with objects within our peri-personal space (the area close to our bodies). On a ship at sea, this *umwelt* contains the ship’s controls, such as steering and propulsion, as well as instrumentation such as radar and electronic chart display information systems. This explains narratives where the seafaring leader’s sensemaking is bodily extended and enabled via objects within their *umwelt*.

Most of the processes described above evolved in a “bottom-up” manner. As Colombetti (2017b p. 451) and Barrett (2017) point out, they are biological processes we share with other organisms that are competent in enacting these processes without consciousness of them. According to Dennett:

We, likewise, can perform many quite adroit and *retrospectively* justifiable actions with only a vague conception of what we are up to, a conception often swiftly sharpened in hindsight by the self-attribution of reasons (2017. P. 340).

Arguably, the hidden and tacit nature of embodied cognition and sensemaking process has fuelled the Cartesian divide; the pervasiveness of which is described by Dennett (2017 p. 20) as *Cartesian gravity*. This theoretical examination of my interpretations of the narratives illustrates how Cartesian rationalism cannot account for the way seafaring leaders, or humans in general, make sense of critical events. Embodied cognition, including its affective and extended implications, provides a more complete and congruent explanation, supported by neuroscientific research,

for the sensemaking accounts of seafaring leaders. I strongly argue that failure to incorporate embodied sensemaking into the MHF body of knowledge will significantly limit its capacity to move forward in its aims of improving safety at sea.

This chapter has explored the embodied nature of sensemaking, as described within the narratives. It highlights that we as humans share competent-yet-unconscious embodied sensemaking capacities with other living organisms, down to the simplest bacterium. However, as Dennett (2017) notes, we are more than the microbes and water beetles discussed above (p. 101); “Our habits of self-justification...are ways of behaving (ways of thinking) that we acquire in the course of filling our heads with culture-borne memes” (p. 340). Memes, as defined by Dennett, are “informational things” that are “prescriptions for the way of doing things” (p. 211). Humans have scaffolded their cognitive processes with language, culture, and an awareness to reflect on their thoughts, feelings and actions.

The next chapter explores the sociological aspects revealed in the narratives that shape the sensemaking of seafaring leaders in enduring, cultural patterns. It explores the paradoxical tensions between culturally bound notions of seafaring leadership and the relentless forces of change sweeping the maritime industry, which problematises professional practice in perplexing and vexing ways.

Chapter ten: The habitus of the seafaring leader

In the previous chapter, the overarching idea of embodied cognition provided a framework for interpreting three of the motifs I developed in my interpretation of the seafarers' accounts of critical incidents. It encouraged me to discover and use some specific theories to considerably enrich my understanding of what the seafarers had said.

In this chapter, the overarching idea of *habitus* serves a similar purpose in generating further insight, particularly in terms of the sociological aspect of sensemaking. It provided a theoretically robust explanation for the enduring “rules of the game” within seafaring leadership. Additionally, I applied Jung's concept of archetypes to describe the seafaring habitus that were apparent within the narratives. The concepts of habitus and archetype were integrated into a lens for exploring the three remaining motifs.

The three motifs to be explored through this lens are Motif 4: *authority and relationship in sensemaking*; Motif 5: *the interaction of systematic diagnosis and action/improvisation*; and Motif 6: *grasping patterns, finding the line and denouement*. The chapter begins with an introduction to habitus, establishes its connection with embodied cognition, and then continues to explore each of the three motifs in turn through the habitus lens.

The idea of habitus

Originally conceived by Mauss, but significantly systematised by Bourdieu (1972), *habitus* is described by Bourdieu as ‘a system of lasting, transposable dispositions ... integrating past experiences, functioning at every moment as a matrix of perceptions, appreciations, and actions’ (pp. 82-83). It establishes ‘durably installed generative principles’ that guide perception, sensemaking and action (78). As such, it is a culturally transmitted embodied way of perceiving, acting and being in the world.

Key concepts within Bourdieu's system of habitus are *field*, *capital* and *habitus* itself. These are worth explaining in brief detail before embarking on an examination of the seafaring habitus. Bourdieu proposed a variety of forms of capital, the basis for power, available to human beings within society, including economic, social, cultural

and symbolic capital (Bourdieu 1986 p. 241; Joy, Game & Toshniwal 2018 p. 4). Cultural capital includes institutional dimensions such as the seafaring qualifications of Master Mariner and Chief Engineer. Bourdieu (1986 p. 244) highlights that capital requires investment, and can be transformed between its different forms.

Joy and others (2018) argue that symbolic capital is the semiotic “manifestation” of various combinations of economic, social and cultural capital (p. 4). Symbolic capital involves those symbols of power and prestige that signal social and hierarchical status, and this can be seen in the symbolic domain of the Chief Engineer’s engine room, or the four gold stripes on the Master Mariner’s epaulettes and their domain of the vessel’s bridge.

Capital itself is meaningless unless contextualised within a particular *field*.

Bourdieu’s concept of field is a “social context” or domain which has a distinct set of “rules of the game” in which the various forms of capital are enacted (Bourdieu 1986 p. 243; Joy, Game & Toshniwal 2018 p. 5). In the maritime context, the field can be defined as seafaring leadership and/or command of a ship at sea. Bourdieu (1986 p. 243) states that the field is highly contested as agents vie for capital, comparing it with a field of play or a field of battle. As seen in the previous chapters, there is much at stake in the field of seafaring leadership, and so matters of capital within this field appeared to me to be quite intensified, as will be illustrated in this chapter.

Habitus is the set of “internalised” “dispositions to action” that individuals or groups deploy in order to manifest their capital (or power) within a particular field (Joy, Game & Toshniwal 2018 p. 5). As such, habitus integrates and mobilises thoughts, values, perceptions and actions (in sensorimotor terms), emotions, language and experience (Silva 2016), towards achieving a ‘state of play’ in terms of capital (power) within a particular field. These dispositions are learned and internalised by agents, resulting in a distinctive habitus. Habitus has been studied in a diverse range of social and professional contexts, such as the Western habitus, the police habitus, the military habitus, and even the affective and erotic habitus (Silva 2016 p. 78). Wacquant (2011), a student and collaborator of Bourdieu, researched the habitus of the boxing gym by becoming a boxer himself as he “grasped boxing technique with one’s body”.

There are several compelling links between embodied sensemaking described in the previous chapter and Bourdieu's concept of habitus. Dennett (2017 p. 101) suggests that what makes humankind unique among organisms is that it has scaffolded its perceptions with social constructions and tools that have provided the basis for human civilisation, from the spear to the space station. Dennett applies the term "meme" (p. 211), borrowed from Dawkins (2009 p. 58), to describe these sociological tools. He states they are replicable ways of thinking, communicating and engaging with the world (including an individual's *umwelt* -the behavioural environment containing all things that matter to the organism [Dennett 2017 p. 165]) that, while enabled by the biological and neurological processes described in the previous chapter, are subject to evolutionary dynamics that are non-biological and yet result in such memes thriving or facing pressure from natural selection due to changes in the cultural environment. One form of this memetic scaffolding can be found in the habitus.

Mauss (Silva 2016 p. 74), Bourdieu (1972 p. 87) and Wacquant (2011 p. 82) described habitus as an embodied phenomenon. Summarising Bourdieu's notion of habitus, Silva concludes it is a "mode of being embodied with an orientation to the world which is lived consciously and unconsciously in everyday life and practice" (2016 p. 75). Wacquant states "the notion of habitus proposes that human agents are historical animals who carry within their bodies acquired sensibilities and categories that are the sedimented products of their past social experiences" (2011 p. 82). Therefore, key scholars of habitus assert its embodied nature.

Colombetti (2017a p. 1443) framed habitus as underpinning cultural influences on affect and mood in an embodied sense. Indeed, the bodily integration of thoughts, actions, emotions, sensations, values, perceptions and language that underpin the habitus (Silva 2016 p. 76) have been argued to be the same neurobiological processes that drive embodied sensemaking through whole-of-body neural populations (Barrett 2017 p. 16) wired together through evolutionary exaptation and neural reuse (Gallese 2018; Lakoff 2012). It is these shared neural pathways that welds embodiment, affectivity, language, extendedness and sensemaking together in neurologically intersubjective ways, while scaffolded by the memes and other cultural tools that gives rise to habitus.

Bourdieu's sociological process of the development of durable dispositions to manifest capital from a given socially-contextual field (Joy, Game & Toshniwal 2018) directly parallels the neurobiological process of an organism's embodied and affective sensemaking to make use of affordances within its particular Umwelt (Colombetti 2017b pp. 447-8). However, while Colombetti described water beetles, microbes and humans as being biologically driven to make sense of their Umwelt to achieve an equilibrium point of "allostasis" within their environment (p. 451), Silva described habitus as "a dynamic trajectory by which we learn to register and become sensitive to what the world is made of" (Silva 2016).

Bourdieu describes the "body as a memory", which carries culture in a way that is:

"placed beyond the grasp of consciousness, and hence cannot be touched by voluntary, deliberate transformation; cannot even be made explicit; nothing seems more ineffable, more incommunicable, more inimitable and, therefore more precious than the values given body (2012 p. 94).

Indeed, Silva quotes Bourdieu as saying "It is because agents never know completely what they are doing that what they do has more sense than what they know (2016 p. 80). Such "unthought knowns" highlight the link between habitus as a bottom-up, "not-consciously-apprehended" phenomenon (Silva 2016 p. 85) and the bottom-up, "competent yet not conscious" processes of embodied sensemaking described in the previous chapter. This suggests that the neurobiological processes of the human-as-organism have been scaffolded in a similar, bottom-up way by cultural constructs such as the habitus.

Furthering the link between habitus and embodied sensemaking, Lizardo suggests that:

As a form of internalised necessity, the habitus biases our implicit micro-anticipations of the kind of world that we will encounter at each moment, expecting the future to preserve the experiential correlations encountered in the past (Lizardo 2013).

This description elegantly mirrors the neurobiological process of predictive coding set out by Barrett (2017 p. 7) to create "embodied, whole-brain representations" of

an organism's umwelt, as well as paralleling Gallese and Sinigaglia (2018) notion of "embodied resonance".

The commonalities between embodied sensemaking and habitus point to their origins as interdependent and evolutionary processes that largely operate below the threshold of conscious thought. The former is the product of biological evolution, while the latter is the process of cultural evolution. Just as biology is replicated genetically across generations, so too is habitus replicated across generations of individuals that are inculcated into the habitus, such as seafaring leaders within the maritime domain. Given that both biological and cultural processes appear evolutionary, they are subject to selective pressures from external forces; a proposition that has significant consequences for seafaring leadership, which will be explored in greater depth in the rest of this chapter.

Motif 4: Authority and relationships in sensemaking

Many participant narratives referred to tensions between the autocratic, command and control approach traditionally associated with seafaring leadership and the growing expectation of collaborative relationships with stakeholders such as customers, crew and shore-based managers. These relationships were nuanced and complex, and did not fall into more "black and white" categorisations that many seafaring leaders seemed accustomed to, such as "Who is in charge and who is not?"

Such tensions were intense enough to be described as critical events by the participants. This highlighted the magnitude of this phenomenon in terms of their professional practice. Their accounts suggested the tensions significantly problematised their practice and defied their sensemaking. As such, I interpreted this phenomenon under the heading of motif 4, *authority and relationships in sensemaking*.

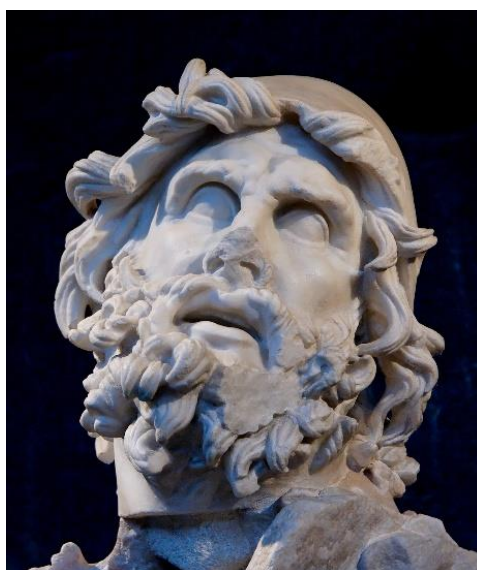
It struck me that the development of this motif could be considerably enhanced by applying the lens of habitus. But how to find a means of focusing the dense and rich elements of the dynamics of habitus, field and capital set out in the previous section? I was already familiar with the notion of *archetypes* and wondered if they

would give me a way of capturing the essence of the key ideas of habits that was, to put it bluntly, a bit more user-friendly!

According to Jung, archetypes are ‘the best possible expression... of a fact as yet unknown’ (Robertson 2016 p. 122). As such, archetypes culturally encode and symbolise idealised human characteristics, or themes, that can be passed down through periods of time including millennia. Archetypes are not merely caricatures, but contain richly encoded values and assumptions, encapsulated within an overarching representation that is largely lost to conscious examination. While the notion of archetypes is popularly attributed to Jung, the concept has its roots in Plato’s notion of *eidos*, or the true, perfect, and timeless idea of *some thing* (Sandwell 2011). An archetype, it seemed to me, could be a very useful way of capturing symbolically the unconscious, evolutionary and yet complex processes of cultural development contained in the habitus framework.

In the context of seafaring, the archetypal figure of Odysseus, Homer’s epic hero of the Trojan War and his ill-fated journey home, seemed both an obvious and potentially very useful choice. Set in stone, his marbled visage reveals his cunning, his strength, and his authority as warrior- captain-king (figure 10.1) (Richardson 2006). As Spivey (2013) notes, this Graeco-Roman statue from Sperlonga, Italy, ‘has justly become a defining image of the hero’ (2013 p. 294). I have chosen this image as a symbol for the archetypal seafaring leader: a monolith casting its shadow across three thousand years to the present day.

Figure 10.1. Graeco-Roman statue of Odysseus, Sperlonga, Italy



(Spivey 2013).

The hero Odysseus, represents Western civilisation's archetype of what a master mariner *ought* to be. Jung conceptualised archetypes as idealised, symbolic personification that are 'pregnant with meaning', and transmitted through the shared, 'collective unconscious' (Robertson 2016 p. 121).

Echoes of the Odyssean archetype resonated for me in some of the language that master mariners used during their interviews. Some describe their roles as seafaring leaders in absolute terms, using words such as 'always', 'never' and 'everything'.

Everything is black and white in this industry. You either do it right or wrong.
(#0768)

If he (the captain) says black is white, whether you agree with it or not. (#0395)

So, the buck stops with him in every respect. (#0768)

Additionally, masters described their absolute authority:

As long as I've got those stripes on my shoulder, nobody comes onto my bridge and talks to me like that. (#0520)

I'm the guy with the ticket. You should be listening to me (#0068)

I see the role of the master as a CEO. (#0361).

Indeed, many interview participants frequently referred to the vessel's master as 'the Old Man' (#0254).

This was not apparent in the interviews with chief engineers. Indeed, chief engineers described their roles in a concrete and detailed manner, indicating a more realistic conceptualisation of their professional identities. It was the master mariners within the participant group that tended to talk in absolutes.

The Odyssean archetype echoes across the millennia in the words of Rear Admiral Lambert in his foreword to The Nautical Institute's (the international representative body for maritime professionals involved in the control of seagoing ships) manual on seafaring leadership, *'On Command'*:

Firstly, be in no doubt that the ship is yours.... The crew of your ship are your people.... You are the arbiter of their lives at sea..... At last you have the authority, freedom and joy of stamping your personality and professionalism on another generation of seafarers. (TNI 2015 p. ii).

It is interesting to note the expressed ownership of the ship and the crew by the master. It assigns to the master the role of 'arbiter', or decider, over the lives of the crew. This authority is expressed as an earned right. Lastly, the use of the word 'stamping', suggesting violence and force, is described as a joyful action. This quote is laden with the symbolic capital associated with the seafaring leadership habitus as motifs of power. It is a clear statement of absolute authority and power over others, endorsed by a peak body within the maritime sector in 2015.

The following quote, is taken from my own interviews with seafarers. It involves an experienced master who took absolute control when members of his crew were confronted by a potentially hazardous situation:

The Chief Officer was just talking crap, so I just shut him down. I said 'It's not happening that way.' The second mate was carrying on and I said 'You just drive the winch. I don't want it done that way. You just do what I tell you'. I turned around to the Bosun and said 'This is what I want out on deck and this

is how I want you to do it'. And the two IR's, I said 'Listen to what I am about to tell you. We'll do it this way and this is the way it's going to happen' (# 0124).

This quote depicts the dominant idealisation of what a seafaring leader *ought* to be. The idea of *role primacy* is useful here (McAdams & McLean 2013 p. 234). Role primacy appears to involve a disproportionate perception of a role in terms of three factors; power, extent and responsibility. It is evidenced by the use of absolute terms to describe the scope of the role. Such terms are less than accurate or rational conceptualisations of an individual's role, which leads to an inflexible perspective of the role that lacks nuance. Nevertheless, these terms have been "accumulated", "internalised" and "sunk in" via the seafaring habitus (Lizardo 2013). Conceptualising a role in this manner shapes the way in which that role will be made sense of and thus enacted (McAdams & McLean 2013 p. 234).

Role primacy, and its 'unrealistic ideals' appear deeply rooted in perfectionism. Clarke and Knight (2018) noted similar issues of perfectionism among veterinary surgeons, which caused significant negative effect on the health and mental wellbeing of this group. Indeed, the parallels between Clarke and Knight's observations of veterinary surgeons and the masters described above may indicate that role primacy may be prevalent in other professions.

Role primacy, as a dimension of the Odyssean archetype, appears to be perpetuated within the seafaring community of practice via habitus (Roberts & Higgs 2019, in press). Role primacy is highly embodied; manifesting in thought, language, action and affect in a highly enmeshed manner, as described in the previous chapter. It is also a manifestation of the seafaring habitus, driven by embodied processes. As such, role primacy is likely automatically and unconsciously replicated by the seafaring community of practice in a process of informal inculcation spanning centuries. This is why, as Palmer (2011) notes, the seafarers of centuries ago would likely recognise and identify with contemporary seafarers in terms of their common concerns and experiences, including 'manner of living, speaking, acting, dressing and behaving'.

In summary, then, the seafaring leadership habitus can be understood as 'a mode of being embodied with an orientation to the world which is lived in everyday life and

practices' (Silva 2016 p. 75). It seems to have replicated the Odyssean archetype across three thousand years of history to inscribe itself upon contemporary master mariners and their embodied practice. As Lizardo observes:

In its capacity as already accumulated (and "sunk in" skill), the habitus carries with it a heavy load of inertia and only changes when external conditions are so dramatically transformed as to permanently disrupt the capacity of the habitus to implement those strategies that worked in the past (2013 p. 407).

Across the nineteenth and early twentieth century, as the maritime sector experienced the gradual progression from sail to powered vessels, master mariners continued to enjoy extensive autonomy in their role, due to the extended isolation of sea voyages: 'The captain of the ship would get a telegram, and he would run everything. He had no-one to go to for advice' (#0897).

However, the 1950s saw the rapid increase in containerisation (using standard sized container to transport cargo), leading to vast increases in the size and number of container ships to meet the exponential growth in global trade (Palmer 2011). Shipping companies, therefore, expanded to take on the forms of corporations, while cargo transport increasingly became a commodity that was subject to competitive pressures (Kristiansen 2005 p. 5).

Additionally, improvements in information and communication technology enabled managers within those shipping companies to interact with their vessel masters in real time, anywhere in the world; through email, satellite telephone, teleconferencing and even electronic system data exchange (Muirhead 2002). Master mariners soon became enmeshed in complex networks of global stakeholders, who sought to control their operations (Gerstenberger & Welke 2002; Roberts & Higgs 2019, in press).

Because of the ease of communication that everybody wants to get their opinions across, everybody wants to get their instructions across, and it becomes that the Master is not out there on his own at sea, contemplating what he's about to do and what is going to happen. He's got everybody in his face every five seconds, saying 'do this, do this' and 'what about that?' (#0768)

This dynamic caused seafaring leaders to be pulled between focusing on the tangible and immediate concerns of the ship, and focusing on the more abstract and distant concerns of these disembodied stakeholders, as described in motif 3 in the previous chapter (zones of attention).

The forces of increased commerciality and technological contactability have given rise to increasing volatility, uncertainty, complexity and ambiguity (VUCA) (Homer 2013; Horney, Shea & Pasmore 2010) within the maritime sector. The dynamic of VUCA itself can be seen as symptomatic of the broader phenomenon of *liquid modernity*. Liquid modernity, as defined by the eminent Polish sociologist Zigmunt Bauman, describes the chaotic aftermath of the modern period, typified by globalisation, capitalist economies, increasing chaos and fluidity of both work and careers (Bauman 2000; Lippi 2013).

These sweeping VUCA forces of liquid modernity are colliding with the autocratic and infallible aspects of the Odyssean archetype. This dynamic appears analogous to tectonic plates on the Earth's surface. Just as these vast plates of planetary crust collide and force against each other (Condie 2016 p. 5), the relentless force of liquid modernity collides with the monolithic nature of the Odyssean archetype. Where these 'tectonic tensions' manifest; pressure, heat and violent eruptions follow. The landscape of leadership is fundamentally altered, rifts occur, and the ground itself is shaken. Applying the analogy of tectonic tensions, it is easy to appreciate how the seafaring leadership habitus has become precarious and problematic.

Liquid modernity has prompted shipping customers to challenge the traditional autocracy and autonomy of the master:

And it's those [customer] demands – push, push, push, push – that really impact upon our abilities to make the correct decisions. We are fully aware that it costs money to run that rig, and every time we delay it means that someone in the office is going to make a judgement upon us. (#0353)

This phenomenon is at the core of Motif 4. This motif highlighted the paradoxical tension that, while the master has full authority (enshrined in maritime law) to stop operations if he/she believes they are unsafe, there are longer-term implications for disappointing customers in terms of their service expectations: 'And [the customer]

might say to [the company] “Your Captain doesn’t know what he’s doing. We want him off” (#0361).

Global training standards now exist for all maritime roles (International Maritime Organization 2011; Miyusov, Zakharchenko & Zhukov 2013), leading to professionalisation of crew members as maritime *experts* rather than unskilled/semi-skilled seafaring labourers. Additionally, seafarers have an expectation to be led with greater inclusion and engagement (Choi, Tran & Park 2015), which is at odds with traditional, command-and-control approaches associated with role primacy. This can be seen in the account of a clash between a master and the unionised crew over the supply of single-use plastic bottles of water:

They walked up, all the MUA [unionised crew] members, like thugs, saying ‘We are not going anywhere. We want to halt the ship.’ As a skipper, regardless how mellow or how hyper you are, you don’t want to hear those words. (#0520)

Another master who yelled and swore at crew members who were about to perform an unsafe act, was confronted by his crew; ‘They [crew members] came up and said “You’ve no right to shout and curse.”’ (#0361). Another master described initially feeling confronted when her decisions were challenged by her officers (#0190). As such, the narratives indicate that the authority of the master mariner is increasingly being challenged by professionalised and unionised crew members.

For many master mariners, the tectonic tensions from the interaction between the Odyssean archetype and liquid modernity can imperil their practice and professional identities. The following vignettes involve a master mariner who experienced the dual impacts of being overruled by his customer and aggressively confronted by a crew member. When I interviewed this particular master, he was on indefinite sick leave due to hypertension, anxiety and heart palpitations. He first described a situation in which he almost ran out of fuel while towing an oil platform because the customer, a global petroleum corporation, refused to allow him to return to port to refuel:

You’ve got [the customer] trying to tell you how to do your job. That gets below my skin because I’m the guy with the ticket. I’m the guy in charge of the tow. You should be listening to me. You shouldn’t tell me how to do my job. But that whole rig move was quite stressful, so I was worrying about the fuel all the

time. If something goes wrong, it comes back at me. You feel like you're in a black hole and you can't get out. And you get nowhere. You just feel as if you're in a black hole and go 'What's the point in having a Master?' (#0361)

Then, the master went on to describe another incident involving conflict with a crew member who verbally attacked him during a safety meeting taking place with the entire crew on the ship's bridge:

Because I knew it was coming. And it came at the safety meeting. That's when he made his attack on me. And he started calling me a c%#@# and a b@#&% in front of everybody, and I had to make a split decision. Now, if I bow down to this guy, everybody here has got no respect for me at all. I went for him. Not physically. I walked up to him, finger pointing, because the red mist just descended. Because you can only take so much s#@& thrown at you. I stopped the meeting, and I said 'You do not run the deck.' About turned, walked up to the bridge console and said 'Meeting closed'. That was it. And then afterwards when the red mist went away <sotto voce> 'Oh shit, I went too far'. I went down to apologise. He just [said] 'I don't want to know'.

It does take a blow to your confidence, and you do get stressed. That's when I said 'Nah, I need a break. I need a break, or else I'm going to go down that pit and I'll never come out. (#0361).

It seems entirely reasonable that masters should be able to refuel when required, and they should not be verbally attacked by their crew. However, unrealistic expectations about absolute authority and infallibility did not help this master navigate these volatile, uncertain, complex and ambiguous leadership situations.

