Behind breakdown: The case of the MV Veteran

by

© Donny Harry Persaud

A Thesis submitted to the

School of Graduate Studies

in partial fulfillment of the requirements for the degree of

Master of Arts

Department of Geography – Faculty of Arts

Memorial University of Newfoundland

October 2018

St. John's Newfoundland

Abstract

Infrastructure as a topic of research has seen much attention within geographic and Science and Technology Studies literature. Frequently, studies of infrastructure explored the implementation of new infrastructures or the effects of infrastructural breakdowns on the relations sustained by these systems carrying the implicit assumption that infrastructures function seamlessly and disruptions constitute aberrations from a working norm. Recent works have problematized this assumption exploring the everyday practices of infrastructure's users and the practices of repair and maintenance which sustain infrastructural systems. This thesis examines breakdown, repair, and maintenance of a new passenger ferry operating in a rural island community off Newfoundland's north coast. This thesis extends current observations on emerging repair and maintenance literature from the situated activities of maintainers to the decision-making processes governing repair and maintenance. In doing so, this thesis illustrates how space, commonly held as a neutral surface on which these practices are undertaken, comes to influence how the passenger ferry is repaired and maintained as well as used by the islands' residents.

Acknowledgements

This thesis would not be possible without the assistance and encouragement of several people. I am indebted to the residents of Fogo Island and Change Islands who welcomed me into their community during my stay. I went to Fogo Island and Change Islands not knowing what to expect and was immediately enamored by their unrivaled hospitality and acceptance. Without you, this research would have never been possible. Thank you for everything.

A tremendous thank you to my supervisor Dr. Josh Lepawsky for the opportunity of a lifetime in allowing me near total control over my research project. It's hard to believe this all began three years ago based on a few emails. Your consistent guidance, attention, and support amidst the highs and lows of my masters exemplify your character as a professor, mentor, and friend.

Thank you to my committee member Dr. Max Liboiron. Max, you are an inspiration. I often find myself applying your advice and guidance to other areas of my life. I will always remember your steadfast devotion to the well-being of your students above all else. Your thoughtful comments and support made this thesis a reality.

Thank you to Dr. Dean Bavington and Dr. Arn Keeling. Throughout the coursework portion of my masters your encouragement and feedback laid the foundation for greater things to come.

To the faculty and administrative staff in the Department of Geography, thank you for the work you do every day without which none of this would have been possible. I am grateful for the funding provided by the Social Sciences and Humanities Research Council and Memorial University's School of Graduate Studies that supported this research.

To Alex Zahara, Amanda Degray, Anna Crofts, Caitlynn Beckett, Ethan Doney, Ignace Schoot, Jessica Hogan, Nelson Graham, and Robert Deering. It has been an absolute privilege to call you my peers and it is an even greater one to call you my friends. Words

cannot do your unwavering support justice. Thank you for making St. John's a home for this Toronto transplant.

To Anthony Roth, Aras Azargholi, Arash Akhiani, Christian Somody, Justin Slater, Matthew Reijerkerk, Pouyan Tabasinejad, Saman Tabasinejad, and Ryan Cattanach. Thank you for being the wonderful people that you are. I do not know what I would have done without your support, insights, and reassurance during my time in St. John's. I am grateful for every day that I have been able to spend with such an amazing group of people.

Thank you to my sister, Tricia Persaud. You are one of the strongest people I know. I consider myself extremely lucky to have you in my life for it would be nowhere near as fun without you. Some of our family members may compare you and I incessantly, but you are my role model.

To my Mom and Dad for their unconditional love and support throughout my masters. Thank you, Dad, for instilling my relentless work ethic. Mom, if Tricia and I possess even a fraction of your resolve we are unstoppable. I love you all.

Table of Contents

List of Figures

List of Abbreviations

ATI	Access to Information
ATIPP	Access to Information and Protection of Privacy Office
CBC	Canadian Broadcasting Corporation
DTW	Department of Transportation and Works
FICI	Fogo Island-Change Islands
GM	Damen Shipyards General Manager
GNL	Government of Newfoundland and Labrador
HVAC	Heating, Ventilation and Air Conditioning
ICEHR	Interdisciplinary Committee on Ethics in Human Research
LTS	Large Technical System
MUN	Memorial University of Newfoundland
NL	Newfoundland and Labrador
RR	Rolls-Royce Holdings plc
RSM	Damen Shipyards Regional Service Manager
STS	Science and Technology Studies

Chapter One
Introduction

Infrastructure has garnered much attention within geographic and Science and Technology Studies (STS) literature. Frequently, studies of infrastructure explore the implementation of new infrastructures or the effects of infrastructural breakdowns on the relations sustained by these systems. In doing so, these studies carry an implicit assumption that infrastructures functions seamlessly and disruptions constitute deviations from a functional norm. Recent works however have problematized this assumption exploring the everyday practices of infrastructure's users and the practices of repair and maintenance which sustain infrastructural systems. This thesis extends these insights through an examination of the breakdown, repair, and use of a new passenger ferry operating in a rural island community off Newfoundland's north coast.

I begin with an overview of the context for my thesis introducing the MV Veteran and the communities of Fogo Island and Change Islands, Newfoundland and Labrador, Canada. I briefly outline the history of Fogo Island-Change Islands (FICI) ferry service as it pertains to the Government of Newfoundland and Labrador's (GNL) resettlement programme and the introduction of government-operated ferry services. Then, I introduce my research questions to be addressed in the following chapters situating my case within Science and Technology Studies (STS) and geographic literature. Finally, I provide my thesis' methods and the ordering of the following chapters.

1.1 Context

The MV Veteran is the latest roll-on/roll-off ferry[1] to serve the communities of Fogo Island and Change Islands, Newfoundland and Labrador, Canada. In 2013, as part of the GNL's vessel replacement programme, the Department of Transportation and

[1] Roll-on/roll-off ships or Ro-Ro ships are vessels equipped with ramps so vehicles can drive aboard under their own power. In contrast with lift-on/lift-off vessels, Ro-Ro vessels do not require a crane to load cargo or vehicles thereby optimizing loading and unloading times.

Works (DTW) awarded a $50 million contract to Damen Shipyards Group, a Dutch shipbuilding and industrial conglomerate, to construct the new Fogo Island-Change Islands (FICI) ferry. The MV Veteran was the first of two Damen Shipyards Group passenger ferries to be delivered to Newfoundland and Labrador replacing the previous FICI ferry, MV Earl W. Winsor, which as of 2018 had been in operation for forty-six years due to delays in awarding the contract for a new FICI vessel.

Fogo Island and Change Islands are two outport communities situated near Newfoundland's north coast approximately 450 kilometers by road from St. John's, NL (Figure 1). They are the only inhabited islands in an archipelago that is a forty-five-minute ferry ride from the mainland terminal at Farewell, NL. The populations of Fogo Island and Change Islands are sparse totalling 2244 and 208 respectively (Statistics Canada, 2017a, 2017b).

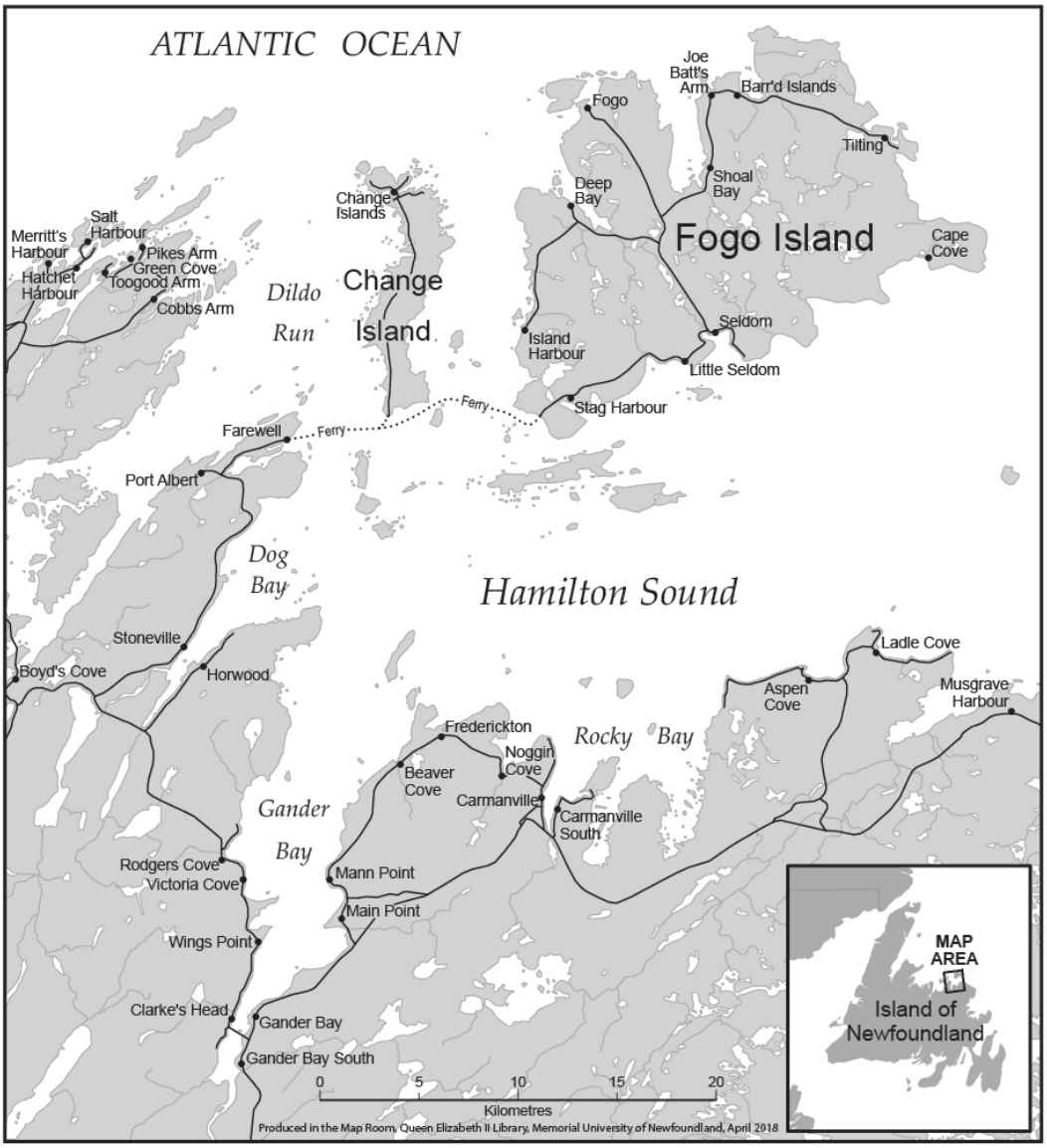


Figure 1: Map of Fogo Island-Change Islands, NL and surrounding region's transportation infrastructure. (Map courtesy of David Mercer, Public Services, Queen Elizabeth II Library, Memorial University of Newfoundland)

The term "outport" in Newfoundland refers to small, remote, coastal communities with seasonal economies almost entirely reliant upon family-based fisheries and merchant trading (Wright, 2001). Historically, the large number of outport communities in rural Newfoundland has been understood by "both Federal and Provincial Governments as

problematic" given their remote locations, small populations, and seasonal economies (DeWitt, 1969: iv). In 1953, GNL under Premier Joey Smallwood initiated the policies of outport relocation, a process that has come to be known as "resettlement" (DeWitt, 1969). During this period GNL instigated, often coercively, the relocation and integration of outports into larger inland towns and cities (Matthews, 1976; Mellin, 2003). The development of towns in central Newfoundland, the construction of the Trans-Canada Highway across mainland Newfoundland post-World War II, and the corresponding transition to automobiles as the dominant form of transportation meant that outport communities like Fogo Island and Change Islands, once hubs for fishing and transport vessels in the North Atlantic Ocean, found themselves at the periphery of newly constructed transportation networks with limited means of access (Smallwood et al., 1984; Walsh and Jones, 2007). The small populations, remote locations, and bleak long-term economic outlook of outports were cited as justification to physically move outports to more populated regions along the road network where infrastructure and essential services would be easier to provide (Matthews, 1976).

With the threat of resettlement for Fogo Island and Change Islands looming in the 1960's, the communities were the focal point of a media campaign undertaken by Memorial University of Newfoundland (MUN) and the National Film Board of Canada titled "The Fogo Process." The Fogo Process documented life on the islands and mobilized resistance against resettlement from the islands' previously divided communities (Mellin, 2003). Fogo Island and Change Islands are two outports that successfully resisted resettlement entailing a responsibility on the part of GNL to provide infrastructural amenities. As Walsh and Jones contend, the "communities that emerged from resettlement unscathed, so to speak, still demanded a modern life, particularly linkages to other parts of the island" (2007: 90). That is, the integration of outports carried the implication of increasing the demand for modern infrastructure and outports' subsequent dependence on amenities located in mainland Newfoundland towns leading to the eventual provision of government operated ferry services.

Today, the ferry is an essential component in all aspects of life on Fogo Island and Change Islands. The FICI ferry service constitutes the sole continuously operating link

between these communities and mainland Newfoundland other than the emergency air services that operate until a back-up vessel is available. Fogo Island and Change Islands have come to be defined by this service as all residents, freight, visitors and the like will encounter the ferry at some point in travelling to and from the islands. Given the near total reliance on the ferry service, the MV Veteran was introduced to improve the reliability and capabilities of both the ferry and the ferry service.

A primary point of contention regarding the MV Veteran concerns the geographies and networks behind the construction, breakdowns, and repairs of the vessel. DTW agreed to purchase the ferry from the Netherlands-based shipbuilder Damen Shipyards Group who built the MV Veteran at their shipyard in Galați, Romania. A decision that was scrutinized in provincial media over building and sourcing the ferry domestically as local companies were quoted stating they were not permitted "to bid on components of the overall project" (Robinson, 2013). Moreover, since the MV Veteran began operations at FICI on December 20, 2015, the vessel's propulsion systems suffered four breakdowns removing the vessel for a total of 144 days between December 20, 2015 and July 6, 2016 given the time needed to diagnose and repair the vessel with the required parts and technicians (CBC News, 2016a). The frequency of the breakdowns and incidents in addition to the MV Veteran's total time out of service created an uproar given the significant allocation of public funds for a ferry servicing a sparsely populated outport community and the expectations of improvement in ferry services with a new vessel (CBC News, 2016b; Ensing, 2016).

The public controversies with which the MV Veteran has become embroiled raise questions about how infrastructure and public life (or more broadly, 'the social') constitute one another. As piece of infrastructure, the MV Veteran has introduced intricate complexities and possibilities for the spaces and spatialities of island life of Fogo Island and Change Islands (Perrow, 1999; Edwards, 2003; Sengers, 2011; Sanne, 2014). What happens when the infrastructures that communities rely on do not function as intended? This question is of great relevance to remote communities such as outports given the limited provision of infrastructural systems within these regions (Baldacchino, 2007; Watts, 2014). There are often few or no back-ups available in these regions so the

timely repair and maintenance of these critical infrastructures is imperative to the livelihoods of periphery communities such as FICI.

This thesis examines the practices of repair and maintenance as they pertain to the MV Veteran and the practices of FICI ferry users as they negotiate the breakdowns and incidents characteristic of the vessel. I present the MV Veteran as an issue of geographic connectivity, not only in terms of the physical connection it affords users between the mainland and the islands, but the social, political, and economic connections that are dependent upon and embodied in infrastructure (Bijker and Law, 1992; Larkin, 2013; Chu, 2014; Harvey et al., 2017; Morita, 2017). In doing so, I situate my case within broader Science and Technology Studies (STS) and geographic literature on infrastructure and the practices of repair and maintenance to be unpacked in Chapter Two.

1.2 Research Questions

The aim of this thesis is to explore the breakdown, repair, and maintenance of the MV Veteran, a critical piece of infrastructure in a remote region of Canada. In doing so, I highlight the differentiated understandings of these events and the practices of the MV Veteran's associated actors in response to the ongoing breakdowns. Here, an overarching research question guides my inquiry: *What do the MV Veteran's breakdowns at Fogo Island and Change Islands reveal about the (re)production of social order?* I approach this overarching question through two sub-questions addressed in Chapters Three and Four respectively:

- How are the practices of repair and maintenance for the MV Veteran undertaken?
- How is the MV Veteran and Fogo Island-Change Islands ferry service used in practice by ferry users?

In Chapter Three, I demonstrate the applicability of conceptions of user-technology relations such as Madeleine Akrich's (1992) 'script' to the practices of repair and maintenance. Akrich's notion of 'scripts' refers to the ways in which designers of technologies attempt to pre-determine or 'script' the technology's potential users and

operational context. Frequently, this approach is applied within the context of technological development overlooking the ongoing acts of repair and maintenance required to physically preserve materials (see Akrich, 1992; Oudshoorn and Pinch, 2003; van Oost, 2003; von Schnitzler, 2008). In applying the 'script' approach to repair and maintenance, I illustrate how the rationales and understandings dictating the development of technologies extend to these practices through the inclusion of Damen Shipyards mandatory manufacturer warranty.

In Chapter Four, I demonstrate how the practices of the MV Veteran's users trouble conceptions of infrastructure as embedded or 'invisible' as they are shaped by the material vulnerability of their limited infrastructural systems (Watts, 2014; Denis and Pontille, 2015; Schwenkel, 2015). The provision of ferry services at FICI and the breakdowns of the MV Veteran shapes the mobilities of FICI residents leading to the formation of what I call 'ferry tactics' to use the ferry as intended (de Certeau, 1984; Cresswell, 2010) Moreover, throughout both substantial chapters of my thesis, I demonstrate how actors' understandings of the MV Veteran, its breakdowns and repairs, and the practices of its associated actors are tied to the spatial characteristics of FICI. My examination of these practices in Chapters Three and Four provide novel insights for STS and geographic literature related to repair and maintenance and infrastructure.

1.3 Methods

Central to the (re)production of the orders embodied in infrastructure are the practices of repair and maintenance (de Laet and Mol, 2000; Graham and Thrift, 2007; Strebel, 2011; Edensor, 2011; Jackson, 2014). Therefore, I looked to follow these practices as they relate to the MV Veteran's breakdowns and incidents over the first eight months of its operations. The MV Veteran was chosen because it suffered from a series of breakdowns early into its service on the Fogo Island-Change Islands route and the resulting media coverage which emphasized the importance of the ferry service to the livelihoods of the islands' residents. In March 2016, I contacted DTW to discuss possibilities for collaboration in determining the effects of the MV Veteran's breakdowns at Fogo Island and Change Islands. Included as a part of this proposal was an ethnography

of the workers performing the repairs to the MV Veteran while the vessel was in St. John's, NL for drydock repairs. If granted permission from DTW, I would follow the repair process on site and document the practices of maintenance workers as they diagnosed and fixed the MV Veteran.

This proposal was declined. The main reason given by DTW was that the resources and staff that would be required for my thesis were inaccessible during DTW's ongoing provincial fleet management activities. In light of this, I opted for an alternate approach to my research by focusing on the deliberations and negotiations that determined how the repairs would take place over the individual actions of specific maintenance workers. Due to a lack of public information on the MV Veteran's repairs in available DTW documents at the time, I filed five Access to Information Requests to GNL's Access to Information and Protection of Privacy Office (ATIPP) requesting all reports, emails, communications, and additional documents related to the MV Veteran from May 1, 2015 to August 31, 2016. During this time, I also gathered policy documents and news articles related to the MV Veteran.

Access to information (ATI) requests are a frequently overlooked source of data given the perceived administrative difficulties in obtaining information and the partial, incomplete character of the data obtained (Walby and Larsen, 2012; Greenberg, 2016). Moreover, while access is granted through formalized ATI requests, issuing agencies approve the material before release allowing the state to "regulate, limit, and protect information it creates" (Gentile, 2009: 145). Therefore, researchers must be cognizant of how the data was produced for it was subject to mediation and constitutes a partial representation of an issue (Walby and Larsen, 2012). Nevertheless, studies have demonstrated the utility of ATI requests as a research tool beyond its immediate associations with activism and investigative journalism (Greenberg, 2016). As Walby and Larsen observe, "if shadowing is not possible for lack of entry, or when dealing with agencies that do not allow researchers entry (such as some security and intelligence agencies), ATI requests present a viable means of producing textual data" (2012: 32). ATI requests offer a partial view of the texts by which government organizations operate

including memos, briefing materials, and emails that would not be accessible otherwise (Smith, 2001; Walby and Larsen, 2012).

Given the content of the ATIPP requests obtained, I draw upon elements of 'institutional ethnography' (Smith, 1987; DeVault, 2006). Institutional ethnography traces social relations as they relate to work processes. Institutional ethnographies are "built from the examination of work processes and study… how they are coordinated, typically through texts and discourses of various sorts" recognizing that 'texts' such as policy documents and medical charts are "technologies of social control" (DeVault, 2006: 294). As DeVault contends, this approach is oriented towards illustrating "how activities in local settings are coordinated and managed extralocally" by different institutions which was of importance in my case based on the physical distribution of repair facilities in relation to the MV Veteran's position at FICI (2006: 295).

The ATIPP requests upon being received were read, sorted, and coded. Thematic coding of the collected documents qualitatively looks at the frequency of words and themes across the transcripts and the collected documents to observe common topics and determine how they relate to one another (Crang and Cook, 2007; Bernard, 2012; Gatrell et al., 2012). Thematic coding involves decontextualizing collected data into themes or categories identified by the researcher. Therefore, caution must be exercised to ensure the contextual aspects of the case which define relationships between the identified categories are not neglected (Ayres, 2008).

Due to the scope of many of the requests, they often included communications not immediately related to the MV Veteran, its breakdowns, and repairs. Therefore, coding at first was done in broad categories with labels based on the themes that emerged in my initial reading of the requests where I used my research questions as guidelines. Examples of the labels created include: 'breakdown', 'warranty claim', 'press coverage', 'repair', and 'action planning'. After this initial period of coding, I went through the labels again to determine how these were understood by different actors looking for moments of conflict between their understandings of these events and their negotiations over the most appropriate way to proceed with repairs.

1.3.1 Interviews and Field Work

In addition to the elements of institutional ethnography outlined above, my thesis also incorporated aspects of ethnographic field work to address my research questions. From June 20, 2016 until July 31, 2016, I lived on Fogo Island and Change Islands to see how the MV Veteran was used in practice by residents and visitors alike. Prior to my arrival at FICI, my research received full ethics clearance through MUN's Interdisciplinary Committee on Ethics in Human Research (ICEHR Number: 20170160-AR) to ensure compliance with the guidelines of the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans*.

I engaged in participant and non-participant observation. During my field work, I found that residents and the ferry's crew had developed tactics to minimize waiting and the effects of service delays and interruptions (de Certeau, 1984). These tactics were documented while at the ferry terminals and in line-ups by photographing and recording them in my notebook as they happened at the time. In addition to my own observations, I also recorded general notes from informal conversations with others in the line-ups and about the practices taking place at the terminals. The time I spent at the ferry terminals would vary wildly ranging from as little as fifteen minutes to over four hours in a few instances. This high variability was due to many factors such as environmental conditions, the volume of traffic or emergent mechanical delays. Much like other ferry users then, my field work period on Fogo Island and Change Islands was marked by lots of waiting, long line-ups, and extended delays. However, these instances revealed the sense of community and solidarity which exists amongst the islands' residents. The multiple trips to and from the islands were times where I was privy to the relationships that are made and rekindled between families, friends, and visitors waiting for the ferry to come into view.

I had visited the Fogo Island prior to the start of my field work in May 2016 to assist in another research project over a period of three days. During that first visit, I established contacts at Fogo Island through informal discussions about life on the islands and the community's relationship with the MV Veteran and the ferry service at large. I informed them of my upcoming field work period and they were helpful in identifying

potential contacts for when I would return to the islands in June 2016. In the three weeks prior to the start of the six-week period, I informed these residents that I would be staying on Fogo Island and asked for their consent to be interviewed once I arrived. Upon receiving permission from potential participants for an interview, I provided a rough overview of the topics to be addressed in the interview such as life on the islands and how their livelihoods are affected by the ferry service.

Interviews offer the means to fill in the gaps of other methods such as archival and document based research while providing insight into the motivations, behaviours, and experiences of the interviewee while discovering what issues and information are relevant to them (Dunn, 2010; Dowling et al., 2016). While useful in discerning participants' understandings of an issue, interviews may prove problematic for they are subject to the dispositions of both researchers and participants. As Hollway and Jefferson contend, during "informal everyday dealings with each other, we do not take each other's accounts at face value, unless we are totally naïve; we question, disagree, bring in counter-examples, interpret, notice hidden agendas" (2000: 3). The formalized structure of the research interview does not negate the subjectivities of those involved requiring respect for participants and careful attention to the subtleties dialogues present (Hollway and Jefferson, 2000). Therefore, interviews were semi-structured premised upon broad topics postulated in my research questions to open and develop dialogues with informants without foreclosing on potential issues and topics that could emerge during interviews (Crang and Cook, 2007; Dunn, 2010).