The outcome of such tectonic tensions appears to be confusion, distress, stress, depression and poor operational performance (Bridger et al. 2011; Kregting 2015). In terms of mental health and wellbeing, the recurring theme of the 'black hole' is particularly alarming. Furthermore, there appears to be significant damage to the master mariner's sense of professional identity (Cuganesan 2017). As such, I have used the image of a broken statue (figure 10.2, below), a contemporary Ozymandias

(Shelley 2005), to symbolise the personal and professional destruction of the master mariner due to the tectonic tension between liquid modernity and the Odyssean archetype.

Figure 10.2: Broken statue.



The notion of tectonic tensions caused by the interaction liquid modernity and Odyssean-style archetypes may be transferable (Jensen 2008 p. 886) across other professions such as medicine. This might encompass doctors, nurses and paramedics who may be caught between liquid modernity and their own professional archetypes (perhaps Hippocratic) rooted in healing and responsibility for the wellbeing and safety of others.

Motif 5: Procedure & diagnosis versus artistry & action

There were complex dynamics associated with when it was appropriate to exercise professional artistry and improvisation in resolving a critical event, and when it was appropriate to apply a procedural/diagnostic approach. These complexities prompted me to interpret these instances under motif 5, *procedure & diagnosis versus artistry and action*. This motif grew out of my sense that the seafaring leadership habitus poses paradoxical dynamics in the resolution of critical events, involving tensions

between diagnostic and procedural problem solving, on the one hand, and artistry and improvisation on the other.

It is important to acknowledge the work of Nobel Prize-winning economist and psychologist, Professor Daniel Kahneman, who described two systems of cognitive processing (2011). System 1 was fast and automatic, and was rooted in humankind's pre-history. It could be both brilliant but also flawed, as it was subject to unconscious biases. System 2 was slow, conscious and deliberate, allowing for logical and explicit decision making. Kahneman's conceptual model, brilliantly outlined in his book *Thinking, fast and slow* (2011), appears entirely consistent with my interpretive conclusions, and my intention is not to repeat them as Kahneman's description of these systems stands quite ably on its own.

However, to make a novel and valuable contribution to Kahneman's System 1/System 2 model, I now explore the sociological dynamics that appear to influence when each of these systems are employed by seafaring leaders; with System 1 being associated with artistry and action and System 2 being associated with diagnosis and procedure. This discerning between the two systems seems to be closer to the core of sensemaking, and therefore more aligned with the aims of my research question.

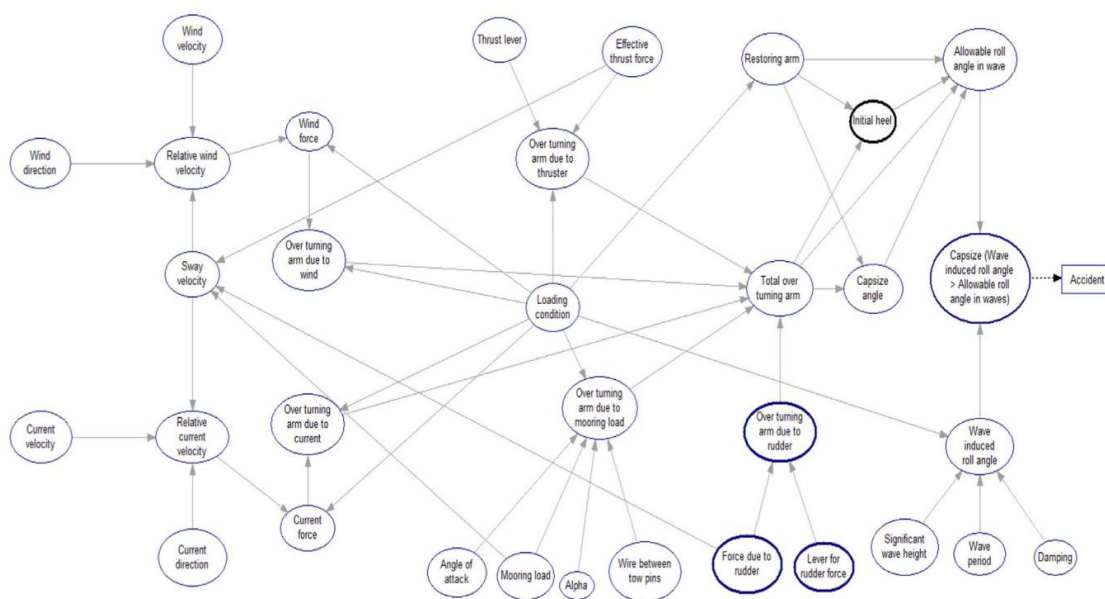
Kahneman's System 2 thinking (deliberate, rational and conscious) appears to be complementary with the techno-rationalist archetype associated with the seafaring habitus. The techno-rationalist archetype represents the seafarer as a rational and methodical technician who responds to events using formal procedures and propositional knowledge to enact their practice. This archetype strikes me as an embodied, seafaring representation of the rational professional hegemony and reductionist, Cartesian paradigm, which would place value on System 2 cognition.

As discussed in the earlier literature review on maritime human factors, there is a prevailing paradigm of techno-rationalism and a prioritisation given to rational thought. This techno-rationalist archetype is encapsulated within the quote from the seafaring narratives "Everything is black and white in our industry. You either do it right or wrong" (#0768). Even the variability of human error has been mathematically systematised into quantified checklists (Wu et al. 2016) and rationally defined parameters for anomalous vessel operations (Zhen et al. 2017).

The potential for maritime disasters, such as collisions, have been codified in regulations such as COLREGs (Belcher 2002; Sellberg, Lindmark & Rystedt 2018). Such regulations strive for improved safety by employing contingency approaches (i.e., in situation x, do y) (Lewis & Smith 2014). However, as discussed in the previous chapter, the COLREG's rely on mutual mind reading to determine which vessel must take a particular avoidance action. Additionally, the COLREG's become unworkable and ambiguous with any degree of complexity beyond two ships in a given maritime scenario (Belcher 2002). Whilst such contingency-based constructs as COLREG's provide the illusion that maritime operations can be rationally managed, the reality is that the complexity of maritime operations rapidly outstrips these techno-rational approaches. In describing an actual collision avoidance situation involving only two vessels, one master admitted: "I had no idea that there was going to be some mitigating action, I just had to get out when I saw what was happening" (#0768).

Figure 10.3, below, depicts the complexity of maritime critical events within the multidimensional network of enmeshed factors that would have influenced the sinking of the Bourbon Dolphin as it towed an oil rig in the North Sea (Gunnu & Moan 2017).

Figure 10.3: Influence diagram related to the anchor handling vessel's stability in anchor handling operations.



(Gunnu & Moan 2017 p.294)

The sheer complexity of this scenario in a dynamic environment of towing an oil platform at sea defies a diagnostic or procedural approach. Nevertheless, as the literature review reveals, the maritime sector overall applies a reductionist, techno-rational approach to the investigation of accidents and incidents. As such, the seafaring leader is likely to be judged on whether he/she followed endorsed diagnostic and decision support procedures in the resolution of critical events.

While the seafaring leader habitus, underpinned by infallibility and rationality, has a cultural preference for the following of techno-rational diagnostic and procedural methods, even when the complexity of the situation makes these unfeasible, Weick cautions that some rational and procedural accounts may be unconscious justifications made after the facts to explain the more intuitive, improvisational actions taken at the time:

The decision actually has already been set in motion before people declare that it has been made. The recent history is viewed in retrospect, with tentative outcomes in hand, to see what decision could account for that outcome. Outcomes develop prior definitions of the situation (1995 p. 184).

And paradoxically, the seafaring leadership habitus itself appears to afford latitude, and significant symbolic capital, to artistry and improvisation under conditions of crisis. This can be seen in the pride in which the interview participants took actions such as using a baking tray to fix a hole in the hull of the ship (#0404), or taking immediate evasive action to avoid a collision without rationally considering COLREG implications (“I just ran” #0768). The pride and ease with which these tales are told, and recounted by others at times, suggests they are culturally *prized* in a way that they would not be if time allowed a procedural, diagnostic approach. This strongly suggests the symbolic capital of artistry and improvisation (as habitus), but, only within the niche *field* (Joy, Game & Toshniwal 2018) of the maritime crisis.

The narratives suggest that seafaring leaders display a significant degree of professional practice judgement artistry (PPJA) in performing their roles. PPJA involves the capacity to tacitly access a “deep and relevant knowledge base and extensive experience”, that employs judgement making on “higher levels of awareness” and “evaluation in the face of greyness/complexity” (Paterson & Higgs

2008 p. 182). This definition strongly parallels the notions of the “competent-yet-not-conscious” (Dennett 2017 p. 101) processes and “unthought knowns” (Silva 2016 p. 80) described above. Wacquant (2011 p. 86) has suggested that “Practical mastery operates beneath the level of consciousness and discourse... in which mental understanding is of little help (and can even be a serious hindrance)”. Whilst PPJA may appear to an observer to be intuitive or spontaneous (Paterson & Higgs 2008 p. 238), what is often hidden is the extensive and deeply internalised experience being accessed and tacitly enacted on levels beyond rational thought.

Paterson and Higgs make the compelling argument that “if decision making in professional practice were entirely procedural and logical, it could potentially be reduced to the realm of rules and manuals” (2008 p. 182). However, the seafaring leadership habitus, embodied in the Odyssean archetype of perfectionism and rationality, allows for professional practice judgement artistry only in the niche field of the crisis. In all other areas, it insists that techno-rational diagnosis and procedures be followed. The narratives point to significant penalties, and loss of capital, when actions cannot be rationally justified, explicitly articulated and shown to be compliant with prevailing decision-making constructs. This reflects a complex and ambiguous disposition towards artistry within the seafaring habitus.

Additionally, there appears to be significant damage arising from a master mariner’s fixation on the infallibility of rationalism. One master became angry with himself because he did not anticipate another vessel unexpectedly heading on a collision course with his ship: ‘So, the fact that I didn’t anticipate that, and it happened, pissed me off... I was furious. Absolutely furious’ (Interview 0768). This reaction to fallibility is validated by Clarke and Knight (2018), who claim ‘the dominant focus on clinical matters and the scientific model renders vets vulnerable and anxiously attached to a perfectionist stance; especially unrealistic given the uncertainties surrounding their daily practice’ (p. 1396). They also associate perfectionism with mental health problems.

There is a further impact upon practice for those seafaring leaders who cling to the techno-rational archetype. Their fixation on infallibility and rationality can make their own errors undiscussable. Therefore, many vital learning and practice development opportunities are foregone. To return to my analogy of tectonic tensions, part of the

crust of one geological plate may be ‘subducted’, or pushed beneath the surface (Condie 2016 p. 87). I suggest that during the metaphorical tectonic tensions described above, practice development becomes subducted (driven below the surface and inaccessible) in order to maintain the unrealistic illusion of infallibility (Clarke & Knights 2018). This would significantly impede professional development and personal growth (Ewing & Smith 2001), which would further reduce the likelihood of overcoming the techno-rational archetype’s impact.

Motif 6: Grasping patterns, finding the line and denouement

Seafaring leaders frequently described their efforts of achieving the best possible balance between complex competing factors in their environment, and I noticed that this process seemed to involve pattern recognition and a “feeling out” of situations in order to take appropriate, harmonising actions and to make sense out of their environment. This embodied sensemaking often extended beyond the critical event itself, as the seafaring leader attempted to achieve an ultimate reconciliation, accounting-for, or closure of the critical events, its causes and its outcomes. The term I applied to my interpretation of this was *denouement*. As such, in keeping with the embodied nature of their accounts of how they perform this practice, I labelled the motif *grasping patterns, finding the line and denouement*.

I noticed that accounts of “finding the line”, in its various descriptions, were often associated with paradoxical situations or tensions within their professional practice. As such, I begin the theoretical analysis of this motif by considering the paradoxical contexts in which this motif is enacted.

In reflecting upon the motifs from the interpretive chapters, it strikes me that the lifeworld of the seafaring leader is fundamentally paradoxical in ways that confound techno-rational reductionist attempts to describe, explain and control it. Both this and the previous chapters highlight a number of paradoxical tensions associated with seafaring leadership and sensemaking. Indeed, the motifs developed from the interpretive readings can themselves be framed in paradoxical terms. Motif 1 can be expressed as the paradoxical tension between the conscious mind’s sense of being in control and the source of self in Cartesian terms, and the deeply enmeshed

dynamic of brain/body/environment as an intersubjective sensemaking entity. Whilst the mind might be under the illusion of “I think therefore I am”, embodied cognition suggests a complex corporeal aspect to sensemaking. Motif 2, involving the strength of emotion in sensemaking, involves the paradox of *being moved* by emotions in an affective sense and *moving with* emotions in an enactive sense (Fuchs & Koch 2014). While emotions are seen as an outcome of interacting with a critical event, emotions are very much the way in which these seafaring leaders *enact* their roles. Motif 3, involving competing zones of attention, can be expressed as the paradoxical tension between embeddedness and extendedness that confronts seafaring leaders at sea. This is particularly so in engaging with a growing number of shore-based stakeholders vying for attention alongside immediate concerns on the vessel itself.

On a sociological level, the tectonic tensions between the Odyssean archetype and the relentless forces of liquid modernity sweeping the maritime sector gave rise to further paradoxes. Motif 4 expresses the paradoxical tension between power/autocracy and relationship/collaboration with others. Seafaring leaders, particularly master mariners, assume a role of autocracy, infallibility and authority, which places this command-and-control style of leadership at odds with maintaining relationships and collaborating with customers and crew. Motif 5 suggests the paradoxical tension between techno-rational diagnosis/proceduralism and artistry/improvisation in responding to critical events. While seafaring leaders are expected to follow prescribed checklists and procedures for resolving critical events, there is significant evidence that these individuals employ experience-based sensemaking, artistry and improvisation to resolve critical events, often constructing rational narratives of such processes after-the-fact. These motifs, from both an interpretive and a theoretical perspective, confirm the deeply paradoxical nature of contemporary seafaring leadership.

Smith and Lewis define the paradox perspective as “contradictory yet interrelated elements that exist simultaneously and persist over time” (2011). Paradox has its roots in tensions generated by competing values (Lavine 2014) and contradictory demands. These tensions present themselves as “persistent and unsolvable puzzles” (Smith & Lewis 2011) and “wicked problems” that vex leadership and

professional practice (Cherry 2014). Paradoxes are not the same as dilemmas, which are difficult, competing choices with complex trade-offs. Although difficult, dilemmas are still solvable. However, to be truly paradoxical, the choices within the dilemma would be “contradictory and interrelated” in a way that choosing between them would only temporarily stave off the tension itself (Smith & Lewis 2011). As such, paradoxes are far more persistent than merely difficult problems to solve. Indeed, they are inherently unsolvable at their deepest level.

Prior to the emergence of the paradox perspective, the dominant management/leadership paradigm was the contingency approach (Lewis & Smith 2014). The contingency approach was a response by theorists to the realisation that there were no “universal leadership traits” like vision or strategic foresight, that could be depended upon to resolve every situation (Daft 2008 p. 64). The contingency approach sought to develop semi-codified principles and guidelines to be adopted in response to a wide variety of external and organisational situations. Contingency theorists proposed an array of models involving decision trees, matrices and menus to match the correct leadership approach for given situational variables, encouraging a diagnostic approach to leadership (Daft 2008 pp. 80-83). Indeed, the techno-rational approaches popular in contemporary MHF and regulations such as COLREG’s (as discussed in detail in the previous chapter), can be seen as contingency-based.

However, increases in the complexity and ambiguity in organisational contexts (Homer 2013; Lavine 2014) has led to the realisation that contingency responses are insufficient to contend with the inherently unsolvable tensions of complex and interdependent phenomena (Cherry 2014; Lewis & Smith 2014). For example, contemporary societies that foster tolerance and free speech as a social good also allow the flourishing of racism and anti-integrationism (Bell 2013). Indeed, as previously discussed, the maritime collision regulations become problematic as soon as there are more than two vessels to consider in a scenario. The prevalence of these persistent, wicked and perplexing tensions requires a deep understanding of the nature of paradox.

The paradox perspective suggests a “both/and” approach rather than the “either/or” approach of contingency thinking (as described above) (Johnson 2014; Lewis &

Smith 2014). This requires dwelling with the tension between the competing values and priorities to sufficiently understand and accept the nuances of the dynamics behind the tension (Cunliffe & Karunanayake 2013), and to develop approaches towards harmonising the tension in holistic ways that leverage both poles towards virtuous cycles (Johnson 2014; Smith & Lewis 2011) of improved outcomes.

Adopting a paradox perspective requires the capacity to be comfortable with competing values and priorities in the face of natural inclinations to problem solve and eliminate tensions rather than coexist with them (Lavine 2014). Such dwelling with paradoxical tensions often involves a cognitive and emotional effort or burden (Jarrett & Vince 2017). Consideration of paradoxical tensions requires time for deep reflection in order to achieve understanding (Lewis & Smith 2014). Additionally, exploring and exploiting paradoxes requires the development of ambidexterity (Lavine 2014; Raisch & Zimmermann 2017), indicating that effort must be exerted towards developing new capabilities on an individual and organisational level. As such, implementing a paradox approach requires time, and effort in terms cognition, emotion and capability development. Therefore, the paradox perspective requires a significant investment.

Paradoxical perspectives may also be unpalatable within professional sectors where rational, scientific approaches are privileged and “hegemonic” (Higgs 2014). The difficulty in implementing paradox perspectives within such organisations is that paradoxes seem absurd and irrational when both poles are pursued or considered simultaneously (Smith & Lewis 2011). Focusing on each polarised element in isolation seems more logical, and therefore more attractive to such organisations (Lewis & Smith 2014). This is relevant to MHF in light of the reductionist dichotomies it is founded upon, such as the Cartesian divide of mind/body.

However, as described above and illustrated by the narratives of seafaring leaders, the increase in complexity and ambiguity means that paradoxes within contemporary organisations are increasingly inescapable. Treating paradoxical tensions as an either/or choice between polarised elements can lead to “vicious cycles” (Smith & Lewis 2011) that consistently produce negative outcomes. As in the previous example of societal tolerance, an untempered adherence to tolerance and freedom of expression provides an opening for harmful ideologies such as

racism and extremism to flourish unchecked. Ultimately, the society considers implementing stringent regulations against crimes such as “hate speech”, while social norms become increasingly quick to censure and censor any dialogue on sensitive societal topics – a form of political correctness that can be extreme and ideologically driven in itself. As in this example, focusing on one polar element eventually prompts a move towards the other polar element when its neglect becomes sufficiently problematic.

In contrast, a paradox perspective advocates achieving a “dynamic equilibrium” between paradoxical elements to harness and harmonise them in sustainable ways that foster “virtuous cycles” (Smith & Lewis 2011). Johnson cites Singapore Airline’s balancing of cost efficiency and service excellence within their business strategy as an example of successful application of a paradox perspective (2014). This dynamic equilibrium suggests parallels with the neurobiological drive for allostasis and the maintenance of the “state of play” in Bourdieu’s concept of habitus, discussed in the preceding chapters.

This line of thinking has some earlier precedents in the theoretical concept of *gestalt* (Sills, Lapworth & Desmond 2012). Emerging as a psychological school in the 1950s (p. 3) this approach encourages holistic, integrative approaches to human perception, experience and psychological processing. There are three key concepts within gestalt that are relevant to both paradoxical tensions and sensemaking. They are wholeness, figure and ground, and zones of awareness.

Wholeness (p. 45), in gestalt terms, means to integrate and make meaningful life experiences in a way that brings balance, and a form of denouement, to an individual or group. It is relevant to the paradox lens in that it seeks to holistically encompass all dimensions of a particular issue (including polarising elements) into a cohesive and harmonised whole. In terms of sensemaking, wholeness provides an avenue for individuals and groups to bring closure to their understanding of critical events so that they can be integrated effectively into narratives and experiential learning. The contemporary perspective of mind-body-world as a sensemaking system as discussed in the theory chapters appears consistent with the gestalt notion of wholeness.

Figure and ground (p. 46) is a concept that distinguishes what the individual or group is currently focusing on (the figure), versus background phenomena (the ground). This distinction is relevant to the paradox perspective in that it highlights the interconnectedness between an element and its surrounding phenomena. The concept of figure and ground cautions against separating one polarising element from its opposite factor, which may lie unconsidered within the ground of the paradoxical tension itself. Figure and ground is valuable to the study of sensemaking as it emphasises that the critical event (figure) that is being made sense of takes place within a broader context of events (ground). The privileging of figure from ground can help and hinder sensemaking.

Zones of awareness (p. 29) are relevant to the paradox perspective as it highlights that there are multiple levels at which paradoxical tensions can be considered. These zones expand outward, much like a Russian doll, from a deeply personal internal zone to a multivocal, collaborative zone that engages with the outside world. This has implications for how the paradox itself is defined, understood and ultimately dealt with. Zones of awareness also relate to how the tensions associated with the paradox are perceived at each zone, providing a deeper understanding of the phenomena. Zones of awareness provide a framework for understanding how a phenomenon contributes to sensemaking of the phenomena at each zone of awareness. It highlights the embeddedness of the seafaring leader within their lifeworld or *umwelt*, and the value of appreciating the interdependencies between internal and external dimensions of their experience.

As such, gestalt and its three concepts of wholeness, figure and ground, and zones of awareness reveals important facets of the paradox perspective, while suggesting how these facets may be effectively engaged. The complementary relationship between gestalt and paradox lies in their shared concern for harmonising seemingly competing or disparate elements in holistic ways that do not seek to reduce the phenomena to its parts, nor privilege one part above another (as is typical of technological and contingency-based approaches).

These gestalt concepts provide a useful way of operationalising the work involved, in theory and in practice, in engaging effectively with paradox. The challenges in doing this are manifest, given the range of paradoxical tensions raised by the six

motifs. For seafaring practice, in the context of critical incidents, a seafaring leader must somehow resolve or find the line that will anchor his actions. For theorists, there are a range of lenses that can be used to try to understand and improve practice.

Many participants described an “intuitive”, *feeling-out* for points of equilibrium, or balance, and of *grasping* for patterns in order to make sense of their lifeworld/umwelt. Many of the seafaring leaders spoke in terms of metaphors such as *finding the line*, that are both terse in expression yet at the same time rich in the possibilities of what might be going on. These metaphors are useful when the patterns can’t be encapsulated within rational decision-making tools such as decision trees and fault-finding processes. Searching for patterns seems to allow seafaring leaders to find “the line”, and achieve “equilibrium”. They frequently described their process for finding the line in bodily terms; such being on “firm footing” (#0068) and “equilibrium” (#0951), as well as emotional terms such as being “happy” (#0951). In one case, although hard numbers such as engine temperatures were referred to, “the line” was finally framed in capital-centric/allostatic terms, such as whether it would reflect badly on his career or whether it would be the best balance between maintaining vessel safety and delivering on customer expectations (#0993).

In all these circumstances, the examples of “finding the line”, “equilibrium”, and “firm footing” used bodily metaphors to express forms of allostasis (optimisation between internal and external conditions). The bodily metaphors used by seafaring leaders to explain how they “find the line” in their operational practice is an example of closely enmeshed dynamics of language and embodied simulation that takes place within common neural populations. As proposed by Barrett (2017 p. 6) and Colombetti (2017b p. 447), the body and the umwelt are mapped within the brain, and Lakoff (Lakoff 2012) states this mapping shares neural activity with the language used to express these interactions. Lakoff (2012) points out that this common basis for language and embodiment establishes reinforcing neural cascades that inscribe embodied action, language and sensemaking in a dynamic and interdependent neural system.

Furthermore, these examples of patterning have a significant affective component in that they are expressed in feelings and sensations such as “happy” and “comfortable”. Positions of “equilibrium” and “comfort” are bodily felt for rather than logically reasoned. They represent, as Fuchs and Koch (2014) describe, being *moved by* and *moving towards*, in an enacted and affective manner. This corporeal dimension supports my interpretation that the patterns are “grasped” by the seafaring leader, suggesting an enactive and bodily attempt to make sense of patterns in metaphorically tactile terms. Additionally, Barrett’s hypothesis that affect is employed in the service of achieving allostasis (2017 p. 16) is reflected in “finding the line”. Finding the line appears to be an extended form of allostasis, and this would explain why this phenomenon is expressed in affective, “felt” terms in a deeply embodied, visceral sense that parallels the concept of “gut feel”.

According to Prison, Dahlman and Lundh (2013), such non-cognitive, pre-reflexive and felt means of knowing and sensemaking have been described as “ship-sense” or having a “seaman’s eye”. They also state that the motivation for employing “ship-sense” is to achieve harmony in vessel manoeuvring, which parallel’s the notion of equilibrium as well as suggesting an affective state. However, “finding the line” extends beyond vessel manoeuvring to include managing the complex interdependencies between stakeholders and their nuanced perspectives and needs, as shown in following account from a master mariner:

Well, to find out where that line is, to establish that line, you’ll look at ‘Why am I doing it? Why do I do this?’ The ship is operational so I draw the line. My experience, my confidence in the systems and the training of the crew, the knowledge that the rig is ready and the crane is ready for me, and that the operation can go as quickly and as safely as possible, I know where that line is. ... As soon as there’s a change, such as [a] crane driver’s no longer available, I’ll move away just far enough to be able to come back and continue the job. So, I redraw the line; no crane driver, therefore the line’s moved, I’ll move away – I’m now back in an equilibrium that I’m happy with. You’re continually reassessing where you need to draw that line. (#0353)

This example parallels the description of Colombetti’s microbe navigating its sugar gradient with its flagella and cellular receptors (2017b p. 447), but on a far more

complex scale. Additionally, it highlights an extended, affective response to the organism's Umwelt, as expressed in Colombetti's account of the water beetle and its management of air bubbles within its pond (p. 450). Colombetti states that:

Sensemaking can also extend – in the sense that it can be brought forth by hybrid organic/non-organic composite systems.... Because sensemaking is also inherently affective, affectivity as well can extend" (p. 450).

The dynamic factors at play in the context of offshore operations are vastly more complex than the Umwelt of the microbe and the water beetle. In fact, figure 10.3 (see page 233) depicts the factors that influence vessel stability during anchor handling operations, which was a critical failure point in the capsizing of the *Bourbon Dolphin* in 2007 (Gunnu & Moan 2017). It appears that, while the rational, conscious mind may have difficulties accounting for and modelling such complex interactions, the bottom-up psychophysiological system described in the previous sections is able to model such dynamics and create predictive coding of anticipated outcomes that are anticipated from this Umwelt (Barrett 2017 p. 7). Barrett further states this predictive coding is a form of pattern identification based on the experience of the individual (p. 7). The individual, as a brain/body/environment sensemaking system, responds to deviations in its predictions in an embodied, enacted and affective manner, depending on the degree and significance of the deviation from the predicted outcome. The greater this deviation, the more the individual draws upon their sensemaking resources (affective, embodied, enacted and cognitive) in order to resolve the event and achieve a return to normalcy, equilibrium and allostasis. As discussed in motif 3, multiple zones of attention, Cevolini (2016) describes these deviations as "weak signals"; the detection of which are "the outcome of a self-referential dynamics that finally leads to the paradox of knowing the unknown." This description strongly parallels the phenomenon of finding the line.

Additionally, finding the line requires the "durably installed generative principle of regulated improvisations" inherent in the seafaring leader habitus (Bourdieu 1972 p. 78). This habitus has been intimately encoded with what Bourdieu described as "the rules of the game" (Lizardo 2013). These sociological dimension of finding the line is a *felt* phenomenon because, as an aspect of the seafaring leader habitus, it

has been deeply internalised to a point that it functions beyond the threshold of conscious thought; as a “matrix of perceptions, appreciations and actions” that “makes possible the achievement of infinitely diversified tasks” (Bourdieu 1972). According to Silva (2016 p. 77), this process is “constituted via affective practice”, where social action emerges through acts of paying attention which articulate semiotic connections and meaning trajectories. As such finding the line operates at a level of “unthought knowns” (p. 85) and “embodied meaning making” (p. 77).

Figure 10.4: Finding the line (Pencil on paper)



(Author's composition)

My sketch of finding the line (figure 10.4, above), depicts the seafaring leader grasping at the metaphorical line, with his/her feet in tactile contact with the deck, and engaging with the ambience of the Umwelt (represented by the wind). I have attempted to sketch the figure as androgynous, representing both male and female seafaring leaders, but my skills as an artist may have fallen short in this depiction. The fish, swimming through helical currents, suggests the biological, bottom-up processes of embodied sensemaking, while the bust of Odysseus and the words from Rear Admiral Lambert (page 223) as text-upon-page represent the bottom-up, sociological processes of the habitus. The compass rose at the bottom left implies moral navigation and direction (the metaphorical 'moral compass'), acknowledging

the values-based dimension of finding the line. The central hourglass shape (#0535) places the seafaring leader at the nexus of the external stakeholders (above) and the crew (below), acknowledging their role in making meaning for both stakeholders to form a cohesive sense of the state of play (Roberts & Higgs 2019, in press). The oil rig and vessel situate this phenomenon within the unique work context of offshore operations. As such, the sketch is an attempt to unify and integrate the dimensions of finding the line in a way that symbolically makes sense of the phenomenon outside of, but augmenting, the written articulation within this section.

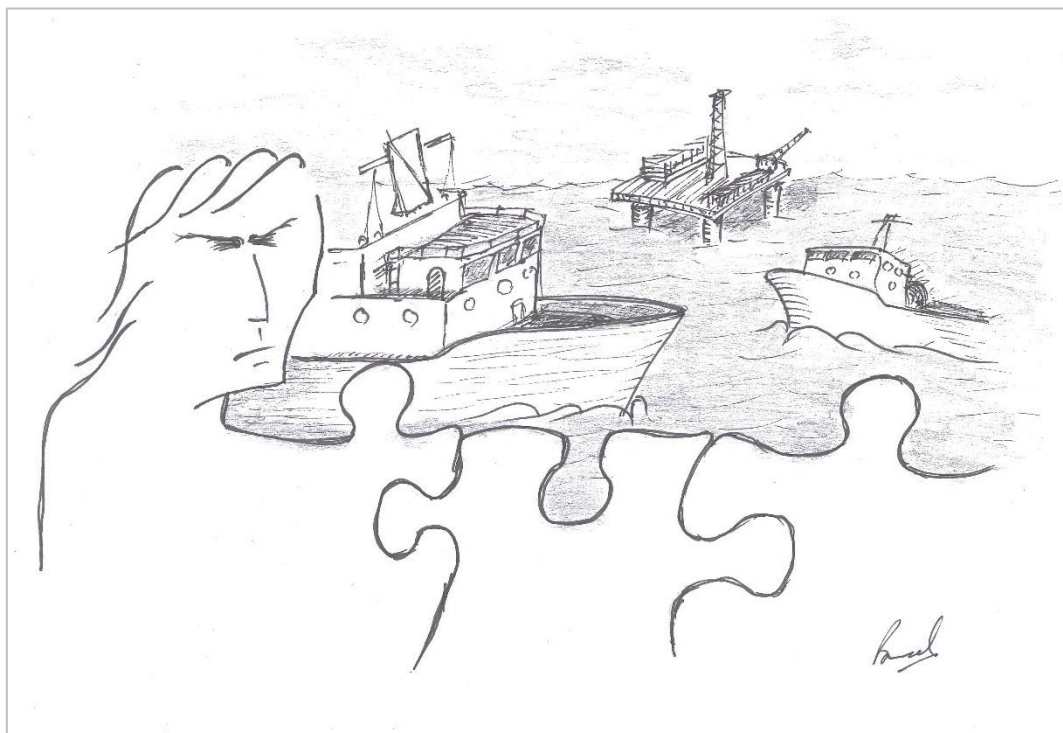
The vast majority of this patterning process falls outside the scope of conscious comprehension, and is orchestrated by the evolutionary, bottom-up, competent-but-not-conscious processes described in the previous two chapters. It is only a fraction of this process that enters conscious comprehension and rational cognition. Those sensemaking aspects that fall outside of conscious thought are attributed to “instinct”, “intuition”, “gut feel” or “just knowing”. However, the conscious elements of sensemaking are brought forward in storied accounts, critical incident interviews and accident investigations to represent the sensemaking process in the linear, rational and lock-step terms of situation awareness. Therefore, finding the line and grasping patterns are critical elements in achieving harmony between paradoxical tensions within the lifeworld of seafaring leaders.

Finding the line in the context of particular critical incidents is one thing, but translating that into a trajectory of ongoing practice development is another. While humans share the basic sensemaking drives of Barrett’s microbe and Colombetti’s water beetle, they are paradoxically much more than these basic non-sentient organisms. As Dennett (2017) claims, humans are unique in their capacity for reflection, conscious thought and sense of identity (p. 11). He states “It is the capacity to self-monitor, to subject the brain’s patterns of reaction to yet another round of pattern discernment, that gives minds their breakthrough power” (p. 390). As such, humans have unique needs for sustaining and expressing concepts of self, often via narrative means and over much longer time periods compared to microbes and water beetles. This requirement manifests in an affective (felt) drive for sensemaking that extends beyond the immediate event. According to Chater and

Lowenstein (2016), this sensemaking drive is evolutionary in nature and on par with other drives such as hunger in its capacity to motivate behaviour. This drive may serve evolutionary purposes (Dennett 2017 p. 57) such as narrative/identity maintenance and ensuring experiential learning of complex events are integrated into the repertoire of the individual, as well as others through situated, social learning. (Lave 1991).

Many seafaring leaders described an ongoing quest to make sense of the events that challenged their professional practice. For example, the master who tried in vain to gain an explanation as to why another vessel headed on a collision course with his vessel (#0768). I interpreted this long-term drive for meaning as denouement, or the satisfactory conclusion or explanation that “wraps up” the event for the seafaring leader in sensemaking terms. Such denouement allows for narrative completion. Additionally, denouement provides reassurance of the sensibility of the world, confirming that it can readily be rendered meaningful from a personal perspective in ways that can be satisfyingly efficient in their explanation. According to Chater et al., “human minds protest against chaos, and people seek to extract a meaning from bewildering events or situations”, highlighting the innate human affinity for telling stories in order to make sense of raw experience (2016). They state that constructing stories allows for the organisation of events in a coherent fashion that gives individuals “a sense of predictability and control” in terms of their lifeworlds.

Figure 10.5: Denouement – (Pencil and ink on paper)



(Author's composition)

This sketch (figure 10.5) symbolically represents the dimension of denouement. The critical event at the centre of the sketch is represented with a comparatively high degree of realism (such as including port holes, hatches, ladders and bridge wings). This symbolises the vivid and detailed nature of the sensemaking that is carried forward towards denouement. This is not an abstract or academic notion for the seafarer, it is a gritty, visceral and multidimensional representation of a yet-to-be-meaningful reckoning. The jigsaw pieces reflect the puzzle that sensemaking-as-denouement involves, and these pieces are depicted as bodily connected to the sensemaker him/herself. The sensemaker has only the suggestion of eyes, symbolising that they do not yet fully “see” the sense in the event whilst working towards denouement. Lastly, I have attempted to depict a moderately pained expression on the face of the seafaring leader, symbolising the affective dimension of the quest for denouement.

Human existence is both imperfect, incomplete (Merino 2015) and frequently “unknowable” (Weick 2006 p. 4). Not every event can be adequately explained and resolved in a way that satisfies this need for denouement. Some seafaring leaders

explain what it is like not to achieve satisfactory denouement regarding a critical event. They describe an affective component that, while less intense than the emotions experienced in the teeth of the crisis, continues to goad them to reflect upon the event over time. This ongoing affective state is often described as a residual anger or frustration at not being able to reach a point of finality in their sensemaking. In these cases, sensemaking remains unfulfilled in a way that generates unpleasant and ongoing affective states (Chater & Lowenstein 2016).

It is interesting to consider the implications of an evolutionary drive for sensemaking in a world that has so recently become exponentially more volatile, uncertain, complex and ambiguous (Homer 2013; Horney, Shea & Pasmore 2010). There are other evolutionary drives that have become unproductive in modern society, such as humankind's innate desire for sugars, fats and carbohydrates in a modern society of abundance, leading to epidemics of obesity. The persistent need for denouement – a final sensemaking – in some cases may be not possible to achieve. As such, the drive for denouement in today's increasingly uncertain and ambiguous society may benefit from tempering with mindful reflection on whether this affective state in the long term is yielding beneficial outcomes for the professional practitioner. Such reflection would require a degree of wise practice to enact. The capacity for wise practice will be discussed in the next chapter.

The literature suggests that failure to achieve denouement in terms of sensemaking can lead to persistent negative moods and periodic bouts of rumination on the event lasting over years if not decades. The narratives show that these affective states can have a significant negative impact on the wellbeing of the seafaring leader. There is a deep sorrow, a compassionate sadness that transcends pity, that the Japanese refer to as *mono-no-aware* (De Mente 2011 p. 126). I experience this emotion myself as I reflect that not all efforts at long-term sensemaking are complete or successful, and that this can result in enduring negative affect, or mood, for seafaring leaders that can span decades.

Concluding comments

I have explored in this chapter some of the ways that Bourdieu's (1972) notion of the habitus can provide a robust sociological explanation for the sensemaking of seafaring leaders. It extends upon the embodied sensemaking processes described in the previous chapter. This chapter explained how the bottom-up neurobiological processes that underpin embodied sensemaking are further scaffolded by cultural memes and tools, including the durable, embodied and deeply internalised dispositions of the habitus.

Not only are embodied sensemaking and habitus bottom-up processes, but they both appear to operate below the threshold of conscious thought in order to shape sensemaking in compelling ways. Silva quotes Bourdieu as stating "It is because agents never know completely what they are doing that what they do has more sense than they know" (2016 p. 80). Additional similarities can be found in the biological interaction between umwelt-affordances-embodied sensemaking; and the sociological interaction between field-capital-habitus. Both processes are employed to serve similar ends, such as allostasis (embodied sensemaking) and maintaining the state of play (habitus). Both make use of highly enmeshed, and neurologically reinforcing, dimensions of thought, action, sensations, perceptions, emotions, values and language. However, the cultural "transmitability" of the habitus from individual to individual, even spanning millennia (as is the case for seafaring leadership), makes it a form of "silent pedagogy" (Wacquant 2011 p. 85) that includes a potent "hidden curriculum" (Boostrom 2010) within seafarer education and socialisation.

The habitus of seafaring leadership is frequently embodied in the Odyssean archetype. Underpinned by the role primacy of autocracy, infallibility and rationality, this archetype has become the dominant blueprint (for master mariners in particular) over the course of millennia. However, sweeping and relentless changes within the maritime sector, fuelled by liquid modernity, have created tectonic tensions between the Odyssean archetype and increasing volatility, uncertainty, complexity and ambiguity (VUCA). These tectonic tensions, manifested in the motifs of relationship versus power, and diagnosis/procedure versus artistry/improvisation, often render seafaring leadership and sensemaking problematic, perplexing and paradoxical. It is

imperative that seafaring leaders not only find the line that will help them to engage effectively with individual critical incidents but that, over time, their search for denouement in the form of wise, sustainable practice is achieved. Additionally, the motif of grasping patterns is suggestive of wise practice (Higgs 2016b) that is deeply embodied and embedded within the environment.

It strikes me that the critical events described within the narratives of the seafaring leaders are not the paradigm shifting events such as the sinking of the Titanic in 1912 (Moyer 2014; Schröder-Hinrichs, Hollnagel & Baldauf 2012), or the destruction of the World Trade Centre towers of September 11th, 2001 (Murphy, Gordon & Mullen 2004). The world after these events were irreversibly altered in profound ways. Considered individually, the critical events within the seafaring leader narratives are not of this magnitude. However, considered collectively, their narratives signal a fundamental change in the dynamics of leading and working within high reliability contexts. The increased volatility, uncertainty, complexity and ambiguity of liquid modernity problematises the prevailing techno-rationalist hegemony (Townley 2008) of risks and rules. These traditional approaches increasingly provide only the illusion of control and predictability (Cevolini 2016). Liquid modernity, of which the critical events are mere minor “crunches” within the broader dynamic, has substantially changed the way the game is played in the maritime domain. This has occurred at a pace of the *just noticeable threshold*. That is, the subtle change is not noticeable on a day-to-day basis, but will cause significant cumulative impact; creeping up on a seafaring leader over the course of a professional career. As such, the rate of change is a weak signal in itself (Cevolini 2016). The pace of liquid modernity, like that of an incoming tide, is not noticeable from moment-to-moment, and yet like the tide it inexorably sweeps in to strand and to swallow up those who have not heeded its advance. This is the nature of change within the maritime sector, as described within the narratives.

My concern remains, however, how to best prepare seafaring leaders for the world to come; where the principles of rules and rationality hold increasingly less sway in the performance of their roles. Making sense of liquid modern nature via embodied sensemaking requires wise practice. The next chapter provides a prescription for enhancing practice wisdom within the maritime sector.

Chapter eleven: Practice wisdom for the maritime sector

The previous two chapters provided theoretical explanations for the deeply embodied nature of sensemaking which often lies beyond conscious thought and beyond the reductionist theoretical approaches of MHF. These chapters also highlighted the strength of habitus in shaping how seafaring leaders make sense of critical events, and the growing tensions between this seafaring habitus and the relentless forces of liquid modernity, resulting in a lifeworld that is increasingly volatile, uncertain, complex and ambiguous.

In this chapter, I present a foundation for a practice wisdom pedagogy for the maritime sector. This includes practical recommendations for improving the way sensemaking is understood and enacted in seafaring contexts. As Higgs notes, professional practice is more than what a professional does. It encompasses the ways that they make meaning of their identities as professionals: “As I learn about the profession I am joining; I learn to walk and talk and think and know the way they do” (2014 p. 254). Such practice is closely linked with the notion of *praxis*, referring to action that is “embodied and embedded... in the practicalities and particularities of a given situation” (Patton 2016 p. 39).

Practice wisdom involves knowing in a way that requires insight, discernment of moral outcomes and the ability to choose between options with sound judgement, and foresight, drawing upon experience, learning, reflecting, critical dialogue, and making and testing hypotheses (Higgs, 2012; Klein & Bloom, 1995). Practice wisdom is commonly associated with the Aristotelian notion of *phronesis*, (Jenkins, Kinsella & DeLuca 2019) or “a state of grasping the truth” (p. 1) that encompasses “embodiment, open-mindedness, perceptiveness and reflexivity (p. 4). The seafaring narratives consistently point to critical events as requiring practice wisdom to navigate paradoxical tensions that are inherently complex and ambiguous. As discussed in the previous chapters, seafaring leaders are frequently provided with contingency-based guidelines and regulatory codes that often fall short in providing viable solutions to complex, ambiguous and novel situations that confront seafaring practice. As such, seafaring leaders employ deeply embodied ways of sensemaking in these circumstances, such as “finding the line”. Yet they have little or no understanding of

these processes and as such the sector has no pedagogical means of integrating these processes into their professional practice.

Additionally, in today's interconnected and interdependent world, shore-based stakeholders such as customers, managers and regulators are not mere spectators to these critical events. They are increasingly enmeshed in the complex operations of seagoing ships. As such, according to Blumenberg (1997) they, too, "are embarked". Therefore, shipping organisations would benefit from applying practice wisdom in the management, as well as co-creation, of their relationships with seafaring leaders.

The theoretical conclusions from my narrative analysis poses grave implications for the maritime sector itself. Firstly, MHF continues to hold to a reductionist, Cartesian paradigm that fails to incorporate the embodied, affective and extended nature of cognition. Failure to holistically conceptualise the seafaring leader as a mind/body/environment system continues to limit the effectiveness of human factors within the maritime domain. As such, contemporary MHF methods fails to account for the ways in which seafaring leaders enact their roles in wise ways to harmonise paradoxical tensions associated with complex organisational contexts. My literature review revealed that attempts to explicate complex and interdependent dynamics cannot be achieved through reductionist methods, and attempts to replicate such dynamics through "fuzzy" computation merely parrots and parodies the embodied and wise processes revealed through practices such as "finding the line". Therefore, the ongoing effectiveness of MHF depends on integrating holistic notions of practice wisdom as bodily enacted in ways that are embedded in the situations themselves.

Maritime regulators, such as the International Maritime Organisation (International Maritime Organization 2018) and the Australian Maritime Safety Authority would benefit from integrating the notion of practice wisdom as the ways in which seafarers and seafaring leaders actually make sense of critical events. Codified regulations such as COLREG's (Belcher 2002) are developed and implemented by rational technocrats on the assumption that these can be transmitted in time and space to be applied in differing situations that were not conceived of at the time of their development. (Townley 2008 p. 69). However, the narratives highlight that the seafaring lifeworld is far messier (Schröder-Hinrichs et al. 2013) than these regulations can accommodate, and the perceptions of seafaring leaders within those

situations do not afford the “god’s eye” perspective (Webster 2007 p. 33) of the technocrats conceiving these regulations. As such, a practice wisdom perspective that acknowledges tacit ways of knowing (Polanyi 1967; Roberts & Higgs 2019, in press) would fundamentally revolutionise the way in which maritime regulation is developed.

As a subcomponent of the techno-rationalist hegemony, steeped in Cartesian duality, the maritime education and training (MET) fraternity has focused exclusively on imparting propositional knowledge to novice seafarers and seafaring leaders. This results in a pedagogy focused on the scientific and the technical, while overlooking the values-based, tacit aspects of professional development found in practice wisdom (Fjeld, Tvedt & Oltedal 2018). As discussed in the previous chapter on habitus, this does not mean there is no transmission of values and seafaring habitus within these institutions. Unfortunately, there is a significant “hidden curriculum” (Boostrom 2010) or “silent pedagogy” (Wacquant 2011 p. 85) passed on to novice seafarers and seafaring leaders by instructors and educators who have little comprehension of the sociological role they are playing in perpetuating the seafaring habitus. As revealed in the Odyssean archetype, dimensions of the seafaring habitus have become increasingly incompatible with contemporary seafaring leadership contexts. As such, MET institutions have the opportunity to integrate much needed practice wisdom into the maritime community of practice.

I am not alone in considering the value of practice wisdom as an embodied phenomenon in addressing increasingly complex practice contexts. In a body of work now spanning decades, Professor Joy Higgs has significantly defined and systematised the concepts of practice (as doing, knowing, being and becoming), *praxis* (as an ethically sensitive, committed and critically reflective form of practice), and *practice wisdom* (as the manifestation of multiple ways of knowing through experience, learning, reflecting, critical dialogue, theory making and hypothesis testing) (2012 p. 75). Higgs observes that practice wisdom (phronesis) has “capacity to build bridges between theory and practice”, and calls for blending explicit, propositional knowledge (episteme) with tacit, embodied knowledge such as phronesis (p. 83). Patton humanises the notion of praxis, by describing it as “an embodied and embedded response to practicalities and particularities of a given

situation” in which people “do the best they can on the day” (Patton 2016). Jenkins and others (2019) highlight the “wisdom deficit in today’s society”, calling for practice wisdom (phronesis) within the field of nursing that is embodied, open-minded, perceptive and reflexive (p. 4). They situate the professional practitioner at the “intersection of history and otherness... [as] the reflective, self-creative self” (p. 5). Indeed, Weick (2012 p. 10) defines wisdom, as the ‘acquired ability to create viable realities from equivocal circumstances, and to use informed judgement to negotiate prudent courses of action through the realities created’. Weick also notes that since impermanence ‘is inherent in organisations’, the role of the professional practitioner is to ‘redo’ elements of this organisation ‘when they begin to unravel’, operating as they do at the ‘edge of chaos’ (pp. 3-4). This calls for a practical set of recommendations for fostering practice wisdom among seafaring leaders.

A practice wisdom prescription for the maritime domain

My objective in this section is to propose a practice wisdom pedagogy for the maritime sector that provides pragmatic and implementable recommendations for seafaring leadership. In considering the ways in which such recommendation might be framed, I initially considered dividing these prescriptions into micro- (the individual seafaring leader), meso- (the shipping organisation) and macro- (the maritime industry itself) (Caldwell & Mays 2012). However, I realised that such a framing would be succumbing to, and perpetuating, the reductionist paradigm prevalent within maritime human factors, as discussed in the literature review. As such, I will present the following recommendations as an integrated prescription that addresses all these dimensions of the maritime domain. Consistent with an intersubjectivist ontology (Frie 2013) my recommendations address the practice spaces that exist between professional practitioners, the organisations they work within and the professional domains or communities of practice they belong to (Bradbury & Lichtenstein 2000; Cunliffe & Karunanayake 2013).

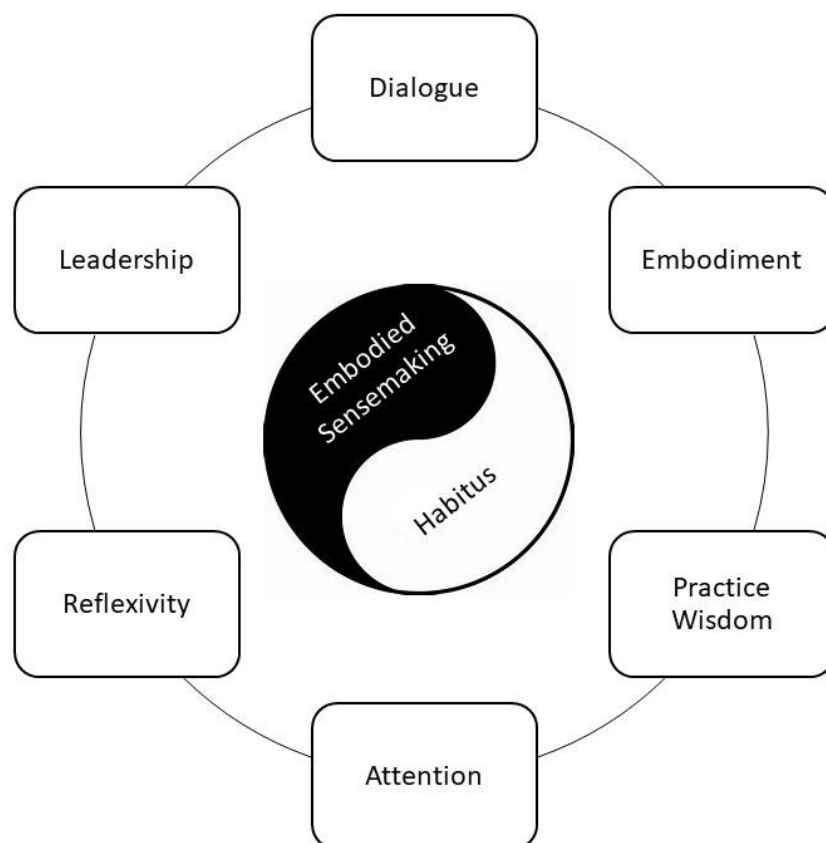
I have chosen the term *prescription* for this integrated set of recommendations as suggesting a considered remedy based upon diagnosis. I reflected upon the insights from the previous two theory chapters, as well as the questions arising from the

interpretive chapters. These questions, upon reflection, all pertained to practice, as it is described in this chapter. Therefore, this prescription seeks to

- Recognise the limitations of formal technical and regulatory knowledge (Higgs 2012), in a way that inscribes practice wisdom within the ‘margins’ of these techno-rational texts (2016a).
- Develop the capacity for mindful ‘reflection as action’ that is closely integrated with their everyday professional practice as master mariners (Bleakley 1999).
- Help future and existing master mariners navigate the paradoxical tensions arising from the impact of liquid modernity upon traditional seafaring practices.
- ‘Lovingly disturb’ the traditional beliefs, perspectives and practices within the seafaring leadership community of practice (Linnell & Horsfall 2016).