In addition to the scheduled interviews with residents, I spent the first two weeks on Fogo Island visiting the islands different communities with the intention of discussing the MV Veteran and ferry service with others who are affected by it. Of course, this group includes all residents and visitors who use it so I looked to interview specific individuals whose activities might be disproportionally affected. In doing so I identified town councillors, business owners and operators, frequent ferry users, and current and former ferry crew members.

I then approached them asking for oral or written consent to interview them. This often took place after a lengthy introduction given that I was a visitor to the islands. Much

of the first two weeks on the islands devoted to establishing contacts was spent explaining the purpose of the project and how I came to be in outport Newfoundland having lived in Toronto, Ontario for all my life. Once the ferry service was mentioned, people overall found the project to be a welcome opportunity to discuss the MV Veteran, ferry service, and how it shapes life on the islands. After these informal conversations, we would schedule a formal interview usually a few days afterward. Upon receiving consent, I would return with my field notebook and audio recorder. Interviews took place at the agreed upon time in the participant's preferred location, frequently this was their residence or place of work.

I conducted a total of twenty-six semi-structured interviews of which sixteen were recorded. Participants were informed prior to the start of the interview that they could request anonymity in quote attribution, that the interview not be recorded, they could skip any questions they did not feel comfortable answering during the interview, and ask that the interview end at any time. For those who indicated that they did not want to be recorded, only notes in my field notebook were taken during their interviews and I recounted the main details from their interview afterward.

During this six-week period, I also kept weekly updates with my supervisor and committee while in the field. These exchanges over email served to recount observations and my field work activities. Here, my supervisor and committee pointed to details to further consider in my summaries and provided support as it was my first time ever doing field work. It was invaluable having their encouragement to stay on track despite the emergent issues presented by field work such as interviews being frequently sidetracked, rescheduled or cancelled. These communications were essential in my attempt to keep to fieldwork timelines given the limited duration of my stay on the islands.

On August 1, 2016, my time on Fogo Island and Change Islands came to an end. I returned to MUN in St. John's, NL to debrief with my supervisor with my compiled field notebooks, audio recordings, and photographs. Upon my arrival home, I began the process of organizing my data to draft my thesis. I started by sorting the different data and transcribing my audio files and field notes. After transcriptions were completed I began the process of coding my data using Microsoft Word and Excel to highlight key themes

within my transcripts. As with the ATIPP requests and news articles I had collected, I created labels in my initial read-through from themes in the data. For example, these labels included: 'scheduling' and 'line-up' if the delays or tactics were mentioned and 'impressions' and 'reputation' if the status of the MV Veteran or the ferry service was being described. With my labels created and data organized, I went through my data again to see how the practices to use the ferry were described by informants.

1.4 Ordering of Chapters

Having presented the context, research questions, and methods of my thesis, I conclude the introduction by outlining the organization of my thesis. Chapter Two is the literature review which situates my case within the relevant STS and geographic literature on technology, infrastructure, and repair and maintenance. In this chapter, I provide the analytical framework for my thesis which is further developed in Chapters Three and Four. In short, infrastructures are presented as a deeply uneven way of ordering the world which purposely and inadvertently privileges certain groups at the expense of others. Attention to the material vulnerability of infrastructure and acts of repair and maintenance reveals this unevenness extends to the practices tasked with its preservation.

Chapters Three and Four are the substantial chapters of my thesis which address my two research questions. Chapter Three explores the breakdowns and incidents that afflicted the MV Veteran and practices of repair and maintenance. I highlight the differentiated understandings of the MV Veteran's breakdowns between the vessel's associated actors and how these extend to its repair and maintenance. Chapter Four discusses how the MV Veteran's breakdowns and the provision of emergency services leading to the formation of their 'ferry tactics'.

Chapter Five concludes my thesis recounting the main findings and connections between Chapters Three and Four. Here, I summarize the contributions of my thesis as well as offer future directions for research on infrastructure and the practices of repair and maintenance.

Chapter Two

Analytical Framework: Infrastructure, Material Vulnerability, and Agency in Repair and Maintenance

My thesis begins with the breakdowns of the MV Veteran, taking them as an analytical entry point to the social relations underpinned by the vessel. I focus on how those relations are sustained and remade through acts of repair and maintenance and through the practices of the vessel's users who must cope with the breakdowns. In doing so, I position the MV Veteran as infrastructure. Infrastructures function as a framework for the practices of different groups influencing them through deliberate or inadvertent efforts and the practices of repair and maintenance are moments when those orders can be both reproduced and disrupted (Winner, 1980; Star and Ruhleder, 1996; Jackson, 2014; Ureta, 2014; Harvey et al., 2017). However, rather than focusing solely on the interruption of social orders during periods of infrastructural breakdown, I focus on the vulnerability of infrastructure and possibilities of agency in practices of repair and maintenance that restore infrastructure. By doing so, I draw attention to the ways in which infrastructures constrain the practices of its users and the ways in which users attempt to resist or redefine their envisioned practices.

To support later empirical chapters, I begin by distinguishing between technologies and infrastructure, detailing ways in which they influence and are influenced by the practices of individuals and groups. Then, I discuss the paradoxes of infrastructure articulated through the risks functioning infrastructures can present and its material vulnerability. Following this, I discuss the uneven physical distribution of infrastructures and how this physical unevenness comes to shape everyday experiences and understandings of place. Finally, I detail user practices amidst the order and unevenness embodied in infrastructure by exploring the tensions in practices of repair and maintenance which aim to preserve or re-script infrastructures.

2.1 Technologies, Large Technical Systems, and Infrastructure

Before discussing infrastructures and the ways they influence practices as they pertain to the MV Veteran, it is necessary to distinguish infrastructure as a concept from

technology and large-technical systems (LTS) as they pertain to Science and Technology Studies (STS) and geographic literature. Paul Edwards notes that infrastructure, "has become a slippery term, often used to mean essentially any important, widely shared, human constructed resource" (2003: 186-187). Technology, LTS, and infrastructures share commonalities with regard to their development, stabilization, and permanence over time (see Hughes, 1983; Bijker et al., 1987; Bijker and Law, 1992; Oudshoorn and Pinch, 2003). However, infrastructures as Brian Larkin contends possesses a "peculiar ontology" because they "are things and also the relation between things" (2013: 329). Infrastructures "operate on differing levels simultaneously, generating multiple forms of address" (Larkin, 2013: 330). By these 'multiple forms of address' Larkin refers to the political, semiotic, aesthetic, and spiritual characteristics ascribed to infrastructures in addition to their technical functions (Larkin, 2013; Chu, 2014; Ishii, 2017; Morita, 2017).

The concurrent scales on which infrastructures function draws attention to the different means by which politics can be constituted (Carse, 2012; Larkin, 2013; Jensen and Morita, 2015). The politics I refer to here entails "the manner in which individuals seek to influence and control others who are not closely related to them but live together in large social groups" (Strum and Latour 1987: 796). The enduring control over the material resources afforded by modern infrastructural systems "play a significant role" in the ability of an individual or groups to control and influence others (Strum and Latour, 1987: 797). Infrastructures then are political for they are material structures that offer durable control and influence of flows of goods, ideas, and people across space while reconfiguring spaces themselves (Castells, 1996; Graham and Marvin, 2001; Akhter, 2015).

Therefore, many definitions of technology emphasize how they are ways of building order in the world (see Winner, 1980; Foucault, 1982; Latour, 1990). Technology as Feenberg argues "provides… a framework within which practices are generated and perceptions ordered" (2002: 19). Here, Langdon Winner's (1977) parsing of 'technology' into three constituent elements folded together proves useful. The first is *apparatus* or the physical objects involving the tools, instruments, and appliances used to complete a variety of tasks. The second is *techniques* including the skills, procedures, and

methods developed to accomplish tasks with those physical objects. The third is *organization* encompassing social arrangements like factories and bureaucracies responsible for the development of the object. Tracing the development of technology through alterations in these three elements demonstrates how "technologies are not merely aids to human activity, but also powerful forces acting to reshape that activity and its meaning" (Winner, 2004: 105). For example, Winner highlights how the adoption of new medical techniques and instruments "transforms not only what doctors do, but also the ways people think about health, sickness, and medical care" (2004: 105). That is, the development and implementation of new technology reproduces certain social relations and values which can be traced through changes in its associated apparatuses, techniques, and organizations.

The LTS approach applies the constituent elements of technology identified by Winner (1977) to technical systems on a macro-scale. Hughes (1983) argues that infrastructures begin as collections of smaller, independent apparatuses each with their own distinct techniques and organizations. Eventually, one of two things will occur: the independent systems will consolidate themselves into a single network with unifying standards or one of those technological systems will come to dominate the others. With the establishment of a single, ubiquitous network, the LTS will possess an inertia that resists change given the scale of organizations and people committed to its operation (Hughes, 1987).

In *Networks of Power*, where he coins the phrase "large technical system," Thomas Hughes (1983) details the creation and growth of electrical systems. His account of infrastructural development in the form of LTS explores how individual technologies eventually become established technical systems that endure over time. In his account, Hughes highlights system builders who pay attention to the social contexts of their technical inventions. Hughes argues that successful entrepreneurs such as Thomas Edison could push their devices to be adopted over others because they considered the organizational and social characteristics of their products in an infrastructural framework rather than as independent technological devices. For instance, the lightbulb was not a new invention at the time, but Thomas Edison stood out amidst others because he

envisioned an integrated system of electrical lighting based upon his generators and cables (Jackson et al., 2007). Edison not only designed his lightbulb, but also the social, political, and economic context in which his innovations could be successful (Hughes, 1983; Bijker and Law, 1992).

While there are principles that can be taken from the LTS approach and applied to that of infrastructure such as the importance of social institutions in shaping emerging systems, there are important differences relevant to the case of the MV Veteran. One of the implied objectives of a LTS or a technology is that of stabilization or closure of its 'interpretative flexibility' between its different relevant social groups in some form (Bijker, 1995; Furlong, 2011). Closure "results in one artifact – that is, one meaning as attributed by one social group becoming dominant across all relevant social groups" (Bijker, 1995: 271). Bijker (1995) demonstrates closure in his case of the bicycle as different bicycle designs supersede one another premised on the meanings attached to them. Similarly, in the case of a LTS, Hughes argues when a "component is removed from a system or if its characteristics change, the other artifacts in the system will alter characteristics accordingly" to ensure stability of the broader system (1987: 51). Stability in a LTS implies that major external shifts are required for transitions to the system which risks obscuring the importance of minor changes to infrastructural systems made by users and the material vulnerability of objects (Barad, 2003; Furlong, 2011; Denis and Pontille, 2015).

Moreover, LTS's approach places emphasis on system-builders and the adoption of technologies. In doing so, a LTS approach risks overlooking the role technical systems play in the production of space (Coutard et al., 2005; Furlong, 2011). Hughes for instance, in his emphasis on the recursive development of society and technology contends that "the convention of designating social factors as the environment, or context, of a technological system should be avoided" (1987: 52). However, studies have demonstrated how the environment is integral to the production of technology and society through infrastructural developments within urban and rural contexts (Kaika, 2005; Furlong, 2011; Carse, 2012; Morita, 2017). Morita (2017) for instance in his case of rice farming in the Chao Phraya river delta points to the multispecies entanglements of

infrastructure. The agricultural rice fields as he demonstrates are an inseparable component of the canal infrastructure of the region influencing the water management practices within the delta as the fields affect river flow rates and patterns. In doing so, Morita (2017) reveals how technology, society, and the environment are mutually reproduced as the environment itself is enrolled into infrastructural networks.

Therefore, the MV Veteran requires an analytical framework which considers the practices of users, the vulnerability of materials, concurrent levels of address on which it operates, and the roles these have in the production of space. Here, concepts from infrastructure studies prove useful as a way of bridging theoretical gaps between STS work on individual cases of technologies and the hierarchal, system-builders approach adopted by LTS studies. Infrastructures have been recognized as a way "to understand culture, power and social change from both top-down and bottom-up perspectives" given their centrality in shaping everyday experiences and understandings of space (Dourish and Bell, 2007; Smith, 2016: 165). Studies of infrastructure adopt less hierarchal approaches, emphasizing the emergence of infrastructure in relation to the practices of the communities which develop around them (Star and Ruhleder, 1996; Carse, 2012). This conceptual shift as Star and Ruhleder argue "de-emphasizes things or people as simply causal factors in the development of such systems" in favour of emphasizing changes in infrastructural relations and practices (1996: 113). Thus, infrastructures are sites that reveal the contested negotiations, struggles, meanings, and relations between their associated actors on multiple levels of address (Carse, 2012; Jensen and Morita, 2015; Kallianos, 2017).

2.2 Infrastructure and Practice

Star and Ruhleder contend infrastructure is a relational concept which "emerges for people in practice, connected to activities and structures." (1996: 112). As is the case with individual technologies, infrastructures are a framework for organized practices, simultaneously reproducing and transforming them. However, the introduction of new infrastructures is not politically neutral as they "generate effects and structure social relations, either through engineered (i.e. planned and purposefully crafted) or non-

engineered (i.e. unplanned and emergent) activities" (Winner, 1980; Harvey et al., 2017: 5). That is, infrastructures are political as their development and implementation deliberately and inadvertently influences the social relations and practices of different individual and groups. Here, I differentiate between the political address of infrastructural systems on the level of users' everyday practices.

The implementation of infrastructures can involve the concerted efforts of groups to use infrastructure "as an enabling or disabling force in the course of everyday political struggles" with other groups (Chu, 2014: 352). For instance, Anand (2012) points out the difficulties faced by Muslim settlers who are disconnected from formal access to the municipal water supply of Mumbai. The settlers' physical disconnection is not a result of a lack of knowledge or capability on the part of the city's hydraulic engineers, but the "cultural politics of the city" which constitute Muslim settlers as abject residents leading city engineers to neglect the region's water infrastructure (2012: 504). In response, the settlers must develop their own tenuous, unauthorized connections to the main water network, circumventing the city's formal application process. Anand (2012) demonstrates how user practices are shaped and structured by the purposeful arrangement of physical infrastructures. The distribution of water infrastructure in Mumbai, in turn enacts identities and reproduces differences between groups based on their differentiated access to the city's water supply.

Examining the politics articulated through infrastructures also reveals cases where the practices of users are inadvertently shaped over time (Winner, 1980). Dalakoglou's (2010) work on the construction of highways in Albania demonstrates how infrastructure facilitates inland flows and mobilities that emerge in practice. The highways, constructed within the framework of socialist modernism, interrupt "vernacular landscape use and perceptions imposing new types of temporal and spatial practices" upon their users and the communities they pass through (Dalakoglou, 2010: 146). Initially, the highways were built by Albanian citizens under the direction of the state, but were unusable for much of the population given extensive state limitations on the private ownership of vehicles. Following Albania's transition to a market economy, the road network now occupies a central position in the migratory practices of Albanian citizens and their economic

relations with European Union. Similarly, the MV Veteran as the only continuously operating link between Fogo Island-Change Islands and mainland Newfoundland affords mobility for the islands' residents as the highways do in Dalakaglou's case. However, the ferry imposes new spatial and temporal practices upon its users such as adhering to a ferry schedule whose effects are made known after its implementation. Thus, infrastructures structure the accessibility of resources and influence the practices of different actors based upon their lived experiences with infrastructure, which are determined in part by the concerted efforts of operators or the inadvertent effects made known following their introduction (Harvey et al., 2017).

2.3 The Paradox of Infrastructure

Infrastructure constitutes a site of paradoxical tension through the simultaneous benefits and risks that infrastructure presents (Howe et al., 2016). The intended purpose of infrastructure is to produce stability and order by mitigating risk, yet they introduce new risks (Howe et al., 2016: 556). Functioning infrastructures integral to modern industrial practices have led to "new kinds of industrialized, decision-produced incalculabilities and threats" which are impossible to determine ahead of time (Beck, 1992: 22). Historical risks, Beck argues, were tied to a *lack* of infrastructure such as city plumbing, whereas risks today have their basis in "industrial *over*production" culminating in global threats (1992: 21, Emphasis in original). For example, Howe et al. (2016) point to the disproportionate contributions to global climate change from pollutants released by those with access to modern, fossil fuel-powered and fossil fuel-creating infrastructure. In these regions, infrastructure's successful operation entails the release of emissions and acceleration of climate change processes.

Another aspect of infrastructural paradox concerns the material durability and vulnerability of infrastructural systems (Star and Ruhleder, 1996; Graham and MacFarlane, 2015; Howe et al., 2016). The successful function of infrastructure frequently entails the assumption that they are materially solid or sturdy (Howe et al., 2016). Because of this, Star and Ruhleder (1996) assert that infrastructure is invisible until moments of breakdown, as infrastructure is the backdrop for the tasks it supports. It

is only during breakdowns and periods of disaster that infrastructures become visible as their failures "cause a collapse of the normal relations between humans and their surroundings" (Ishii, 2017: 694). However, the apparent rigidity and stability of infrastructure "can be juxtaposed against the inevitable degeneration of its matter over time" (Howe et al., 2016: 553). Recent works problematize infrastructural invisibility and stability by considering vulnerability and disorder as modes of everyday existence (Furlong, 2011; Dalakoglou and Kallianos, 2014; Denis and Pontille, 2015). For instance, studies examining the practices of repair and maintenance reveal that the apparent stability of infrastructure is subject to continuous breakdown and decay without these timely interventions (Graham and Thrift, 2007; Strebel, 2011; Jackson, 2014; Tironi, 2015).

Moreover, the assumption of infrastructural stability and durability is decidedly a 'First World' phenomenon in which breakdowns are considered deviations from the uninterrupted normalcy of their operation (Graham and Thrift, 2007). It may be the case that different groups' experiences with infrastructure are characterized by constant disruption or disorder through concerted efforts, unintended effects or the inability to mobilize the necessary resources for repair and maintenance (Anand, 2012; Chu, 2014; Schwenkel, 2015; Kallianos, 2017). Julie Chu demonstrates the "tensions of redevelopment through accounts of infrastructural disrepair" experienced by Chinese citizens resisting eviction in a Fuzhou neighbourhood slated for redevelopment (2014: 353). Citizens' everyday experiences are marked by the "slow crumble and sudden disconnections" from infrastructures facilitated by the practices of state bureaucracies and land developers to negate the impacts of citizens' protests against the redevelopments (Chu, 2014: 352). Similarly, Christina Schwenkel (2015) highlights the inability of the Vietnamese government to maintain socialist housing developments in Vinh City ultimately leading to the decay of their water infrastructure. The persistent state of ruination requires "the collaborative efforts of both men and women, temporarily suspending the gendered division of labor around infrastructure" in which women are excluded from the restoration of technical systems so water infrastructure can function as intended (Schwenkel, 2015: 531). In both cases, the decay and material vulnerability of

infrastructure constitutes a site that reveals the contested power relations between and within groups of state actors and citizens despite the presumed stability and invisibility of infrastructure.

2.4 Infrastructure and Unevenness

Infrastructures "cross social, economic, and geographical boundaries," affecting individuals and groups who experience them differently (Carse, 2012: 543). In *Splintering Urbanism*, Graham and Marvin (2001) demonstrate how infrastructures "unevenly bind spaces together across cities, regions, nations and international boundaries whilst helping also to define the material and social dynamics, and divisions, within and between urban spaces" (2001: 11). Graham and Marvin (2001) contend that the development of networked infrastructures in predominately Western cities initially conformed to what they call the 'modern infrastructural ideal' which entailed the integration and standardization of infrastructural systems. Following the collapse of the 'modern infrastructural ideal' beginning in the 1960s, Graham and Marvin argue that:

> "the diverse political and regulatory regimes that supported the roll-out of power, transport, communications, streets and water networks towards the rhetorical goal of standardised ubiquity are, in many cities and states, being 'unbundled' and 'splintered' as a result of a widespread movement towards privatisation and liberalisation" (2001: 382).

The splintering within cities is the result of political and regulatory regimes supporting the segregation of integrated infrastructures which allows for 'bypass' strategies. These bypass strategies lead to the creation of 'premium networked spaces' which connect more powerful users and places at the expense of less powerful ones (Graham and Marvin, 2001). The creation of premium networked spaces ultimately limits a user or group's "ability to extend their influence in time and space" as they lack access to the necessary connections (Graham and Marvin, 2001: 288).

While Graham and Marvin (2001) address the uneven differentiation and division of spaces produced by infrastructural networks, the notion of 'splintering urbanism' "presumes the existence of modern infrastructural networks with universal or at least widespread provision" in which services were already bundled (Kooy and Bakker, 2008: 1844). For example, Fernández-Maldonado (2008) demonstrates the failure of the modern infrastructural ideal in her case of utility provision in Lima. Here, the universal integration of infrastructural networks was historically hindered by social inequalities and widespread poverty within Lima. Therefore, "the dual circuits (of premium networks and excluded spaces) that would characterize the new situation in urbanism have been a historic feature" of the city (Fernández-Maldonado, 2008: 1893). In such instances, the bundling underpinning the modern infrastructural ideal failed to be implemented or was absent altogether (Coutard, 2008; Fernández-Maldonado, 2008; Kooy and Bakker, 2008).

Similarly, the notion of splintering urbanism fails to account for the different ideological regimes under which infrastructures within the Global South are often constructed (Kooy and Bakker, 2008). Graham and Marvin (2001) position neoliberal reforms and the privatization of infrastructural networks as central to the creation of premium networked spaces which segregate cities. However, considering the specific contexts of cities reveals the simultaneous segregation and integration of infrastructural networks. For instance, Alana Boland highlights how water networks in Chinese cities were already highly fragmented based on class differences from the "organization of production and social reproduction around industrial and institutional work units" (2007: 24). The integration and further fragmentation of water infrastructures then continues following China's market reforms with the development of premium water networks in select cities.

The experiences and practices of infrastructure's users then are highly contingent and context dependent, informed by the relations which constitute and characterize different places as in Fernández-Maldonado and Boland's cases. Therefore, the MV Veteran requires a framework to account for the variable circumstances and ongoing relations under which infrastructures operate. Here, Doreen Massey's notion of a 'global sense of place' proves useful for conceptualizing unevenness as it pertains to

infrastructures by drawing attention to the multiplicity of relations that influence users' everyday experiences and understandings of space. Massey defines 'places' as:

> "moments in networks of social relations and understandings, but where a large proportion of those relations, experiences and understandings are constructed on a far larger scale than what we happen to define for that moment as the place itself" (1991: 28).

As Massey advocates, considering the relations playing out beyond the immediate context draws attention to the multiple levels of address that constitute places. The 'global sense of place' integrates the local and the global demonstrating how "there are real relations with real content - economic, political, cultural - between any local place and the wider world in which it is set" (Massey, 1991: 28). Infrastructures are deeply rooted in this integration for they facilitate flows of goods, people, and ideas stretching social, cultural, and economic relations across space "from the household to the local area to the international" (Massey, 1991: 27; Larkin, 2013).

Moreover, Massey cautions against narratives of universalization which assume that places are equally enrolled and positioned in wider social relations. A performative reading of place attributes a place's uniqueness to the wider social relations in which it is situated (Massey, 1993; 2005). This distinction is required as:

> "different social groups and different individuals are placed in very distinct ways in relation to these flows and interconnections… different social groups have distinct relationships to this anyway-differentiated mobility: some are more in charge of it than others; some initiate flows and movement, others don't; some are more on the receiving end of it than others; some are effectively imprisoned by it" (Massey, 1993: 61).

When applied to infrastructures, Massey's conception of place as relational and performative draws attention to not only the uneven distribution of mobilities afforded by

infrastructure, but the ways in which mobility and control over mobility can actively weaken other groups. Thus, infrastructures are central to a politics of mobility in which control over mobility can reflect and reinforce the power of certain groups and individuals over others in concerted or inadvertent ways (Massey, 1993). At Fogo Island-Change Islands for example, the differentiated positioning of social groups in relation to the mobility afforded by infrastructures is revealed following the implementation and breakdowns of the MV Veteran. The peripheral location of the islands with its limited connections to other places 'effectively imprison' the islands' residents for they are unable to initiate those flows themselves without ferry services.

2.5 Action Given Order and Difference

The physical location of the MV Veteran and the actions of its users and operators reveal it to be a site "through which the identity and status of relevant stakeholders and the distribution of benefits and losses" are being worked out simultaneously as they conflict with the intended protocols envisioned by Damen Shipyards (Jackson et al., 2007). For this reason, Akrich's (1992) material-semiotic notion of 'scripts' proves useful for conceptualizing the MV Veteran.