My conceptual model for this prescription is shown in figure 11.1, below.

Figure 11.1: Embodied Sensemaking Prescription



Source: Developed for this thesis.

Dialogue

A practice-wisdom pedagogy for the maritime sector needs to begin with dialogue around the central topics of embodied sensemaking and habitus. The dialogue would be partially dialectic, in raising awareness of and teaching the dynamics of embodied cognition and habitus, but it would also be exploratory in extending the depths of insights that these new perspectives bring to the maritime sector.

The topic of embodied sensemaking can be framed around the gap between how people actually make sense of the world and how current industry thinking accounts for this phenomenon. The topic of the habitus should involve a foundational understanding of how the seafaring leadership habitus has evolved to this point, and how compatible it is in terms of today's commercial challenges as well as those of tomorrow.

Dialogue would take place on a peer-to-peer level between seafaring leaders or between mentor and novice in order to foster development of professional practice, on an organisational level in order to better manage the complex paradoxes of contemporary seafaring operations, and at a maritime sector level to ensure the ongoing evolution of seafaring and seafaring leadership to meet the challenges of today and tomorrow. It strikes me that the global fraternity of MET institutions, and/or the MHF community of practice should take a leading, first-mover role in fostering this dialogue. The overarching sponsor for this dialogue should be the International Maritime Organisation under its Human Elements sub-committee (International Maritime Organization 1997).

Embodiment

Whilst a significant component of maritime education is focused on the hardware and software of a contemporary vessel's machinery and equipment, curriculum regarding the "wetware", or the embodied dimension of the seafarer in maritime operations, is virtually non-existent.

This pedagogy requires the incorporation of embodied cognition and sensemaking into MET, accident investigation and professional practice in general. This necessitates a radical departure from the Cartesian perspective and its techno-rationalist paradigm, as has been demonstrated in the previous chapters. MET must

integrate the corporeal turn into its pedagogy, or else fail to equip novice seafarers and seafaring leaders with the competencies required to succeed in an increasingly complex maritime environment.

MHF must incorporate an embodied perspective into its conceptualisation of human interaction in complex work environments. However, the holistic approach required by this perspective problematises the techno-rationalist, reductionist perspective that continues to dominate this community of practice. Embodied sensemaking challenges the Cartesian divide at a fundamental level, despite the compatibility of embodied sensemaking and complex, holistic models such as the Socio-Technical System. Failing to integrate this perspective would ignore decades of neurobiological research and the lived experience of its seafarers as shown within the narratives.

Regardless of whether MET and MHF are willing and/or able to integrate these research insights, seafaring leaders at a grass roots level can practically understand their own embodied sensemaking, and begin to leverage this to navigate their complex and paradoxical roles. As such, an embodied sensemaking debrief process appears later in this chapter.

Practice Wisdom

The seafaring leader habitus has developed as a bottom-up, sociological dynamic, giving rise at times to unproductive manifestations such as the Odyssean and techno-rationalist archetypes. However, practice wisdom provides pragmatic ways of interrogating and addressing these archetypes by making their influence upon practice open to conscious consideration and choice of actions that are congruent with personal values rather than cultural norms.

Whilst the support from the MET fraternity and shipping organisations would vastly improve the uptake of practice wisdom, its development is very much within the grasp of seafaring leaders at the grass-roots level. However, an embodied sensemaking debrief method has been developed that will build capacity for wise practice among seafaring leaders. This will be discussed shortly.

Attention

One of the issues identified as problematic for seafaring leaders has been the competing zones of attention they encounter in their roles at sea. As discussed in the previous chapters, their focus is paradoxically pulled into both embedded (the immediate vicinity of the vessels) and extended (the more abstract concerns of global stakeholders) zones of attention. Zooming in and zooming out requires considerable attentional effort and energy, and results in contingency-based approaches of either being zoomed in/or out.

As discussed in motif 3, *multiple zones of attention*, I propose that a component of attention should also be directed inward. This internal zone of awareness would be receptive to the embodied sensemaking and habitus referred to above, and would facilitate the attentiveness required to appreciate the dynamic of these often-hidden processes upon perception and sensemaking during critical events. This internal focus, alongside an external *depth of field* attention, enables the practice of *reflexion-as-action*, described next.

Reflexivity

Both embodied sensemaking and habitus occur in practices involving “competence without consciousness” and “unthought knows”. As such, their influence on sensemaking is largely hidden from conscious examination. Reflexivity is required to draw these dimensions of sensemaking and habitus into conscious examination in order to cultivate practice wisdom.

Reflexivity, the bending back of thought upon itself, is extolled by many writers as central to practice development (Bleakley 1999; Cherry 2008; Lowery 2017). There are many ways that reflexivity can be practically achieved. I have developed an embodied sensemaking debrief method delivered via facilitator-led reflexion-on-action (Bleakley 1999). This enables seafarers to curate their practice wisdom based on their personal narrative accounts (Cherry 2008).

A higher level of reflexivity is possible via reflexion-as-action (Bleakley 1999), where a component of attention is made available during practice, even during critical events, for reflexive examination of embodied sensemaking and enaction. This allows for the reflexive appreciation of this inward state of practice as it interacts

with the environment and with others in real time, and in situ. This is a deep form of situated learning (Lave 1991), allowing for adaptation in relation to achieving the types of “equilibrium points” and nuanced adjustments to harmonise paradoxical tensions in the maritime environment. As such, I have developed an embodied sensemaking scan as a method for enacting *reflexion-as-action*.

Leadership

Whilst this thesis has focused primarily upon the sensemaking of seafaring leaders, a significant number of their narratives were framed around leadership issues. Indeed, seafaring leaders hold vitally important leadership roles, both in terms of direct leadership of their crews as well as organisational leaderships as key representatives of the shipping companies they work within. As such, this component of the prescription highlights that a significant amount of reflective examination will involve leadership encounters and interactions. Leadership is an embodied, affective and enacted process, requiring a significant component of wise practice to navigate deeply paradoxical, complex and ambiguous contexts.

Fostering embodied sensemaking and practice wisdom on the parts of mentors, organisations, maritime education and training and maritime human factors requires considerable leadership in itself. This practice wisdom prescription, as a pathway for embodied practice wisdom for the maritime sector, requires fundamental transformation of a number of deeply held traditions, paradigms and entrenched sociological practices. As such, it requires significant leadership to enact and embed this perspective.

Return to dialogue

The diagram of the prescription (figure 11.1, page 258) is intentionally circular. It proposes a return to dialogue as an iterative process that, having established the mandate and momentum for an appreciation and integration of embodied sensemaking, is dialogically (and narratively) taken up again to reach deeper insights into the nature of seafaring leadership and its processes of knowing, doing, being and becoming. The return to dialogue as a form of reflection and continuous evolution makes the prescription a dynamic, mindful and purposive system of professional practice development.

Implementing this pedagogical prescription as a pathway to practice wisdom for the maritime sector requires significant investment at all levels, and a genuine leadership commitment. The fruits of this leadership will, however, be well worth the investment in terms of improvements to the efficiency of maritime operations, the safety and wellbeing of seafarers and the safeguarding of fragile marine environments.

The Embodied Sensemaking Debrief Method

I now intend to provide a deeper, more detailed approach for developing practice wisdom in terms of the embodied sensemaking of seafaring leaders. Reflexive practices have been identified as the key to developing wise practice. Some scholars, such as Katzman (2015), and Denshire and Ryan (2001) prescribe a writing-based approach to reflexivity. For example, Denshire and Ryan advocate a four-strands reflexive writing method (2001). I have provided an example of this approach in chapter four, *Research reflections: Disclosing my values*, which can be used as a guide for this method of reflexive writing.

Whilst critical, detailed and articulate writing is a preferred form of expression for academics, I am doubtful that many of the seafaring leaders I interviewed would be comfortable with the quantity of writing that such methods require. As such, the successful uptake of writing-based reflexivity seems unlikely for many seafaring leaders. However, the seafaring leaders I interviewed seemed to enjoy, and were skilled at, telling stories. For this reason, I have developed my own approach to facilitating reflexive practice utilising a narrative, audio-visual approach as an embodied sensemaking debrief. It strikes me that the interview process employed in this research, which provided such a rich foundation for my interpretive analysis, would also prove fruitful for enabling these seafaring leaders to better understand, and take ownership of, their own embodied sensemaking.

The method I propose involves interviewing seafaring leaders using the same approach and questions as I used during data collection for this research project, as discussed in detail in the methods chapter. The facilitator would invite the seafaring leader to tell about a critical event that particularly challenged their professional

practice, or had a major impact on themselves or others. However, these interviews would be recorded both visually and audially in a manner that enables immediate playback for the participant so that they can see and hear themselves during their narratives. The recording and playback equipment should be sufficient so that the seafaring leaders can see in detail their embodied states and actions during the interview, whilst providing a high degree of control over pausing and re-cueing the footage.

The embodied sensemaking debrief session would commence by stating the purpose of the session and what participants can expect from the process. The confidentiality of the recorded information must be assured, stating clearly how the footage may be utilised in the future (for participant and facilitator review only). This assurance of confidentiality and anonymity must also be given in written form, requiring the participant's signed consent before proceeding. As part of the protocol, counselling and support services should be offered if the participant experiences distressing feelings as a result of recounting, and thereby re-experiencing, their stories.

The embodied sensemaking debrief session begins with the interview phase. The facilitator begins by asking the participant to describe their role in detail. This provides an insight regarding how the seafaring leader conceptualises their role, creating valuable context for the narrative information to follow. It also "breaks the ice" and allows the participant to adjust to talking in front of a camera. This opening phase of the interview should take around five minutes.

The facilitator would then ask the participant to describe a critical event that they encountered that required them to make sense of, and that challenged their professional practice. Space should be made for them to situate themselves in the account and to describe (and re-explore) the event. Interview techniques to encourage their storytelling should be applied, including positive affirmations and nods. Phenomenological probing should then be applied to encourage them to describe what it was like to be in that situation, and what they experienced and what they did. Participants should be encouraged to tell how the event has impacted them, and what they think and feel now about the event. Guidance on the interview

technique can be found in the methods chapter. The narrative phase should last for around twenty minutes.

During the narrative phase, the facilitator should take notes of embodied sensemaking and habitus as they emerge during the interview, noting the time at which they occurred (to assist with playback of those elements).

Before the debriefing stage occurs, the facilitator should give a five-minute overview of the types of embodied sensemaking and signs of habitus that typically emerges during these interviews, and provide examples of how these aspects can influence sensemaking. This brief talk provides the participant with an opportunity to recover themselves from their story telling and “take a break” from their narrative effort before the debriefing commences.

During the debriefing stage (approximately 20 minutes), the facilitator and participant observe and discuss key aspects of the recorded narrative, focusing on aspects of embodied sensemaking and habitus that may have influenced the participant’s sensemaking of the event. This should be a matter of co-creating meaning rather than the facilitator solely interpreting the narrative. This process extends beyond the event itself, to the way the participant has made sense of the event in the long term and how it has shaped their practice.

The aim of this critical, reflexive examination is to identify embodied sensemaking and habitus within the participant’s current practice, and to assess whether these aspects are valid and helpful to their ongoing practice. This fosters reflexivity and wise practice that the participant can then apply for themselves on an ongoing, iterative basis. The debriefing process concludes by identifying a set of practice-based insights for the participant to “take away” and integrate into their ongoing professional practice.

Having developed this embodied sensemaking debrief method, above, I then prepared two examples of this process to demonstrate the way in which such sessions would unfold (table 11.1, below). To achieve this, I returned to the research data, and selected two narratives (one chief engineer and one master mariner) to step through each stage of the embodied sensemaking debrief. In these examples, the narrative samples (B) are taken directly from the interview transcripts

to enhance the verisimilitude of the examples. However, the contents of the debrief section (D) were constructed by myself out of my imagined view of how the debrief process might realistically unfold. The embodied sensemaking aspects (C) are those that have been theoretically examined in the previous chapters as resulting from embodied cognition and/or habitus. Lastly, the practice-based insights (E) have been constructed with a view to identifying pragmatic objectives that promote wise practice.

Table 11.1: Examples of an embodied sensemaking debrief session

Example 1: Chief Engineer (Interview 0675)	
<p>A. Narrative Scenario: The Chief Engineer described a mechanical breakdown on his first voyage as a Chief Engineer. It involved a controllable pitch propeller. This is a ship's propeller that adjusts the angle of its blades to control the speed and direction of its thrust, and therefore, the speed and direction of the ship. He describes how he fixed the problem, but also how it impacted his relationship with his First Engineer (a direct report).</p>	
B. Narrative Sample	C. Embodied Sensemaking
<p>The controllable pitch propeller, was stuck. And I thought of something quite interesting in that as a chief engineer you get taught fault-finding skills, but to be able to use them when there is huge, huge pressure 1.</p> <p>The rig was desperate and we were sitting there, completely stuck, with one leg completely gone. In that situation when you have people on the phone saying "When are we going to get going? What's the deal?"2 You know, the ability to I guess think clearly and deflect the pressure. Nothing I did in that situation was particularly complicated technically. However, it needed someone in that situation to stand up and go "This is the situation that's wrong, what can cause it?" But it's like</p>	<p>1. Affective aspect. Felt pressure of having to resolve a breakdown.</p> <p>2. Relationship with disembodied stakeholders. How to deal with them.</p>

<p>when I got down there, he <had> just been trying the lever". <I thought> "The problems not the lever, mate. And you keeping on going is not just suddenly going to make it fix itself.</p> <p>I remember thinking, "We're still safe. We still have one leg that we're driving on. But it's like, I knew the ship wasn't in danger, but I thought "I'm not frigging going off hire on my first stint as Chief", <laughs>. You know, I refused to. People are going to rip me up.³</p> <p>So, I split the system in half, it's hydraulically controlled, so you have a control system and then in the hub it has a piston that goes in and out to turn the blades. So, like straight away, don't touch anything, I'm going to go down to the place where you can manually control the hydraulics and see the pressures and did it. I went, "I know it's either in the propeller shaft or in the hub. That's guaranteed. ⁴</p> <p>I knew it wasn't a control issue. I knew it was something, you're sort of looking at the evidence, or whatever, but I think it's seizing in the hub. And then, and then the problem was actually in the hub, binding in the hub. So, it's like, now I understand that, go and talk to the Master. This is the situation; you stay in this range and you'll be right. If you aren't then you'll have the risk that it will pick up, yadda yadda.</p> <p>What was actually interesting is that that changed our relationship, then. ⁵ Because previously to that I was leaning very heavily on him, and then after that event, It was almost like a weight had</p>	<p>3. Habitus. Sociological notion that to go off hire is to fail in an engineering role. Also, affective enaction as he used his felt determination to motivate his actions.</p> <p>4. Combination of externalisation – the vessel as patient, plus sensemaking by doing and seeing what happens.</p> <p>5. Reflection – "Interesting". Relationship changed through mutual, non-</p>
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<p>been lifted off his shoulders, like up until that point he was like “Alright, I don’t know if Aaron’s going to handle it” but then after it happened, it was like the weight was off his shoulders, so “If we have a crisis, I just call the Chief Engineer”</p>	<p>spoken understanding. Mirror neurons. We space.</p>
<p>D. Debriefing Example</p> <p>Both facilitator and Chief Engineer watch the video recording of the interview, pausing at key points to discuss:</p> <p><u>Facilitator</u>: I notice how you describe the “huge pressure” of having a mechanical failure and also the need to meet the expectation of your customers and the office. That sounded like something you actually felt. What does that physically feel like?</p> <p><u>Chief Engineer</u>: To me, it feels like an external pressure, particularly around my chest and shoulders. I think it’s like being at great depth, in the water, with the outside steadily pressing in.</p> <p><u>Facilitator</u>: So how do you manage that pressure, and keep focused on resolving the issue?</p> <p><u>Chief Engineer</u>: I guess, like a pressure vessel, you need to keep your integrity, make sure you have no cracks or dings that might be a flaw. You know, pressure always finds the weakest point, and then it splits. So, I guess I try to keep smooth and even, and just ride the pressure out.</p> <p><u>Facilitator</u>: So, you kind of feel it, but keep it evenly applied, and just keep problem solving?</p> <p><u>Chief Engineer</u>: Nods</p> <p><u>Facilitator</u>: You said “I’m not going off hire in my first stint as Chief”, and that seemed to spur you on. What do you notice about that?</p> <p><u>Chief Engineer</u>: It’s a matter of pride, and expectation that you have been trusted in the role, that you get the job done. I think I got a bit cross with myself and that made me determined to get into action and solve the problem.</p> <p><u>Facilitator</u>: Would people have really ripped you up?</p>	

Chief Engineer: Probably not, I guess. It's just what you feel, very conspicuously, that it is a moment of truth for you and your credibility.

Facilitator: Where do you think that idea comes from?

Chief Engineer: I think everybody probably thinks it. I mean, sometimes a vessel would need to go off hire because of a breakdown, which can't be helped. But you always feel it as a personal failure, and that's particularly tough on your first trip as Chief Engineer.

Facilitator: Perhaps it's a way of thinking that gets picked up and passed on within the profession. However, it seems like it both helped you with the motivation to get the situation solved, but also seemed to add to the pressure you felt as well. As you said, sometimes you go off hire and it's nobody's fault, so why would it reflect on you in your first stint as Chief?

Chief Engineer: I think I see what you are saying, but it... it's still not what you want to have happen.

Facilitator: Sure, I guess now that you are aware of these things, and how they fit together in the way you may be making sense of things, how do you want to engage with them in the future? What would help you engage with a future situation that would be better for you and better for the situation as well?

Other aspects that can be discussed and examined are:

- the hybrid method of problem solving that is partly diagnostic (I split the system in half) and part action-based investigation (manually controlling the unit to see what happens).
- The change to the relationship with his direct report, where they have mutually negotiated a way of working together without discussion, but by interpreting each other's behavioural cues.

E. Practice-based insights

- A deeper understanding of pressure, and how it is felt and coped with during critical events.

- The learned belief (habitus) that going off hire in your first stint as Chief Engineer, for whatever reason, is a source of shame. However, this does not seem to make sense when pulled into conscious thought.
- The pressure from the above belief adds to the felt pressure of machinery breakdowns.
- Having understood this dynamic, it is more possible to choose how much pressure is felt and how this feeling (affect) is directed (enacted) towards solving the problem (practice).

Example 2: Master Mariner (Interview 0768)

A. Narrative Scenario: A Master Mariner was at the controls of an offshore vessel, working within 2 metres of an oil rig, when another vessel headed towards his vessel at speed. The Master had to take action to avoid a collision between the vessels.

B. Narrative Sample

Now, I was alongside a platform, and I was right up close. I was about two metres off this platform.
1 And the Chief Officer came running up to the bridge and said “Have a look at that!” and I looked up and it was a pipe-lay vessel – heading straight at me. It was full power. And I’m thinking, uh, I am in a real situation because I’ve got this submarine over the side, I’ve got this ship which is probably, it may have missed me but I wasn’t sure, and I didn’t know if there was anybody on its bridge. I did call them but I didn’t get a response. So, then I just had to take action **2**, so I just went full ahead on four engines, and just powered away from the rig. And it was a horrible situation, so I just kept these four engines power on, and then I put my stern to him and tried to run away from him.

C. Embodied Sensemaking

1. Multiple zones of attention. Focus was tightly honed on a two-metre area between his ship and the rig.
2. Embodied, enacted sensemaking. During

<p>That was a situation where I think I would have been, had my Chief Officer not come up and told me, I think we would have been t-boned and would have been a major, major disaster. So that was awful.... Terrible, because it was one of these moments when you are... <deep intake of breath> okay, you've realised there's an issue. You know that that ships about to plough into you. I mean it was close, we got close. So, four engines, flat out, and then you're just hoping. I called the engine room and said "I'm going to use full power right now. I can't afford to black out, and then get yourselves out of the engine room." 3 The crew were all out on deck. And it just happened that quick. But it was a very frightening, yeah, very frightening position</p> <p>So, whatever I could to try and get that ship out of there as quickly as possible. That's where you are going "Blackout. No, I don't want to black out. I've got thrusters going – Off, off, off! Shut 'em down, bang!" So, your mind races of course when this is happening, but once you've done it, there's nothing more you can do 4.</p> <p>And the follow up from that was terrible. Because when I got away, and got the ship to safety, and everybody calmed down, I then got on the radio and said that this was a major incident.... And I never really got a full understanding or an overview of what had occurred. So, um....<reflective pause></p> <p>So, the fact that I didn't anticipate that, and it happened, pissed me off. And, although it would</p>	<p>narratives, participants hands moved to the controls of the vessel as he recalled taking action.</p> <p>3. Extended sensemaking, through engine room crew members, plus the other crew were able to tap into sensemaking through situated cues.</p> <p>4. Reflection as action, reviewing his actions as they are undertaken.</p> <p>5. Denouement. He never received an explanation, and is angry about this.</p>
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probably never happen again, and just the fact that, how could this happen on another ship in our operation? I was really disappointed to think, you know, how did that person get there in the first place? And the fact that nothing came of it at the end, that also really pissed me off. I was furious. Absolutely furious.⁵

C. Debriefing Example

Master Mariner: Well, I didn't realise how much I moved around when we were talking! I got more worked up than I would have thought.

Facilitator: That's okay. Did you notice the hand gestures you were making when you talked about avoiding the other ship?

Master Mariner: For sure. They were the control sticks of my ship to a tee. I had no idea I was doing that. That is exactly what I would have been doing at the time.

Facilitator: There's a lot of evidence to suggest our actions and emotions are encoded in our recollections of important experiences that happen to us. That might be why it came out so strongly and accurately when you told your story about the near collision. It was a pretty intense experience. You say it was frightening, but you seemed to respond almost fluidly. Tell me about how you did that?

Master Mariner: Well, on one level I was feeling the fear, but it seemed to free me up to take the action I needed to do at the time. It just happened that way. At the same time, a part of my thinking was looking in on all this and just double checking. Just observing what I was doing.

Facilitator: Well, that might be a case of reflexion-as-action, where a part of your awareness was monitoring what would have been a fairly complex coordination of feeling, experience, action and your senses – all of which were operating at full throttle, as it were. It was interesting that you felt relief after the situation was over, but that turned to anger as you tried to get an explanation for the event.

Master Mariner: Yes, I never got an explanation, and it still makes me angry to think about it.

Facilitator: It seemed that, when you say you were annoyed by not predicting it, you turned a bit of that anger to yourself. Is that so?

Master Mariner: That's probably true. I do. I mean, I was the master at the time and we nearly had a major collision.

The facilitator then would then explain, or try to elicit an understanding of, how the unfulfilled drive of denouement may cause ongoing feelings, and that the master's view of his role would direct part of that anger towards himself. Awareness of these dynamics would allow the Master Mariner to better resolve the ongoing conflict regarding the incident.

E. Practice-based insights

- Actions, emotions and sensations are encoded with detail and fidelity along with the recollection of experiences. Telling stories bring these events into the fore of awareness in vivid detail.
- The drive for denouement may cause ongoing feelings of anger, dissatisfaction and restlessness when there is no closure or explanation for an event.
- The Master's concept of his role could be re-examined to challenge whether he was at fault for not predicting that this event would have happened. This may also allow for a greater degree of denouement for this event.

The above examples of my embodied sensemaking debriefing method are a guide to how such sessions can be facilitated, as well as a demonstration of the validity and practicality of the method as a pedagogical tool. The contents of the previous two theory chapters can be developed into instructional texts that would be provided to the participant as supplementary learning material to support the embodied sensemaking debrief process.