Akrich (1992) introduces 'scripts' as a way of conceptualizing new technologies with regards to designers and users in which she claims that designers inscribe their visions and predictions of the world in the technical content of a new object. The development of new technologies entails designers constructing representations of imagined users' "specific tastes, competencies, motives, aspirations, political prejudices, etc." that are materialized in new objects (1992: 208). For instance, Ellen van Oost (2003) points out the materialization of gender roles in the scripts of men's and women's electronic shavers. The design of the razors in terms of their appearance and added features were premised upon and served to reinforce their manufacturer's imaginations of male users as technologically competent and female users as technophobic.

However, Akrich (1992) also notes that designer imaginations of hypothesized users are not fixed. It may be the case that users and the technical object come to realize their hypothesized roles just as they may resist those roles or redefine them altogether. As

in van Oost's (2003) case of shavers, users are not forced to adhere to the gender script. Women outright reject the shavers' gender script by not shaving or using a man's shaver or modify their imagined role in the gender script by taking the encased women's shaver as a "technological challenge" to be opened (van Oost, 2003: 207). Thus, the script approach to analyzing user-technology relations draws attention to not only those who adhere to the object's script, but actors who deviate and modify it through their actions of non-compliance.

The warranty implemented by Damen Shipyards constitutes an attempt to 'script' (Akrich, 1992) repair and maintenance by regulating the moments where "infrastructure is normalized and integrated into broader… infrastructure configurations" (Castán Broto and Bulkeley, 2014: 200). Repair and maintenance practices are ongoing processes of adjustment which make infrastructure more familiar to users and manufacturers in response to material agencies and mobilities unforeseen in their development "as new elements are included, redefined, and/or discarded" (Edwards et al., 2009; Castán Broto and Bulkeley, 2014; Ureta, 2014: 369). As repair and maintenance are performed to ensure the status quo is preserved, it follows that those who perform repair work would also have their actions scripted as infrastructures are developed with specific imaginations of users on the part of designers.

The script approach to conceptualizes "both designers and users as active agents in the development of technology" (Oudshoorn and Pinch, 2003: 11). However, as Oudshoorn and Pinch point out, "the world of users, particularly the cultural and social processes that facilitate or constrain the emergence" of users' non-compliance is often overlooked in actor-network approaches (2003: 11). That is, the emphasis on agency in the construction of technologies draws attention away from "the effects of the already constructed attributes of the world" and how these affect the ability of individuals or groups to act (Kleinman, 1998: 288). Therefore, discussions of actors' agency must consider the influences of structures for they impose constraints on the ability of actors to act (Klein and Kleinman, 2002; Liboiron, 2017). Kleinman defines structures as:

> "specific formal and informal, explicit and implicit 'rules of play,' which establish distinctive resource distributions, capacities, and incapacities and define specific constraints and opportunities for actors depending on their structural location. Power and its operation are then understood within this structural context" (1998: 289).

These rules of play as Liboiron argues "manifest in norms, practices, and material infrastructure" which dictate acceptable and allowable actions for actors (2017: 507). In short, material infrastructures are sites which reflect and serve to reproduce the structures through which they were developed as infrastructures (re)shape the practices of users and the power asymmetries between groups (Harvey et al., 2017). In chapter three, I contend this shaping extends to practices of repair and maintenance where I position the warranty for the MV Veteran as a structure which affords certain actors advantages "over others by endowing them with valued resources or… by serving as resources themselves" through their ability to influence the vessel's repairs (Kleinman, 1998: 289).

2.6 Repair and Maintenance: Re-scripting Infrastructures

By adhering to the user-designer dualism emphasizing the agency of actors in the development of technology, aspects such as the vulnerability of objects, structural constraints upon agency, and the realization of 'scripts' through human actions of repair and maintenance are ignored (Denis and Pontille, 2014). Recent studies exploring practices of repair and maintenance have sought to "consider the multiplicity of context and action" of materials and the social activities in which they are used (Jarzabkowski & Pinch, 2013: 586). In these texts, repair and maintenance are essential processes in the preservation and extension of social orders (Orr, 1996; Henke, 2000; Graham and Thrift, 2007; Jackson, 2014; Denis and Pontille, 2015). As Steven Jackson states, repair constitutes:

> "the subtle acts of care by which order and meaning in complex sociotechnical systems are maintained and transformed, human value is preserved and extended,

> and the complicated work of fitting to the varied circumstances of organizations, systems, and lives is accomplished" (2014: 222).

For example, de Laet and Mol (2000) contend that infrastructures and a community's existence are inseparable from localized practices of repair and maintenance. In their case of a Zimbabwe bush pump, "the pump's working order depends on the maintenance programme, which in turn depends on a community to keep it up and running" (de Laet and Mol, 2000; 245). The maintenance programme for the bush pump is upheld by the community whose existence would not be possible without the fresh water provided by the pump. Likewise, Verhaegh and van Oost (2012) highlight the preservation and extension of sociotechnical systems and human value through the work of a volunteer Wi-Fi repair collective. The work of volunteer maintenance workers preserves the functions of their Wi-Fi networks and in return, the collective grants the workers status and recognition within the community depending upon the quality of their repairs. In both cases, repair and maintenance are central to the establishment and preservation of infrastructures, livelihoods, and organizations.

Repair and maintenance constitute the means "by which the shape, standing, and meaning of objects in the world is produced and sustained" (Jackson, 2014: 234). To repair and maintain is "to guarantee stability, to provide things with a level of permanence they do not possess 'naturally'" (Denis and Pontille, 2014: 411). Yet, rather than inventing order, repair and maintenance are usually understood as being entirely premised upon, "the existence of a state of 'order', usually located in a certain previous configuration… understood to be the 'normal' situation" (Ureta, 2014: 370). That is, the practices of repair and maintenance also repair and maintain the status quo.

Yet, because repair and maintenance are sites of scripting and re-scripting, they are also moments of vulnerability which may disrupt the status quo and presumed normality of the orders infrastructure embodies. Studies examining practices of repair and maintenance often position them as inherently positive in the name of skillful preservation amidst a world marked by perpetual breakdown or rampant consumerism (Watson and Shove, 2008; Dant, 2010; Tironi, 2015). However, repair and maintenance

are “not always heroic or directed to noble ends” (Jackson, 2014: 233). What constitutes good in relation to these practices is not universal, but case dependent (de Laet and Mol, 2000). Repair and maintenance are exclusionary. They are selective modes of attention which privilege certain groups and orders at the expense of others (cf Martin et al., 2015; Murphy, 2015). Repair and maintenance constitute ongoing commitments to preserve systems which may “work with and through the grain of hegemonic structures, rather than against them’’ (Murphy, 2015: 719).

Attention to the vulnerability of infrastructures changes our understanding of repair and maintenance work from practices of monotonous preservation to practices which are guided by different rationales and privilege the preservation and extension of certain orders over others (Graham and Thrift, 2007; Ureta, 2014; Barnes, 2017). For example, in their study of Parisian subway workers, Denis and Pontille (2015) demonstrate how the wayfinding sign system of the subway exists in two states simultaneously in which stability is achieved through acknowledging the system’s vulnerabilities. One version is that of the orderly and stable navigation system used by subway riders whereas the other is enacted through the skilled vision and care of the maintenance worker (Grasseni, 2007; Mol et al., 2010; Puig de la Bellacasa, 2011; Ureta, 2016). The signs of the wayfinding system are experienced as fragile, broken, and vulnerable by the maintenance worker as the signs deviate from their standardized appearance and functionality. Denis and Pontille emphasize the ephemeral character of the wayfinding system’s order noting that “it draws on situated reordering micro-processes that have to be continually repeated” by maintenance workers (2015: 353).

The influence structures have on practice are visible through the actions of maintenance workers. The practices are premised on restoring the system to a standardized, scripted form as determined by the subway’s operators while relying upon the local actions of its workers. In Denis and Pontille’s case, the situated repairs performed by maintenance workers generally adhere to the guidelines governing the repairs of the wayfinding system. The repairs to the MV Veteran described in Chapter Three, demonstrate how practices are influenced by structure as revealed through crew members’ resistance and deviation from their position within the warranty’s hierarchy.

Repair and maintenance are practices that often defy scripted designer guidelines and visions driving the implementation of new technologies because of the need for "local solutions to specific problems" that arise after their introduction (McIntyre, 2000; Mol et al., 2010: 13; Sanne, 2010). Breakdowns and the subsequent repair work they require emerge in practice and are contingent on circumstantial interactions (Dant, 2010; Rosner and Ames, 2014). Many infrastructural systems are "deliberately designed so that the possibilities of maintenance and repair are foreclosed" or subject to extensive regulation (Graham and Thrift, 2007: 18). Akrich (1992) for example, points to the embargo on local repairs for photoelectric lighting kits sent to Africa from France. In her case, repairs were only allowed to be performed by a specified contractor who barred residents from going to local electricians in the event of breakdown citing the complexity of the photoelectric units. Similarly, Sanne (2014) in his study of Swedish railway workers notes that system-wide vulnerabilities are often cited as a reason for such embargos as manufacturers worry that local fixes may be 'narrow' in their focus. As a result, local repairs risk "creating vulnerabilities in complex systems when practitioners overlook how their practices interact with structure and other practices" (Sanne, 2014: 200). The risk of complex interactions occurring is used to justify the regulation of repair and maintenance on the part of system manufacturers. As in my case of the MV Veteran, this is frequently accomplished by imposing a structure which differentiates actors' roles in repair and maintenance (Barnes, 2017), removes non-compliant entities (Ureta, 2014; Denis and Pontille, 2015), and controls actors' access to the resources necessary for the repairs of complex systems (Sanne, 2014).

Barnes (2017) demonstrates how structure affects the practices of irrigation canal maintenance in Egypt. Here, repair and maintenance are the responsibility of the state to ensure the functionality of canals in rural farming communities. Barnes however extends her analysis of maintenance further highlighting the greater social context in which it is situated, drawing attention to the decision-making processes behind repair and maintenance. In doing so, the seemingly innocuous maintenance of an irrigation canal is revealed to be a method the state uses to assert its control over its population through the removal of their localized tweaks, adaptations, and 'mediating technologies' (Furlong,

2011). The illegal widening and construction of canals by farmers conflict with the state's envisioned appearance and standardized functionality of the canal infrastructure. Similarly, Ureta (2014) positions repair as a form of normalization by which material scripts are aligned and non-compliant components are identified, and in some instances removed altogether in attempts to fix Santiago's public transport system. In this case, the transport system's administrators redesign the layout of bus stops to align the actual practices of users with those of the system's envisioned user who prioritizes route efficiency over comfort and leisure when travelling. Both cases illustrate the existence of a "politics of repair and maintenance" that parallels the status quo sustained by infrastructural configurations (Graham and Thrift, 2007: 17-18). In short, repair and maintenance can never be taken as neutral.

Thus, infrastructures are ways of ordering the world and the practices of repair and maintenance are integral to the enactment and preservation of that order. The orders infrastructures constitute are deeply uneven and prove to be sites of contestation amongst different groups. Moreover, attention to the vulnerability of infrastructures and the practices of repair and maintenance that restore and re-script them reveal the different rationales and power relations which privilege the preservation of certain orders over others. Having established my analytical framework, I move to my empirical chapters. The first empirical chapter demonstrates the tensions seen in the repair and maintenance of the MV Veteran from the imposition of Damen Shipyards warranty structure. The second empirical chapter explores the spatial and temporal practices of Fogo Island-Change Islands residents in their use of the MV Veteran.

Chapter 3

The Breakdowns of the MV Veteran: Re-scripting Repair at Fogo Island-Change Islands

The MV Veteran experienced several breakdowns following the start of its operations at Fogo Island-Change Islands on December 20, 2015, requiring substantial periods out of service for diagnosis and repairs. The frequency of these breakdowns and the time required for the vessel's repairs serve as my analytical entry point for this chapter to address the question of what these breakdowns reveal about the reproduction of social order of the islands and its connection (or disconnection) with those other places linked by the MV Veteran's travels. The MV Veteran's breakdowns provide insight into the relations and the social orders that are constructed, negotiated, and remade through the introduction of new technologies at the scale of infrastructure. While previous studies have attended to infrastructural breakdown, a growing body of work within Science and Technology Studies (STS) and geographic literature have begun to look at the practices of repair and maintenance that restore these systems and the social orders they embody (Graham and Thrift, 2007; Gregson et al., 2009; Edensor, 2011; Strebel, 2011; Denis and Pontille, 2014; Ureta, 2014; Barnes, 2017).

Data for this chapter comes from three bodies of evidence which I coded thematically for their representations of the Veterans' breakdowns. I weave together evidence from an analytical coding of documents obtained through Access to Information and Protection of Privacy requests made to the Government of Newfoundland and Labrador's (GNL) Department of Transportation and Works (DTW) regarding the MV Veteran; interviews with former and current members of DTW; and media publications related to the MV Veteran.

The chapter begins with an overview of the breakdowns of the MV Veteran's propulsion system and the modifications added by the vessel's manufacturer, Damen Shipyards, and their respective contractors between December 20, 2015 and August 31, 2016. Then, I highlight instances of additional incidents observed on the vessel discussing how the breakdowns were represented by the MV Veteran's associated actors. Finally, I

detail how these are addressed through Damen Shipyards' warranty procedure which structures how the repairs made to the MV Veteran take place.

Throughout, I analyze Damen Shipyards' warranty as a 'script' for the practices of repair and maintenance associated with the MV Veteran. Akrich's (1992) concept of script describes how designers attempt to pre-determine the relationships between an object and its envisioned users during its development phase. Yet, as Akrich shows in her case of photoelectric lighting kits, "it may be that no actors will come forward to play the roles envisaged by the designer. Or users may define quite different roles of their own" (1992: 208). As such, scripts are no guarantee for successfully shaping user-object relations in advance. Scripts can, and often do, breakdown and fail because it is impossible for designers to fully specify in advance how and under what conditions an object will actually be used.

Applying the concept of script to the MV Veteran's warranty, I contend that Damen Shipyards attempts to pre-determine the roles of actors involved in its repair and maintenance ahead of time through their understanding of the vessel's technical characteristics. The manufacturer's warranty introduces stipulations on the repair and maintenance of the MV Veteran that inscribe constrained roles for actors based on their position within the warranty structure. Some actors on the MV Veteran's crew actively resist these roles, and look to redefine their roles by their understanding of the vessel's operating environment in rural Newfoundland.

First, I show how the warranty structure imposes limitations on local actions of repair and the agency of the MV Veteran's crew through administrative and geographic controls, such as determining allowable actions for the crew and their access to the resources required for vessel repairs. Second, as geographers Lepawsky et al. advocate, I demonstrate how space is not only a site where repair practices occur, "but is the *product* of interrelations where heterogeneous socio-material practices associated with repair coalesce" (2017: 28, emphasis added). I do so by revealing how the repair action plans that must be developed in adherence to (or in spite of) the warranty structure make repair a space of contestation through the MV Veteran's reliance upon geographically disparate sites for its required parts and technicians when contrasted with the need for local timely

repairs. My case demonstrates how different understandings of infrastructure extend to its repair and maintenance as Damen Shipyards implements their warranty to pre-determine how repairs will take place based on their understanding of technical characteristics of the vessel. However, the actual use of the MV Veteran is disrupted because of the spatial characteristics of FICI which reveal the differentiated positioning of actors in the warranty structure and the power geometries of space.

3.1 'Breaking In': The MV Veteran's Breakdowns and Incidents

The service period of the MV Veteran has been and continues to be a tumultuous one given the vessel's ongoing thruster breakdowns and operational glitches. Charles Perrow's (1999) conceptualizations of 'system', 'incidents', and 'accidents' prove useful for framing the MV Veteran as he applies them to cases which include a variety of infrastructural systems including aircraft, power plants, and marine transportation to characterize their complexity and failures. The MV Veteran comprises a system, which Perrow (1999) argues can be divided into four distinct levels. The first level being *parts*, the smallest components likely to be identified during accident analyses. The second level is comprised of *units,* which are groups of functionally-related parts such as those forming an electric generator or hydraulic pump. The third level is *subsystems* such as the MV Veteran's azimuth thrusters or hydraulic ramps which contain multiple units. The fourth level is the *system*, the vessel itself, encapsulating all of its subsystems.

Perrow (1999) distinguishes between incidents and accidents based on the level of the system that is disrupted. 'Incidents' describe disruptions at the first and second levels whereas 'accidents' denote more serious disruptions at the third and fourth levels. Disruption in both instances indicates the need for timely repairs to the failing part, unit, or subsystem to continue future operations (Perrow, 1999: 66). When discussing the MV Veteran hereon, 'breakdown' refers to higher level disruptions at the unit or higher, such as those of the MV Veteran's propulsion system which halt operations, and thus the system, entirely, and 'incident' refers to the glitches and faults experienced by the vessel's parts and units that may temporarily suspend operations, but do not require its removal from active service.

For Perrow, breakdowns and incidents are a matter of scale in terms of component size and complexity. However, system breakdowns are not only a suspension of the system, but also a suspension of the social orders underpinned by the ferry amplified by a lack of alternative infrastructure available to Fogo Island-Change Islands (FICI). FICI is characterized as periphery and at the edge of infrastructural networks relative to other places given its physical isolation which in part is due to the limited systems present there. The breakdowns and repairs made to the MV Veteran reveal the relative positioning of FICI in the power geometries of space and the roles infrastructural systems play in the (re)production of geographic scales (Massey, 1993; Swyngedouw, 1997). As I argue, the (re)production of scales manifests in the understandings different sets of actors mobilize to explain the breakdowns of the MV Veteran and the practices of repair and maintenance which resolve the vessel's breakdowns.

Early into the MV Veteran's operational history, the vessel's propulsion systems suffered multiple breakdowns requiring extensive diagnosis and repairs. During the MV Veteran's first attempt to make the ocean crossing to Newfoundland, one of the vessel's diesel engines suffered a technical issue in the Mediterranean Sea on August 20, 2015. The MV Veteran returned to the Damen's Galati Shipyard in Romania, where it was built, for a full diesel engine swap with its 'sister' vessel, the MV Legionnaire. After the full engine replacement, the vessel completed its crossing of the North Atlantic arriving in St. John's, NL on October 17, 2015. The formal ownership transfer to the Government of Newfoundland and Labrador (GNL) took place a few days later on October 23, 2015.

Upon its official introduction to the FICI run on December 20, 2015, the MV Veteran's propulsion system saw four breakdowns within its first five months of operations. In all, these four breakdowns kept the new vessel out of service for 144 of its 199 expected days of service on the FICI run, over 70% of its time in the province. The first of these breakdowns was a bow thruster subsystem failure on December 29, 2015. This breakdown removed the MV Veteran from service for two days and required certified warranty technicians to travel to Fogo Island to inspect the thruster and perform the needed repairs (CBC News, 2015a).

The second breakdown was an engine fire that took place on January 19, 2016, that removed the MV Veteran from service for five days. The fire was caused by a failed turbocharger unit on one of the MV Veteran's Volvo engines while docked at Fogo Island that evening. The repairs were performed by a Wajax Power Systems engineer at Fogo Island-Change Islands under the direction of the Volvo Action Center in British Columbia (TW-008-2016: 2026). The engine subsystem was inspected by the Wajax engineer and the old turbocharger unit was replaced with a new one on January 21, 2016 after it was delivered to Fogo Island the same day.

The third breakdown was the failure of the starboard Rolls-Royce (RR) thruster unit of the propulsion subsystem on February 1, 2016. When the MV Veteran was arriving at Change Islands during a midday trip, the crew noticed smoke coming from the starboard propulsion room. Upon entering they discovered the damaged thruster unit and the vessel was tied at the dock at Farewell, NL. A Damen representative onboard at the time made a preliminary diagnosis of the damage while in contact with RR facilities in St. John's and the Netherlands noting serious marking and scoring damage to the gears (parts) accompanied by scattered debris within the upper gearbox housing (parts) of the thruster unit (DTW, 2016a: 2188). In short, the identification of damaged parts within the thruster unit led the engineer to speculate there was greater subsystem damage. The next day an engineer from RR St. John's inspected the thruster unit and confirmed the Damen representative's preliminary diagnosis. The upper gearbox housing would need to be taken to St. John's for further inspection and repairs. Throughout the repair process of the starboard thruster, planning was primarily led by the RR facility in Finland. Damen Shipyards is responsible for the system at large, but defers to third party manufacturers they have requisitioned for subsystems aboard the MV Veteran on a case dependent basis should they not be able to perform the repairs themselves.

The MV Veteran's starboard thruster, upon inspection by the RR facility in St. John's, required the vessel to be dry-docked on March 2, 2016 for the necessary repairs. The starboard thruster was completely stripped down and rebuilt by RR with new parts, including: input shaft, gearing, and bearings. On the advice of an RR technician, the port side thruster was also checked for any mechanical faults noting that, "even though the

units are 'individuals', we can not be sure this won't happen with the other unit as well" (DTW, 2016a: 2188). Upon inspection, the port side thruster was found to be in good working condition. Nevertheless, RR replaced all bearings in the upper portion of the port side thruster (DTW, 2016b: 764, 769). With the precautionary replacement of parts, it was expected that the overall system would function as expected. The MV Veteran passed sea trials with the new parts and the vessel was reintroduced to the FICI run on March 16, 2016.

The MV Veteran remained in service until April 3, 2016 when the port side thruster failed in the same fashion as the starboard thruster as it was departing Change Islands. The vessel left FICI on April 7, 2016 for further diagnosis and repairs in St. John's. After a near identical thruster breakdown less than three weeks after its return despite the precautionary part swap, RR and Damen Shipyards assumed that the breakdowns were not caused by a faulty part, but through a causal chain of sequences culminating in the failure of the propulsion subsystem. As a result, the MV Veteran was subject to an extensive 'root cause analysis' to determine the cause of the thruster failure. A 'root cause analysis' is a structured, systemic approach to investigating incidents allowing for, "a deeper look into… work processes to determine the underlying cause of incidents" (ABS Consulting et al., 2008: 6). A 'root cause' is the initiating cause of a series of events resulting in a specific outcome (ABS Consulting et al., 2008). In a root cause analysis, possible causes and events are first identified through diagnosis. Data from all causal factors and their underlying causes is collected and analyzed to determine the actual cause for incidents. After which recommendations are made to avoid such incidents from taking place again (ABS Consulting et al., 2008; Okes, 2009).

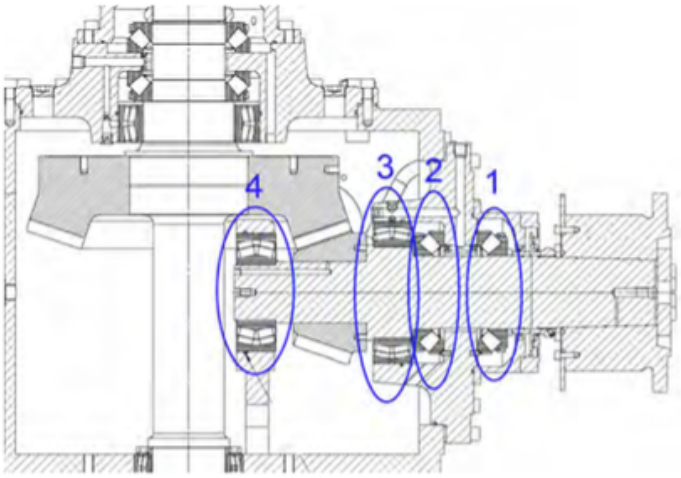
The root cause analysis approach to breakdowns fundamentally changes the character of repair work through the strict delegation of labour and roles during the diagnosis, analysis, and modification stages. Damen Shipyards is ultimately involved in all repairs through their warranty and the scale of additional actors' involvement is determined on a case dependent basis. Depending on their respective knowledge, technical capabilities, and the breakdown or incident that occurred, some actors may find themselves at the center of repair work or excluded altogether. During the MV Veteran's

repairs, the root cause analysis was led by RR Finland with support from Damen Shipyards with DTW sidelined during the repairs.

In a technical summary sent to DTW and Damen on May 6, 2016, RR Finland made a preliminary diagnosis into the root cause of the failures of the bearings in the thrusters (Figure 2). An external root cause was suspected by RR Finland due to its "rapid deterioration… within a very short time after a precautionary bearing exchange" (DTW, 2016c: 165).

Observed failures

The observed failures are on the bearings 2 and 3, in the upper gearbox, on both starboard and port side units (Picture 1).



Picture 1. Upper gearbox of US 35 thruster unit.

Figure 2: Diagram indicating the bearing failures within the upper gearbox of the thruster units from the Rolls-Royce Technical Summary sent to DTW on May 6, 2016 (DTW, 2016c: 163)

Their findings indicated that the thruster breakdowns were likely caused by a mechanism decreasing lubrication oil flow to the thruster leading to excessive overheating of two of the bearings in its upper gearbox (DTW, 2016c: 164). A lack of lubrication was eventually determined to be the root cause of the bearing failures by RR specialists in Finland and Sweden, the manufacturer of the bearings, and an additional specialist contracted by GNL (DTW, 2016c: 654). Extensive modifications to parts were made to the thrusters in June 2016 to prevent a decrease in the lubrication oil flow.

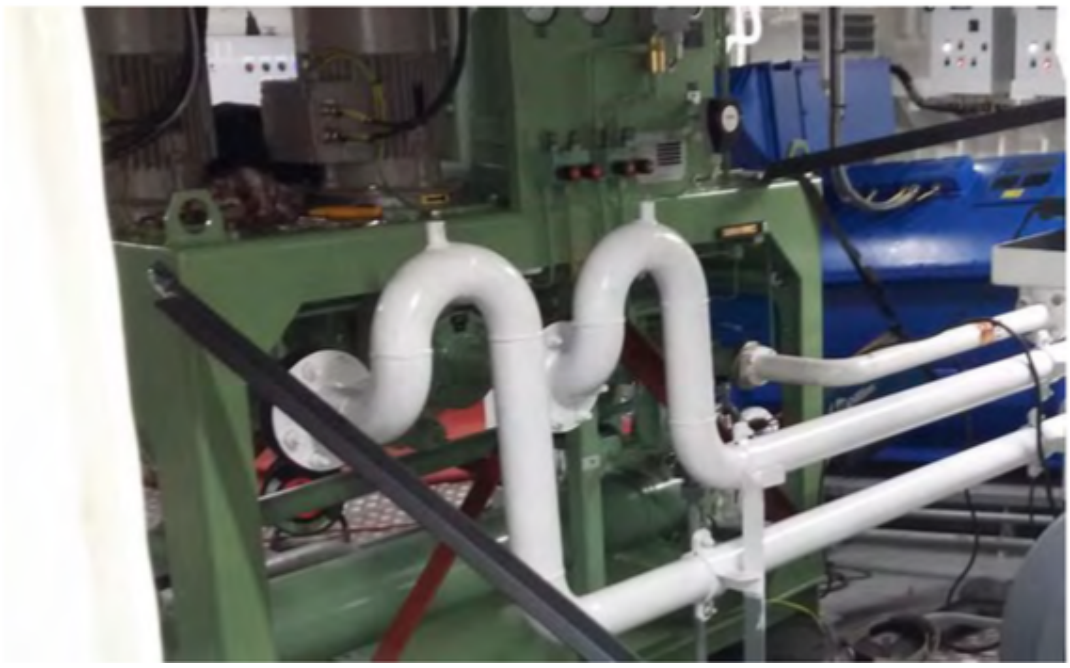


Figure 3: Goose Neck (curved white pipes in centre) added to the oil suction line of thrusters taken from the Damen Shipyards Report presented to DTW on June 10, 2016 (DTW, 2016c: 658)

Figure 4: Stiffened electrical oil lube pumps using steel supports (red beams attached to the frame of the green pump and the vessel walls) taken from the Damen Shipyards Report presented to DTW on June 10, 2016 (DTW, 2016c: 667)

Figure 5: Additional oil lubrication channel (silver coloured pipe from centre to bottom right of image) added to bearings two and three taken from the Damen Shipyards Report presented to DTW on June 10, 2016 (DTW, 2016c: 664)

RR and Damen Shipyards added additional pressure and temperature sensors to the MV Veteran's alarm system along with a protective cap on the push-button which stops the oil pump. A goose neck, a curved pipe that prevents overflow and water ingress, was added to the suction line of the oil pump to prevent damage from it running dry for too long and to stop air intake during periods of heavy vibration. An additional lubrication channel was added to the second and third bearings of the thruster units to increase oil flow to the two bearings. The frame of the electrical oil lubrication pump was stiffened with additional beams attached to the MV Veteran to prevent heavy vibrations from disrupting oil flow. And an additional spacer ring was added between the second and third bearings to reduce thermal conductivity between the bearings and decrease consequential damage should

there be any future bearing failures (DTW, 2016c: 657-670). Following the MV Veteran's completion of sea trials with these modifications to the port side thruster, the vessel returned to the FICI run on July 6, 2016.

The actors involved in the MV Veteran's repairs invoke scale within the system as an "explanatory device to account for" its breakdown (Swyngedouw, 1997: 139). The port side thruster repairs are an example of how "places and spaces at different geographic scales are invoked in attempts to account for dramatic events that have major local, national, and international implications. These "scalar narratives" provide the metaphors for the construction of "explanatory discourses" (Swyngedouw, 1997: 139).

In addition to the four breakdowns, the MV Veteran continued to experience smaller mechanical and electrical incidents which did not require the vessel to be removed entirely from service, but necessitated a warranty claim with Damen Shipyards. At the end of my data collection in August 2016, DTW had filed an additional eighty-one warranty claims to Damen Shipyards for a multitude of incidents observed aboard the vessel. The eighty-one warranty claims are of varying severity ranging from minor incidents such as a damaged lifeboat flap (Claim 56) and salt ingress accumulation in the windows of the aft passenger lounge (Claim 48) to more prominent incidents such as the hoistable vehicle decks (Figure 6) not locking (Claim 80) which can reduce the vessel's vehicle capacity.

Figure 6: Hoistable hydraulic ramps on the MV Veteran's vehicle deck which were the subject of warranty claim 80 (Source: Author's Photo)

Moreover, the MV Veteran experienced day-to-day incidents that did not require a formal warranty claim, but hindered daily operations and services. The toilets in the washrooms onboard the vessel would cease to function during ferry runs in July 2016 so passengers were not able to use them (Bird, 2016). The hoistable vehicle decks at times would not lower at one end, requiring cars to reverse off the functional side of the ramp rather than being able to drive though, creating service delays with increased disembarking times. With the longer loading times from increased traffic, components such as the hydraulic bow doors and vehicle ramps requiring more lead time to operate. With the near daily mechanical or electrical issues onboard, it was routine to find the MV Veteran operating one to two hours behind schedule by the final crossing of the day. Ferry service as per the schedule released by DTW had the last crossing from Farewell to Fogo Island listed as 8:30pm. Passengers waiting until 10:00pm or later at Farewell was

common until the addition of a smaller supplementary ferry, the Norcon Galatea, on July 22, 2016.

3.2 Understandings of Actors: The Specificity of Breakdown and Repair

The frequency of the MV Veteran's breakdowns and incidents during its introductory period to the Fogo Island-Change Islands (FICI) run became a public controversy in Newfoundland and Labrador. I hypothesize that this controversy can be described as the failure of a system that impacts the scale that is one step above system: its place within the power geometries of space (Massey, 1993). Doreen Massey defines place as the construction "of a particular constellation of relations, articulated together at a particular locus" (1993: 66). Subsequently, place is implicated in the use of geographic narratives by the MV Veteran's actors as "different scalar narratives indicate different causal moments and highlight different power geometries" in explaining events (Swyngedouw, 1997: 140). For example, Erik Swyngedouw demonstrates the importance of place in scalar narratives mobilized to explain the collapse of the United Kingdom based Barings Bank in 1995. The understandings of different sets of actors emphasized different factors leading to the bank's collapse ranging from the different regulatory environments of Singapore and England, the unanticipated behaviour of the Japanese stock exchange, and the 'rogue' actions of one of the bank's traders. Here, Swyngedouw highlights how "places and spaces at different geographic scales are invoked in attempts to account for dramatic events" dependent upon one's political or ideological alignments (1997: 139).

The ongoing breakdowns of the $50 million MV Veteran built specifically for the environmental conditions of Newfoundland's north coast occurred during a time of considerable austerity measures and budget cutbacks implemented by GNL. Criticism levied against the MV Veteran highlighted the suitability of the MV Veteran for FICI's operating conditions suggesting appropriate experts had not been consulted (Hobbs, 2016), the expenses incurred by the Department of Transportation and Works (DTW) providing emergency and supplementary ferry transportation (CBC News, 2016c), and the frequency of the vessel's breakdowns affecting the communities of FICI (Delaney,

2016). All of these complaints mirror the geographic narratives used to explain system scale breakdowns in terms of explanations at smaller scales and more minute locations, yet these explanations focus on the embodied social orders of infrastructure more than the technical specifications of the vessel.

The geographic narratives used by the vessel's actors mobilize competing sets of knowledges in their understandings of the breakdowns. One narrative concerns infrastructure as complex systems requiring specific knowledge to understand its functions. The enhanced technical capacities of infrastructure are frequently accompanied by increased internal complexities requiring the mobilization of experts who can understand those complexities (Hughes, 1983; Perrow, 1999). As a result, many new infrastructural systems implemented today are presented solely as the domain of experts who have the requisite knowledge to understand its internal complexities which may not be easily grasped by the public it serves.

However, as Harvey et al. argue, a lack of understanding of the complex, technical specifications of infrastructure does not beget powerlessness for its users who have an expertise based in "localized knowledge of certain of its features" (2017: 14). It is here that narratives evoking place, at levels above the immediate system of the MV Veteran, are used in FICI residents' understanding of the vessel's breakdowns. The knowledge of FICI residents and DTW employees, developed through their familiarity with marine technologies used off Newfoundland's north coast and their experiences with the multiple vessels used throughout the history of the FICI run, prove capable of exposing what they understand as the MV Veteran's inadequacies for the aims of the FICI ferry service.

The implementation of the MV Veteran presents a case where the suitability of infrastructure for its operational conditions is understood and articulated differently throughout the course of its breakdowns by different groupings of its associated actors. Here, I move between the understandings of the MV Veteran specific to its users and designers. As Madeleine Akrich argues, this movement provides access to the relationships essential to the realization of scripts: "the user's reactions that give body to the designer's project, and the way in which the user's real environment is specified in part by the introduction of a new piece of equipment" (1992: 209). I contend these

differentiated understandings are central to the contestations and resistances to the warranty script implemented by Damen Shipyards.

The understandings and criticism of the MV Veteran's breakdowns and incidents by the vessel's actors can be placed into three distinct groups based on the vernacular used to describe the vessel. The first group of actors consists of FICI residents who used the term 'lemon' to describe the vessel while discussing the expectation of improvement for the FICI ferry service. The second group comprised of FICI residents and MV Veteran crew members who referred to the MV Veteran's equipped technology as 'overkill' beyond what they believed to be necessary for the FICI run. And the final group composed of DTW and Damen Shipyards employees who pointed out that the MV Veteran's breakdowns are not out of the ordinary, but an expected reality that accompanies complex machinery such as car-passenger ferries.

In all cases, the distinct understandings of each group and their respective scalar narratives invoked speak to the ontological politics which can be articulated through infrastructures (Mol, 2002; Jensen and Morita, 2015). In using the term ontological politics, I refer to Annemarie Mol's (2002) conception of politics which concerns how problems are shaped and framed by different actors and subsequently shape lives. Infrastructures are "emergent systems that produce variable practical ontologies—novel configurations of the world and its elements" (Jensen and Morita, 2015: 84). Infrastructures not only mobilize politics in their development through material realizations such as 'scripts' (Akrich, 1992), but generate affective politics "through the incessant interplay between (intended) design inscriptions and the varied, unpredictable and often overlooked responses of other actors" (Jensen and Morita, 2015: 84). Here, I distinguish between the three dominant understandings of the MV Veteran's breakdowns.

3.2.1 'We have a lemon'

Throughout interviews and informal conversations, some FICI residents, while acknowledging the MV Veteran as a 'beautiful' boat or a 'mini-cruise ship', also labelled the MV Veteran a 'lemon'. 'Lemon' was often used to describe the ferry in online posts, including comments made in a Facebook group called 'Fogo Island Ferry Updates!'

created to provide more timely ferry updates for the travelling public during the MV Veteran's breakdowns (https://www.facebook.com/groups/1718127821758586). The group eventually became a place for ferry users to vent their frustrations over the constant interruptions brought by the introduction of the MV Veteran with members eventually being interviewed by provincial media outlets. One Fogo Island resident was quoted in ongoing news coverage describing the MV Veteran as such:

> We thought for sure when we got it back this time everything was going to be good, but obviously I guess we do have a lemon. (Fogo Island Resident) (CBC News, 2016b)

The use of 'lemon' by the Fogo Island Resident and the creation of the Facebook group demonstrate the possibilities for the "emergence of potentially novel political forms out of infrastructural arrangements" (Jensen and Morita, 2015: 85). 'Lemon' has traditionally been a way to describe new cars as unsatisfactory or defective (Merriam-Webster, 2018). Likewise, for residents of FICI and members of the Facebook group, 'lemon' conveys their anger and disappointment over the MV Veteran's ongoing breakdowns. The MV Veteran was incapable of completing its scheduled crossings on time and its use was undermining the quality of the FICI ferry service instead of improving it. The use of 'lemon' to describe the MV Veteran then speaks to the liability of change within infrastructural configurations and the "forms of politics" these changes can foster over time (Jensen and Morita, 2015: 83). Moreover, 'lemon' as used by FICI residents in response to the vessel's repeated breakdowns emphasizes the relations FICI is dependent upon and excluded from when mobility is limited (Massey, 1993). As one Change Islands resident emphasized, the primary purpose of the FICI ferry service is facilitating movement between FICI and mainland NL, a task the recently introduced MV Veteran was failing:

> There were parts of it [the MV Veteran] that were very impressive. It was naturally beautiful, but again, it's functionality that we want. We want to get from

> point A to point B as expeditiously as possible. Service is what we want… If the service is inadequate, and you replace it with a vessel of the same capacity, that process is still automatically inadequate. Not to mention the deficiencies in comparison to the Winsor. At the very most, they [DTW] could expect the same service as they had before. And at the very least, in what has happened, is the reduction of service. (Change Islands Resident Interview – July 24, 2016)

The Change Islands Resident's comments gesture to the vulnerability of infrastructures as they "can be unpredictable in ways that are politically consequential" (Reeves, 2017: 717). The residents' aims for the service were that of expeditious movement and functionality on the ferry run to handle the increasing traffic volumes, but the MV Veteran's similar capacity and breakdown frequency meant it was failing to meet the standards the previous vessel, the MV Earl W. Winsor, was capable of achieving warranting the 'lemon' label. 'Lemon' then encapsulates the resentment or buyer's remorse felt when a new purchase fails to perform as expected.

Moreover, in the view of these residents, the MV Veteran was the wrong design for the service requirements of the FICI run. As one Change Islands resident explained when commenting on the design of the vessel:

> The work in the vessel is perfection. I mean they just built the wrong boat. The work in that boat is meticulously done. She's a piece of state of the art, but it's not much needed up here… It's like somebody experimenting with a vessel to see how it works out then leaving two islands with a bunch of people left out in the back. It's like we're a guinea pig for an experimentation of a design. (Change Islands Resident Interview – July 24, 2016)

Here, the resident comments on the "contradictions and slippage between [the] planning and enactment" of infrastructure at a scale beyond that of the MV Veteran by drawing attention the particularities and unique spatialities of FICI by stating the minimalist requirements needed (Massey, 2005; Smith, 2016: 165). Infrastructures are developed

with specific assumptions and representations of their envisioned operational context during the planning and developmental stages, but these often are never an exact match for their users' needs (Smith, 2016). As Monica Smith observes, infrastructure carries "gradations of imperfection but nonetheless is often sufficiently functional to carry out some of its intended purpose" (Smith, 2016: 165). However, because of the effects of MV Veteran's breakdowns on the livelihoods of FICI residents and the vessel's inability to meet the service conditions of the FICI run as understood by residents, the vessel is generative of a different politics articulated through their frustration and the use of the lemon label. Thus, 'lemon' demonstrates how the material properties of infrastructure, "can undermine the political work that is invested in a given infrastructural form," despite the well-meaning behind its implementation (Reeves, 2017: 717).

3.2.2 'Too much overkill'

The comparisons between the MV Veteran and the MV Earl W. Winsor by FICI residents and DTW ferry employees highlighted both the quality of the FICI ferry service and the technology aboard the two vessels as well. Many of FICI's residents are intimately familiar with the kinds of technologies that will work in the sparsely populated marine environment of the North Atlantic Ocean. For example, of Fogo Island's 2244 residents, 750 are employed by the Fogo Island Co-Operative Society which coordinates long-liner fishing vessels, smaller fishing boats, and the modern, proprietary fish processing technologies used by the Fogo Island fishery (Innovation, Science, and Economic Development Canada, 2017; Statistics Canada, 2017). These FICI residents and ferry crew members emphasized that mechanical simplicity in the operational setting of Newfoundland's North Coast would best meet their needs. They believed an ice-strengthened replica of the MV Earl W. Winsor, the original ferry that the MV Veteran replaced, would have been ideal as ice was the main source of previous service delays and the MV Veteran's technical complexity exceeded what was required for the FICI run. As one DTW employee explained, the setting of the FICI run was paramount:

> My interpretation of what you want for ferry service is keep it simple. That's basically it. You don't need to get into overkill. Sure, it looks nice and everything but it's expensive and it's expensive to maintain. And who knows, there might be a method to the madness. Go for what works, basically. It's already been proven to work. (DTW Employee Interview – July 24, 2016)

As the employee's comments suggest, "technology is context dependent and has to be understood and made to work in its sociotechnological network" (Beisel and Schneider, 2012: 642). In the case of the MV Veteran, additional features like its bow doors and internal ramps were detrimental to its actual use on the FICI run where service efficiency and reduced crossing times were the priority. For instance, one crew member attributed the MV Veteran's inability to stick to its schedule to the time required to operate all its hydraulic systems in relation to the length of the crossings:

> It's just that I don't think it's suited for here. We went way overboard. Too much overkill. That's the reason why they're late all the time now and it's not going to get any better. I think we got a worse service now than we've had in the last twenty-five years… Like if you're making two to three trips a day it'd be perfect down in the straits [Cabot Strait, Gulf of St. Lawrence], but we're talking every twenty minutes here. Those big 'ol clam doors and big 'ol ramps. We want something fast, but we got slowed down. (DTW Employee Interview – July 11, 2016)

Similarly, the DTW Employee also felt the MV Veteran was not best suited for the FICI run based on their previous experience with azimuth thrusters. The crew member first encountered azimuth thrusters on the MV Beaumont Hamel, a vessel also built specifically for the FICI run that operated throughout the 1980s, which experienced ongoing thruster issues during its first few years at FICI as well. The crew member noted azimuth thrusters like those featured on the MV Veteran were fine and had been used effectively by other vessels, but again pointed to their use being context dependent

highlighting the difficulties to be encountered in using the technology on the FICI run (Akrich, 1992). The crew member emphasized that technical simplicity was essential for success at FICI:

> We didn't need that. We needed something that was going to speed up the service. But I guess I'm from the old school and like the traditional things, but I think the azimuth thrusters are not suited to over here. I think if we get heavy ice conditions that we've experienced over the years. We're gonna see lots more problems with the thing… especially the depth of water and the ice conditions. It's not technology. No, probably the best of technology for certain situations. I would say it is, I mean, small tugs and things use them all the time. (DTW Employee Interview – July 11, 2016)

The concerns presented by the employee mirror the contestations that emerge from the inclusion or exclusion of certain technical features in new technologies (Akrich, 1992). In Akrich's case of photo electric lighting kits developed in France for example, the "potential significance" of certain parts were not made aware until the kits were delivered to Africa despite the sound rationale for their inclusion (1992: 210). As Akrich contends, "it was only in the confrontation between the real user and the projected user that the importance of such items… came to light" (1992: 210). That is, the significance of the MV Veteran's inclusion of technical features like its azimuth thrusters, hydraulic ramps, and bow doors only became evident through its actual interactions with the ferry's users and their interplay with the relations which constitute FICI. This is evident in the previous DTW employee's comments which emphasize the need for improvement in service times and the understood decrease in service quality compared to previous iterations of the FICI ferry service. In doing so, the DTW employees gesture to the relations which manifest in place at a scale beyond the internal, technical characteristics of the vessel. Moreover, with the choice to include such a large volume of equipment in the MV Veteran and the environmental conditions at FICI, residents and employees believed that breakdowns were an inevitability. As one member of the Fogo Island Co-Operative Society observed:

> We needed a boat to get us from point A to point B. You know what, the Earl Winsor was the best boat we had. Even though you couldn't open your [car] doors, that boat was reliable. She got us to and from the destination on time. There was no fancy ramps inside to put things up. All that is the more moving parts you have, the more breakdowns you're going to have and the less capacity you're going to have. If those ramps don't work in two years which I'm going to state it right now. I think in two years' time, we're going to have problems with those hydraulic ramps because of the salt water environment that we exist in with spray coming in over the boat. They're going to get into the gears and everything that makes that work and we're going to have less capacity. (Fogo Island Co-Operative Society Member Interview – July 13, 2016)

The Fogo Co-Operative Member and DTW Employee in contrasting the significance of the MV Veteran's equipped technologies with the context of the FICI run allude to what Charles Perrow deems the 'interactive complexity' of a system (1999: 4). With the quantity of parts and units aboard the MV Veteran, some of which serve multiple purposes, unexpected interactions of part and unit failures unforeseen by the vessel's designers will occur leading to the eventual breakdown of major subsystems. Similarly, individual part failures might be trivial and are expected over the course of continuous use from operational wear and tear, inclement weather, salt ingress or ice conditions within the confines of the FICI run. Such interactions are accounted for by designers and manufacturers who introduce safety precautions into their designs and preventative maintenance scheduled at regular intervals, but it is the unplanned interaction of multiple failures that will inevitability lead to incidents and accidents (Perrow, 1999). The root cause of these disturbances may not be readily identifiable due to the quantity of subsystems onboard and their impact will disrupt the ongoing operations of the system. However, Perrow (1999) emphasizes that interactive complexity will increase the potential for incidents and accidents to occur, not their frequency within a given time frame which was the focal point of FICI residents frustration with the vessel. The

potential for accidents and incidents due to the interactive complexity of the MV Veteran is central to the final group's understanding of the vessel's breakdowns.