The embodied sensemaking debrief process has the benefit of being guided by a professional facilitator with knowledge of embodied cognition and habitus. It does not rely upon an extensive written approach to generate reflexivity. It encourages the participant to reach their own conclusions about the embodied aspects of their sensemaking, which builds their reflexive capacity. The proposed process results in pragmatic, actionable insights. This encourages ownership in terms of implementing the practice-based insights.

However, the participant must move beyond the embodied sensemaking debrief session into the world of their professional practice. As such, I have developed a simple, yet practical, embodied sensemaking scan that the participant can apply as *reflexion-as-action*.

Embodied sensemaking scan

I was concerned about supporting the participants of the embodied sensemaking debrief process beyond the session itself, within the everyday context of their practice and particularly during future critical events. As such, I developed the following embodied sensemaking scan that can be implemented as *reflexion-as-action* (Bleakley 1999).

This method requires a component of the seafaring leader's attention to be focused on their internal zone of awareness as part of the focal ambidexterity discussed in motif 3, zones of attention (see page 260). It requires a reflexive scan of the embodied engagement with the environment and situation as it unfolds. This brings into awareness the aspects of embodied cognition and habitus that may be influencing (for good or ill) the way they are making sense of the situation.

To make this reflexive practice as simple and easy-to-recall as possible, I have structured it as a mnemonic acronym. Doing so is more than a conceptual gimmick. The mnemonic acronym is designed to reduce the cognitive load of recalling the method itself, as cognitive capacity is already under demand in supporting the ambidextrous focus across internal, external and extended zones of attention. I selected the acronym SHEAF (table 11.2, below), meaning bundled together, to acknowledge that the aspects of the embodied sensemaking scan are in fact

bundled together in ways that are highly enmeshed, if not impossible to separate as discreet “human factors”.

Table 11.2: The embodied sensemaking scan

Situatedness	Is there an aspect of being in the physical environment that is influencing the way I am making sense of the event? (i.e. alarms, tools within grasp). Where is my zone of attention now, and where would it best be directed now?
Habitus	Are there traditional values or beliefs that may be influencing the way I am making sense of the event? Are these relevant or helpful to the situation?
Embodiment	What am I sensing that has triggered my attention? How do I utilise my body to make sense of and resolve the situation? How am I working with and through others?
Artistry	In what ways could my experience and creativity be mobilised to appropriately deal with the event? Is there scope for improvisation in ways that would be helpful?
Felt	What are my emotions? How am I enacting them, and are they helping or hurting the outcome?

The embodied sensemaking scan is designed to be an internally reflexive process in the midst of, and as an inseparable dimension of, action (Bleakley 1999); conducted in an embodied and open-minded manner (Jenkins, Kinsella & DeLuca 2019) that supports wise practice (Higgs 2016b).

It involves accessing the internal zone of awareness within the context of the external zones of awareness (Sills, Lapworth & Desmond 2012 p. 28). It then involves running through each dimension of the scan using the SHEAF acronym and critically reflecting upon the impact of each dimension upon their sensemaking within that moment of practice. This brings these otherwise hidden influencers

within the scope of reflexion. In many cases, simply identifying the influencer (such as a feeling of anxiety) can bring that element into a manageable state. However, identifying the specific embodied content within a situation can provide the scope for wiser practice to be enacted on a more mindful and deliberate basis, by suggesting alternatives to these default routines.

This chapter has outlined a multileveled prescription for implementing a practice wisdom pedagogy within the maritime sector. This prescription incorporates seafaring leaders, their organisations and the maritime sector as a whole. I have then taken this prescription to a deeper level of pragmatic detail by developing an embodied sensemaking debrief method and an embodied sensemaking scan that will generate valuable practice-based insights as reflexion-on-action and reflexion-as-action respectively. Both methods are practical, practice-based applications of the theoretical conclusions of the previous two chapters. In their development, I have returned to the data to develop realistic examples that will result in actionable practice-based outcomes.

The practice wisdom pedagogy developed within this chapter is a significant component of the original contribution of this practice-based PhD thesis. I conclude this practical chapter with a metaphor for practice transformation within a seafaring context based on a narrative from the data - *mending with gold*.

Mending with gold

Seafaring leaders, both master mariners and chief engineers, are not always successful in resolving the critical events they encounter. Sometimes, their professional identities can become damaged as an outcome. However, some narratives suggest the prospect of a healing process akin to the Japanese practice of Kintsugi – or mending broken items with gold. In Kintsugi, repairs are made not to hide the fracture, but to venerate it while making the cup whole again. This process also makes the cup vastly more valuable than if it had remained intact (figure 11.2, below) (Hammill 2016; Met 2017).

Figure 11.2. Kintsugi bowl.



(My Modern Met 2017)

The following example of the kintsugi metaphor involves a master mariner whose ship sank at sea, through no fault of his own. It was a devastating loss and yet he made that event the cornerstone for becoming not only a better captain, but by devoting his career to developing other seafaring leaders as a mentor:

I was just a young Master. Hadn't been mentored - probably in at the deep end. There were a lot of circumstances to the incident that couldn't have been foreseen, and we basically managed it as best we could.

We felt [the impact with the other ship]. We felt the contact, and then the engineers immediately rang and said we were taking on water. There was this massive Bang! And then all of a sudden, she started to [lean to one side]. That's when the bulkhead split, and then she sank about half an hour after that.

For me, it could have been a catastrophic, career-ending event, you know.

It's played a big part in the way I do my business today, because I mentor. I would like to think that anybody who sailed with me would not be in the same situation as I was in being underdone. Not being well enough prepared for the job. So, I think it's had a big weight, in going on, in the way I do my business. The company was very good, they looked after me well. I went back as Chief Mate, with a mentor, for eighteen months. Until he and I decided I was ready to move on again, so I [became Captain] again after that. (#0897).

Several other interview participants referred to this master's transformation of a tragic career event into a positive outcome, not only for himself but for the benefit of the entire fleet.

This vignette suggests that the Odyssean archetype and its associated role primacy, as counterproductive aspects of the seafaring leadership habitus, can be overcome. Key to this professional transformation appears to be the acknowledgement of fallibility. It takes enormous courage (Patton 2016) to display this level of vulnerability. However, the reward for this particular seafaring leader has been accelerated professional growth and the development of an entire cadre of navigation officers. Not only is this an exemplar of mending a broken career with gold, but it demonstrates the possibility and power of transcending the Odyssean archetype.

According to Higgs and Tichen (2001 p. 269), the self-knowledge that comes through metaphorically mending with gold (*kintsugi*) is a precursor to achieving the goal of transforming self and helping others empower themselves. They cite Freshwater's claim that it requires 'the risk of seeing ourselves as we truly are, coming to know ourselves through our experiences.

The previous chapters have resulted in the central concepts of embodied cognition and habitus as shaping sensemaking within maritime contexts. This chapter has provided a prescription, a pragmatic set of recommendations for integrating these concepts into practice wisdom for the maritime sector. The prescription incorporates dialogue, embodiment, practice wisdom, attention, reflexivity and leadership into an end-to-end, multileveled and actionable blueprint for establishing practice wisdom within seafaring contexts. Practice wisdom provides an integrative approach for bringing embodied sensemaking and habitus within conscious examination, enabling these largely hidden dynamics to be harnessed, or at least harmonised towards the goals of improving seafaring leadership practice and safety at sea.

The concluding chapter of this thesis provides a summary of the journey undertaken in this research project, proposing future research possibilities and a vision for the ongoing development of embodied sensemaking within the maritime sector.

Chapter Twelve: Embodied Sensemaking as Practice Wisdom

There is a sea within
Where deeper currents thrum
With silvered fish sensations – Where
Scrimshawed emotion and sinew
Engage and enact my craft -
Where this sea's whispered swash barely
Crests my knowledge of
The body I have

And yet this sea
Touches far shores – where nations ringed about
With traditions and conventions - myths
And marbled heroes –
Subsumed into the sound of distant surf -
Never noticed
And yet so compelling to
The body I am

(Author's composition)

I wrote this poem to encapsulate my conclusions from the interpretive readings and the theoretical work. The first verse refers to embodied sensemaking in its neurobiological context, leading to the “body I have” (Sheets-Johnstone 2015) as a corporeal sensemaking entity. The second verse refers to the habitus, where the sea touches many sociological shores to create a sensemaking identity that is “the body I am” (Sheets-Johnstone 2015). The poem draws upon the scaffolding of neurobiological and sociological sensemaking processes that enact a deeply embodied form of sensemaking involving pattern recognition and felt states of being in relation to the seafaring leader's lifeworld.

This research has found that seafaring leaders make sense of their roles and of critical events through embodied sensemaking, and Bourdieu's concept of the *habitus* can be used to help us understand how they do this. These largely hidden processes influence sensemaking in profound ways. However, MHF has not yet incorporated embodied cognition or habitus into its practice or scholarly literature. Additionally, the MET framework seems unaware of its own role in perpetuating the seafaring habitus, including those elements that are detrimental to contemporary professional practice.

This chapter concludes my thesis by outlining its original contribution and exploring further research opportunities suggested by its conclusions. It describes the foreseeable challenges in taking up an embodied sensemaking perspective within the maritime sector, whilst highlighting exemplars from the health and biological sciences sectors who are successfully integrating this paradigm. The chapter concludes with a call to action for the maritime sector in reviewing its concepts of professional practice development and seafaring leadership. I begin by outlining the original contribution my thesis makes to the fields of maritime human factors, leadership and maritime research itself.

Original Contribution

Kinsella (2015 p. 250), in her examination of the embodied knowledge component of the corporeal turn, raised two outstanding questions regarding current theorising around phronesis, or practical wisdom:

I am left wondering if part of the 'invisible' or 'elusive dimension of phronesis is revealed through embodiment, and whether practical wisdom itself is an embodied phenomenon when enacted well. Further, what are the implications of considering that knowledge enacted by practitioners who exhibit phronesis might be inscribed and produced through habitus, and what might that mean for education and practice?

My research has mapped, with significant granularity, the neurobiological processes that give rise to embodied sensemaking. To achieve this, I integrated a number of neuroscientific theories in a novel manner to arrive at an explanation for embodied

sensemaking. I then integrated neurobiology with sociology – particularly Bourdieu’s notion of *habitus* - to provide a robust account of the ways in which seafaring leaders make sense of critical events and to explore contemporary dynamics that problematises seafaring leadership in a liquid modern world. Finally, I applied practice wisdom – *phronesis* – as an integrative and pragmatic concept for understanding and addressing embodied sensemaking within seafaring leadership.

My research, therefore, addresses the key questions posed by Kinsella, regarding the links between embodiment, habitus and phronesis. My research opens up fruitful new ground within MHF to address safety and reliability at sea, by validating an explanation for sensemaking that overcomes the reductionist Cartesian divide between mind/body/environment. Improved understanding of how seafaring leaders make sense of their lifeworlds, such as in the phenomenon of *finding the line*, will ensure the continued development of MHF theory, leading to further reductions in incidents and accidents at sea.

Through the narrative interpretation of chief engineers and masters, this thesis has provided a theoretical examination of the bottom-up, and therefore largely invisible, neurobiological (embodied cognition) and sociological (habitus) processes that shape their sensemaking, both in their everyday practice and during critical events. This theory was then applied to the practice-based issues that confront seafaring leaders when their traditional seafaring habitus collides with relentless liquid modern forces that are volatile, uncertain, complex and ambiguous. This dynamic causes paradoxical tensions and wicked problems that confront and confound seafaring leadership, while potentially giving rise to critical events that can have catastrophic consequences.

Practice wisdom (phronesis) is identified within my research as a means of drawing the “invisible” and “elusive” dimensions of embodied sensemaking and habitus into conscious examination and to align these dynamics with wise practice in terms of harmonising these paradoxical tensions. A multi-level, actionable practicum was proposed that will deliver a practice wisdom pedagogy for the maritime sector. As such, my research makes a further original contribution by providing a theoretically validated and much needed pedagogy for the maritime sector. No such pedagogy or practicum exists at the time of writing.

Finally, my research has applied a holistic, interpretive approach to examining embodied sensemaking among seafaring leaders. It has done so in a strongly phenomenological manner, paying close attention to the experiences and perceptions of seafaring leaders as they make sense of critical events. The literature review highlights that such a *phenomenologically attentive narrative interpretation* of the maritime domain has not been published to date. As such, it is the only scholarly work found to apply an intersubjective ontology to the topic of seafaring and seafaring leadership. In this way, the method itself has broken new and fertile ground for future research. This method makes an original contribution as an exemplar of a qualitative, interpretive examination of the lived experience of seafarers that has yielded pragmatic, implementable outcomes. This successful application of this research method paves the way for further use within the maritime sector.

Having described the original contribution my research has made in terms of:

- Establishing a theoretically valid link between embodiment, habitus and phronesis to explain embodied sensemaking,
- Developing a practice wisdom pedagogy for the maritime sector, and
- Deploying a phenomenologically attentive narrative interpretive methodology within the maritime sector,

I now move on to propose further research opportunities extending from my thesis.

Further research opportunities

No PhD thesis is able to address all the theoretical implications that it uncovers in the pursuit of its research question. As such, this thesis prompts a number of promising research pursuits that would meaningfully improve safety in the maritime environment.

Firstly, embodied cognition and habitus have been framed within a practice-based context. I have not explored the policy dimensions of the implications of an intersubjective ontology where the seafaring mind/body/environment/others are enmeshed in their interactions. As discussed in this thesis, maritime regulations are

frequently developed with an empirical “god’s eye view” (Webster 2007 p. 33) of maritime operations that is inconsistent with the embodied and embedded way seafarers make sense of unfolding events at sea. Therefore, a tantalizing research question may be “What are the implications of the embodied sensemaking lens on the future development of maritime regulations?”

Secondly, my detailed examination of the neurobiological and sociological dynamics of embodied sensemaking has not yet been applied to the field of maritime human factors *design*. In other words, how to extrapolate design principles that leverage the embodied sensemaking dynamics identified within this thesis. Danielsen (2018) has already proposed the application of embodied sensemaking, as developed within this research project, to developing a theoretical approach to maritime information design. Citing my research approach for this thesis (Roberts 2018), she states her research project into the design implications for embodied sensemaking at sea has already commenced.

Thirdly, the phenomenologically attentive narrative interpretation method applied within this thesis can be used to explore, in a robust methodological manner, other maritime topics of interest. One such topic is improving gender diversity in the maritime community. This topic is a priority for the International Maritime Organisation and the theme for its 2019 Day of the Seafarer (International Maritime Organization 2018). A narrative interpretive method that is sensitive to lived experience in a holistic manner would yield a deep understanding of the issues of women within the maritime sector. This methodology would generate validated and impactful strategies for improving gender diversity.

Finally, there is an opportunity to explore embodied sensemaking within other professional contexts. For example, Clarke and Knights (2018) explored the implications of perfectionism among veterinary surgeons, noting its impact upon them in terms of mental health and wellbeing. Exploring this phenomenon further through the lens of embodied sensemaking may yield richer insights that can be translated into improvements for professional practice in that field.

Taking up embodied sensemaking and wise practice: challenges and exemplars

Chapter eleven proposed a robust and multileveled approach to implementing an embodied sensemaking perspective and a practice wisdom approach. However, it must be acknowledged that such a change in consensus faces significant challenges due to the firmly entrenched position of MHF (Schröder-Hinrichs et al. 2015), as discussed in the literature review, and the historically oriented and deeply reinforcing dynamic of the seafaring leadership habitus (discussed in chapter ten). Change, for both MHF and MET, will be difficult and far from certain; regardless of the benefits that an embodied sensemaking perspective offers. There are many who would argue that a techno-rationalist approach to human factors and maritime regulation is required to keep people safe. However, as Schroder-Hinrichs et al (2015) note, “This does not mean that the current regulations need to be demolished, but they do need to be re-evaluated.” What my thesis proposes is the *integration* of embodied sensemaking and practice wisdom into the existing body of knowledge within the seafaring leadership domain. This is essential for developing a complete understanding of how professionals make sense within high reliability work contexts and during critical events.

Whilst acknowledging the potential for challenges in the uptake of these new ways of understanding sensemaking, I have encountered little resistance or objection to my conclusions when I have shared them with the broader maritime community. As a professional practitioner, I shared my research with key members of the Australian Maritime Safety Authority (AMSA). There was interest in applying embodied sensemaking to the way that operators in the domestic fishing sector apply their mandated safety management systems to keep themselves, and their crew, safe at sea. The approach we discussed would involve the integration of fishers’ experience and tacit knowledge (embodied forms of knowing) with the regulatory and procedure-based information (propositional knowledge) (Higgs 2012 p. 83), as proposed by my embodied sensemaking prescription (depicted in Figure 11.1).

AMSA also expressed keen interest in applying the notion of seafarer habitus to improving gender diversity within maritime, particularly in promoting women in maritime roles. This is a key focus area for the International Maritime Organisation.

Rather than merely promoting gender diversity on top of the prevailing seafaring habitus, AMSA expressed interest in the value of applying habitus to re-evaluate the foundation that such diversity would be built upon. My research, and the embodied sensemaking prescription depicted in Figure 11.1 provides a pathway to achieve this level of reflection and change.

Additionally, in my professional role within AMSA, I have been working alongside a team of Port State Control Inspectors (former seafaring leaders who inspect the safety of ships and their management systems against maritime standards). These inspectors are adapting to a major shift in the scope of their responsibilities, which now includes responsibility for domestic vessels as well as ocean-going ships. I have been informally applying the principles of the embodied sensemaking debrief session (table 11.1) to help them understand how their embodied professional judgement interacts with their application of formal knowledge and professional standards. Their anecdotal feedback has shown that this has helped them transition to inspecting types of vessels and operations which they initially found unfamiliar and uncomfortable. As such, these initial examples demonstrate there has been an encouraging level of receptivity to my research conclusions and practice-based outcomes.

In terms of the broader maritime community, Danielsen (2018) has cited my research as influencing the application of embodied sensemaking towards improved maritime information system design (as discussed in the previous section). This is a further indication of receptivity from the maritime sector towards my research conclusions.

Whilst the receptivity of embodied sensemaking within the maritime sector is in its infancy, an encouraging indicator that embodied sensemaking and practice wisdom can be successfully integrated lies in exemplars from another high reliability industry. The health and medical science field has made significant inroads into uptake of the corporeal turn, and reflective practice, as evidenced by the following examples.

One example of embodied sensemaking within the medical science sector was recently studied by Dall'alba, Sandberg and Sidhu (2018) via field observations and interviews with 14 genetic scientists working to improve plant-based herbicide resistance using genetic modification. They noted that these scientists co-constituted themselves in the world as well as the world in themselves, as they extended their selves ("the body I am") via equipment such as tweezers and microscopes to make sense of the biological changes they were enacting on a genetic level. Whilst this involved strict adherence to documented protocols and procedures, the scientists enacted these protocols through embodied artistry, finding their way towards success in similar ways to seafaring leaders finding the line in their professional practice.

Another example of applying embodied sensemaking can be found in the health sector, where altering the "bodily geometries" between the nursing practitioner, the patient and the clinician in relation to the hospital bed were suggested to markedly improve the engagement, sensemaking and outcomes of ward rounds (Hopwood 2015 p. 53). This example highlights the intersubjective "we space" suggested by Gallese in his work on mirror neurons and embodied resonance (2018 p. 42). In Hopwood's case study, the nursing officer placed themselves intentionally beside the patient at a particular height so as to manage the focused attention and power dynamic of the patient/doctor interaction.

A further example from the health sector involves Ellingson's (2015) exploration of the role of emotion in enacting care during patients' dialysis treatments. This example also suggests how emotions can be performative, enactive, as well as felt; and that all these facets of affect combine to constitute professional practice and meaning for practitioners and patients alike, often in nuanced but profound ways. Too little demonstration of emotion, such as empathy, was perceived by the patient as cold, uncaring and detached. However, too much expressed empathy, enacting intense sorrow for the patient's plight, was found to be distressing for the patient. This example is consistent with the view of Barrett (2017) that emotions are constructed in bodily ways, that emotional virtuosity is advantageous - if not essential - to practice, and that emotional labour requires effort as an enacted facet

of professional practice, effectively making meaning for others (dialysis patients) in important ways.

As a final example, Caddick, Smith and Phoenix (2015) studied the recovery of male combat veterans suffering from post-traumatic stress disorder (PTSD) in a therapy centred around surfing (which in itself constitutes therapeutic body work) and social contact. They identified how the existing masculine hegemony and the military habitus have been positively reconstructed and co-opted within the therapy to rebuild identities and overcome PTSD as a deeply embodied mental injury. In this way, the combat veterans are encouraged to understand themselves and their embodied trauma in a manner that leverages their military masculine habitus. This example demonstrates the value of deep understanding and wise engagement of habitus (rather than automatically assuming it to be entirely problematic) in order to generate beneficial outcomes.

These examples reveal high reliability professional domains – health and biological science - that are increasingly applying an embodied sensemaking lens with the view to developing wise ways of enacting their practice. Higgs (2012) notes, however, that this progress is being achieved against a prevailing backdrop of professional hegemony. As such, she describes this progress as professional practice discourse marginalia (Higgs 2016a), or inscribing these practice-based insights into the margins of existing technical and rational sources of knowledge.

My aim in this thesis is to move embodied sensemaking and practice wisdom beyond marginalia - both within maritime and potentially in other professions - so that they can be effectively *integrated* into professional practice. To achieve this, I incorporated dialogue and leadership into my multileveled prescription for the maritime sector in chapter eleven, in order to overcome the entrenched seafaring habitus and MHF's reductionist paradigm and secure ongoing development of seafaring professional practice development. However, my positive experiences in sharing my research outcomes and the progress made within the examples above provides encouragement in the uptake of embodied sensemaking and wise practice.

In light of the progress towards embodied practice wisdom within the health and medical sciences sectors, and the positive reception of my research conclusions within AMSA, it seems that achieving the shift in consensus towards an embodied understanding of sensemaking and the adoption of the practice-based solutions described in the previous chapter are ultimately achievable. Having demonstrated the original contribution of my research, the potential to extend upon this research, and the challenges and exemplars involved with taking up embodied sensemaking as a paradigm, I turn to concluding comments and a call to action for the maritime sector itself.

Concluding Comments: Out from the shadows of archetypes

In August 2018, I presented my research conclusions at the 2018 Standing Conference for Organisational Symbolism in Tokyo, Japan (SCOS 2018). I concluded by presenting the image of John Connell's sculpture, 'Buddha' (figure 12.1, below). Constructed from raw, commonplace materials such as wood, paper, wire and tar (figure 6, below), it is a confronting image that is gritty, visceral and vulnerable. I invited the conference attendees to note the slight, downward angle of the head in reflective contemplation, the excruciatingly flayed and vulnerable anatomy juxtaposed with its serene lotus position.

Figure 12.1. 'Buddha', John Connell. Wood, paper, wire, tar



(Wilson-Powell 2015).

To me, this sculpture speaks of dwelling with processes that are far from comfortable; that leave one vulnerable and imperfect, in order to attain valuable insights and wisdom. I have selected it to symbolically represent the professional practitioner who, through diligent reflection (Bleakley 1999; Cherry 2008), is enmeshed in a self-making process of being and becoming (Higgs & Titchen 2001). This figure strives for perfection (De Mente 2011 p. 26) yet remains ever an emerging work-in-progress.

This image stands in stark contrast with the unquestionably autocratic and infallible visage of Odysseus (figure 10.1) - the archetype of traditional seafaring leadership. However, I offer this new image, in its raw vulnerability, as a more contemporary, accurate and productive alternative for seafaring leaders. It suggests wise ways of fostering practice wisdom (Higgs 2016b; Klein & Bloom 1995), and offers the possibility of mending broken careers with gold (Hammill 2016; My Modern Met 2017). It offers serenity in lieu of the anxiety of perfectionism (Clarke & Knights 2018) that comes from role primacy and the adherence to unrealistic archetypes.

The narratives of seafaring leaders indicate that many remain in the shadow of the monolithic Odyssean archetype; in the belief that this represents the ideals of seafaring leadership. Such a shadow offers only cold comfort; and allows meagre illumination for finding better ways of knowing, doing, being and becoming (Higgs & Titchen 2001). Additionally, many seafaring leaders struggle with the technorationalist archetype that insists on scientifically rational, reductionist responses to critical events that are inherently messy, paradoxical and ambiguous. Such deep assumptions and beliefs are transmitted to future seafaring leaders through the seafaring leadership habitus in deeply embodied ways (Roberts & Higgs 2019). The Odyssean archetype is in 'tectonic' tension with the forces of liquid modernity (Bauman 2000) and its inherent volatility, uncertainty, complexity and ambiguity (Homer 2013; Horney, Shea & Pasmore 2010), leaving many seafaring leaders in paradoxical situations (Lewis & Smith 2014) that confront their professional practice (Roberts & Higgs 2019, in press). My research has shown that failure to navigate paradoxical, liquid modern tensions can have catastrophic impacts on seafaring leaders, both personally and professionally.

My research has revealed that the nature of sensemaking at sea is highly embodied; evolving as a "bottom up" neurobiological phenomenon. Embodied sensemaking integrates affect, sensation, perception, movement, action, values, and thought (including extended cognition) through shared neural populations (groups of neurons) in ways that problematise artificially imposed divisions between mind and body and environment. My research explains how seafaring leaders bodily make sense of critical events and also maintain high reliability in complex work contexts through processes such as "finding the line". However, embodied sensemaking is entirely absent from the MHF literature. Whilst embodied sensemaking is consistent with contemporary MHF concepts such as the sociotechnical systems model, it is not incorporated into the MHF research or practice. My research offers fertile ground for holistically integrating embodied sensemaking into the MHF body of knowledge. Failure to integrate these theoretically validated perspectives into MHF research and practice will result in the plateauing of safety improvement within the maritime sector; foregoing a commensurate reduction in catastrophic accidents at sea. The urgency of my research intensifies with the rapid development of new technologies and levels

of automation that requires a deeper understanding of how seafaring leaders make sense of their environments.

Likewise, my research has shown how the “bottom-up” sociological phenomenon of habitus, scaffolded by the neurobiological processes listed above, shapes the way seafaring leaders make sense of their roles. Bourdieu’s habitus provides insights into a prevailing Odyssean archetype of infallibility, autocracy and rationality that is increasingly in tectonic tension with relentless forces of liquid modernity. My research provides a productive avenue for the MET fraternity to understand the seafaring habitus they inculcate into cadres of seafarers as “hidden curriculum”. These insights would enable the MET fraternity to wisely consider the habitus they impart on the industry, while they equip seafarers and seafaring leaders to develop their own practice wisdom. Failure to do so will increasingly see seafarers and seafaring leaders ill-equipped to contend with the relentless waves of change that are radically altering the maritime sector, impacting on their professional practice in confounding and catastrophic ways.

In the face of these dire outcomes, my thesis calls for practice wisdom for the maritime sector. It proposes an integrated practicum that incorporates the micro- (seafaring leader) meso- (shipping organisation) and macro- (maritime sector) levels (Caldwell & Mays 2012). This practice wisdom prescription encourages existing master mariners to explore the embodied nature of their sensemaking, and the validity of their deep beliefs and assumptions about how they take up leadership. It calls on managers of maritime organisations to embark on productive dialogue about the organisational dynamics within their organisations, and how these impact upon leadership within high risk/high reliability contexts. It calls upon maritime education and training to integrate practice wisdom into their pedagogy, and to mitigate the risk of imprinting unproductive and anachronistic archetypes onto future seafaring leaders. Lastly, it calls upon the maritime human factors community of practice to take a leadership role in casting off Cartesian notions that separate mind from body, and body from environment, in terms of how it investigates, researches and develops recommendations around maritime seafaring practices.

Whilst the lifeworld of the seafaring leader is unique in many regards, it shared many common attributes with professional communities of practice of all types. Research into professions such as veterinary surgeons (Clarke & Knights 2018) suggests that other professions may well suffer from similar issues as those described above. While professional communities of practice play a vital role in fostering the ongoing development of their professions (Higgs et al. 2008 p. 177), my research highlights their responsibility in critically examining the deep assumptions and beliefs such communities of practice pass on to future professionals.

Given the relentless forces of liquid modernity sweeping through professional practice, it is time to accept the embodied nature of sensemaking and to step out of the shadows of archetypes.

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Appendices

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Appendix A: Ethics Approval

From: Astrid Nordmann
Sent: Thursday, 5 February 2015 1:57 PM
To: Julian Lippi
Cc: RES Ethics; Bradley Roberts
Subject: SHR Project 2014/264 - Ethics modification/extension (1)

To: Dr Julian Lippi, FBE/Mr Bradley Roberts

Dear Dr Lippi,

SHR Project 2014/264 Sensemaking by offshore maritime officers, as an example of a high reliability work context, to resolve uncertainty and ambiguity (pilot study)

Dr Julian Lippi, FBE/Mr Bradley Roberts

Approved Duration: 18/11/2014 to 18/05/2015; Modified February 2015.

I refer to your e-mail of 05 February 2015 in which you requested a modification to the project by increasing the number of interviews for the main study to 30. The documentation was reviewed by a SHESC1 delegate.

I am pleased to advise that, as modified to date, the project/protocol may continue in line with standard ethics clearance conditions previously communicated and reprinted below.

Please contact me if you have any queries about on-going ethics clearance, citing the SUHREC project number. Copies of clearance emails should be retained as part of project record-keeping.

As before, best wishes for the project.

Kind regards,
Astrid Nordmann

Dr Astrid Nordmann
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Swinburne Research (H68)
Swinburne University of Technology
PO Box 218, Hawthorn, VIC 3122
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Appendix B: Ethics Application



HUMAN RESEARCH ETHICS COMMITTEE

APPLICATION FOR ETHICS APPROVAL of a RESEARCH PROTO

SECTION A: GENERAL INFORMATION

[Nb This application form should not be used for research involving clinical trials or ionising radiation.

See below.**]

Date Received
.....

PROJECT FULL TITLE	Sensemaking by offshore maritime officers, as an example of a high reliability work context, to resolve uncertainty and ambiguity (pilot study)
SHORT TITLE (If applicable)	Sensemaking processes in offshore marine operations (pilot study)
APPLICANT DETAILS	
RESPONSIBLE SWINBURNE FIRST INVESTIGATOR / SUPERVISOR (Where project is part of student research degrees or dissertations, Senior Swinburne Supervisor must still be listed as the first investigator)	Name & Title/Position: Doctor Julian Lippi Tel No(s) +61 3 9214 8071 Email jlippi@swin.edu.au Fax Faculty / School / Centre / Institute: Faculty of Business and Enterprise Swinburne Status: <input checked="" type="checkbox"/> Swinburne Staff Member <input type="checkbox"/> Adjunct Staff Member Address for correspondence: Swinburne University, Faculty of Business and Enterprise, PO Box 218, HAWTHORN 3122 Australia
Please complete as clearly as possible. (For Honours, higher degree and discrete student projects.)	Main Student Investigator(s): Bradley Roberts Email bradleyroberts@swin.edu.au Tel No(s) 0439845283 Student ID Number 4960866 Fax Degree Being Undertaken PhD (Business) Practice-based research

List below the names of other Chief/Associate Investigators and Research Assistants (including those with access to identifiable data).

(Add (copy/paste) cells as required for additional investigators/assistants. **Append Student lists for class projects.**)

Name & Title/Position: Professor Nita Cherry Email ncherry@swin.edu.au Tel No(s) 61 3 9214 5901 Faculty / School / Centre / Institute: Faculty of Business and Enterprise, Swinburne University of Technology Swinburne Status: <input checked="" type="checkbox"/> Swinburne Staff Member <input type="checkbox"/> Adjunct Staff Member

Proposed Period During Which Human Research Activity Requiring Ethics Approval is Needed:	From 30 10 2014 to 30 10 2015 dd mm yyyy
--	---

[Double-click on ☐ YES/NO 'check box' to select box, then enter Default Value as Checked ☒ or leaving as Not Checked ☐

TYPE OF ACTIVITY (Select as many boxes as applicable)	<input type="checkbox"/> Research by Staff Member	<input type="checkbox"/> Contract Research (Attach copy of contract)
	<input checked="" type="checkbox"/> Supervised Postgraduate Research	<input type="checkbox"/> Supervised Undergraduate Research
<input type="checkbox"/> Supervised Class Projects: No of students involved: Subject Code & Short Title:		

Broad Category of Research

Select one category box which best fits the application:

- ☐ Social/Cultural/Humanities Evaluation
 ☒ Business/Management
 ☐ Education/Training/Program
☐ Psychological/Brain/Neuro-sciences
 ☐ Health/Safety
 ☐ Engineering/Science/Technology
☐ Other (please specify)

[For research involving Clinical Trials or Ionising Radiation, please contact the Research Ethics Officer.]**

<i>Official Use Only:</i>	
<input type="checkbox"/> Higher Risk/Impact	<input type="checkbox"/> Minimal Risk/Low Impact Research Only
<input type="checkbox"/> SUHREC	<input type="checkbox"/> SHESC (HBS - A / B) <input type="checkbox"/> SHESC (SBT - A / B) <input type="checkbox"/> Other <input type="checkbox"/> Notification Only

Human Research Risk/Review Classification (Nb Checking to be consistent with [published risk criteria](#).#)

To enable a determination as to whether prima facie your research activity is Minimal Risk and/or Low Impact, please clarify by selecting [X] any one or more boxes below as to whether your research activity involves:

[Double-click on ☐ YES /NO 'check box' to select X by entering in Default Value as Checked ☒ or leaving as Not Checked ☐

<input type="checkbox"/> Vulnerable participants, children or those dependent on care*	<input type="checkbox"/> Indigenous Peoples* or Special Cultural/Ethnic groups
<input type="checkbox"/> Externally funded research requiring HREC-level clearance*	<input type="checkbox"/> Multi-centre/Other sites requiring HREC-level approval*
<input type="checkbox"/> Research conducted overseas	<input checked="" type="checkbox"/> Conflicts of interest or dual researcher-professional roles
<input type="checkbox"/> Data access/use without an individual's prior consent*	<input type="checkbox"/> Data access/use subject to statutory guidelines &/or reporting*
<input type="checkbox"/> Identification of participant individuals/groups in research outcomes without full consent or there is unclear consent for this*	
<input type="checkbox"/> Sensitive information/issues vis-à-vis context/impact (legal*, regulatory compliance*, commercial, professional, cultural, etc)	
<input type="checkbox"/> Personally intrusive/confronting or quite inconvenient/embarrassing questioning or other activity	
<input type="checkbox"/> Physically confining/invasive techniques or significant physical contact/stimulation (TMS*, X-ray*, CT scan*, MRI*, clothing change, etc)	
<input type="checkbox"/> Working in hazardous environments (asbestos dust*, infectious disease*, war or civil strife*, etc)	
<input type="checkbox"/> Handling hazardous substances (eg, asbestos*, radioactive material*, explosives*, etc) or equipment	
<input type="checkbox"/> Administration of medical/herbal substances*/treatments*	<input type="checkbox"/> Administration of other (non-medical) substances/treatments
<input type="checkbox"/> Health/medical diagnosis*/therapy*	<input type="checkbox"/> Non-minimal impact therapeutic or other devices*/activity*

<input type="checkbox"/> Screening for healthy participant inclusion/exclusion	<input type="checkbox"/> Medical or psychiatric assessment/conditions*
<input type="checkbox"/> Serious psychological profiling, investigation or exploration	<input type="checkbox"/> Withdrawal of treatment/services or use of placebo
<input type="checkbox"/> Withdrawal/substitution of educational/professional/commercial/recreational/other programs or services	
<input type="checkbox"/> Deception or covert observation	<input type="checkbox"/> Limited or non-disclosure of research information/procedures
<input type="checkbox"/> Participant recruitment/selection via third party	<input type="checkbox"/> Human research activity commenced without clearance
<input type="checkbox"/> Participation incentives, prizes or significant payments	<input type="checkbox"/> Research placing researchers/assistants at risk

PLEASE NOTE: If you have selected any one or more of the above boxes, your project will ordinarily be put for SUHREC ethical review. Items above marked * must be put to SUHREC proper. But in other cases, you may wish to put a case for expedited review by a SUHREC Sub-Committee (SHESC) in the (expandable) box below in relation to the [criteria for determining risk/impact](#). If you put forward a case, then in the first instance your application will be put to the relevant SHESC; however, the relevant SHESC may still consider the project needs full SUHREC appraisal or SUHREC may review or override the SHESC decision.

The risk of conflict of interest due to the dual role of researcher and professional will be effectively mitigated through the following factors:

- The relative organisational seniority of the researcher is about the same as the members of the subject group.
- The researcher is part of organisational support, while the subject group is part of operations – there is no reporting line between the researcher and the subject group.
- The Swinburne Policy on the Conduct of Research will be followed throughout the research. As such, research subjects will be thoroughly advised that their participation is entirely voluntary, and that they may withdraw from participation at any stage of the process. Additionally, effective academic supervision will provide a further level of safeguard throughout the research process.
- The research objective is not to criticise, or disparage, the organisation. It is to examine how its seafaring officers resolve ambiguity or uncertainty in their daily roles to extend and improve industry best practice. As such, participants will not be placed in a position where their comments might compromise their professional standing.
- No inducements or penalties will be extended towards participants to ensure their participation. Participants may decline to participate at any time without prejudice.
- Research data will be aggregated and de-identified to ensure complete anonymity for participants. This includes removing reference to gender, age, nationality, operational geography, vessel type and client identity. The participant group will be referred to as “seafaring officers”, expanding the pool of potential subjects to approximately 400 individuals. A sample of ten participants out of 400 is sufficient to ensure anonymity of the individual.

As such, it is not anticipated that the researcher/professional role will influence the decision to participate or influence the quality of the data.

Risk/Impact Checked with a Research & Ethics Advisor (REA)? Yes ☒ No ☐ REA Comment, Initials & Date:

Dr Julian Viecegli, 12 August 2014

A1 WHY IS THE PROJECT TO BE UNDERTAKEN

Summarise in sufficient detail why the project is being undertaken. If references are quoted, full citations should be given. Include the educational and/or scientific aims of the project. (boxes will expand for your text)

This research involves an inductive study of how offshore marine officers make sense of uncertainty and ambiguity to maintain high operational reliability. It will utilise qualitative interview methods to develop detailed descriptions of their lived experience. It will analyse the results in light of sensemaking processes (how people make sense of their experiences) (Weick, 2012, p. 147) and embodied cognitive theory (the interplay between action/movement processes and thinking processes) (de Bruin, Kastner, 2012), in order to improve practice wisdom concerning resolving ambiguous or uncertain events arising within high reliability work contexts (Lekka, Sugden, 2011, p. 443). This qualitative research will apply interpretive analysis to explore how leaders in the offshore marine sector, as an example of a high reliability work context, engage in sensemaking processes (Weick, 2012, p. 147) to work towards resolving ambiguous and uncertain situations that occur in their daily work that could result in high risk or danger if they do not notice and resolve these situations.

High reliability organisations have a heightened need to avoid unanticipated variance in performance (Blatt, Christianson, Sutcliffe and Rosenthal, 2006, p. 897). Offshore marine vessels service oil and gas platforms at sea, and therefore constitute High Reliability Organisations due to their integral role in the oil and gas exploration and extraction industry with potential risks to personnel safety and from natural disasters of catastrophic magnitude (Binci, Cerruti, Donnarumma, 2012, p. 868), such as the point to the Piper Alpha platform explosion and the Gulf of Mexico's Deep Water Horizon explosion in 2010 (Lekka, Sugden, 2011, p. 443). Schulman states that it is impossible to remove variance in performance, ambiguity and uncertainty through prevention and through the routinisation of work. Instead, Schulman advocates building organisational resilience to identify and resolve these factors as they arise (2004). As such, this research will develop a body of practice wisdom, the combining of theory and experience, that will increase organisational resilience in resolving situations involving high ambiguity and uncertainty within high reliability work contexts.

This research builds upon the work of Weick (1995), who constructed a conceptual framework for organisational sensemaking, or the processes by which organisational actors make sense of events that are triggered by discrepancy or unexpected variance in ongoing workflows. Weick's sensemaking model has been used to analyse a range of disasters to identify root causes of catastrophic incidents. However, this study will fill a gap in the research by applying sensemaking processes to everyday work contexts that have been successfully resolved by leaders and followers to examine how these actors make sense of emergent ambiguity and uncertainty and take appropriate action to maintain operational reliability and safety. Additionally, whilst Weick's model focuses on the cognitive aspect of sensemaking, this research seeks to develop a nuanced understanding of the roles of embodiment (the combination of thinking and sensory-motor processes) and social interaction in sensemaking (Cunliffe, Coupland, 2013) via narrative accounts of their lived experience (Caracciolo, 2011, p. 374).

Insights from this research will be applied to the training of offshore marine officers to improve the effectiveness of their situational awareness and adaptability in the face of increasing levels of uncertainty and ambiguity. This in turn will improve operational reliability and safety within the marine sector. Research outcomes will be useful across a broad range of high reliability work contexts (Binci et al, 2012) at a time of global increases in volatility, uncertainty, complexity and ambiguity (Horney, Shea, Pasmore, 2010, p. 32). It is the intention that this pilot study of up to ten seafaring officers will form the basis of a broader study of up to 30 seafaring officers.

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A2 WHAT - BRIEF DESCRIPTION OF PROJECT

In plain English

This research explores how offshore marine officers make sense of uncertain and ambiguous situations that emerge in their day to day operations. The pilot study will examine the sensemaking experiences and practices of up to 10 senior marine officers (Masters, Chief Mates, Chief Engineers and First Engineers). It will consider their sensemaking behaviour to provide rich, nuanced and specific descriptions of sensemaking in resolving uncertainty and ambiguity in high reliability work contexts. Conclusions from the analysis of the results will then be applied to the development of effective high reliability organisational leaders and processes.

Qualitative, interpretive analysis of this phenomenon is considered the most appropriate methodology to apply to this research question given the focus on the lived experience of the actors taking part in sensemaking processes (Creswell, 2013, p. 57-61). The primary data collection method will be semi-structured interviews with senior marine officers (Josselson, 2013) to generate thick descriptions of their lived experience (Sergi, Hallin, 2011, p. 191). A phenomenological approach to qualitative analysis will be applied when organising, analysing and synthesizing data (Moustakas, 1994, p. 181). Conclusions from the analysis of the results will then be applied to the development of improved training processes for marine leaders.

A3 HOW - PROCEDURES

Please detail clearly and sufficiently the proposed research/statistical method(s), procedures and instruments to be used in the project, including all screening and research 'procedures' to which the participants will be subjected, and asterisk those which may have adverse consequences.

Please include as appendices all screening instruments, questionnaires, interview protocols etc (at least in draft form if not finalised).

For this pilot study, qualitative data will be collected through semi-structured interviews with senior marine officers in the offshore marine industry. Additionally, research will also involve collecting data from literary and web-based materials. The interviews:

The research for the pilot study will involve semi-structured face to face interviews (Josselson, 2013, *passim*) with up to ten senior marine officers (Masters, Chief Engineers, Chief Officers and 1st Engineers) from <anonymised> Shipping ASA, a global offshore vessel operator.

An initial "Letter of Advice" (Appendix D) will be sent to <anonymised> Shipping ASA's Executive Vice President Asia Pacific before inviting the senior marine officers to take part in the research.

The initial contact of senior marine officers will be conducted via telephone by Mr. Brad Roberts, inviting participants to take part in the study. Subsequently, a letter verifying time and date of interview will be emailed along with a plain language Project Information Statement (Appendix A) and an informed Consent Form (Appendix B). This will be done via email.

Prior to participating in an interview, the potential interviewees will be asked to sign the Informed Consent Statement, indicating the level of anonymity, confidentiality and privacy concerning their personal information as well as that of others who may be named in the interview.

Data will be collected using a semi-structured interview schedule (refer Appendix C). The interviews will be audio-recorded and last for approximately 60 minutes. All audio-recorded interviews will be transcribed.

The privacy and anonymity of participants will be maintained. Data will be managed by Swinburne researchers in accord with *Policy on Conduct of Research* and *Privacy Policy*, as detailed in Project Information Statement (Appendix A).

Anonymity will be further maintained by excluding details of specific geographical areas, clients, vessel types and gender (due to extremely low female participation rates in this sector) from the findings, where these details might lead to the identification of any one individual within the offshore marine sector. Participants will be referred to as "seafaring officers", expanding the pool of potential subjects to approximately 400 individuals. A sample of ten participants out of 400 is sufficient to ensure anonymity of the individual.

It is the intention that this pilot study of up to ten seafaring officers will form the basis of a broader study of up to 30 seafaring officers.

If you feel that it is necessary to include further material, please append.

A4 DESCRIBE ANY RISK THAT MAY ARISE TO THE PARTICIPANT / DONOR?

Risk to participants (and to researchers) can be real but does not need to be physical. Risk includes such as self esteem, regret, embarrassment, civil or criminal liability, disease, physical harm, loss of employment or professional standing, etc. Please consider such

possibilities carefully

Some research activities may put the participant at risk through what is being done or simply through their participation.

Please describe the risk you perceive and the protective measures to be taken.

This research will pose negligible risk to participants, given that participation in the interview is voluntary and will take place in an office/meeting room environment rather than in the workplace. The interview questions are intended to prompt reflection by the interviewee, and the style of the interview will be non-confrontational and open ended. Emphasis will be placed on drawing out their experiences in their roles.

Interviewee responses will be de-identified to maintain confidentiality and anonymity. Anonymity will be further maintained by excluding details on specific geographical areas, clients, vessel types and gender (due to extremely low female participation rates in this sector) from the findings, where these details might lead to the identification of any one individual within the offshore marine sector.

A5 DESCRIBE ANY RISK THAT MAY ARISE TO THE RESEARCHER / ADMINISTRATOR?

Some research activities may put the researcher at risk through what is being done or simply through their participation.

Please describe the risk you perceive and the protective measures to be taken.

The foreseeable risk to the researcher is negligible.

A6 WHAT BENEFITS ARE ANTICIPATED FROM THE PROJECT

Ethical principles would require that benefits flowed from the activities - but please avoid grandiose claims.

(a) To the Participant (what and how so)

The interviews will provide an opportunity for participants to reflect upon their roles and how they make sense of uncertain and ambiguous situations that arise in their work. It provides them with an opportunity to voluntarily provide narratives that highlight their professionalism, and relate those factors that make performing their roles difficult at times. As such, the interviews will validate their lived experiences as seafaring professionals in highly demanding roles.

(b) More generally (to society, profession, knowledge, understanding, etc, and how so.)

The research will provide a nuanced understanding of how leaders in high reliability organisations make sense of emergent ambiguity and uncertainty to maintain exceptional levels of operational reliability and safety. This will extend the body of knowledge of organisational leadership and safety. These insights can be incorporated into development of marine officers as well as leaders in other high reliability work contexts to improve adaptability to increasing levels of uncertainty and ambiguity, which will minimise help to minimise the risk of associated danger.

A7 POTENTIAL PROBLEMS

From time to time in the course of a research project important information, such as an individual found to be at risk, or entirely unforeseen events may come to pass. What procedures are in place to handle unexpected or particularly significant personal or other information that may come to light through the project, eg, unknown medical/psychiatric condition, a particularly distressed participant, civil or criminal liability, etc.

Due to the non-confrontational nature of the interviews and the focus on successful resolution of situations, there are no foreseeable problems with conducting the interviews. Participants will be referred to the organisation's Employee Assistance Programme should they experience, or exhibit signs of, emotional distress during the course of the interviews.

A8 PROFESSIONAL/ETHICAL ABILITY & TRAINING (Researchers/Students/Assistants)

NS 1.15 Research must be conducted or supervised only by persons or teams with experience, qualifications and competence appropriate to the research ... using (appropriate) facilities ... (and with appropriate skills and resources for dealing with any contingencies...

(a) Sufficiently detail what investigators/assistants will do in this project and their expertise/competence to do so.

The research supervisors have been involved with sensitive and ethically observant research, and are qualified to provide postgraduate research supervision. The primary student investigator, Bradley Roberts, is an HR professional with over 20 years experience. This includes conducting semi-structured interviews.

(b) Sufficiently detail any further training/qualifications required for investigators/assistants to carry out the project.

The research supervisors will provide guidance and quality assurance on interview processes and protocols.

A9 FUTURE USE OF DATA

Will any of these data be used by yourself, your students or others for any purpose other than for this project as described in the protocol? If so please describe.

It is the intention that this pilot study of up to 10 seafaring officers will form the basis of a broader study of up to 30 seafaring officers. However, the data from this study will not be used for any other purpose outside of the scope of this research proposal. As referenced above, the research findings will be provided in summary form to the participants and made available to the Swinburne University of Technology. The findings will be made available to the scholarly community, through publications including a possible book, journal articles and relevant conference presentations.

A10 EXTERNAL INVOLVEMENT

Is a body external to Swinburne involved in initiation or support of the project?

- ☐ Yes Name of body/organisation.
If an external body is associated with the project you **must** provide the HREC with detail of the arrangements, *including details of any funding or other resources being provided*. A copy of relevant pages from the contractual arrangements should be attached.
- ☒ No

A11 EXTERNAL APPROVALS

Projects involving other organisations or entities may require approval from other institutions or their ethics committees, etc. for such things as access to prospective participants, contact lists, data, facilities, etc. A copy of such approvals may be required to be provided to the HREC at the time of application or be made available as soon as possible. **In which case, the project may not commence, until such evidence is provided.**

Please indicate, as appropriate, if formal clearance/permission has been obtained or sought:

Institutional	Yes	<input checked="" type="checkbox"/> Documentation Attached	<input checked="" type="checkbox"/> or to follow	<input type="checkbox"/>
Next of Kin (for special groups)	Yes	<input type="checkbox"/> Documentation Attached	<input type="checkbox"/> or to follow	<input type="checkbox"/>

(estimate when likely to be obtained)

Annex D is a copy of the letter to <anonymised > Shipping ASA requesting institutional permission dated 24/09/14. Permission has been granted by the Managing Director.