3.2.3 'These things happen'

Actors including Damen Shipyards employees, DTW employees, and the MV Veteran's part manufacturers foregrounded breakdowns as an inevitability due to the nature of shipbuilding and the uncertainty surrounding how the components of a new vessel will operate. Their narrative for the breakdowns invokes the scale of the system drawing attention to the mechanical vulnerability and complexity of the MV Veteran instead of the unique spatialities of the FICI run and the social relations disrupted by the breakdowns as the two previous sets of actors emphasize (Perrow, 1999; de Laet and Mol, 2000; Jackson, 2014; Reeves, 2017). For example, the DTW Minister who oversaw the construction of the MV Veteran specifically addressed the modular character of units, emphasizing the ability for parts to act counter to their expected operation:

> …two of us can buy two cars the same day, mine might break down the next day, you might go six years and not have a hitch**.** Doesn't necessarily mean there's an issue with a particular part or something. It may have just been either how that one particular part was manufactured that particular day it was done or inspected or installed at the time. (Former DTW Minister Interview – June 14, 2016)

The DTW Minister comments on the slippages and shortcomings in the enactment of infrastructure, but they do so by mobilizing a different narrative based on their understanding of the vessel in response to those developed by other groups (Jensen and Morita, 2015; Smith, 2016). Damen Shipyards' General Manager (GM) for North American operations felt the 'lemon' label used in press and by some FICI residents to describe the MV Veteran was unfair. 'Lemon' was featured within news coverage to contrast the MV Veteran with a car, which the GM viewed as problematic due to the differences in part sourcing, the construction of the vessel, and the volume of equipment aboard. As the GM explained:

> We're not talking about a series of cars that are produced. These are custom built machines, very complex ships, with an enormous amount of equipment, mechanical and electrical. (Damen Shipyards GM Interview – July 4, 2016)

The GM's comment suggests that actors framing the MV Veteran as a 'lemon' were thought to be oversimplifying the vessel's propulsion systems. Presenting subsystems like the MV Veteran's thrusters and engines as comparable to those found in cars was highlighted by the Damen GM as problematic in the wider public's understanding of the breakdowns and time required for repairs. When discussing the damaged gears in the upper gearbox housing from the thruster breakdowns, the Damen Shipyards GM commented on the inability to swap parts as one would in other marine technologies such as the vessels used by FICI residents:

> Up until now, I didn't know half a year ago that if you have two identical thrusters, that you cannot simply swap out gears if you wanted to. The gears of every thruster are handmade to that thruster because of tolerances. We messed up one of the gears and it took them a month to reproduce that gear… it's very tailor made. (Damen Shipyards GM Interview – July 4, 2016)

The GM emphasizes that the MV Veteran is the product of many bespoke components of varying scales interacting with one another from the large thruster units to the small gearings housed within those thruster units. And with the interactive complexity of these components comes greater potential for unforeseen interactions and which may lead to accidents such as the thruster and engine breakdowns (Perrow, 1999). Representatives from Damen Shipyards and DTW repeatedly emphasized that start-up issues are not out of the ordinary for a new vessel. As a Damen Shipyards Regional Service Manager (RSM) explained:

> The issues there were on the VETERAN were unplanned. These issues could not have been avoided, in any case. Only by a sixth sense. It also could not have been done any quicker since all parties involved had this subject as their number one [top] priority. We understand that it has been a real issue for the public transport and all parties would like to have seen it that it went differently but in the maritime business these things happen. Fortunately, not common, but most vessels of such lengths are sophisticated and complex devices. (Damen Shipyards RSM Email – August 3, 2016)

Based on the RSM's explanation, the MV Veteran's introductory period was like those of most new technologies where technologies do not 'mesh' and their components might prove unreliable during their initial use (Graham and Thrift, 2007: 10). Similarly, before the thruster accidents began in December 2015, DTW was prepared for a period where familiarity with the MV Veteran would need to be developed as the crew gained a feel for how the vessel operates. In doing so, this group of actors also point to the vulnerability of infrastructure (Reeves, 2017). For instance, with the purchase of a newly commissioned vessel, DTW's Assistant Deputy Minister was aware that:

> Ongoing tweaks and repairs are a reality with a new class of vessel - how tweaks, planned technical fixes are linked with op [operating] schedules, liabilities/responsibilities are something we will need to look at and discuss. (Assistant Deputy Minister Email – November 6, 2015) (DTW, 2016a: 92)

The Assistant Deputy Minister as with other actors in this group foreground breakdowns and incidents as ongoing and expected (Jackson, 2014). When discussing the breakdown of the engine turbocharger in January 2016, a Damen Shipyards Service Engineer received a similar message from the manufacturer that installed the engine and performed the repairs at the time. The service engineer pointed to the modularity of the engine and the scale of the system when contemplating potential root causes for the engine breakdown:

> The turbo that failed was new with a new engine, it was only removed from the engine to allow safe passage through the generator room door. So yes it has failed with 1033 hours on it. I have spoken with the commissioning engineer from DBR who installed the engine and it would seem that turbo failures like this happen quite often. It could be regarding preservation conditions if it was a stock engine or even material failure.
>
> The reason as to why it failed cannot be diagnosed by anyone here just now, the turbo will be taken by Wajax and they will send it to Volvo for examination/inspection and so it will be some time I guess until an exact reason, if at all, is given for the failure. (Damen Shipyards Service Engineer email to DTW– January 22, 2016) (DTW, 2016a:1988)

The Damen Shipyards employees and the excerpt from the Service Engineer regarding the turbocharger breakdown demonstrate the interdependence and independence of the MV Veteran's parts and units. Perrow (1999) defines the interdependence of these independent parts and units as 'coupling' within systems. Perrow distinguishes between two types of coupling, 'tight' and 'loose', as a spectrum that can be used to classify systems based on the causal interactions between their composite parts and units. Tightly coupled systems are distinguishable from loosely coupled ones based on their ability to recover from failure. Tightly coupled systems feature deliberately designed in buffers, redundancies, and substitutions such as buffering walls and emergency pumps. Conversely, loosely coupled systems while equipped with designed failsafes allow for the use of fortuitous recovery aids which may have not been envisioned by designers (Perrow, 1999). For example, tightly coupled systems such as power plants exhibit more time-dependent processes that require immediate attention should they begin to fail, invariant procedures that often must be followed sequentially to achieve the desired function, and limited opportunities for substitutions of materials or resources (Perrow, 1999: 96). Loosely coupled systems such as cars are less time dependent allowing users to continue operating them while deferring repairs, procedures that allow for alternative

methods to be developed to achieve the same functionality of units and subsystems, and ample opportunities to substitute materials with the widespread availability of automobile parts (Perrow, 1999: 96).

The MV Veteran exhibits elements of both tightly coupled and loosely coupled systems. Subsystems such as the hydraulic ramps feature tailor made parts and procedures that must be adhered to in a specified order to operate them whereas others such as the washroom and kitchen plumbing exhibit many opportunities for substitution with alternative parts to achieve the same functionality. The MV Veteran's inclusion of purpose built subsystems such as the Volvo engine, hydraulic ramps, and the Rolls-Royce thrusters however proves problematic due to its operational location. As the Damen Shipyards Service Engineer stated, these tightly coupled subsystems may be unable to be diagnosed locally at FICI requiring external expertise to assess and repair them. For example, during the engine breakdown, the faulty turbocharger was examined by a Wajax Power Systems employee before being sent to the Volvo Action Center in British Columbia for diagnosis. Similarly, many of the failing parts in the incidents filed as warranty claims often need to be shipped to FICI or St. John's, NL from manufacturers in other provinces or countries altogether.

The three cases above demonstrate how the introduction of the MV Veteran specifies the environment of its users and how material scripts enacted through infrastructure are generative of different political communities (Akrich, 1992; Mol, 2002; Jensen and Morita, 2015; Reeves, 2017). The breakdowns of the MV Veteran and its equipped subsystems lead two sets of actors to question whether the MV Veteran is appropriate for the FICI run. The first two narratives are rooted in place gesturing to a geographic scale beyond that of the MV Veteran as they emphasize the disruption of embodied social orders which only became known upon the vessel's actual use. The 'lemon' and 'overkill' groups draw attention to the importance of place in the implementation of new infrastructure. Conversely, the MV Veteran's manufacturer and DTW focus on the interactive complexity within the scale of the vessel itself to explain its breakdowns (Perrow, 1999). Despite their respective differences in their understandings of the breakdowns, all cases point to the vulnerability of infrastructure articulated through

the ongoing disruption of human activities and infrastructure's own agency (Jackson, 2014; Smith, 2016). As Monica Smith observes, engendered in infrastructures are "degradation and failures that require ongoing mitigation through modification and repair" to ensure they can function as planned (2016: 173). Damen Shipyards aware of the potential for breakdowns and incidents implements a centralized management structure to repair the MV Veteran.

3.3 Damen Shipyards' Warranty: Scripting Repair and Maintenance

Complex, mechanical, and expensive products often come with a form of warranty coverage provided by manufacturers. Warranty agreements offer partial or total coverage for any unforeseen accidents and incidents in which the manufacturer or an approved subcontractor will repair, and provide parts or a new product altogether within a prescribed term. Warranty agreements are honoured so long as the stipulations or 'script' (Akrich, 1992) outlined by manufacturers, such as using only authorized repair facilities or not tinkering with the product, are followed.

Madeleine Akrich (1992) contends that technical objects are inscribed with a designer's predictions of the world. These objects constitute a 'script' that attempts to pre-determine relationships for the object and its associated users. Akrich originally applied the 'script' to instances of technological development exploring the confrontations between technical objects and their projected users, noting there may be instances where "no actors will come forward to play the roles envisaged by the designer. Or users may define quite different roles of their own" (1992: 208). As Denis and Pontille suggest, even though Akrich's notion of scripts "has been mostly mobilized to study how users are configured by designers, it is particularly useful to question the place ascribed to maintainers" (2017: 1). I contend that the comprehensive warranty provided by Damen Shipyards for the MV Veteran is a 'script' which defines roles for the vessel's crew members, DTW employees, and Damen Shipyards itself for the practices of repair and maintenance.

Building from Akrich (1992) and Perrow (1999), I demonstrate how the contestation between the narratives of the suitability of the MV Veteran for Fogo Island-

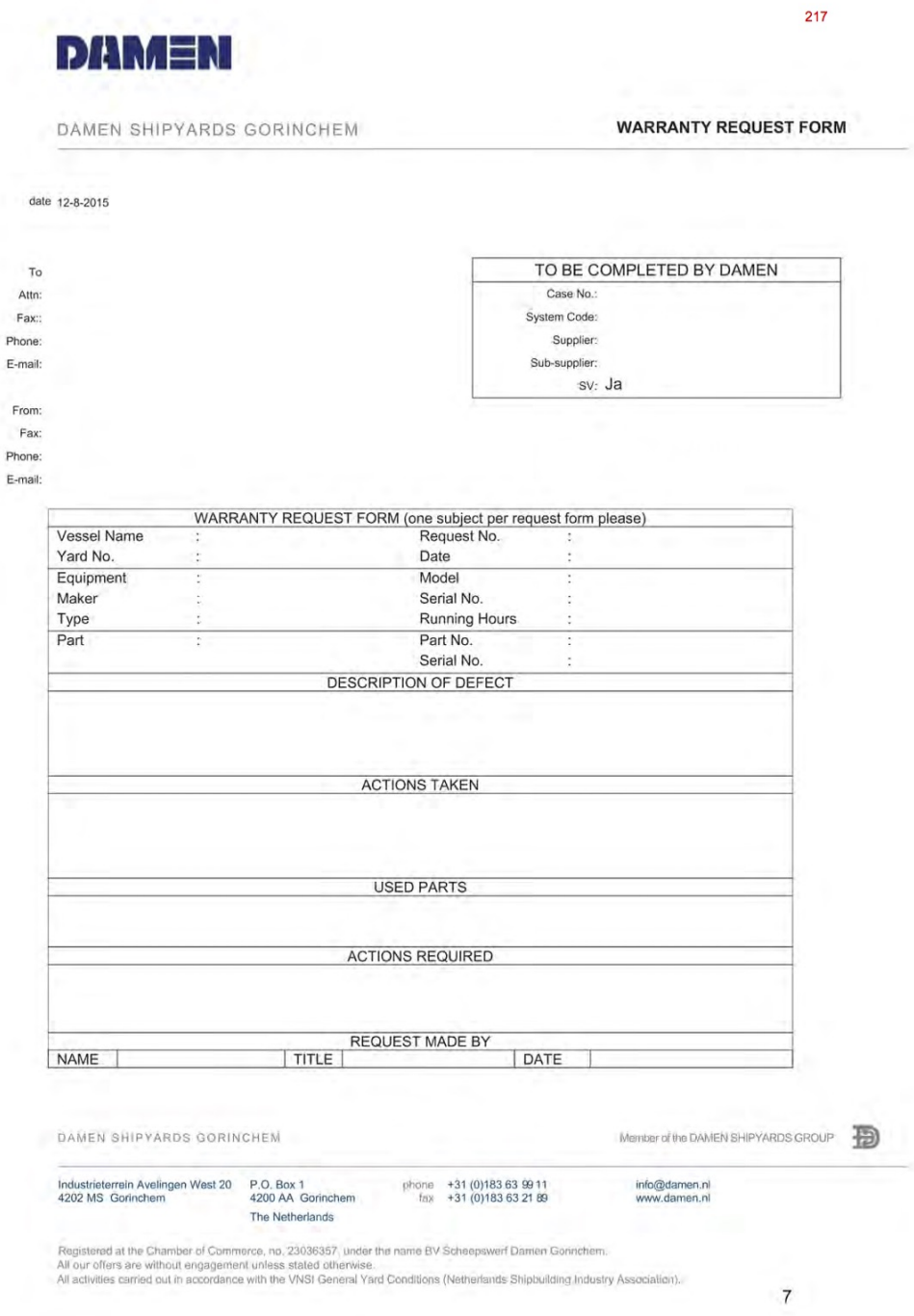
Change Islands (FICI) and the interactive complexity of the vessel witnessed throughout its implementation extends to the repair and maintenance of the MV Veteran. In doing so, I draw upon Scott (1998) and Massey (1993; 2005) as well as works on repair and maintenance to demonstrate the contentions between structure and space as they relate to these practices and the MV Veteran. The interactive complexity, tight coupling of many of the MV Veteran's subsystems, uncertainty behind the causes of breakdowns, and the quantity of custom parts aboard the vessel lead Damen Shipyards to implement a script to diagnose and address breakdowns and incidents. Conversely, the emergent shortcomings of the MV Veteran encountered throughout its actual use on the FICI run in addition to the geographically isolated location of FICI necessitate timely repairs and interventions by its users to ensure it can function. Thus, in this case study, the implementation of the warranty 'script' sees actors such as the MV Veteran's crew members attempt to redefine their inscribed roles during attempts to keep the vessel operational at FICI.

To address breakdowns on any of their new-build vessels, Damen Shipyards provides comprehensive warranty coverage for their first-year[2] of operations. It is a hierarchal, top-down approach towards managing the MV Veteran's breakdowns and incidents which Damen Shipyards believes will limit miscommunications in repair action planning by centralizing communications through a chain of command structure. The centralization of all warranty claims as a Damen Shipyards Regional Service Manager (RSM) posited, allows Damen Shipyards to:

> …easily identify issues which are related to systems and vessels. If we have problems on one vessel/system we will investigate the issue on the similar vessels and/or systems. This will give us the opportunity to prevent breakdowns and upgrade our designs to high standards. (Damen Shipyards RSM Email – September 3, 2016)

[2] Damen Shipyards extended the warranty coverage on the MV Veteran to two years on July 4, 2016 at the request of GNL due to the vessel's time out of service and costs incurred by DTW, GNL, and the communities of Fogo Island and Change Islands.

To carry out Damen Shipyards' warranty process, each vessel is assigned to a warranty engineer and Damen Shipyards provides customers with access to their Enterprise Resource Planning software to manage communications and part requisitions related to malfunctions. Claims may be made by Damen Shipyards' customer using the online Services Portal or by submitting a warranty request form (Figure 7).



217

DAMEN

DAMEN SHIPYARDS GORINCHEM

WARRANTY REQUEST FORM

date 12-8-2015

To
Attn:
Fax::
Phone:
E-mail:

From:
Fax:
Phone:
E-mail:

TO BE COMPLETED BY DAMEN
Case No.:
System Code:
Supplier:
Sub-supplier:
SV: Ja

WARRANTY REQUEST FORM (one subject per request form please)			
Vessel Name	:	Request No.	:
Yard No.	:	Date	:
Equipment	:	Model	:
Maker	:	Serial No.	:
Type	:	Running Hours	:
Part	:	Part No.	:
		Serial No.	:
DESCRIPTION OF DEFECT			
ACTIONS TAKEN			
USED PARTS			
ACTIONS REQUIRED			
REQUEST MADE BY			
NAME		TITLE	DATE

DAMEN SHIPYARDS GORINCHEM — Member of the DAMEN SHIPYARDS GROUP

Industrieterrein Avelingen West 20
4202 MS Gorinchem

P.O. Box 1
4200 AA Gorinchem
The Netherlands

phone +31 (0)183 63 99 11
fax +31 (0)183 63 21 89

info@damen.nl
www.damen.nl

Registered at the Chamber of Commerce, no. 23036357, under the name BV Scheepswerf Damen Gorinchem.
All our offers are without engagement unless stated otherwise.
All activities carried out in accordance with the VNSI General Yard Conditions (Netherlands Shipbuilding Industry Association).

7

Figure 7: 'Warranty Request Form' used by customers for warranty claims included in the Damen Services Warranty Introduction sent to DTW on October 12, 2015 (DTW, 2016a: 217)

Warranty claims for the MV Veteran start aboard the vessel and follow the script per the sequencing of the 'Warranty Request Form' and 'Warranty Call Handling' diagram (Figures 7 and 8). After identifying a defect, the crew make attempts to repair it with the local resources available. If the crew cannot repair the defect, the MV Veteran's Chief Engineer reports the issue to DTW detailing what the crew did for the 'Actions Taken' (Figure 7). If DTW consider it a warranty claim, DTW will open a claim in the Damen Services Portal or submit a Warranty Request Form with the information provided by the crew (Figure 8). Damen Shipyards evaluates the claim and if it is deemed a warranty issue, they will determine the appropriate next steps per the 'Actions Required' (Figure 7). After which Damen Shipyards will either send parts, instruct third party manufacturers or their on-site Field Service Engineer to solve the claim (Figure 8).

The inclusion of mandatory warranty means Damen Shipyards remains the primary actor responsible for resolving warranty claims with respect to their suppliers and customers. The RSM described the role of Damen Shipyards throughout a claim:

> Because we are the seller of the vessel we remain responsible at all times, but also we remain always in the lead. We decide what will be done to solve it**.** Of course in good relation with the suppliers and customers. Besides the advices and recommendations from the suppliers and customers we have our own specialists. (Damen Shipyards RSM Email – September 3, 2016)

With Damen Shipyards positioning the warranty process as the most effective means of addressing faults aboard their vessels, I contend their warranty functions as an acknowledgement of the ongoing character of breakdown during the MV Veteran's introductory period emphasized by their representatives reiterating that breakdowns and incidents happen. Damen Shipyards positions their warranty as the most capable method of addressing these inevitable accidents and incidents that accompany tightly coupled, complex machinery because of the commonalities across marine-based subsystems and the quantity of specifically requisitioned parts featured in the MV Veteran.

Characteristics, which in their view, warrant a hierarchal, centralized management structure and the accompanying script (Figures 7 and 8) to diagnose and repair faults.

In *Seeing Like a State*, James C. Scott (1998) explores the shortcomings and failures of centralized forms of management used by nation states to manage their subjects and environment. Scott contends that the rationalization and standardization of social order put forth by nation states functions as a schematic, which "always ignores essential features of any real, functioning social order" (1998: 6). Using a work-to-rule strike as an example, Scott presents the essential features of production processes as the informal practices and acts of improvisation undertaken by employees which formalized sets of rules prove incapable of sustaining. Should employees adhere solely to the stipulated rules governing their work, production would be halted altogether because the formalized rules amount to a simplified description and enactment of a parochial view of the production process which excludes or downplays the importance of the employees' informal work. Scott summarizes the tension between formal management and informal practices in production:

> The formal scheme was parasitic on informal processes that, alone, it could not create or maintain. To the degree that the formal scheme made no allowance for these processes or actually suppressed them, it failed both its intended beneficiaries and ultimately its designers as well (1998: 6).

Akin to the production example used by Scott (1998), the operations of the MV Veteran are highly dependent upon both the formal training of its crew and the informal practices the crew develop through repair and maintenance work. Breakdown and repair are processes that are "not simply planned or avoided through design, but instead actively produced and reconfigured through use" (Rosner and Ames, 2014: 319). Manufacturers and designers often include fail-safes and guidelines to prevent breakdowns (Perrow, 1999), but the emergent character of breakdowns frequently requires the development of local solutions to repair accidents and incidents to ensure functionality (Bowker and Star, 1999; Mol et al., 2010). Thus, procedures for repair work proves difficult to standardize

because of its contextual and emergent character in which parts and worker tasks may be the same for many repairs, but each individual instance of repair requires specific inquiries and judgements depending on qualities such as the mechanical condition of those parts (Tironi, 2015; Callen and Cirado, 2016; Sormani et al., 2016). When on the FICI run, improvisation and adaptation are central to the work of the MV Veteran's crew members who repair faults encountered on the vessel ensuring ferry services can continue. Damen Shipyards attempts to account for the situated character of repair work in the warranty procedure by allowing the crew to make initial attempts at repairing defects observed aboard the MV Veteran by recording their 'Actions Taken' when filing a warranty claim.

Nevertheless, Damen Shipyards requires their customers to follow the warranty process to manage all vessel breakdowns and incidents for the prescribed period, rather than straying too far in their localized efforts to repair. As Sanne (2014) observes, the improvisation and 'bricolage' (Levi-Strauss, 1966) characteristic of locally developed repairs with resources at hand risks increasing the vulnerability of other standardized subsystems. The local modifications may be successful for achieving their intended purpose, but there is the risk of unintended interactions with other standardized subsystems if local practitioners overlook how their modifications may affect those subsystems (Sanne, 2014).

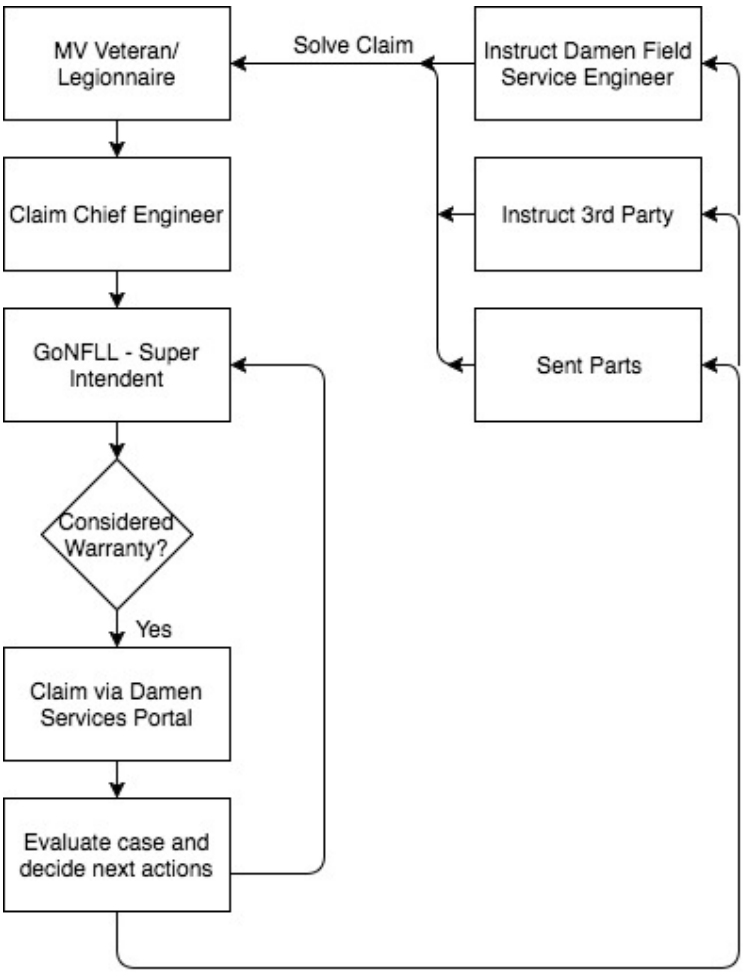


Figure 8: Flow chart describing 'Warranty Call Handling' included in the Damen Services Warranty Introduction sent to DTW on October 12, 2015 (DTW, 2016a: 215)

With Damen Shipyards remaining 'in the lead' throughout the duration of the warranty, the agency of the crew at times is limited based on their position at the start of the warranty procedure with subsequent actions subject to approval (Figure 8). Klein and Kleinman (2002) emphasize the need to consider the placement of actors within a structural context when discussing the agency of actors. As Klein and Kleinman contend, structures constitute the formal or informal 'rules of play' which allocate distinct resources, capacities, and opportunities for actors depending on their location within the structure (2002: 35). The positioning of actors within the structural context affects their ability to act by determining the types of resources they can mobilize based on the advantages afforded to them by their position. The MV Veteran's warranty presents a

structure which constrains the actions of actors like its crew members by delineating responsibilities, allowable actions, and available resources for resolving faults during a warranty claim. Per their inscribed role in the warranty flow diagram (Figure 8) and the Warranty Request Form (Figure 7), the MV Veteran's crew can attempt to repair any observed fault with the resources available to them so long as they thoroughly describe their actions taken. However, after a claim is filed, the crew's actions are limited until they receive the required external information, parts or a specific technician, provided by Damen Shipyards, arrives to repair the fault. Resources that are frequently unavailable to the crew and DTW until the fault is deemed a warranty claim by Damen Shipyards.

3.4 Local Repair Practices: Re-inscribing Repair onboard the MV Veteran

Based on the roles inscribed for actors by the warranty, Damen Shipyards assumes responsibility for a fault if it is approved as a warranty claim. Some of the MV Veteran's crew believed that the warranty was interfering in the development of local expertise onboard to deal with faults as they occurred due to limitations the warranty placed on tinkering. If the crew failed in their initial attempts to fix a fault, the crew would have to defer repairs to external specialists with the requisite knowledge or skill set. Repair is a situated practice that often presents cases which fall outside of prescribed procedures or systemic learning requiring improvisation to keep things functioning (Jackson, 2014; Sanne, 2010). As a new vessel, the MV Veteran was suffering from unexpected faults that would need to be resolved in a timely manner to continue a day's service. Some of these faults were addressed with local solutions by the crew that had to be reverted as part of the warranty procedure so Damen Shipyards could evaluate the claim or contact their suppliers.