☐ No (please explain)

A12 RESEARCHER / SPONSOR RELATIONSHIP

Is there any relationship or association between the sponsor and any of the researchers listed in Section A of this form, for example are any of the researchers directors, officers, employees, shareholders or promoters of the sponsor or do they receive any personal benefits from the sponsor under any other contracts or arrangements?

- ☒ No
- ☐ Yes (please explain the relationship(s), including how a vested or a conflict of interest situation does not arise.)

N/A

SECTION B: ETHICAL ISSUES OVERVIEW

B ETHICAL ISSUES

[Double-click on ☐ YES/NO 'check box' to select box, then enter Default Value as Checked ☒ or leaving as Not Checked ☐

		<u>YES</u>	<u>NO</u>
(a)	Non-/Limited Disclosure or Deception: Is any detail in relation to research purposes, methods or questions being withheld from participants? Or will deception of any kind be involved? Or any covert/undeclared observation? (Refer <i>National Statement</i> Chap 2.3)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(b)	Does the data collection process involve access to confidential personal data (including access to data provided for a purpose other than this particular research project) <u>without</u> the prior consent of subjects?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(c)	Will participants have pictures taken of them, e.g., photographs, video recordings? If "YES", please explain how you intend to retain confidentiality and ultimately dispose of the material.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(d)	If interviews are to be conducted, will they be recorded by electronic device? If "Yes", please explain how you intend to retain confidentiality and ultimately dispose of the material.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(e)	Will participants be asked to perform any acts or make statements which might compromise them, diminish self esteem or cause them embarrassment or regret (minimal, moderate or significant)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(f)	Might any aspect of your study reasonably be expected to place the participant at risk of criminal or civil liability (not just immediately or directly)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(g)	Might any aspect of your study reasonably be expected to place the participant at risk of damage to their professional/social/cultural/financial standing or employability?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(h)	Will the research involve access to data banks subject to privacy legislation?*((NOTE: Annual reporting to Government may be required on this item. For info: please contact the Research Ethics Officer.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(i)	Will participants come into contact with any equipment which uses an electrical supply in any form e.g., audiometer, biofeedback, electrical stimulation, magnetic stimulation, etc.? If "YES", please outline below what safety precautions will be followed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(j)	Will any treatment be used with potentially unpleasant or harmful side effects?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(k)	Does the research involve any stimuli, tasks, investigations or procedures which may be experienced by participants as stressful, noxious, aversive or unpleasant during or after the research procedures?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(l)	Will the research involve the use of placebo control conditions or the withholding/substitution of treatment, programs or services (health, educational, commercial, other)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(m)	Will any samples of body fluid or body tissue be required specifically for the research which would not be required in the case of ordinary treatment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(n)	Will participants be fingerprinted or DNA "fingerprinted"?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(o)	Are there in your opinion any other ethical issues involved in the research?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

NOTE: If the answer to any of the above questions is "yes", please **explain** and **justify** below in sufficient clear detail. (The box below will expand to fit your response.)

Data will be recorded on an audio recorder. **These recordings will be transcribed by the researcher.** The audio files will be stored in a locked filing cabinet in the Faculty of Business and Enterprise. All electronic transcripts will be stored on a password-protected computer. Recordings will be available to the named researchers only. All data sources will be disposed of after five years, in accord with Swinburne Policy on the Conduct of Research.

Attach further documents if appropriate

SECTION C: PARTICIPANT DETAILS

C1 PARTICIPANT DETAILS

The composition of the participant group may, in some circumstances, distort and invalidate an outcome, and risks may arise through the composition of the participant group.

How many individual participants will be involved? (Number/number ranges for which approval is sought)

Males:

Females:

Total participants

Over what range of ages?

From (youngest):

25

To (Oldest):

65

If there is a gender or age imbalance in the number of participants please explain why.

The offshore marine industry is predominantly male in terms of demographic. Female participation rates are extremely low. There are only two female officers within the identified sample group. The intention is to include them both in the pilot study.

C2 RECRUITMENT

How will participants be recruited/selected?

Please outline the process in sufficient detail how this is to occur.

Note: Where participants are obtained from or through schools, hospitals, prisons or other institutions, appropriate institutional or other authority will probably be needed. If soliciting for participants by advertisement or poster please attach proposed copies or text.

(See also Project Information Consent Statements and Signed Consent Forms info at the end of this application form.)

Individual interviewees will be sourced from among the marine officers of <anonymised> Shipping ASA. Contact will be made by phone by Bradley Roberts, primary student investigator. A letter under the signature of Doctor Julian Lippi will subsequently be sent verifying time and date of interview and including a Plain Language Project Information Statement (Appendix A) and an informed Consent Form (Appendix B). [Consent for phone interviews will be facilitated by employing the script found at Appendix E.](#)

C3 PRE-EXISTING CONDITIONS

In some situations an underlying medical or other significant condition of a participant may result in an otherwise relatively innocuous situation causing excessive stress and exacerbate the condition. Researchers must, therefore, be alert to such situations and be able to address the resulting issues.

Do participants have any medical or other significant condition of which you are aware, eg. diabetes, asthma, depression, epilepsy? What steps are in place to handle any resulting problems (you may need to correlate with A3, A4 and A7 of this form)?

None known.

C4 DISCLOSURE AND INFORMED CONSENT

How will participants be informed about the project in order to give valid consent:

- ☒ Consent Information Statement(s)/Letter(s) and Signed Consent Form(s) will be used.
A copy must be attached to your application. A guide to consent instruments is given at the end of this form.
- ☐ Consent Information Statement(s)/Letter(s) and consent implied by return of anonymous questionnaire
- ☐ Verbal advice (Please explain how and why)
- ☐ Other (Please explain how and why)

Project Information Statement (Appendix A) and an Informed Consent Form (Appendix B).

Copies of appropriate consent instruments must be attached to your application. Please consult the [Guide to Human Research Informed Consent Instruments](#) in carefully preparing informed consent instruments.

C5 COMPENSATION

Consent to participate must be freely given and not induced through the level of reward, perceived reward, or power relationships

Provide details of any financial or other reward or inducement is being offered to subjects for participation. Indicate the source of the funds.

No compensation or incentives will be provided

C6 RELATIONSHIP TO INVESTIGATOR(S)

Free consent may be difficult to ensure if the participant is dependent upon the investigator for employment, assessments etc

Some relationships cause special ethical issues to arise

Are participants linked with the investigator through some particular relationship - eg. employees ultimately responsible to or superiors of the investigator, students of investigator, family members, friends etc.

Participants are linked professionally to Bradley Roberts, primary student investigator, who is Learning and Development Manager Asia Pacific for <anonymised> Shipping ASA. The research is for the purpose of undertaking his PhD as practice-based research. However, any potential for conflict of interest or potential power imbalance in the researcher/subject relationship will be mitigated through the following factors:

- The Swinburne Policy on the Conduct of Research will be followed throughout the research. As such, research subjects will be thoroughly advised that their participation is entirely voluntary, and that they can withdraw from participation at any stage. Effective academic supervision will provide a further level of safeguard throughout the research process. Consent will be documented via compliant formats (see annex B and annex E).
- The organisational seniority of the primary student researcher is equal to, or lesser, than the research subjects. Whilst the researcher is part of the organisational support function, the research subjects are part of operations. Therefore, there is no line reporting relationship between the researcher and the subject group.
- It will be made extremely clear that participation is voluntary, and there will be no threat, promise or inducement held out to participants concerning their participation.
- The research objective is to develop best practice based upon the experiences of seafaring officers, not to criticise or disparage the organisation. As such, participants will not be placed in a position that compromises their professional standing or employment.
- Research data will be aggregated and de-identified, including removing of reference to gender, age, nationality, geographic operation, vessel type and client identity wherever possible, to ensure the anonymity of research participants.
- The participant group will be referred to as "seafaring officers", expanding the pool of potential subjects to approximately 400 individuals. A sample of ten participants out of 400 is sufficient to ensure anonymity of the individual.

C7 INVOLVEMENT OF SPECIAL GROUPS

Particular issues of consent may arise where special groups of participants are to be involved. There may be, for example, a need to obtain informed consent from persons other than the direct participant. Examples of such special groups include special cultural groups - eg. indigenous Australians; children and young persons (Guidelines section 4.2); groups with special circumstances - eg. persons with an intellectual or mental impairment (Guidelines s. 5)

Please identify and describe the nature of the groups and procedures used to obtain permission.

Note. Persons proposing research projects involving Indigenous Australians should consult with the relevant University manager of indigenous programs prior to finalising definition of the project.

N/A

C8 PRIVACY

The University is subject to the Victorian Information Privacy and Health Records Acts as well as the Commonwealth Privacy Act and, in particular, the Information/Health/National Privacy principles (IPPs/HPPs/NPPs) set out therein and is required to report annually on projects which relate to or utilise particular records.

Does the research involves access to data which was collected by an organisation for its own purposes (ie. not specifically collected for this project) such as student records, other data banks, human pathology or diagnostic specimens provided by an institution/s?

If yes, please indicate source/s.

Given that the research involves seafarer experience rather than operational processes, there is no specific nautical legislation or policy that relates to this study, aside from the general Occupational Health and Safety requirements that pertain to any and all employees.

C9 LOCATION OF STUDY

Please indicate where the research will be carried out. If the research will not be on University premises permission of owner / occupier may be required. If so, please indicate what authority or permission may be required and how will be obtained. **NB:** Where required, please attach to this application evidence of authority obtained or provide the Secretary, HREC as soon as practicable.

The interviews will be carried out in meeting rooms at <anonymised> Shipping ASA offices (Melbourne or Perth) or at a place convenient to each participant. If necessary the interviews may be conducted by phone.

SECTION D: DATA & PUBLICATION ARRANGEMENTS (Nb Section D Revised Aug 2007)

PLEASE CONSIDER CAREFULLY YOUR RESPONSES TO THIS SECTION. YOU NEED TO BE CLEAR AS TO WHAT IS OCCURRING WITH RESPECT TO DATA COLLECTION, RETENTION and DISPOSAL.

(In your responses, you should demonstrate familiarity with National Statement requirements for confidentiality, relevant Privacy Principles and Swinburne's *Policy on the Conduct of Research*, eg, Sect 4, see URL: <http://www.swinburne.edu.au/corporate/registrar/ppd/docs/PolicyontheConductofResearch.pdf>).

D1 DATA COLLECTION/RECORDING (Nb Section D1 Revised Aug 2007)

Please note that, with any information or data collected/retained, if any individual can reasonably be identified, the information can be deemed "personal information" or "health information" under National/Health/Information Privacy Principles (NPPs/HPPs/PPs).

(a) How or in what form will **data** be collected/recorded?

(eg, notes; verbatim, audio and/or video recordings; transcriptions of recordings; recorded or signed consents; etc)

Interview data from each participant will be collected using notes and audio recordings. Transcripts will be made of the recording and each transcript will be provided with a project management number related to the participant for organizational purposes and if confidentiality is required at the request of the participant.

(b) As regards **any individual**, in relation to any data collection or retention, you need to acknowledge either or both of the following:

[Double-click on ☐ 'check box' to select X by entering in Default Value as Checked ☒ or leaving as Not Checked ☐

☒ **An Individual can be identified OR is Potentially Identifiable / Re-Identifiable**

(An individual can be identified at some point or by the very nature of the data collected/retained: at time of an interview, by signed consent form, identified or labelled voice or image recording, pen-and-paper questionnaire, on-line survey instruments, etc.

Whilst data may not have (explicit) identifiers, an individual's identify can still reasonably be worked out.

Or data may have (explicit) identifiers removed and replaced by codes that permit matching of an individual with the data collected/retained, in which case it is possible to identify or re-identify the person to whom the data relates.)

☐ **An Individual is Non- or Un-identifiable**

(Data collected/retained anonymously and with no reasonable possibility of being identified.)

Your acknowledgement may require further explanation or clarification; if so, please include in the following box.

Given that this is an industry specific study of finite population, the following approach will be adopted to mitigate any risk that an individual can be identified from the information provided. Interviewee responses will be de-identified to maintain confidentiality and anonymity. Anonymity will be further maintained by excluding details on specific geographical areas, clients, vessel types and gender (due to extremely low female participation rates in this sector) from the findings, where these details might lead to the identification of any one individual within the offshore marine sector. The participant group will be referred to as "seafaring officers", expanding the pool of potential subjects to approximately 400 individuals. A sample of ten participants out of 400 is sufficient to ensure anonymity of the individual research subjects.

D2 DATA SECURITY (Nb Section D2 Revised Aug 2007)

Please note that “data must be held for sufficient time to allow reference. For data that is published this may be for as long as interest and discussion persists following publication. It is recommended that the minimum period for retention is at least 5 years from the date of publication but for specific types of research, such as clinical research, 15 years (or more) may be more appropriate.” (Sect 4.3 of *Swinburne’s Policy on the Conduct of Research*)

Please indicate **how data** (all types of data, including, eg, signed consent forms) **will be securely retained** (eg, electronic form in password-protected disk drive, locked filing cabinet, etc) **and where?** With more than one type of data, will the types be separately stored?
In your explanation, you will need to make clear **how due confidentiality and/or anonymity will be maintained**.

(a) During the study

Data will be collected via one-on-one interviews conducted on the premises of <anonymised> Shipping, which will be audio recorded using a digital recorder. Audio recordings will be transcribed using a word processing program (e.g., Word) for the purpose of content analysis. Transcript documents will be saved on a password protected computer in the office of the primary student investigator (raw data e.g., print outs of transcripts, will be stored in a locked filing cabinet). Only the researchers Doctor Julian Lippi, Bradley Roberts and Professor Nita Cherry, who are conducting this study will have access to the data.

(b) Following completion of study

Upon completion of the study, data will be stored on a secure medium (CDRom) in a locked storage area in the Centre for Leadership and Management, in the Faculty of Business and Enterprise, and will be held there for a minimum of five years before it will be destroyed.

D3 PUBLICATION/OUTPUT (Nb Section D3 Revised Aug 2007)

Please explain in sufficient detail:

- (a) What, if any, publication (conference, news media, academic journal, other journal, etc) is envisaged following on or in relation to this project, both in terms of data proper and/or analysis of data?
- (b) Will participants be informed about any envisaged research publication/outcome? (This information is normally to be included in the information given prior to obtaining informed consent.)
- (c) Would any participants be able to be identified through the publication of data proper or research findings? If so, explain why this is necessary.

- (a) It is envisioned that a PhD thesis, book, conference papers, academic articles and reports will result from the research.
- (b) Participants will be kept informed of research outcomes and publication via email. Copies of the documents listed above will be provided to participants upon their publication.
- (c) No. Research data will be aggregated and de-identified to ensure complete anonymity for participants. This includes removing reference to gender, age, nationality, operational geography, vessel type and client identity wherever possible. The participant group will be referred to as “seafaring officers”, expanding the pool of potential subjects to approximately 400 individuals. A sample of ten participants out of 400 is sufficient to ensure anonymity of the individual.

D4 INDIGENOUS ISSUES

Storage arrangements for data relating to research into Indigenous matters must be determined in compliance with the Policy on the Conduct of Research after consultation with the communities involved.

What consultation has taken place and what arrangements have been made.

N/A

D5 OTHER ISSUES (Nb Section D5 Revised Aug 2007)

Are there any other issue relating to data collection, retention, use or disclosure which the ethics committee should be made aware of and, if so, please explain how you are to deal with this.
(Eg, Research outcomes unduly impacting on any individual or group not directly participating, etc.)

N/A

SECTION E: SUBSTANCES & CLINICAL ISSUES

☒ **No matters in this section are applicable to the study** or

E1 ADMINISTRATION OF SUBSTANCES/AGENTS

Name of substance(s)

Dosage per administration

Frequency of administration

Total amounts to be administered

Anticipated effects:

--

NOTE: *If the research involves administration of foreign substances or invasive procedures, please attach a statement accepting responsibility for those procedures by a medical or paramedical practitioner with Indemnity insurance.*

☐ **STATEMENT ATTACHED**

E2 BODY FLUIDS OR TISSUE

What fluids or tissue? How will be samples be obtained?

--

Frequency and volume

--

How are samples to be stored?

--

How will samples be disposed of?

--

Who will take the samples?

--

What are their qualifications for doing so?

--

Do participants carry, as far as you know, the Hepatitis B or HIV virus? If so how will the risks be handled

--

Do participants carry, as far as you know, any other contagious diseases or viruses? If so how will the risks be handled

--

SECTION F Declarations for Signature ^{1 2 3}

1. With respect to this project, I / We, the undersigned Investigator(s)/Assistant(s) agree:

- To undertake human research activity or handle data confidentially in accordance with Swinburne requirements, including any standard or special ethics clearance conditions, under the proper direction of the responsible Swinburne manager and/or principal Swinburne (or other) researcher/supervisor.

NAME: (block letters)	SIGNATURE:	DATE:
Dr. Julian Lippi		
Professor Nita Cherry		
Bradley Roberts		

All listed applicants must sign. The Chief Investigator/Supervisor is also responsible for personnel subsequently joining the project. Expand this table or duplicate this page as required. NB This information is subject to Swinburne or external audit.

****** Please note that ******

PROJECTS MUST NOT COMMENCE WITHOUT PRIOR WRITTEN APPROVAL from the Human Research Ethics Committee (SUHREC) or its appropriate Subcommittee (SHESC)

2. Declaration of Compliance by Chief Investigator(s)/Student Supervisor(s).

I declare that the above project has been developed and will be conducted in accordance with relevant Swinburne standards, policies and codes of practice, including any standard or special conditions for on-going ethics clearance. I further declare that all listed and subsequently appointed researchers or assistants involved in this project will be made aware of the conditions of ethics approval as communicated to me, including approved documentation and procedures.

Signature & Date:

...

Name of Signatory & Position:

...

(Optional) **Form checked by a Research & Ethics Advisor (REA)?** Yes ☒ No ☐ REA Initials & Date: Dr. J
Vieceli 12/8/14.....

3. Endorsement of Head of Academic Unit (or Delegate) or Above.

I declare that this project: has been developed and will be conducted in accordance with relevant Swinburne standards, policies and codes of practice; and has research merit, adequate resourcing and appropriate leadership/supervision.

Signature & Date:

...

Name of Signatory & Position:

...

*(Please note: This endorsement must be given by an authorised official who is **not** also a chief or co-investigator of the project and who is not also the supervisor of a student investigator with an interest in the project.)*

Appendix C: Information Statement



Department of Leadership & Management
Faculty of Business & Enterprise
Swinburne University of Technology

Project Title – Sensemaking processes in offshore marine operations

Principal Investigators: Dr. Julian Lippi, Brad Roberts.

Dear [participant name],

Thank you for your interest in this project. The purpose of the research is to explore your experience and insights as an offshore marine officer. The study will examine the situational awareness and sensemaking practices of up to 30 seafarers in the offshore marine sector. It will provide a deeper understanding about how leaders within the maritime industry, go about making sense of uncertain and ambiguous situations that occur in the context of their daily work that could result in high risk or danger if they do not notice and resolve these situations. **During the interview, you will be asked about your personal experience of and response to such situations.**

This research will lead to improved development of officers within the maritime sector, as well as contributing to better practices across the full range of high reliability work contexts, leading to improved operational reliability and safety.

The information for the project will be collected via personal interview, which will last approximately one hour and will be audio recorded. Notes will also be taken by the interviewer. Transcripts will be made of the recording and transcripts will be de-identified if preferred. All audio files will be stored confidentially on a CD Rom in a locked facility at the Department of Leadership & Management, Faculty of Business and Enterprise, Swinburne University of Technology, to which only the named researchers will have access. Following completion of the study data will be held for a minimum of five years before it will be destroyed. Should you so desire, you may withdraw your participation, data or material contributed at any time.

The information provided by you during the course of the interview may be used in the outputs of this research. All personal information, during and after the study, will be handled in accordance with the Swinburne University Policy on the Conduct of Research.

At the interview the interviewer will ask you to sign an Informed Consent form. Your informed consent will indicate that:

- all questions about the research have been answered to your satisfaction
- your participation in the research is voluntary
- you may withdraw from the research at any stage and any unused data will be destroyed
- you agree to the interview being audio recorded and transcribed

Signed informed consent forms will be stored in a locked facility, located separately from interview transcripts and data.

If you have any questions regarding this project, please don't hesitate to contact:

Dr. Julian Lippi

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This project has been approved by or on behalf of Swinburne's Human Research Ethics Committee (SUHREC) in line with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the conduct of this project, you can contact:

Research Ethics Officer, Swinburne Research (H68),
Swinburne University of Technology, P O Box 218, HAWTHORN VIC 3122.
Tel (03) 9214 5218 or +61 3 9214 5218 or resethics@swin.edu.au

Appendix D: Informed Consent Form



Department of Leadership and Management

Faculty of Business & Enterprise

Swinburne University of Technology

Project Title: **Sensemaking processes in offshore marine operations**

1. I consent to participate in the project named above. I have been provided a copy of the project consent information statement to which this consent form relates and any questions I have asked have been answered to my satisfaction.

2. *In relation to this project, please circle your response to the following:*

- | | | |
|--|------------|-----------|
| ▪ I agree to be interviewed by the researcher | Yes | No |
| ▪ I agree to allow the interview to be recorded by electronic device | Yes | No |
| ▪ I agree to make myself available for further information if required | Yes | No |

3. I acknowledge that:

- (a) my participation is voluntary and that I am free to withdraw from the project at any time without explanation, and any related data will be destroyed;
- (b) the Swinburne research project is for the purpose of research and not for profit;
- (c) any identifiable information about me which is gathered in the course of and as the result of my participating in this project will be (i) collected and retained for the purpose of this project and (ii) accessed and analysed by the researcher(s) for the purpose of conducting this project;
- (d) my anonymity is preserved and I will not be identified in publications or otherwise without my express written consent.

By signing this document I agree to participate in this project.

Name of Participant:

Signature & Date:

Please keep a copy of this Informed Consent Form for your records.