The inability of the MV Veteran's crew to repair faults after their initial attempts often lead them to challenge their scripted role within the warranty process to keep the vessel operational for FICI ferry users. The crew's resistance against warranty structure reveals the contestation between the informal and formal rationales driving repair and maintenance work; those of rationales of localized, contextual adaptation (de Laet and Mol, 2000; Callen and Cirado, 2016), improvisation (Dant, 2010; Edensor, 2011), and

'bricolage' (Jackson et al., 2014; Sanne 2014) versus the implementation of top-down centralized and standardized repair procedures by designers and manufacturers (McIntyre, 2000).

One prominent case of the warranty constraining the crew in repairs was detailed in an email exchange between the MV Veteran's Chief Engineer and DTW regarding the programming of the port-side elevator:

> ***MV Veteran Chief Engineer****:* …Yesterday as an experiment I did increase the time to 280 sec in the port elevator and we almost got a full day[3] out of it. This morning however it was tripped out again. (Email sent to DTW – March 23, 2016) (DTW, 2016b: 664)
>
> ***DTW****:* I will put a warranty claim in the system and Damen will be in contact with [Damen Shipyards Representative]. (Reply to Chief Engineer – March 23, 2016) (DTW, 2016b: 663)
>
> ***Chief Engineer****:* Is there nothing we can do to try and rectify the situation. Like I said increasing the time gave us a full day. I have since set back the time to original setting. Waiting for the whole warranty process does not seem like it is heading in the right direction. It will get the problem fixed but what we need to do is to develop the skill set on board for a quick response. Before you put the claim through let me give [Damen Shipyards Employee] a call. I just need his number. I mean it could be something really simple like you need to bleed a little air out of the system… (Reply to DTW – March 23, 2016) (DTW, 2016b: 663)

[3] 'full day' refers to the scheduled crossings for the MV Veteran as determined by DTW. During the 2015-2016 winter season (October 16 – May 14), a full day lasted from the first crossing departing Fogo Island at 7:00am until the completion of the last crossing departing Farewell at 6:30pm (See A1).

> ***DTW***: In keeping with the warranty procedures I have notified Damen so they are aware of the claim. (Reply to Chief Engineer – March 23, 2016) (DTW, 2016b: 663)

In this exchange, the chief engineer points to the conflicting scalar narratives actors have over the MV Veteran. The source of the elevator glitch remains unknown because of potential interactions with other parts of the system necessitating a warranty claim which stops the chief engineer from making local changes. However, the chief engineer is primarily concerned with ensuring the elevator works for an entire service day gesturing to a geographic scale beyond that of the MV Veteran itself. As in Scott's (1998) work-to-rule example, following the scripted repair via the warranty would negatively affect the ferry service afforded by the MV Veteran overall because the elevator would not be working. The need to adhere to the warranty often left the crew frustrated with formalized procedure they saw as impractical for keeping the MV Veteran running efficiently. The experimental changes made by the chief engineer, essential to the development of local expertise and adaptation with the vessel (Graham and Thrift, 2007; Sanne, 2010), were reverted at the end of the day despite their success. Throughout the exchange, DTW reiterated the need to follow the warranty procedure to receive assistance with the fault (Figure 8). Furthermore, Damen Shipyards representatives stressed the importance of following the warranty to avoid miscommunications over any local modifications made contending that the warranty is the only way Damen Shipyards can 'act':

> In the meantime I wanted to send you a mail about spare parts. We sometimes receive requests from the chief engineers to supply them with a quotation. As agreed with [DTW] we only 'act' if we get official requests. Not via our field engineers. (Damen Shipyards Service Representative email to DTW – July 27, 2016) (DTW, 2016c: 339)

The crew's frustration with the restrictions placed on their ability to repair sometimes led them to send descriptions of faults or part quotations directly to Damen Shipyards

representatives in attempts to expedite the warranty procedure which was not allowed, as indicated by the note above.

A probable cause for the crew attempting to circumvent the inscribed warranty procedure despite DTW and Damen Shipyards' insistence on following the warranty are the feelings of responsibility or obligations maintenance workers can have to a third party (Sanne, 2008). For example, Sanne (2008) explores the situational risk-taking of Swedish railway maintenance workers who are tasked with the upkeep of a public utility. Maintenance workers in Sanne's case describe risk-taking and rule-bending outside of formal safety and maintenance procedures as a necessary part of their responsibility to railway users to ensure the railway works as required. Such feelings and obligations to the broader public are used to justify occupational risks such as informal practices and experimental changes as acceptable for the sake of functionality (Sanne, 2008).

Similarly, the MV Veteran's crew expressed their concerns for FICI residents' livelihoods and reputation of the FICI ferry service. The vessel had been out of service for a total of 144 days from a series of breakdowns during which labels such as 'lemon' and 'overkill' were applied to the vessel amidst continuous emergency vessel services. As the MV Veteran's Chief Engineer stated in an email to DTW regarding the elevators before the port thruster breakdown in April 2016, 'it would reflect poorly in the public eye if our elevators are out of order already' (DTW, 2016b: 663). Any faults observed onboard the MV Veteran would likely be subject to extreme scrutiny in the press because of the vessel's price and by FICI residents whose patience was running thin as they had to negotiate continuous delays when using the FICI ferry service. Even with Damen Shipyards acknowledging that breakdowns and start-up issues are expected with a new vessel (Graham and Thrift, 2007; Jackson, 2014), the MV Veteran would still be unable to work within the context of the FICI run as its equipped systems are understood by some residents and crew members to not align with the priorities indicated by FICI ferry users.

Moreover, many of the MV Veteran's crew members are FICI residents who recognize the importance of a reliable ferry service to the islands' seasonal economies and the well-being of the islands' residents as ferry users themselves. Prolonged delays,

particularly during the summer season have the potential to reduce tourism to the islands during a period where they are looking to diversify their economies beyond the North Atlantic Ocean fisheries. Given the constraints placed on the crew's agency to repair faults due to their position in the warranty structure where 'Actions Required' for all claims are subject to approval and determined after their initial efforts to repair (Figure 7), the crew attempted to accelerate the warranty in ways which proved detrimental to receiving Damen Shipyards' assistance with faults.

3.5 Local Repair Practices: Space and the Agency of Actors

While scripts in the warranty constrain action, so too, do the spatial qualities of Fogo Island-Change Islands (FICI), affecting the script in unanticipated ways because of the limited connections to FICI. When recounting the warranty procedure, a crew member drew attention to their inability to repair faults due to the lack of parts available onboard the MV Veteran:

> We are supposed to assess the problem. Attempt to make repairs. If we can't make repairs, we send an email off of what we've done and then between Newfoundland government and Damen. They will bring in a contractor. However, most times you can't do repairs if you haven't got parts. (MV Veteran Crew Member Interview– July 27, 2016)

The MV Veteran operates in a physically remote setting off Newfoundland's North Coast located approximately one hour by car from the inland town Gander, NL and four and a half hours from the province's capital and largest city St. John's, NL. The ferry terminal at Farewell, NL is accessible only by a single road interspersed with small towns inhabited by, at most, a few hundred residents. The sparse population and limited means of transportation within the region surrounding the FICI ferry service means the qualities of space are inseparable from how and when the practices of repair and maintenance are undertaken. Many of the parts required for the MV Veteran's repairs and its tightly coupled subsystems are often unavailable to crew in rural Newfoundland until Damen

Shipyards provides the necessary resources via the warranty. The crew and DTW's requirement to adhere to the warranty structure for those resources reveals the MV Veteran's reliance on geographically distributed resources for repair action planning. Plans which are hindered in some instances by the physical location of those resources in relation to MV Veteran's operational setting at FICI.

Repair is often thought of primarily as a temporal practice by which one restores an object to a previous state. For instance, Steven Jackson (2014) presents repair as "an inescapably timely phenomenon, bridging past and future in distinctive and sometimes surprising ways" (2014: 223). Actors such as the MV Veteran's crew members or specialized technicians return a broken part to a prior state before its breakdown thereby restoring functionality and providing a temporal continuity to the vessel's operations, whether it be through formal or informal channels governing its repair. When discussing the restorative qualities of repair and maintenance, the spatial qualities of these practices are often overlooked.

However, some studies of repair and maintenance have highlighted the spatial dimension of these practices, but limit their consideration to technologies used in the global south. For example, Jackson et al. (2012) conceive of 'repair worlds' in which place, landscape and built environments are implicated the repair of information and communication technologies used in Namibia. In doing so, Jackson et al. (2012) reveal Namibia to be populated with heterogeneous sites which are the product of social relations premised upon the localized adaptation and innovation characteristic of informal repair work. Sites that are developed out of necessity to ensure functionality amidst mismatches with formal government policies which advocate for a centralized repair model. Likewise, de Laet and Mol (2000) in their study of a Zimbabwe bush pump highlight the pump's success within the environmental setting of rural Zimbabwe. The loosely coupled design of the pump allows for ample opportunities for the pump to be modified to suit local conditions irrespective of part availability or its surrounding environment ensuring it can be used as needed. In both contexts, repairs are premised upon adaptation to localized settings transforming the spaces where they operate, which in turn, fosters new connections and relations between entities. As Lepawsky et al.

observe, repair work "makes connections between things, places and people. Sites are assembled through this work into geographies of repair" (2017: 57). That is, repair is not only temporal, but deeply spatial as well.

I argue that an understanding of space as a neutral backdrop for the temporal interactions between the MV Veteran's actors proves unsatisfactory for understanding the vessel's repair and the structural effects of Damen's Shipyards warranty. As Doreen Massey (2005) contends, space is co-constituted by the interrelations made by the interactions between local and global entities, predicated upon co-existing multiplicity and difference between those entities, and it is perpetually made and remade. Moreover, Massey emphasizes space as the product of relations "which are necessarily embedded material practices which have to be carried out" (2005: 9). Material practices such as the physical movement of parts and technicians underpinning the repair of the MV Veteran's breakdowns and incidents through Damen Shipyards' mandatory warranty.

The lack of available parts and the constraints on the agency of the crew in local repairs for the MV Veteran's faults is tied to the vessel's isolated operation setting at FICI and the international sourcing of its parts. As numerous Damen Shipyards employees emphasized, the MV Veteran contains an enormous amount of complex electrical and mechanical systems requiring their centralized warranty procedure to attend to the vessel's tightly coupled subsystems. Some of the vessel's subsystems are supplied by global manufacturers whose specialized facilities are located outside of Newfoundland and Canada. The globalization of the MV Veteran's parts, units, and subsystems entail the production of another scalar narrative to account for the vessel's breakdowns as disparate sites must be enrolled to repair the system ultimately affecting the actions the crew can take for repairs (Swyngedouw, 1997).

The MV Veteran's reliance on these distributed entities leads Damen Shipyards to stress the importance of adhering to the scripted warranty procedure as the most efficient means to resolve faults. Moreover, the location of those entities in relation to the MV Veteran's location at FICI increases the time required to diagnose faults and provide the requisite parts or technicians. The island of Newfoundland presents the MV Veteran's actors with logistical challenges in acquiring parts, which in some cases may not be

readily available on the island or must be delivered as weather permits with its limited transportation network. Common throughout many of the warranty claims filed to Damen was the need to import parts to St. John's, NL and then get those parts to FICI to fix the vessel if it was in service at the time. As a Heddle Marine representative [Damen Shipyards NL-based contractor] commented during a warranty claim for the vessel's hydraulic system:

> If I can arrange for tomorrow we will send fittings for the watermist and Hydraulic system. So far finding a 30mm stainless compression fitting is proving difficult. Island living has its disadvantages, we may have to fly it in. (Heddle Marine Representative email sent to DTW – January 18, 2016) (DTW, 2016a: 1882)

Similarly, during the port thruster breakdown in April 2016, the spatial and temporal considerations of the proposed repair plan were foregrounded by Damen Shipyards emphasizing the time required for just repairs due to the location of facilities and the custom specifications of the replacement parts. The Damen Shipyards Representative explained the expected timeline to DTW:

> As you might know, RR [Rolls-Royce] is currently dismantling the upper gearbox [in St. John's, NL]. We have received a lead time of RR for all parts (same as Starboard) week 17 in Finland. It will take approximately one week to get the parts to St. John's and another one and a half to two weeks to repair the thruster. This is only for the repair and not for any modification of the thrusters… (Damen Shipyards Representative email sent to DTW – April 8, 2016) (DTW, 2016b: 443)

The two cases above demonstrate how the MV Veteran's repairs entail the mobilization of globally distributed sites connected through the repair action planning and the work of the vessel's crew and manufacturers that manifest in a space created by the relations between those sites (Massey, 1991; Lepawsky et al., 2017). The MV Veteran's repairs

often require the movement of parts and technicians provincially, nationally, and internationally. There is not a single location where all parts and manufacturer technicians are concentrated for the vessel. The space in which the MV Veteran's repairs occur is not confined to a single physical location in Newfoundland such as St. John's Harbour or FICI for it is "constructed out of a particular constellation of social relations, meeting and weaving together at a particular locus" (Massey, 1991: 28).

DTW was aware of the potential challenges in sourcing parts for the repair and maintenance of a large, complex, and tightly coupled vessel that would be operating in a geographically remote region of Newfoundland. During the MV Veteran's design and construction, DTW insisted that Damen use as many Canadian suppliers as possible for subsystems aboard the MV Veteran to negate some of the potential logistic issues regarding the procurement of spare parts or technicians for repairs. However, the crew's attempts to resist their scripted role in the warranty structure by going directly to part suppliers revealed ambiguities in part sourcing for subsystems such as the MV Veteran's Heating, Ventilation and Air Conditioning (HVAC) system. As a Damen Shipyards Representative noted:

> We have been informed by our supplier Heinen & Hopman that the Government of Newfoundland (CE [Chief Engineer] Veteran) had contacted them for a spares inquiry. Because H&H delivers 95% of all our HVAC systems there are some agreements and they will not provide any quotations directly. So I kindly ask you if GNL has interest in spares for the HVAC system (or any other [sub]system) onboard the Veteran and Legionnaire… send your request to [Damen Shipyards Representative] in copy. (Damen Shipyards Representative email sent to DTW – June 16, 2016) (DTW, 2016c: 764)

DTW had the following internal exchange in response to the Damen Shipyards regarding the sourcing of the HVAC system:

> **DTW 1**: So we have to go through Damen for HVAC spares going forward? Are there any other pieces of machinery with this type of agreement? This was one of the items we insisted happen in this build, local content and local supply. Up to now I don't see a lot of this happening. (Internal DTW email communications – June 16, 2016) (DTW, 2016c: 764)

> **DTW 2**: Regarding the Canadian content requirement. Damen did make an effort to go Canadian with a number of items they bought themselves, but I don't think they imposed this requirement on their subcontractors. Aside from Eekels hiring Techsol that is. (Reply to DTW 1 – June 16, 2016) (DTW, 2016c: 764)

DTW, as noted above, emphasized the need for 'local content and local supply' because they were aware of the need for the MV Veteran to be made to work within the context of the FICI run (Akrich, 1992; de Laet and Mol, 2000). Getting requisitions for replacement parts filled in a timely manner under the warranty was frequently cited as a problem given the lack of spares available aboard the MV Veteran, waiting for parts to arrive to Newfoundland or the vessel, and the financial constraints the provincial government was operating under at the time. The lead times for warranty parts could vary from a few days to several weeks in some cases depending on the type of breakdown or incident. A crew member stressed that:

> While getting these parts sooner or later doesn't affect the vessel running, it effects it running efficiently and defers ongoing maintenance we're responsible for. (MV Veteran Crew Member Interview – July 27, 2016)

The crew member, as the chief engineer had in the case of the elevator points to the effects beyond the internal parts of the MV Veteran emphasizing the detrimental effects that the lack of parts has on the service quality and efficiency of the FICI ferry service. The uncertainty surrounding the acquisition of parts lead the MV Veteran's crew to

challenge their scripted role within the warranty procedure by requesting parts directly from Damen Shipyards to keep the vessel operational for FICI ferry users.

The MV Veteran is the sole option for travel between the islands and mainland Newfoundland for many residents and visitors. All aspects of life on the islands are inseparable from the FICI ferry service. The lack of parts available to the crew and the islands' reliance on the ferry service often led to alternative repairs with the resources at hand until Damen Shipyards could mobilize the entities required for repairs. One prominent case being the passenger toilets aboard the MV Veteran in July 2016:

> ***MV Veteran Crew*:** …Three of the toilets out of service are in the women's washroom. We are now having to move toilets from crew's quarters to keep a sufficient number of toilets functioning for passengers. Need some replacement parts ASAP. (Email sent to DTW – July 14, 2016) (DTW, 2016c: 149)
>
> ***DTW***: FYI - this happened to a toilet a while back so there is already a claim in for one diaphragm. That was ordered June 14 and isn't here yet. I mention this because I expect additional diaphragms to take just as long to get here. (Reply sent to MV Veteran Crew – July 14, 2016) (DTW, 2016c: 149)

In this case replacement parts for the toilets had been claimed without deviating from the warranty script, yet the crew had been waiting over a month for them to arrive so they could fix the toilets. As a result, some crew members thought the warranty would be more effective if the crew received the necessary parts or the repair work was performed before filing the warranty claims. A repair first approach in opposition to Damen Shipyards' warranty script where Damen Shipyards verifies each of DTW's claims before Damen assumes responsibility for fault resolution (Figure 8). Furthermore, the vessel's crew and FICI residents linked the inability to repair the vessel to the complexity of the vessel contending that mechanical simplicity seen in their previous ferry the MV Earl W. Winsor would ensure repairs could be done quickly enough by not having to rely upon the mobilization of globally distributed sites for local repairs, which would entail a more

reliable and contextually appropriate ferry for the FICI run. As in de Laet and Mol's (2000) case of the bush pump, the simplicity and adaptability of its design allowed for more timely repairs and functionality within its operational environment despite a lack of resources such as replacement parts. Thus, the warranty script implemented to address the interactive complexity and uncertainty of system failures reveals not only the differentiated positioning of actors related to the repairs of the MV Veteran, but the positioning of those actors in the power geometries of space based on their ability to mobilize the resources for repairs.

3.6 Concluding Remarks for Chapter

Through tracing the breakdowns and repairs of the MV Veteran, my empirics demonstrate the politics of infrastructure through the understandings different groups mobilize to explain the breakdowns. The narratives of the different groups gesture to and produce different geographic scales based on their understandings of the MV Veteran's breakdowns. Damen Shipyards and DTW employees emphasize the internal scale of the system highlighting the inevitability of breakdowns given the vessel's interactive complexity. Conversely, FICI residents and crew members point to a scale beyond that of the MV Veteran because of the detrimental impacts the breakdowns were having on the quality and efficiency of the FICI ferry service from the apparent mismatch between the vessel's equipment and its operational context.

Here, my case demonstrates how attempts to predetermine user-object relations in advance are premised on understandings which also extend to the repair and maintenance of that object. The conflicting understandings of the three sets of actors to explain the breakdowns highlighted earlier in this chapter apply to the repair and maintenance of the MV Veteran through the inclusion of Damen Shipyards' warranty, which is a script premised on the Damen's understanding of the vessel. The MV Veteran's crew resists and attempts to redefine their scripted role within the warranty demonstrating how the spatial qualities and positioning of FICI relative to the resources needed for the vessel come to influence their ability to repair. The warranty structure for repairs is understood by crew members to be contextually inappropriate for the emergent character of breakdowns and

for providing the needed resources to FICI as they point to geographic scales and levels of address beyond the internal complexity of the vessel. In doing so, I highlight the interplay between conceptions of user-object relations such as Akrich's (1992) 'script' and conceptions of space in geography through the crew's practices of repair. Repair and maintenance, frequently analyzed in terms of the actions of the practitioner and the mutuality of users and objects, are co-constitutive of space generating new relations and (dis)connections between different sites.

Moreover, the MV Veteran underpins relations between FICI and other sites and the repair and maintenance work of the crew is essential to sustaining those relations. Delays in the repairs to the vessel halt relations between FICI and other sites ultimately leading crew members to deviate from their scripted role to ensure the MV Veteran can function as it is the only physical link FICI residents have to mainland Newfoundland. Consequently, the interplay between the spatial qualities of FICI and practices of repair and maintenance also affect the passengers that must use the FICI ferry service. Having addressed the breakdowns and repairs made to the MV Veteran during its introductory period, I now move to the challenges encountered by FICI ferry users and the tactics used to negotiate the contingencies presented by the FICI ferry service. The following chapter addresses how FICI residents and visitors alike used the ferry service during the introductory period of the MV Veteran.

Chapter 4

Disrupted Mobilities at the Edge: The Breakdowns of the MV Veteran and Development of Ferry Tactics

During the MV Veteran's breakdowns between December 2015 and August 2016, the Fogo Island-Change Islands (FICI) ferry service was subject to multiple vessel swaps while the MV Veteran was taken to St. John's for the required repairs under Damen Shipyards' warranty. As demonstrated in Chapter Three, the repair and maintenance of the MV Veteran is hindered, in part, by the physical location of FICI which entails the mobilization of geographically disparate sites and entities. I contend that the spatial and temporal qualities of FICI influence not only the ways in which operators attend to the MV Veteran, but also influence how the vessel is used by FICI residents. The MV Veteran's breakdowns and the emergency services implemented in its absence are my analytical entry point to address research question of what these breakdowns reveal about the reproduction of the mobilities facilitated and hindered by the FICI ferry service. I argue the breakdowns of the MV Veteran reveal that the use of the FICI ferry service is a space of contradiction and conflict, marked by the uneven and limited provision of infrastructures in periphery spaces.

Data for this chapter come from media publications related to the MV Veteran and semi-structured interviews with residents of Fogo Island and Change Islands and employees within the Department of Transportation and Works (DTW) which were coded thematically as they relate to the MV Veteran's breakdowns and the FICI ferry service. First, I begin with an overview of the ferry service at Fogo Island-Change Islands, describing the emergency transportation plans enacted during the MV Veteran's breakdowns that interrupted the FICI ferry service. Then, I contrast the breakdowns and delays in ferry service experienced by residents with their expectations for the MV Veteran, including the promise of a more timely and reliable ferry service. Finally, I describe the habitual tactics developed by the MV Veteran's users to use the ferry under its actual conditions of operation.

I draw upon geographer Tim Cresswell's (2010) notion of a 'politics of mobility' for this chapter, situating its constituent elements within studies of infrastructures and islands. Consequently, a politics of mobility draws attention to how "mobilities are both productive of such social relations and produced by them" (Cresswell, 2010: 21). Cresswell (2010) defines mobility "as the entanglement of movement, representation, and practice" (2010: 19). Mobility then is constituted by three qualities: the physical movement afforded by (but not limited to) transportation infrastructures, the meanings and affective enchantments one attaches to mobility, and the embodied and routine experiences of practiced mobility (Bourdieu, 1990; Watts and Urry, 2008; Edensor, 2009; Cresswell, 2010; Vannini, 2011c). The MV Veteran affords ferry users mobility, but does so with the caveats of contradiction and conflict which its users must negotiate. The simultaneous physical connection and disconnection from the mainland, the affective attachments made with infrastructures, and the spaces defined by their own distinct senses of place and time ferry users move between when using the vessel. The MV Veteran's breakdowns change each of mobility's constituent elements ultimately necessitating the development of what I call 'ferry tactics' on the part of its users to manipulate the ferry service ensuring the relations the ferry underpins can continue.

4.1 Strategies and Tactics in Everyday Life

Michel de Certeau (1984) in his examination of the practices of everyday life distinguishes between 'strategies' and 'tactics' based on the structured power relations between actors. de Certeau defines strategies as:

> "the calculus of force-relationships which becomes possible when a subject of will and power (a proprietor, an enterprise, a city, a scientific institution) can be isolated from an "environment." A strategy assumes a place that can be circumscribed as proper (propre) and thus serve as the basis for generating relations with an exterior distinct from it (competitors, adversaries, "clienteles," "targets," or "objects" of research). Political, economic, and scientific rationality has been constructed on this strategic model " (1984: xix).

Strategies as de Certeau argues are the domain of structure. The differentiated positioning of actors within structures “constitute permanent implications and regulations and their existence depends upon construction of power space” (Yilmaz, 2013: 67). In doing so, de Certeau positions strategies as deeply spatial processes for the manipulation of relations between entities always occurs in a place, tied to their positioning in the power geometries of space.

Conversely, de Certeau (1984) presents ‘tactics’ as the practices of groups and individuals without access to structured power. A tactic, as de Certeau argues:

> “insinuates itself into the other's place, fragmentarily, without taking it over in its entirety, without being able to keep it at a distance. It has at its disposal no base where it can capitalize on its advantages, prepare its expansions, and secure independence with respect to circumstances. The "proper" is a victory of space over time. On the contrary, because it does not have a place, a tactic depends on time—it is always on the watch for opportunities that must be seized "on the wing." Whatever it wins, it does not keep. It must constantly manipulate events in order to turn them into "opportunities."” (1984: xix).

Tactics then are manipulations and adaptations made by actors in response to the strategies of those with power. They are practices which play on or against spatial arrangements imposed upon them. Furthermore, de Certeau posits that the practices of everyday life constitute forms of resistance against predetermined spatial arrangements and subsequent ways of living. For example, de Certeau presents walking as a tactic that manipulates the spatial arrangement of city streets. The spatial order of the city “organizes an ensemble of possibilities (e.g., by a place in which one can move) and interdictions (e.g., by a wall that prevents one from going further)”, but the walker can manipulate the spatial arrangement by using shortcuts or finding the best route to navigate the lived realities of city life (de Certeau, 1984: 98). Similarly, as I will demonstrate the MV Veteran and its breakdowns impose a spatial arrangement onto FICI and ferry users

in response develop ‘ferry tactics’ to navigate and manipulate that arrangement by capitalizing on the opportunities it affords them.

4.2 The Fragility and Visibility of Infrastructure at Fogo Island-Change Islands

Before discussing the tactics used by FICI residents to cope with the breakdowns, I begin with an overview of infrastructure and island studies to demonstrate the importance of the MV Veteran’s breakdowns and the emergency provisions implemented for the FICI ferry service. I begin with the work of Star and Ruhleder (1996) whose conception of infrastructure proves useful as a departure point for exploring the tactics developed during the MV Veteran’s breakdowns. Star and Ruhleder deem an infrastructure successful when:

> “the tension between local and global is resolved. That is, when local practices are afforded by a larger-scale technology, which can then be used in a natural, ready-to-hand fashion” (1996: 114).

As I will demonstrate through incorporating the works of island studies scholars and my own empirics, FICI as a rural island setting introduces spatial and temporal considerations which prevent the MV Veteran from being used as anticipated leading to the development of what I call ‘ferry tactics’ by the islands’ residents.

Studies exploring the social order embodied in infrastructure often invoke Star and Ruhleder’s proposition that infrastructure is successful until it becomes visible upon breakdown. That is, the “normally invisible quality of working infrastructure becomes visible when it breaks” as the local practices and relations it sustains are hindered or halted altogether during disruptions (Star and Ruhleder, 1996: 113). Within this framework, infrastructure is presented as a substrate through which the material relations between entities are made real and sustained. In the absence of the affordances provided by infrastructure, users’ attention is drawn to its shortcomings when they are unable to continue their own tasks.

Star and Ruhleder's proposition however proves problematic if applied indiscriminately across all sites for it assumes breakdowns and service interruptions are abnormal occurrences (Carse, 2012; Larkin, 2013). Infrastructural 'visibility' premised upon the interruption of the affordances provided to its users is applied primarily in urban regions of the Global North. As Graham and Thrift contend, "the deep infrastructural ideologies of the West – which tend to normalize a ubiquitously networked urbanism" deny the existence of times and places where the conveniences afforded by infrastructural networks are marked by their widespread unavailability or interruption (2007: 11). As such, the local norms for 'working' infrastructure can vary significantly throughout different spaces for they occupy distinct positions in relation to global flows and interconnections (Massey, 1993; 2005). Depending on the ability of actors to mobilize the required resources to ensure infrastructure's functionality and the physical setting in which the infrastructure operates, as is the case with the MV Veteran, working infrastructure may be characterized by persistent delays, breakdowns or interruptions (Edwards, 2003; Howe et al., 2016; Kallianos, 2017).

Rural islands are sites often framed in opposition to those of their mainland counterparts given the visibility and fragility of their frequently limited infrastructural systems. When contrasted with urbanized, continental locations whose existence is underpinned by the embedded connectivity afforded by contemporary infrastructural networks, rural islands are conceived of as isolated spaces at the edges of these networks (Baldacchino, 2006; 2007; Hay, 2006; Stratford, 2008). As Godfrey Baldacchino contends:

> "the small, remote, and insular subject [islands] also suggests peripherality, being on the edge, being out of sight and so out of mind; such and similar situations expose the weakness of mainstream ideas, orthodoxies, and paradigms while fomenting alternatives to the status quo" (2007: 166).

As Baldacchino (2007) implies, rural islands are sites whose existence is frequently marked by contradiction, disruption, and adaptation based upon their positioning at the

periphery of mainland infrastructural networks. As a result, rural islands are also spaces which challenge the rote implementation of technologies used elsewhere (Watts, 2014). For instance, my analysis of the MV Veteran's repairs in the previous chapter demonstrates the difficulties in keeping the new vessel operational when accounting for the spatial and temporal dimensions of FICI. To ensure the vessel works here requires larger scopes for tinkering and localized, informal improvisations in repairs and operational procedures made by its crew which lie outside of the manufacturer's formal warranty structure (de Laet and Mol, 2000; Schuman, 2002; Oudshoorn and Pinch, 2003). These are necessary as FICI's limited resources present an extreme environment that normalizes the informal, reconfiguration work done by the MV Veteran's crew to ensure the islands sole means of transportation to the mainland is functional (Watts, 2014; Saxton, 2015).

Central to conceptualizations of islands as peripheral and contradictory spaces is their self-apparent fragility and vulnerability (Baldacchino, 2007; Watts, 2014). For example, Laura Watts (2014) contends that the populations of rural islands such as the Orkney Islands possess an acute self-awareness of the fragility of their natural and cultural landscape. Watts links the fragility of life on the Orkney Islands to the islands' public infrastructures and the limited resources available to address disruptions to them. The tenuous connectivity underpinning the relations which manifest in place at Orkney are, as Watts argues, readily "visible and embodied in the weather-reliant ferries, in the occasional electricity blackouts, in the 'not spots' of absent broadband and mobile phone signal" (2014: 30). As Watts observes, residents' recognition of their vulnerability is "a necessary effect of… remote islandness and the insistence of the infrastructure; flows of new goods, people, data, and energy are not unending but stop in bad weather" requiring innovative and adaptive solutions to negotiate infrastructural delays (2014: 33). Thus, at sites such as FICI, the intermittent operations of their limited infrastructures from environmental conditions or mechanical delays afford users continuous interruption and inconvenience as the functional norm.

4.3 The MV Veteran's Breakdowns and the Provision of Emergency Services

During each of the MV Veteran's breakdowns, alternative arrangements were made by the Department of Transportation and Works (DTW) to continue transportation between Fogo Island-Change Islands (FICI) and mainland Newfoundland. In the event of a mechanical breakdown aboard a DTW vessel while in service, their standard protocol is to procure a back-up or 'swing' vessel as quickly as possible to temporarily serve on the route until the faulty vessel can be diagnosed, repaired, and return to service. DTW often tries to keep one vessel in its fleet as a swing vessel to provide quicker responses to vessel breakdowns. If a swing vessel is unavailable, DTW will provide emergency air transportation until a swing vessel can be procured from another ferry run.

During periods of emergency air transportation in the absence of a swing vessel, DTW provides two forms of air travel to FICI. At the Farewell terminal, a helicopter is provided for trips between Farewell, Change Islands, and Fogo Island at designated times and on an as-needed basis. For ferry users going to Fogo Island, DTW provides scheduled flights on a small fixed-wing aircraft between Gander International Airport and the Fogo Island Airstrip given Fogo Island's larger population and proportion of ferry users.

The MV Veteran's four breakdowns between December 20, 2015 and July 6, 2016 resulted in extensive planning by DTW to provide alternative transportation and by local passengers who developed tactics to handle the ongoing changes made to the FICI ferry service. At times, DTW provided emergency air services in the absence of a swing vessel at a significant cost to the provincial government without the guarantee of transportation between the mainland and the islands due to inclement weather conditions. While the air services ensure that users can move between mainland Newfoundland and the islands, the air services present their own challenges. The Fogo Airstrip is located roughly in the geographic center of the island so it is isolated from the island's coastal villages. Landing at the airstrip requires passengers to have a car or transport waiting for them or they may be stuck at the airfield. The distance from the towns to the Fogo Airstrip is walkable, but takes several hours and is a challenge for much of the island's predominately elderly population. Additionally, the use of emergency period aircraft introduces restrictions on freight and shipping to both islands. Shipping is limited to small packages due to the size of the helicopter and the length of the airstrip at Fogo Island which prohibits the use of

larger fixed-wing aircraft. The only viable means of consistently moving people, freight, and cars to Fogo Island and Change Islands is with the ferry. Therefore, it is paramount that a swing vessel be implemented as quickly as possible.

Early into February 2016 following the MV Veteran's first thruster breakdown, the primary swing vessel for the FICI ferry service, the MV Earl W. Winsor, suffered damage to its bow ramp after a docking accident which required the vessel to be removed for repairs. Following the MV Earl W. Winsor's accident, the ferry service was forced to operate at a significantly reduced capacity because of the sizes of the swing vessels brought to FICI. The swing vessels available to DTW during this time were the MV Norcon Galatea and the MV Beaumont Hamel which have capacities of twenty-five and thirty-five vehicles respectively compared to the sixty vehicles the MV Earl W. Winsor and sixty-four vehicles the MV Veteran can transport per crossing. The reduction in vessel capacity and the volume of traffic at FICI led to extended line-ups at all terminals and periods where ferry users were left at terminals following the final crossing of the service day. Similarly, the reduced capacities of the swing vessels provided also left tractor trailers loaded with time-sensitive goods such as fish for processing stuck at the FICI run's terminals.

DTW responded to the reduced capacity with a 'Temporary Schedule' featuring an additional fifth crossing to Fogo Island to ensure all vehicle traffic at the Farewell terminal would be able to reach FICI with service ending following the final crossing to Fogo Island at 8:30pm[4] (See A1 and A2). The MV Beaumont Hamel's 'Temporary Schedule' proved inadequate for resolving the traffic delays on the FICI run starting in May 2016, prompting DTW to implement an 'Enhanced Temporary Schedule' (See A3) which featured three additional crossings to Fogo Island extending service until 2:30am. The MV Beaumont Hamel operated on the Enhanced Temporary Schedule until the vessel was relieved by the re-certified MV Earl W. Winsor on June 4, 2016. While the return of the MV Earl W. Winsor increased the passenger capacity per trip, the vessel's

[4] The Fogo Island-Change Islands Winter Schedule (See A1) lists the last scheduled crossing to Fogo Island at 6:30pm assuming there are no weather or mechanical delays in service provision.

bow ramp was deemed unsuitable for use requiring all loading and unloading to be done via its stern ramp. The lack of a functioning bow ramp also meant that vehicles with trailers and tractor trailers had to reverse on to the MV Earl W. Winsor when loading, ultimately increasing crossing times for passengers. These contingencies produced by the emergency services persisted until the return of the MV Veteran on July 6, 2016.

4.4 Fogo Island-Change Islands and the Mainland: Mobility as Differentiated Resource

Cresswell's notion of mobility is helpful in achieving a nuanced discussion of the effects of the MV Veteran's breakdowns and the emergency services implemented in its absence. Mobility as my case demonstrates is a resource which is differentially accessed by actors depending on their positioning in the power distributions of space determined in part by their access to infrastructure (Massey, 1993, 2005; Cresswell, 2010). The Fogo Island-Change Islands (FICI) ferry, whether it is the MV Veteran or one of the alternate swing vessels operating in its absence, constitutes the sole, continuously operational transportation link between these communities and mainland Newfoundland. Therefore, encounters with the ferry in everyday life at FICI are unavoidable for almost all the islands residents. The importance of the single connection was foregrounded in many of my conversations with residents and visitors alike throughout my field work. Upon mentioning the ferry service and the MV Veteran, residents of both islands frequently began interviews by emphasizing the FICI ferry service's unrivalled significance and their dissatisfaction over the MV Veteran's reoccurring breakdowns and delays:

> Well I'd like to start by saying that the lifeline of Fogo Island is the ferry service. That's our connection to the outside world. It's important that we have a reliable, stable, on-time ferry service and that's not the case. (Fogo Island Resident Interview – July 13, 2016)

Many FICI residents simultaneously held conflicting opinions over the ferry service. The ferry enables movement between the islands and the mainland, yet it can hinder or halt

movement altogether. The FICI ferry service affords timely access to mainland Newfoundland sustaining the livelihoods of FICI's residents while presenting unplanned consequences and effects its users must confront (Tanner, 1997; Vannini, 2011b). One resident who recently moved back home to Fogo Island described the centrality of the ferry to FICI residents' everyday experience:

> People need to travel and you feel bad for people that are living here… I moved back two years ago to the island. I was living in St. John's. I had a really good job working for government and my husband had a good job, but we just wanted to be home. I have three small kids. It was a big decision for us to move here because of the ferry. The ferry… you have to deal with that every day. And I talk to my other friends who want to move back home – the ferry is the biggest deterrent for everybody. It's not even finding a job anymore. There are jobs here now. It's the ferry. You want Fogo Island to grow, but this obstacle is there in your way and it's something that's fixable. It's so frustrating. (Fogo Island Resident Interview – July 25, 2016)

As the resident points out, the ferry is an embodiment of the contradiction between openness and closure islanders must navigate (Baldacchino, 2007). The ferry is simultaneously held as the driver and limiter of the islands' growth by many residents. There are growing economic opportunities at FICI indicated by the resident, yet the possibility of contending with everyday ferry delays deters potential residents from moving to FICI.

Despite the contingencies presented by the single vessel ferry service, residents were understanding of delays resulting from unfavourable weather or ice buildup along the ferry's route. For instance, geographer Phillip Vannini (2011a; 2011b) in his analysis of ferry dependent communities on Canada's west coast islands points to island residents' acceptance of the inconveniences which accompany ferry mobility because of their distinct attachment to place. The same rationales for contending with the unique

characteristics of ferry mobility were alluded to by FICI residents. As one Change Islands resident explained:

> Maybe you're familiar with an island that has to depend on ferry service, but we all know that if – and of course when you're living on an island, it's something that's sort of – how could I explain it? It's something that you tolerate. You tolerate disappointments over the ferry's delayed or the ferry is not running today, those sorts of things. We got used to that because it does happen. Well not regularly, but on times it happens… We have to realize that we chose to live on an island and with that choosing to do that. Everything is not going to work out so smooth as if you were living on the mainland of Newfoundland. (Change Islands Resident Interview – July 22, 2016)

When discussing their ferry usage, the resident emphasizes that patience and tolerance of ferry delays are pre-requisites for living on an island as opposed to mainland Newfoundland. Such delays were taken as a condition of their choice to live on an island where the availability of transportation will differ from that of the mainland because of the intermittent scheduling of ferry crossings or environmental conditions the service faces (Watts, 2014; Leung et al., 2017).

Nevertheless, FICI residents still have expectations of reliability and consistency from the ferry service in the absence of environmental delays because the service underpins residents' livelihoods and export-driven economy. The MV Veteran's breakdowns and the corresponding emergency services demonstrate how FICI residents' choice to be 'immobile' in living on an island intersects and co-exists with mobilities at a scale beyond that of immediate physical movement (McMarron, 2015). Off-island travel is a necessity for many medical appointments and governmental affairs given the lack of specialists and facilities on the islands. Businesses on the islands from small artist galleries and bed and breakfasts to the larger Fogo Island Fishing Co-Operative and Shorefast Foundation rely on the connectivity to global markets afforded by the ferry service. The constant vessel swaps and schedule changes throughout the MV Veteran's

breakdowns disrupt these connections. The persisting delays led some residents to avoid the ferry service despite travel being a necessity for sustaining these relations. As one Fogo Island resident commented:

> I haven't been off the island in about three months. And when they had the Beaumont Hamel on there, I would not travel because it wasn't necessary – in my view, it was only taking someone else's space who might have more important things to do. And when the Winsor came back on there I didn't go on the Winsor. The ramp was broken… but I do have to go away for art supplies and I got a framer that does my work for me [on the mainland] and I need to be able to [travel]… If I had to go off island for business and supplies all the time, I'd be so frustrated. I'd feel like leaving. (Fogo Island Resident Interview – July 6, 2016)

As the Fogo resident points out, the additional time required for trips to the mainland, persistent uncertainty over ferry scheduling, and the limited capacities of the swing vessels provided by DTW ultimately disrupted residents' lives by hindering or discouraging travel altogether amidst their reliance upon mainland-based services. The impacts brought by constant changes to the ferry service are readily visible as FICI residents must accommodate for such contingencies (Vannini, 2011c). While the emergency arrangements facilitated movement, the lack of a vessel that could follow its scheduled crossings emphasizes the tenuous precarity underpinning the lives of FICI residents who need a reliable link to the mainland (Watts, 2014). The MV Veteran's breakdowns reveal how flows to FICI are disrupted by the islands' fixity and limited physical mobility given their positioning towards the end of infrastructural networks. That is, they are effectively imprisoned by the MV Veteran's breakdowns, on the receiving end of unevenly differentiated mobilities (Massey, 1993).

4.5 Expectations of Service Improvement: Mobility as Representation

Recognizing the importance of the ferry service to Fogo Island-Change Islands (FICI), the Department of Transportation and Works (DTW) had prioritized replacement

of the run's previous vessel, the MV Earl W. Winsor because of reoccurring delays from its susceptibility to ice buildup and the increasing frequency of mechanical incidents. As a former DTW Minister commented when discussing DTW's ongoing vessel replacement strategy:

> So in the discussions Fogo needed one [new ferry] because the Winsor's nearly fifty years old. So it's life expectancy in principle is done. Gone. We continue to get extensions. We continue to spend money into it and it doesn't help in capacity. It doesn't help in reliability. It doesn't help in the aesthetics particularly if you've got communities that are trying to grow their economies based in tourism. So that becomes an issue. The Winsor wasn't as good in ice. We needed something that was super ice class. So the plan was that what's going to be built. (Former DTW Minister Interview – June 14, 2016)

The minister's comments encompass the constituent elements of mobility when discussing the rationale for replacement (Cresswell, 2010). The increased capacity of the new vessel would improve physical movement between the islands and the mainland. The minister also points to the aesthetics of the old vessel and links its appearance and poor reliability as detrimental qualities counter to FICI's efforts to grow their economy. Moreover, there is an underlying assumption that a new vessel will improve the affective experiences of users and the reliability of the FICI ferry service. In doing so, the minister emphasizes "how travel and journeying are necessarily inhabited spaces, filled with multiple cultural agencies and meanings" derived in part from passengers' experiences and understanding of transport infrastructure (Lin, 2015: 288).

Premised on this understanding of the old vessel, DTW awarded a $50,000,000 contract to Damen Shipyards to construct the MV Veteran. The Minister as indicated above also cited the increasing maintenance and refit costs of the MV Earl W. Winsor as rationale for its replacement, which as of 2018 had been in operation for forty-six years and had been extended beyond its projected life cycle. The MV Veteran was purchased to improve the reliability of both the FICI ferry service, particularly in winter ice conditions

because of the need to request ice breaking services from the Canadian Coast Guard. The MV Earl W. Winsor's lacked the required hull integrity and curvature in its bow shape to break its own path through icy conditions. In contrast, the slightly curved shape of the MV Veteran's bow and reinforced hull allows it to glide over the surface of ice, after which the weight of the vessel pushes the ice downward breaking it and displacing it to the outer edges of the curved hull out of the vessel's path.

Figure 9: Slightly curved bow of the MV Veteran designed for ice-breaking (Source: Author's Photo)

Given the islands' reliance on the ferry, the announcement and delivery of the MV Veteran was met with high expectations from the residents of Fogo Island-Change Islands (FICI) whom anticipated immediate improvements in the ferry service. With the arrival of a newly commissioned vessel, residents believed that service delays caused by icy conditions, extensive repairs, and refits for the aging MV Earl W. Winsor would be minimized. The MV Veteran like other infrastructural systems, delivers "not only services, goods, and people but also power, hope, and ideas" (Barnes, 2017: 147). As one Fogo Island resident conveyed the impression the MV Veteran made when FICI residents first saw the vessel at a public event held by DTW in St. John's, NL before it began operations at FICI:

> Oh I was impressed. Oh god we all were. I mean we had this new ferry. This super, super ferry. Everyone was excited. Couldn't wait to get her out there and get her on the run. (Fogo Island Resident Interview – June 29, 2016)

As the interviewee's words suggest, the MV Veteran is understood by some residents as an "excessive fantastic object generating desire and awe in autonomy of its technical function" (Larkin, 2013: 333). The vessel's appearance left residents awestruck at its build quality in combination with the prospect of an improved ferry service with a new vessel (CBC News, 2015b).

In addition to the newness of the vessel, a few FICI residents pointed to the MV Veteran's appearance emphasized as contemporary and modern in contrast to the near fifty-year-old MV Earl W. Winsor. The chair of the Fogo Island Transportation Committee expressed the excitement of residents in an interview with CBC News:

> Everybody that I've spoken to is in awe of the… state-of-the-art boat. I mean, she is just a beautiful ship (CBC News, 2015b).

When describing the vessel as 'state-of-the-art', some residents pointed to the MV Veteran's design featuring systems they believed would never have been seen at FICI

such as hydraulic bow doors and internal vehicle ramps (CBC News, 2015). The recognition of the MV Veteran's design and equipment extended to the shipbuilding industry where the vessel was selected as one of the top-ten passenger ferries constructed in 2015 by the industry-based *Marine Log* magazine (Marine Log, 2016). Moreover, FICI residents were optimistic at the prospect of mitigating some of the environmental delays brought by icy conditions. With the ice-strengthened hull[5] of the MV Veteran, there was an understanding that the quality of the FICI ferry service would improve during the winter season as the vessel could navigate the frequently ice laden waters of the North Atlantic Ocean.

In the narratives surrounding the replacement of the MV Earl W. Winsor and the capabilities of the new vessel, the MV Veteran demonstrates how the politics of mobility intersect "with global flows of capital, technology and hegemonic discourses of 'modernity'" and 'progress' through residents' understandings and media's representations of the vessel (Butcher, 2011: 241). As Cresswell notes,

> "some of the foundational narratives of modernity have been constructed around the brute fact of moving. Mobility as liberty, mobility as progress. Everyday language reveals some of the meanings that accompany the idea of movement. We are always trying to get somewhere. No one wants to be stuck or bogged down" (Cresswell, 2010: 21).

The price, design, and technical capabilities of the MV Veteran in addition to its newness are central to Western narratives of 'progress' which are derived, in part, from enhancements and improvements in mobility (Cresswell, 2010; Butcher, 2011; Harvey and Knox, 2012). That is, the ability to move and enhancements in that capacity are frequently positioned as desired.

[5] The MV Veteran has the highest ice rating certificate for ferries (Ice Class 1A Super) allowing for maneuverability in up to forty-centimeter-thick floating ice at four knots without ice-breaker assistance (Damen Shipyards Group, 2015).

However, these narratives were disrupted during the MV Veteran's breakdowns and the ongoing vessel changes at FICI. Many residents were frustrated with the persistency of service delays culminating in a rally on May 1, 2016 organized by the Town of Fogo Island and Fogo Island Transportation Committee attended by 400 of the island's 2500 residents. At the rally residents voiced their concerns over the current state of the ferry service, the MV Veteran's persistent mechanical breakdowns, and the potential effects of these events on their livelihoods. Residents felt that throughout the breakdowns and repairs to the vessel, the social relationships and affective experiences tied to the ferry service were being disregarded by Damen Shipyards and DTW.

For the residents of FICI, the mobility afforded by the MV Veteran is central to "forming and maintaining social networks of various kinds with places and people" (Manderscheid, 2013: 189). This occurs on the co-existing scales of the everyday travel experiences of the ferry's passengers and through residents' business, service, and familial relations on the mainland and beyond. For instance, one Fogo resident described the importance of the ferry service in the overall travel experience of tourists because it is a moment where personal connections are forged with FICI residents:

> It's when tourists are wandering around [the ferry terminals], asking questions, looking at stuff. What should I be doing here, there, whatever. And you also get to say hope you had a good time, tell all your friends [laughs]. And you wish them safe travels and goodbye. From a bookending type of thing for people's experience to Fogo Island, that boat is essential and that [facet] is ignored by Transportation and Works. (Fogo Island Resident Interview – June 30, 2016)

Physical movement such as ferry travel "elicits affects and feelings that are neither located solely within the person nor produced solely by the mode of transport, but occur as circulations of affects" between different people and infrastructures (Jensen et al., 2015: 370). The MV Veteran as the Fogo resident suggests, is a generative component of the social relations that are part of a passenger's travel experience (Watts, 2008). To many FICI residents, a visit to Fogo Island and Change Islands begins with the

conversations and relationships visitors build with residents and other passengers aboard the ferry or at the ferry terminal while waiting for the next crossing. As Vannini contends, these moments during travel "are evidence of the fact that journeys have the potential of being transformative of the traveler's experience" (2010: 115). A visitor's ferry experience would, in these residents' view, set the tone for tourists staying on the islands from their first moments in the ferry line-up until their eventual departure.