Appendix E: Literature Review Articles

Authors	Year	Title	Journal
A. Raffetti; F. Marangon; F. Zuccarelli	2000	Integrated Navigation System Safety Assessment Methodology	Journal of Navigation
J. Sharit; S. J. Czaja; E. Iakovou; J. Moses	2000	A human factors systems approach to examining oil spills in tankbarge operations: analysis and reappraisal of management policies	Maritime Policy & Management
K. Inoue	2000	Evaluation Method of Ship-handling Difficulty for Navigation in Restricted and Congested Waterways	Journal of Navigation
L. van Breda	2000	Capability Prediction: An Effective Way to Improve Navigational Performance	Journal of Navigation
G. W. U. Lee	2001	What's Lookout About at Sea?	Journal of Navigation
N. A. Stanton; P. R. G. Chambers; J. Piggott	2001	Situational awareness and safety	Safety Science
R. W. Cooper	2001	Removal of an Ambiguity from the Maritime Collision Regulations	Journal of Navigation
X. Zhu; H. Xu; J. Lin	2001	Domain and Its Model Based on Neural Networks	Journal of Navigation
Z. Kopacz; W. Morgaś; J. Urbański	2001	The Maritime Safety System, its Main Components and Elements	Journal of Navigation
H. N. Psaraftis	2002	Maritime safety: To be or not to be proactive	WMU Journal of Maritime Affairs
J. L. Veiga	2002	Safety culture in shipping	WMU Journal of Maritime Affairs
M. H. Lützhöft; S. W. A. Dekker	2002	On your watch: Automation on the bridge	Journal of Navigation
P. Belcher	2002	A sociological interpretation of the COLREGS	Journal of Navigation
P. M. P. Muirhead	2002	A study of the impact of new technology and teaching methodologies on global maritime education and training into the 21st century (Thesis)	
P. Manley	2002	Collision Regulations – Discussion	Journal of Navigation
B. Pritchard	2003	Maritime English syllabus for the modern seafarer: Safety-related or comprehensive courses?	WMU Journal of Maritime Affairs
D. Nielsen; D. Jungnickel	2003	Maritime accident investigation and temporal determinants of maritime accidents: A case study	WMU Journal of Maritime Affairs
E. Pedersen; K. Inoue; M. Tsugane	2003	Simulator Studies on a Collision Avoidance Display that Facilitates Efficient and Precise Assessment of Evasive Manoeuvres in Congested Waterways	Journal of Navigation
G. R. J. Hockey; A. Healey; M. Crawshaw; D. G. Wastell; J. Sauer; J. Sauer	2003	Cognitive demands of collision avoidance in simulated ship control	Human Factors
P. A. Wilson; C. J. Harris; X. Hong	2003	A Line of Sight Counteraction Navigation Algorithm for Ship Encounter Collision Avoidance	Journal of Navigation
S. J. Singh	2003	Mariner anticipation and performance	WMU Journal of Maritime Affairs
A. N. Ince; E. Topuz	2004	Modelling and Simulation for Safe and Efficient Navigation in Narrow Waterways	Journal of Navigation

N. Akten	2004	Analysis of Shipping Casualties in the Bosphorus	Journal of Navigation
W. Filipowicz	2004	Vessel Traffic Control Problems	Journal of Navigation
Z. Kopacz; W. Morgaś; J. Urbański	2004	The Changes in Maritime Navigation and the Competences of Navigators	Journal of Navigation
D. V. Lyridis; N. P. Ventikos; P. G. Zacharioudakis; K. Dilzas; H. N. Psaraftis	2005	Introduction to an innovative crew composition approach based on safety/operational and financial requirements	WMU Journal of Maritime Affairs
M. L. Barnett	2005	Searching for the root causes of maritime casualties	WMU Journal of Maritime Affairs
C. Hetherington; R. Flin; K. Mearns	2006	Safety in shipping: The human element	Journal of Safety Research
E. Salas; K. A. Wilson; C. S. Burke; D. C. Wightman	2006	Does Crew Resource Management Training Work? An Update, an Extension, and Some Critical Needs	Human Factors
L. Gucma; Z. Pietrzykowski	2006	Ship Manoeuvring in Restricted Areas: An Attempt to Quantify Dangerous Situations Using a Probabilistic-Fuzzy Method	Journal of Navigation
P. van Erve; N. Bonnor	2006	Can the Shipping-Aviation Analogy be used as an Argument to decrease the need for Maritime Pilotage?	Journal of Navigation
A. Harati-Mokhtari; A. Wall; P. Brooks; J. Wang	2007	Automatic identification system (AIS): Data reliability and human error implications	Journal of Navigation
I. Campbell; J. Frowley	2007	Attitude to safety onboard fishing vessels in the Northern Periphery	WMU Journal of Maritime Affairs
J. L. Rodríguez; J. Á. Fraguela Formoso	2007	Work-Related Accidents in the Maritime Transport Sector	Journal of Navigation
B. Schager	2008	When Technology Leads Us Astray: A Broadened View of Human Error	Journal of Navigation
C. Chauvin; G. Le Bouar; C. Renault	2008	Integration of the human factor into the design and construction of fishing vessels	Cognition, Technology & Work
I. C. Gemelos; N. P. Ventikos	2008	Safety in Greek coastal shipping: The role and risk of human factor revisited	WMU Journal of Maritime Affairs
J. Ellis; B. Forsman; S. Gehl; U. Langbecker; K. Riedel; P. C. Sames	2008	A risk model for the operation of container vessels	WMU Journal of Maritime Affairs
J. Urbański; W. Morgaś; Z. Kopacz	2008	The Safety and Security Systems of Maritime Navigation	Journal of Navigation
L. Smolarek	2008	Human Reliability at Ship Safety Consideration	Journal of Konbin
O. Arslan; I. D. Er	2008	A SWOT analysis for successful bridge team organization and safer marine operations	Process Safety Progress
T. Statheros; G. Howells; K. M. Maier	2008	Autonomous Ship Collision Avoidance Navigation Concepts, Technologies and Techniques	Journal of Navigation
V. D. Tsoukalas; D. A. Papachristos; N.	2008	Marine engineers' training: Educational assessment for an engine room simulator	WMU Journal of Maritime Affairs

K. Tsoumas; E. C. Mattheu			
Z. Ou; J. Zhu	2008	AIS Database Powered by GIS Technology for Maritime Safety and Security	Journal of Navigation
C. Macrae	2009	Human factors at sea: common patterns of error in groundings and collisions	Maritime Policy & Management
C. Tam; R. Bucknall; A. Greig	2009	Review of Collision Avoidance and Path Planning Methods for Ships in Close Range Encounters	Journal of Navigation
F. Knudsen; L. L. Froholdt	2009	The consequences of “culture’s consequences”: A critical approach to culture as collective programming applied to cross-cultural crews	WMU Journal of Maritime Affairs
M. A. Yazici; E. N. Otay	2009	A Navigation Safety Support Model for the Strait of Istanbul	Journal of Navigation
M. Celik; S. Cebi	2009	Analytical HFACS for investigating human errors in shipping accidents	Accident Analysis and Prevention
R. Suppiah	2009	ISPS and manning issues	WMU Journal of Maritime Affairs
C. Österman; L. Rose; A.-L. Osvalder	2010	Exploring maritime ergonomics from a bottom line perspective	WMU Journal of Maritime Affairs
E. Tzannatos	2010	Human Element and Accidents in Greek Shipping	Journal of Navigation
J. Kuronen; U. Tapaninen	2010	Evaluation of maritime safety policy instruments	WMU Journal of Maritime Affairs
J. U. Schröder-Hinrichs	2010	Human and organizational factors in the maritime world — Are we keeping up to speed?	WMU Journal of Maritime Affairs
K. Bruno; M. Lützhöft	2010	Virtually being there: Human aspects of shore-based ship assistance	WMU Journal of Maritime Affairs
K. G. Aarsæther; T. Moan	2010	Adding the Human Element to Ship Manoeuvring Simulations	Journal of Navigation
M. Celik; S. M. Lavasani; J. Wang	2010	A risk-based modelling approach to enhance shipping accident investigation	Safety Science
M. Lundh; M. Lützhöft; L. Rydstedt; J. Dahlman	2010	Evacuation in practice — Observations from five full scale exercises	WMU Journal of Maritime Affairs
N. Wang	2010	An Intelligent Spatial Collision Risk Based on the Quaternion Ship Domain	Journal of Navigation
S. I. Baniela; J. V. Ríos	2010	The Risk Homeostasis Theory	Journal of Navigation
C. Chauvin	2011	Human factors and maritime safety	Journal of Navigation
E. Holder; S. R. Pecota	2011	Maritime Head-Up Display: A Preliminary Evaluation	Journal of Navigation
J. G. Davy; C. K. Noh	2011	A study on education's role in establishing strategies for improving safety at sea	Asian Journal of Shipping and Logistics
J. U. Schröder-Hinrichs; M. Baldauf; K. T. Ghirxi	2011	Accident investigation reporting deficiencies related to organizational factors in machinery space fires and explosions	Accident Analysis and Prevention
M. Baldauf; K. Benedict; S. Fischer; M. Gluch; M. Kirchhoff; S. Klaes; J.-U. Schröder-Hinrichs; D.	2011	e-Navigation and situation-dependent manoeuvring assistance to enhance maritime emergency response	WMU Journal of Maritime Affairs

Meißner; U. Fielitz; E. Wilske			
M. J. m. i. c. Taber; A. S. Ré; J. Power	2011	A preliminary ergonomic assessment of piloting a lifeboat in ice	Safety Science
M. Lützhöft; M. R. Grech; T. Porathe	2011	Information Environment, Fatigue, and Culture in the Maritime Domain	Reviews of Human Factors and Ergonomics
O. Turan; I. H. Helvacioğlu; M. Insel; H. Khalid; R. E. Kurt	2011	Crew noise exposure on board ships and comparative study of applicable standards	Ships and Offshore Structures
P. O'Connor; W. Max Long	2011	The development of a prototype behavioral marker system for US Navy officers of the deck	Safety Science
P. S. Szwed	2011	Risk factors and theory building: a study to improve passenger vessel safety	WMU Journal of Maritime Affairs
R. S. Bridger; K. Brasher; A. Dew; S. Kilminster	2011	Job stressors in naval personnel serving on ships and in personnel serving ashore over a twelve month period	Applied Ergonomics
S. I. Baniela; J. V. Ríos	2011	Maritime Safety Standards and the Seriousness of Shipping Accidents	Journal of Navigation
S. Mills	2011	Watch-Keeping on Fishing Vessels: Can Electronic Marine Systems Help?	Journal of Navigation
G. Dimitrios	2012	Engine control simulator as a tool for preventive maintenance	Journal of Maritime Research
G. E. Miller	2012	HFE in Design	Marine Technology
G. W. Gill; C. M. Wahner	2012	The Herald Of Free Enterprise casualty and its effect on maritime safety philosophy	Marine Technology Society Journal
I. Rudan; P. Komadina; R. Ivčič	2012	Officers' subjective near miss notion in situations of collision avoidance at sea	Promet
J. Weng; Q. Meng; X. Qu	2012	Vessel Collision Frequency Estimation in the Singapore Strait	Journal of Navigation
J.-U. Schröder- Hinrichs; E. Hollnagel; M. Baldauf	2012	From Titanic to Costa Concordia—a century of lessons not learned	The international Journal for professionals in maritime administration, industry and education
M. Hänninen; P. Kujala	2012	Influences of variables on ship collision probability in a Bayesian belief network model	Reliability Engineering and System Safety
R. Mohović; I. Rudan; D. Mohović	2012	Problems during simulator training in ship Handling Education	Pomorstvo
T. Wynn; P. A. Howarth; B. R. Kunze	2012	Night-time Lookout Duty: The Role of Ambient Light Levels and Dark Adaptation	Journal of Navigation
W. Ning	2012	Intelligent Quaternion Ship Domains for Spatial Collision Risk Assessment	Journal of Ship Research
A. Russo; I. Urlić; T. Popović; J. Dvornik	2013	The Issues of Consciousness and Conscience in the High Tech Maritime World	OUR SEA : International Journal of Maritime Science & Technology
C. Chauvin; S. Lardjane; G. Morel; J. P. Clostermann; B. Langard	2013	Human and organisational factors in maritime accidents: Analysis of collisions at sea using the HFACS	Accident Analysis and Prevention
H. Duanfeng; D. Song	2013	Review of Human Factors in Maritime System	Applied Mechanics and Materials

J. Prison; J. Dahlman; M. Lundh	2013	Ship sense—striving for harmony in ship manoeuvring	WMU Journal of Maritime Affairs
J. Vinagre-Ríos; S. Iglesias-Baniela	2013	The Human Element in Shipping Casualties as a Process of Risk Homeostasis of the Shipping Business	Journal of Navigation
J.-U. Schröder-Hinrichs; E. Hollnagel; M. Baldauf; S. Hofmann; A. Kataria	2013	Maritime human factors and I policy	Maritime Policy & Management
N. Wang	2013	A Novel Analytical Framework for Dynamic Quaternion Ship Domains	Journal of Navigation
P. John; B. Brooks; C. Wand; U. Schriever	2013	Information density in bridge team communication and miscommunication—a quantitative approach to evaluate maritime communication	WMU Journal of Maritime Affairs
R. Riahi; I. Robertson; S. Bonsall; I. Jenkinson; J. Wang	2013	A proposed methodology for assessing the reduction of a seafarer's performance with insufficient recuperative rest	Journal of Marine Engineering and Technology
S. Bhardwaj	2013	Technology, and the up-skilling or deskilling conundrum	WMU Journal of Maritime Affairs
S. Grøn; G. L. H. Svendsen	2013	"Blue" social capital and work performance: anthropological fieldwork among crew members at four Danish international ships	WMU Journal of Maritime Affairs
S. T. Chen; A. Wall; P. Davies; Z. Yang; J. Wang; Y. H. Chou	2013	A Human and Organisational Factors (HOFs) analysis method for marine casualties using HFACS-Maritime Accidents (HFACS-MA)	Safety Science
T. A. Stoffregen; F.-C. Chen; M. Varlet; C. Alcantara; B. G. Bardy	2013	Getting Your Sea Legs	PLoS ONE
T. Brcko; J. Švetak	2013	Fuzzy reasoning as a base for collision avoidance decision support system	Promet - Traffic - Traffico
Z. L. Yang; J. Wang; K. X. Li	2013	Maritime safety analysis in retrospect	Maritime Policy & Management
A. Mazaheri; J. Montewka; P. Kujala	2014	Modeling the risk of ship grounding—a literature review from a risk management perspective	WMU Journal of Maritime Affairs
A. Noroozi; R. Abbassi; S. MacKinnon; F. Khan; N. Khakzad	2014	Effects of cold environments on human reliability assessment in offshore oil and gas facilities	Human Factors
B.-M. Batalden; A. K. Sydnese	2014	Maritime safety and the ISM code: a study of investigated casualties and incidents	WMU Journal of Maritime Affairs
E. Akyuz; M. Celik	2014	Utilisation of cognitive map in modelling human error in marine accident analysis and prevention	Safety Science
F. A. Jimenez	2014	The human factor in maritime safety compliance with international standards MLC 2006 and STCW 2010 by Colombia	Journal of Maritime Research

F. van Westrenen; G. Praetorius	2014	Situation awareness and maritime traffic: having awareness or being in control?	Theoretical Issues in Ergonomics Science
G. Praetorius; E. Hollnagel	2014	Control and resilience within the maritime traffic management domain	Journal of Cognitive Engineering and Decision Making
K. Majewska; M. Mieloszyk; W. Ostachowicz; A. Król	2014	Experimental method of strain/stress measurements on tall sailing ships using fibre bragg grating sensors	Applied Ocean Research
M. J. Akhtar; I. B. Utne	2014	Human fatigue's effect on the risk of maritime groundings – A Bayesian Network modeling approach	Safety Science
M. J. Akhtar; I. B. Utne	2014	Common patterns in aggregated accident analysis charts from human fatigue-related groundings and collisions at sea	Maritime Policy & Management
M. J. Akhtar; I. B. Utne	2014	Reducing the probability of ship grounding: Which measure to undertake?	WMU Journal of Maritime Affairs
M. Ljung; M. Lützhöft	2014	Functions, performances and perceptions of work on ships	WMU Journal of Maritime Affairs
N. P. Ventikos; G. V. Lykos; I. I. Padouva	2014	How to achieve an effective behavioral-based safety plan: the analysis of an attitude questionnaire for the maritime industry	WMU Journal of Maritime Affairs
S. Erol; E. Başar	2014	The analysis of ship accident occurred in Turkish search and rescue area by using decision tree	Maritime Policy & Management
Y. Mulyadi; E. Kobayashi; N. Wakabayashi; T. Pitana; Wahyudi	2014	Development of ship sinking frequency model over Subsea Pipeline for Madura Strait using AIS data	WMU Journal of Maritime Affairs
Y. V. Aydogdu	2014	A Comparison of Maritime Risk Perception and Accident Statistics in the Istanbul Strait	Journal of Navigation
A. Kregting	2015	Stress: Sink or swim	Maritime by Holland
A. Mazaheri; J. Montewka; P. Kotilainen; O.-V. Edvard Sormunen; P. Kujala	2015	Assessing Grounding Frequency using Ship Traffic and Waterway Complexity	Journal of Navigation
B. Sahin; Y. E. Senol	2015	A Novel Process Model for Marine Accident Analysis by using Generic Fuzzy-AHP Algorithm	Journal of Navigation
E. Akyuz	2015	A hybrid accident analysis method to assess potential navigational contingencies: The case of ship grounding	Safety Science
E. Akyuz; M. Celik	2015	A methodological extension to human reliability analysis for cargo tank cleaning operation on board chemical tanker ships	Safety Science
E. Akyuz; M. Celik	2015	Application of CREAM human reliability model to cargo loading process of LPG tankers	Journal of Loss Prevention in the Process Industries
G. A. Psarros	2015	Bayesian Perspective on the Deck Officer's Situation Awareness to Navigation Accidents	Procedia Manufacturing
G. Di Bucchianico	2015	Design for human diversity in the maritime design domain	Theoretical Issues in Ergonomics Science
G. Praetorius; A. Kataria; E. S. Petersen; J. U. Schröder-	2015	Increased Awareness for Maritime Human Factors through e-learning in Crew-centered Design	Procedia Manufacturing

Hinrichs; M. Baldauf; N. Kähler			
H. Sandhaland; H. Oltedal; J. Eid	2015	Situation awareness in bridge operations - A study of collisions between attendant vessels and offshore facilities in the North Sea	Safety Science
K. I. Øvergård; L. J. Sorensen; S. Nazir; T. J. Martinsen	2015	Critical incidents during dynamic positioning: operators' situation awareness and decision-making in maritime operations	Theoretical Issues in Ergonomics Science
M. Grabowski	2015	Research on Wearable, Immersive Augmented Reality (WIAR) Adoption in Maritime Navigation	Journal of Navigation
Ö. Uğurlu; S. Erol; E. Başar	2015	The analysis of life safety and economic loss in marine accidents occurring in the Turkish Straits	Maritime Policy & Management
O. Uğurlu; U. Yildirim; E. Başar	2015	Analysis of grounding accidents caused by human error	Journal of Marine Science and Technology (Taiwan)
S. C. Mallam; M. Lundh; S. N. MacKinnon	2015	Integrating Human Factors & Ergonomics in large-scale engineering projects: Investigating a practical approach for ship design	International Journal of Industrial Ergonomics
S. Li; J. Zhou; Y. Zhang	2015	Research of Vessel Traffic Safety in Ship Routeing Precautionary Areas Based on Navigational Traffic Conflict Technique	Journal of Navigation
Ü. Özdemir; A. Güneröğlu	2015	Strategic approach model for investigating the cause of maritime accidents	Promet
W.-K. K. Hsu	2015	Assessing the Safety Factors of Ship Berthing Operations	Journal of Navigation
Y. Wu; T. Miwa; K. Shimamoto; M. Uchida	2015	Development of quantitative team performance evaluation method for ERM	WMU Journal of Maritime Affairs
A. K. Jensen; R. Y. Bergqvist; H. M. Hjelle; M. B. Lekakou	2016	The perception and image of shipping	WMU Journal of Maritime Affairs
B. Brooks; T. Coltman; M. Yang	2016	Technological Innovation in the Maritime Industry: The Case of Remote Pilotage and Enhanced Navigational Assistance	Journal of Navigation
B. Wu; X. P. Yan; Y. Wang; X. Y. Wei	2016	Quantitative method to human reliability assessment for maritime accident	Jiaotong Yunshu Xitong Gongcheng Yu Xinxi/Journal of Transportation Systems Engineering and Information Technology
C. Liou; C. W. Chu	2016	A system simulation model for a training ship evacuation plan	Journal of Marine Science and Technology (Taiwan)
C. Österman; C. Berlin; L.-O. Bligård	2016	Involving users in a ship bridge re-design process using scenarios and mock-up models	International Journal of Industrial Ergonomics
D. Mohovic; R. Mohovic; M. Baric	2016	Deficiencies in Learning COLREGs and New Teaching Methodology for Nautical Engineering Students and Seafarers in Lifelong Learning Programs	Journal of Navigation
E. Lema; G. P. Vlachos; D. Zikos	2016	Linking causal factors and the human element in maritime accidents using K-means clustering	International Journal of Risk Assessment and Management
E. Ucan; S. Nas	2016	Analysing Istanbul Strait Maritime Pilot Capacity by Simulation Technique	Journal of Navigation

F. Saeed; A. Wall; C. Roberts; R. Riahi; A. Bury	2016	A proposed quantitative methodology for the evaluation of the effectiveness of Human Element, Leadership and Management (HELM) training in the UK	WMU Journal of Maritime Affairs
J. Fenstad; Ø. Dahl; T. Kongsvik	2016	Shipboard safety: exploring organizational and regulatory factors	Maritime Policy & Management
J. Weng; Y. E. Ge; H. Han	2016	Evaluation of Shipping Accident Casualties using Zero-inflated Negative Binomial Regression Technique	Journal of Navigation
K. Fukuoka; M. Furusho	2016	Relationship between latent conditions and the characteristics of holes in marine accidents based on the Swiss cheese model	WMU Journal of Maritime Affairs
L. Maglić; D. Zec; V. Frančić	2016	Model of the Adaptive Information System on a Navigational Bridge	Journal of Navigation
M. R. Grech	2016	Fatigue Risk Management: A Maritime Framework	International Journal of Environmental Research and Public Health
P. E. Doherty	2016	A study of the effects of spatial contiguity and hierarchically structured headings in a shipboard operating and maintenance manual	WMU Journal of Maritime Affairs
P. Sotiralis; N. P. Ventikos; R. Hamann; P. Golyshev; A. P. Teixeira	2016	Incorporation of human factors into ship collision risk models focusing on human centred design aspects	Reliability Engineering & System Safety
S. C. Mallam; M. Lundh	2016	The physical work environment and end-user requirements: Investigating marine engineering officers' operational demands and ship design	Work
S. Röttger; S. Vetter; J. T. Kowalski	2016	Effects of a classroom-based bridge resource management training on knowledge, attitudes, behaviour and performance of junior naval officers	WMU Journal of Maritime Affairs
A. H. Gausdal; J. Makarova	2017	Trust and safety onboard	WMU Journal of Maritime Affairs
A. John; U. J. Osue	2017	Collision Risk Modelling of Supply Vessels and Offshore Platforms Under Uncertainty	Journal of Navigation
A. Sidibé; G. Shu	2017	Study of Automatic Anomalous Behaviour Detection Techniques for Maritime Vessels	Journal of Navigation
B. Roberts	2017	Recasting Odysseus: embodied sensemaking among seafaring leaders	Australian Journal of Maritime & Ocean Affairs
C. Sellberg	2017	Simulators in bridge operations training and assessment: a systematic review and qualitative synthesis	WMU Journal of Maritime Affairs
E. Akyuz	2017	A marine accident analysing model to evaluate potential operational causes in cargo ships	Safety Science
F. Cucinotta; E. Guglielmino; F. Sfravara	2017	Frequency of Ship Collisions in the Strait of Messina through Regulatory and Environmental Constraints Assessment	Journal of Navigation
J. Jinki; K. Hongtae	2017	Designing Effective Virtual Training: A Case Study in Maritime Safety	Journal of the Ergonomics Society of Korea
J. Montewka; F. Goerlandt; G. Innes-Jones; D. Owen; Y. Hifi; R. Puisa	2017	Enhancing human performance in ship operations by modifying global design factors at the design stage	Reliability Engineering & System Safety

J. R. E. Saward; N. A. Stanton	2017	Latent error detection: A golden two hours for detection	Applied Ergonomics
J. T. Mansson; M. Lutzhoft; B. Brooks	2017	Joint Activity in the Maritime Traffic System: Perceptions of Ship Masters, Maritime Pilots, Tug Masters, and Vessel Traffic Service Operators	Journal of Navigation
L. De Vries	2017	Work as Done? Understanding the Practice of Sociotechnical Work in the Maritime Domain	Journal of Cognitive Engineering and Decision Making
M. E. Manuel	2017	Vocational and academic approaches to maritime education and training (MET): Trends, challenges and opportunities	WMU Journal of Maritime Affairs
N. A. Costa; E. Holder; S. N. MacKinnon	2017	Implementing human centred design in the context of a graphical user interface redesign for ship manoeuvring	International Journal of Human-Computer Studies
O. S. Hareide; R. Ostnes	2017	Maritime Usability Study by Analysing Eye Tracking Data	Journal of Navigation
P. Taezoon	2017	Communication and Cultural Factors Influencing Human Performance and Errors in Ship Navigation	Journal of the Ergonomics Society of Korea
R. Islam; R. Abbassi; V. Garaniya; F. Khan	2017	Development of a human reliability assessment technique for the maintenance procedures of marine and offshore operations	Journal of Loss Prevention in the Process Industries
R. Zhen; Y. Jin; Q. Hu; Z. Shao; N. Nikitakos	2017	Maritime Anomaly Detection within Coastal Waters Based on Vessel Trajectory Clustering and Naïve Bayes Classifier	Journal of Navigation
S. Lee; Y. B. Moh; M. Tabibzadeh; N. Meshkati	2017	Applying the AcciMap methodology to investigate the tragic Sewol Ferry accident in South Korea	Applied Ergonomics
S. Rezaee; M. R. Brooks; R. Pelot	2017	Review of fishing safety policies in Canada with respect to extreme environmental conditions and climate change effects	WMU Journal of Maritime Affairs
T. Kececi; O. Arslan	2017	SHARE technique: A novel approach to root cause analysis of ship accidents	Safety Science
U. Yildirim; O. Ugurlu; E. Basar; E. Yukseyildiz	2017	Human factor analysis of container vessel's grounding accidents	Transactions of the Royal Institution of Naval Architects Part A: International Journal of Maritime Engineering
V. P. Da Conceição; J. Dahlman; A. Navarro	2017	What is maritime navigation? Unfolding the complexity of a Sociotechnical System	
W. Zhang; C. Kopca; J. Tang; D. Ma; Y. Wang	2017	A Systematic Approach for Collision Risk Analysis based on AIS Data	Journal of Navigation
W.-K. Hsu; S.-J. Lian; S.-H. Huang	2017	Risk Assessment of Operational Safety for Oil Tankers - A Revised Risk Matrix	Journal of Navigation
Y. Wu; T. Miwa; M. Uchida	2017	Using physiological signals to measure operator's mental workload in shipping—an engine room simulator study	Journal of Marine Engineering and Technology
Z. L. Duan; H. Cao; G. Ren; J. D. Zhang	2017	Assessment method for engine-room resource management based on intelligent optimization	Journal of Marine Science and Technology (Taiwan)

Z. Pietrzykowski; P. Wołjsza; P. Borkowski	2017	Decision Support in Collision Situations at Sea	Journal of Navigation
A. M. Wahl; T. Kongsvik	2018	Crew resource management training in the maritime industry: a literature review	WMU Journal of Maritime Affairs
B. Bhaskaran; D. Rajasekar	2018	Perception on simulators in training to reduce human factor based accidents in modern ships among marine engineers on board ships	International Journal of Mechanical Engineering and Technology
B. Özsever; L. Tavacıoğlu	2018	Analysing the effects of working period on psychophysiological states of seafarers	International Maritime Health
C. Heij; S. Knapp	2018	Predictive power of inspection outcomes for future shipping accidents – an empirical appraisal with special attention for human factor aspects	Maritime Policy & Management
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