Moreover, many FICI residents felt the negative press coverage and visitors' experiences with the MV Veteran's breakdowns and delays would be detrimental to residents' livelihoods. The ferry schedule's unpredictability, the MV Veteran's questionable reliability, and the time passengers must allocate to use the ferry were all understood as factors that disrupt livelihoods and should they persist had the potential to end them altogether. When asked of the possible effects of the MV Veteran's breakdowns, a Fogo Town Council member reiterated their frustration from a conference call they had with Damen Shipyards and DTW representatives regarding the impressions the vessel was leaving on the public:

> We had a guy tell us the other day, I won't say which guy, but one guy told us it's costing the company [Damen Shipyards] a lot of money. And I said you're costing us our future. You're going to kill us. It's going to kill us if the boat keeps up like this. You know we're getting a lot of people not coming here this summer because of it… but they don't understand. They don't understand the concept of what this ferry means to us and what it's doing to us. I think we made it clear a few days ago that this is serious stuff. (Fogo Town Council Member Interview – July 7, 2016)

The Fogo Town Councillor emphasizes that the MV Veteran simultaneously presents "the possibility of having a future" and the foreclosure of that possibility when it fails to function as needed (Ferguson, 1999; Larkin, 2013: 333). As the only link these islands have to the mainland, the MV Veteran and FICI ferry service is integral to the relations created and sustained at the scale between FICI and other locales. Consequently, the MV

Veteran and its breakdowns are a focal point for residents' frustrations because those relations are halted when the ferry stops (Watts, 2014).

Brian Larkin links these feelings to the political address of infrastructures or "the feelings of promise" infrastructures can stimulate (2013: 333). Harvey and Knox posit that such promises for infrastructure's intended users include those of speed and connectivity as well as economic prosperity (2012: 523). The promise of speed and connectivity with mobility enhancing infrastructures as Harvey and Knox argue is premised upon the recognition that in isolated, peripheral communities like FICI, difficulty and slowness when travelling detrimentally interfere with "livelihoods and life itself" (2012: 524). Fresh fish that needs to be processed on and shipped from the island expires, tourists cancel their travel plans and reservations, and residents miss or reschedule appointments. Furthermore, the physical connection to the mainland afforded by the MV Veteran functions as a means of bridging existing geographic and social gaps between FICI and mainland Newfoundland (Harvey and Knox, 2012). Without the timely access afforded by the ferry, residents cannot access government services available only in central Newfoundland towns in addition to the global markets they are looking to engage through their fishery and tourism industries. The delays and breakdowns of the MV Veteran ultimately disrupt the initial narratives attached to the vessel given the significance of their impacts and the understandings associated with the introduction of new infrastructures.

4.6 Ferry Tactics: Mobility as Practice

Despite the frustrations, intermittent character of its operations, and uncertainty brought by the introduction of the MV Veteran, the vessel is the only continuously operating link between Fogo Island-Change Islands (FICI) and mainland Newfoundland. The ferry service must be used by FICI residents and visitors alike irrespective of the physical inconveniences it presents. The MV Veteran, then, constitutes "a structure of confinement" for it makes travel possible while simultaneously limiting travel opportunities through its assigned schedule, weather-dependent operations, and mechanical breakdowns (Tsing, 2005: 6). Having established the centrality of the MV

Veteran in the livelihoods of FICI residents and residents' affective entanglements with the vessel, I move to discuss the final component of Cresswell's (2010) conception of mobility. The practices of FICI residents when using the MV Veteran and the emergency transportation provided during its breakdowns. Practices in this case refer to the habits and routines developed and enacted by FICI ferry users (Bourdieu, 1990; Cresswell, 2010).

Drawing upon de Certeau (1984), Vannini (2011c; 2012), and Wunderlich (2010), I position the practices of ferry users as tactics that manipulate the spatial and temporal arrangement between FICI and mainland Newfoundland produced by the MV Veteran and its breakdowns. Because the MV Veteran is the only available form of physical transport to the mainland and is generative of the social relations sustaining FICI, the vessel's use necessitates embodied practices which are obscured if the ferry service is presented solely as a means of travelling from point A to point B (Cresswell, 2010). I return to de Certeau's (1984) conception of tactics before describing the interplay between user practices and the time-space produced by the introduction of the MV Veteran at FICI.

Strategies as de Certeau (1984) contends are the domain of actors with structured power (such as the state) and manifest in the manipulation of power relations in place. In doing so, de Certeau (1984) positions the manipulation of power relations as a method to control and delineate space. Conversely, tactics work on, alongside or against predetermined ways of living implied by certain spatial arrangements. de Certeau provides an example of this in the case of state owned low-income housing:

> "a North African living in Paris or Roubaix [France] insinuates into the system imposed on him by the construction of a low—income housing development or of the French language the ways of "dwelling" (in a house or in a language) peculiar to his native Kabylia. He superimposes them and, by that combination, creates for himself a space in which he can find ways of using the constraining order of the place or of the language. Without leaving the place where he has no choice but to live and which lays down its law for him, he establishes within it a degree of

> plurality and creativity. By an art of being in between, he draws unexpected results from his situation." (1984: 30)

Here, the resident "manipulates spatial organizations" in the space they inhabit to create a space of their own (de Certeau, 1984: 101). The resident transforms and resists the spatial configuration imposed upon them by the low-income housing development through their everyday tactics seizing opportunities that present themselves to their advantage. At FICI, the islands' residents subvert and transform the spatial organization imposed upon them by the MV Veteran and its breakdowns through what I call 'ferry tactics'. The ferry tactics of FICI residents allow them to maximize the opportunities they can derive from the spatial arrangement between FICI and mainland Newfoundland. I discuss the two primary ferry tactics used by FICI residents.

4.6.1 Tactic One: The Fogo Island-Change Islands Ferry Line-Up

The Fogo Island-Change Islands ferry service operates on a first come, first serve basis without a formal reservation system. Instead, users board the ferry in the order which they arrive at the three terminals until the ferry reaches its maximum capacity. The limited capacity of the vessel on the FICI run and the timings of crossings can prove contentious for ferry users given the volume of traffic, environmental conditions or vessel breakdowns that can limit ferry operations. If a user misses a crossing and there is only one vessel active on the run, the user will likely have to wait two to three hours or more until they are able to make their trip. To ensure that one can get on a crossing at a certain time, users will manipulate the spatial arrangement of the ferry line-up by leaving their vehicle in the line-up at the islands' terminals effectively abandoning their car for periods ranging from a few hours to overnight. This primarily takes place on Fogo Island because of its larger population and greater volume of ferry users whereas the residents of Change Islands will only need to leave their vehicles at the terminal during the peak of the summer season.

Residents of both islands often have multiple vehicles or will enlist the help of their family or friends to position their car in the ferry line-up at the island's terminal. If

someone needs to travel off-island they will drive their vehicle to the ferry terminal with a friend or family member following them in another vehicle. After the ferry user drops their vehicle off in the line-up, they will get a ride back to their town with the car that followed them to the terminal and will return to their own vehicle when it is time to board the ferry. The process occurs most frequently after the last crossing to Fogo Island in the evening when ferry users position their cars at the Man O'War Cove terminal overnight to ensure they can get on the first crossing to Farewell. In these instances, before the user has boarded the ferry, they will have made two trips to the terminal without leaving the island to ensure they have a chance at catching the ferry.

Figure 10: Vehicles placed in the ferry line-up overnight at Man O'War Cove, Fogo Island (Source: Author's Photo)

However, in his discussion of British Columbia's coastal islands, Vannini (2011c) points to the 'elusiveness' of the infrastructural affordances presented by ferries. As Vannini observes:

> "no event can ever unfold the same way twice; no series of actions – no matter how routinized – can be reassembled in identical combinations. Differing situations, different relationships amongst actors, different permutations of action give rise to different potentialities and different actualizations" (2011c: 355).

Despite the line-up tactic developed and made routine by FICI ferry users, any crossing at its scheduled time is not guaranteed. The number of cars already in the line-up, prevailing weather or ice conditions, possibility of mechanical delays or an overnight emergency crossing[6] can all alter the ferry's schedule. Due to the emergent circumstances that affected the MV Veteran and the constant swing vessel and schedule changes during its absence, users developed an additional tactic to address the elusiveness of ferry travel.

4.6.2 Tactic Two: Additional Planning for Trips by Ferry Users

Given the environmental or mechanical conditions that afflict the MV Veteran and the Fogo Island-Change Islands ferry service, its users must incorporate the potential for delays in their travel plans at the expense of their own time and money. A stop in a mainland town or the neighbouring island for ferry users is an event that can require a full day or multiple days in some cases if there is a delay in ferry services (Sengers, 2011). With the MV Veteran's reoccurring breakdowns and the uncertainty surrounding the ferry service's schedule, some island residents began to dryly joke about bringing overnight

[6] Section 320 of the Government of Canada's Marine Personnel Regulations (SOR/2007-115) dictate that the master of a crew and crew members of Canadian vessels require six hours of continuous rest every twenty-four-hour period. The Fogo Island-Change Islands ferry crew remain on call throughout the night after the last run of a service day. If there is a medical emergency on Fogo Island or Change Islands, the ferry is used to move the resident to mainland Newfoundland after which the crew must rest for six hours shifting the next day's schedule.

bags when making crossings. The Mayor of Change Islands summarized the sentiments in an interview with CBC:

> There's two places now you'd have to pack your overnight bag — when you go out on the fishing boat and probably now when you go out on the ferry. [Mayor of Change Islands – April 5, 2016] (Delaney, 2016)

The mayor's comments point to the need for residents to account for the elusiveness of ferry travel (Vannini, 2011c). This is required of FICI residents due to the distinct spatial and temporal differences between Fogo Island-Change Islands and mainland Newfoundland brought by the MV Veteran. The widespread practice of orienting travel around ferry schedules at FICI contributes to the formation of what Filipa Matos Wunderlich (2010) deems 'place temporality'. Akin to the 'sense of place' by which specific locations are constituted of distinct sets of relations (Massey, 1991; 2005), Wunderlich presents place temporality as a "sense of time that is place-specific, unique to specific locations, and intersubjective, practised and perceived collectively" (2010: 46). That is, different places have different senses of time identifiable through "focusing on its structure and the rhythmic patterns that constitute it" (Wunderlich, 2010: 46). Therefore, senses of time and place are inseparable from one another and serve to constitute the other. As Tim Edensor notes, "rhythms are essentially dynamic, part of the multiplicity of flows that emanate from, pass through and centre upon place, and contribute to its situated dynamics" (2010: 3). Accounting for the sense of time in place demonstrates how places are not fixed, but are "always in a process of becoming, seething with emergent properties, but usually stabilised by regular patterns of flow that possess particular rhythmic qualities whether steady, intermittent, volatile or surging" (Edensor, 2010: 3). The uniqueness of place is attributable not only to its distinct constellation of relations, but the rhythms and temporalities of those relations as well.

Through the experiences of FICI residents and ferry users in their collective enactment of the line-up tactic to use the MV Veteran and its swing vessels in addition to the intermittent character of their physical access to mainland Newfoundland, the ferry

service is a constituent element of what Vannini (2012) calls 'island time'. Island time is often characterized by lifestyles featuring a more laid-back attitude and *in situ* scheduling of activities in contrast to the busy, time-managed rigor associated with mainland place temporalities found in cities (Sengers, 2011; Vannini, 2012). The MV Veteran, then, as the only form of physical transport to the mainland is also the point at which ferry users move between the two distinct place temporalities: that of the frequently weather-dependent social practices and experiences of FICI residents and the proactive control of time sought via route scheduling on the mainland where islanders must go for services (Sengers, 2011).

What the ferry-as-intersection-point of two place temporalities means in practice, then, is that for many off-island trips, FICI residents rarely leave the day of if they need to be somewhere on mainland Newfoundland. Ferry users adjust their schedules to that of the MV Veteran with significant leeway as the "speed, rhythms, and duration patterns of ferry mobilities" shape and frustrate their attempts to move between different place temporalities (Vannini, 2012: 246). Booking accommodations for an extra night and leaving a day or two earlier were frequently mentioned as ways to deal with the tenuous and intermittent character of the ferry service. As one Change Islands resident explained:

> We do have some that commute back and forth to work, but I mean they're going to Fort McMurrary so they schedule that, "Oh I got to go back to work Friday so I'll make sure I get on the ferry so I make sure that I go away Thursday and I won't wait for the ferry Friday because we're living on an island. And if I'm depending on that ferry to be operating right on time and all that stuff." So you have to adjust your schedule… I mean – if moose hunting season opens now in September on say the 12th of September. I'll be out of Change Islands on the 10th or 11th. I'm not going to wait until the 12th [laughs]. Or if you got a doctor's appointment that's very important. A specialist appointment in St. John's. If my appointment in St. John's was 4pm this afternoon I wouldn't have waited until this morning to went away. I would leave the day before, evening before. (Change Islands Resident Interview – July 22, 2016)

As the Change Islands resident's comments suggest, the MV Veteran plays "the role of synchronizing islanders in time" with the place temporalities of the mainland (Vannini, 2012: 256). The mobility afforded by the ferry imparts a structure and order to the temporality of island life through its intermittent, schedule-based operations (Edensor, 2010). Consequently, this means that FICI residents' experiences and habitual practices are ordered by the ferry service (Wunderlich, 2010; Vannini, 2012). Residents' fly-in-fly-out work, doctor's appointments, hunting seasons, youth sports teams' games, and mainland supply trips as emphasized by residents are all underpinned by the schedule of the FICI ferry service. The MV Veteran's breakdowns however disrupt that ordering for they halt those relations between the island and the mainland ultimately requiring ferry users to allocate more time for travelling.

The contention between the distinct place temporalities linked by the MV Veteran is best demonstrated by the practices of the Fogo Island based Shorefast Foundation in facilitating travel to FICI. The Shorefast Foundation is a non-profit organization operating the Fogo Island Arts residency program established in 2008 (Shorefast, 2018). Through their additional initiatives geared towards the preservation of Fogo Island and Change Islands' local culture and the construction of the luxury Fogo Island Inn, the Shorefast Foundation have been instrumental in the islands rise as an internationally renowned tourism destination. A chief component driving Fogo Island's recognition as a luxury destination is the Fogo Island Inn, built to financially supplement the Shorefast Foundation's other programs on Fogo Island. Guests pay several thousand dollars for a stay at the Inn and the Shorefast Foundation goes to great lengths to facilitate travel between the Fogo Island and mainland Newfoundland. When discussing the MV Veteran and the ferry service with a Shorefast board member, they described how Shorefast accommodates guests staying at the Inn:

> People that'll drive to the island. If they can't get on the ferry, they can walk on the ferry and we'll pick them up over here when they arrive [at the Fogo Island Terminal]. And once they get on the island they're spending two, three, four, five

> days with us and we have to provide local transportation to get around the island too. We have cars available that they can use. Often, we go to Gander [Gander International Airport] and pick people up and bring them out [to the Farewell Terminal], which means more staff have to go or some of the community members go to meet them and we do the same thing going back [to the mainland]. (Shorefast Board Member Interview – July 14, 2016)

The Shorefast Foundation's efforts to limit the role of the MV Veteran and the ferry service in a guest's experience is done to ensure a smooth transition between the place temporalities of the mainland and Fogo Island. The ferry service demonstrates how different places and mobilities are interdependent for they frequently overlap, contradict or resist one another given their distinct senses of time (Vannini, 2012). The clientele of the Fogo Island Inn is worldwide in its scope and Shorefast's guests arrive at Fogo Island under varying circumstances: with or without vehicles at the Farewell Terminal, arriving at the nearby airport requiring an islander to pick them up, or avoiding the ferry altogether by flying directly to the Inn by chartered air services. The different steps that Shorefast takes to account for the elusiveness of ferry travel, at the meeting point of different place temporalities, reveals how the ordering brought by the MV Veteran is "precariously achieved and open to becoming, replete with potentialities and differentiation" necessitating the additional planning tactic (Edensor and Holloway, 2008: 499).

4.7 Concluding Remarks for Chapter

On the periphery of mainland and the global relations that manifest in place at FICI, residents are limited to a single, tenuous means of physical transport which both affords and structures their mobility (Baldacchino, 2007; Watts 2014). Having outlined Cresswell's (2010) conception of mobility, my analysis of the MV Veteran reveals the entanglements of movement, representation, and practice in an extreme rendition of mobilities that are considered mundane elsewhere due to the geographic setting of Fogo Island-Change Islands. Mobility, as my case emphasizes is a resource that is differentially

accessed by groups depending on how they are positioned relative to one another (Cresswell, 2010).

As the sole link FICI residents have to mainland Newfoundland, the MV Veteran elicits strong feelings due to the effects repeated breakdowns have on the quality of the ferry service and passengers' subsequent travel experiences. When their physical movement is hindered, or halted altogether, the social relations underpinned by the ferry also suffer. The breakdowns of the MV Veteran as in the previous chapter reveal the ferry to be a contested space where back-ups are not readily available and travel remains perpetually elusive despite efforts to schedule it. FICI residents must contend with the simultaneous physical connection and disconnection that the ferry service affords them with their choice to live on the islands (Baldacchino, 2007). The distinct spatial and temporal arrangements produced by the MV Veteran and its breakdowns ultimately leads its users to manipulate the ferry service through the tactics they have developed given their dependency on mainland-based flows (de Certeau, 1984; Vannini, 2012).

The MV Veteran's breakdowns and the ferry tactics developed by residents are a demonstration of difference and the unevenness which accompanies the provision of limited infrastructural systems in spaces considered peripheral or at-the-edge of mainland infrastructural networks. However, it is that same difference and unevenness produced by their limited infrastructures which allows FICI residents to enact their own sense of place and time (Massey, 2005; Wunderlich, 2010; Sengers, 2011; Vannini, 2012). The residents of FICI have made a conscious choice to live on an island and maintain their distinct identity amidst the introduction of a ferry service that is now inseparable from their livelihoods. And with that choice, the contradiction, conflicts, and affective experiences the MV Veteran affords its users will continue as travel to and from the islands via the ferry remains elusive.

Chapter 5
Conclusion

Infrastructures have considerable influence in shaping everyday experiences and understandings of space (Dourish and Bell, 2007; Carse, 2012; Larkin, 2013; Smith, 2016). I began with the MV Veteran's breakdowns, which as Star and Ruhleder (1996) suggest are the moments in which infrastructures become visible. That is, the social relations upheld by infrastructural networks have been disturbed and cannot function as intended rendering infrastructures 'visible' (Ishii, 2017). Based on this premise, I set out to address my overarching research question which asks what the breakdowns of the MV Veteran reveal about the reproduction of the social orders of Fogo Island-Change Islands (FICI) and its connections (or disconnections) with other places linked as linked by the vessel. As I have argued throughout my previous chapters, the conception of infrastructures as solid or durable until periods of breakdown proves inadequate for a nuanced understanding of the MV Veteran and its shaping of the practices of its associated users. Here, I recount the main arguments from my empirical chapters highlighting my key findings regarding the material vulnerability and physical unevenness of infrastructure at FICI through examining the practices of the MV Veteran's repair and maintenance and the ferry tactics of the vessel's users. Then, I suggest future lines of inquiry for research on the practices of repair and maintenance.

5.1 Infrastructural Vulnerability and Experiences of Space

My thesis challenges the assumption that infrastructures remain stable and invisible until breakdown by considering the material vulnerability of infrastructure as an everyday mode of existence. Furthermore, while existing literature has highlighted the vulnerability of infrastructural systems within urban regions of the Global South, my case emphasizes how the uneven provision of infrastructure in rural regions of the Global North is a fundamental component in the everyday precarity experienced by FICI residents. Rural regions of the Global North, particularly evident in the context of outport Newfoundland through the practices of resettlement, have undergone an extended period

of infrastructural disinvestment and service relocation producing an infrastructural deficit between these regions and their urban counterparts. The unevenness resulting from this deficit, as I argue, manifests in the Government of Newfoundland and Labrador's (GNL) efforts to upgrade the FICI ferry service and actors' attempts to repair the MV Veteran.

In Chapter Three, I focused on how actors' different understandings of the MV Veteran gestured to different scales when explaining the vessel's breakdowns and service delays (Swyngedouw, 1997; Mol, 2002; Jensen and Morita, 2015). In doing so, the different sets of actors foregrounded both the material vulnerability of the MV Veteran and the social relations sustained by the ferry's travels. The understandings of FICI residents and crew members were rooted in 'place' as they pointed to the suitability of the vessel for the context of the FICI run. These groups felt there was a mismatch between the "planning and enactment" of the MV Veteran because of its reoccurring mechanical breakdowns and incidents as well as the equipment included for the crossing which was understood to be 'overkill' for FICI (Smith, 2016: 165). Conversely, Damen Shipyards and employees of the Department of Transportation and Works (DTW) continuously emphasized that breakdowns and incidents were unfortunate, but expected outcomes attributing them to the interactive complexity of the MV Veteran revealing faults that need to be worked out after its introduction (Perrow, 1999; Graham and Thrift, 2007). This understanding leads Damen to include the mandatory warranty for the vessel which acts as a script for repair and maintenance.

Moreover, as discussed in Chapter Four, FICI residents and crew members emphasized how their experiences with the MV Veteran the ferry service were always characterized by precarity and uncertainty given the lack of alternative options available for travel. The ferry service was already susceptible to disruptions from inclement environmental conditions such as heavy winds or ice along the route. These cases however were viewed as outside of any groups' control whereas greater scrutiny was placed on mechanical breakdowns and incidents as such events were understood to be preventable with the appropriate precautions. The 'elusiveness' (Vannini, 2011c) of ferry travel brought by the breakdowns of the MV Veteran and the constant swing vessel swaps at FICI leads its users to develop ferry tactics in response.

In all cases, the vulnerability of infrastructure as I argue is tied to the spatial qualities and the uneven positioning of FICI relative to other sites. As discussed in Chapter Three, the procurement and delivery of replacement parts is hindered in part by FICI's limited connectivity to the MV Veteran's internationally distributed suppliers. Similarly, in Chapter Four I emphasize how the social relations and mobility afforded by the ferry service can be hindered or halted altogether at any time given the physical isolation of FICI. With its limited connections to other sites for the repair and maintenance of the vessel and the physical movement of ferry users, precarity and vulnerability are ubiquitous for all of the MV Veteran's actors across the various scales mobilized to explain the vessel's breakdowns and their subsequent effects.

5.2 Scripting Repair and Maintenance

One of my intentions with this thesis is to extend Akrich's (1992) notion of 'scripts' from technological development to the practices of repair and maintenance. The script approach to user-technology relations has been applied in individual cases to analyze the compliance and non-compliance of users in the realization of their imagined roles on the part of an object's designers (see Oudshoorn and Pinch, 2003; van Oost, 2003; von Schnitzler, 2008). In considering the breakdown and vulnerability of objects, it appears straightforward that repair and maintenance would be inscribed into objects to ensure the preservation and extension into the future (Jackson, 2014; Denis and Pontille, 2017). Indeed, these practices are inscribed through scripts such as the Damen Shipyards warranty to address the material vulnerability of infrastructural systems and to ensure they can continue to function as intended.

However, as I argue in Chapter Three, the inscription of repair and maintenance is also a site of contestation over the imagined roles of maintainers as envisioned by designers. Damen Shipyards implements a hierarchal structure to resolve breakdowns and incidents aboard the MV Veteran. The Damen Shipyards warranty, much like the MV Veteran does, defines "a framework of action together with the actors and the space in which they are supposed to act" (Akrich, 1992: 208). In doing so, I demonstrate how repair and maintenance are political as one group of actors sets out to control and

influence the actions of other groups, determining "how and in which conditions they are supposed to act in different situations" (Strum and Latour, 1987; Ureta, 2014; Denis and Pontille, 2017: 1; Barnes, 2017).

Here, the differentiated understandings of the MV Veteran's breakdowns and incidents from its associated actors extend to the practices of repair and maintenance. The structure of the warranty interferes with and forecloses the actions of crew members who look to make local repairs to keep the vessel operational. Their motivations and rationale are again rooted in place as they emphasize the inability to acquire the necessary parts at FICI and the importance of the vessel's travels to the livelihoods of FICI residents. Conversely, Damen Shipyards cite the interactive complexity and the potential for unforeseen interactions which warrants their approval for repairs (Perrow, 1999; Sanne, 2014). Approaching the warranty as a script reveals the forms of resistance taken by the MV Veteran's crew members who attempt to redefine their role in the warranty and the actions taken by Damen Shipyards and DTW to ensure crew members adhere to their imagined roles.

5.3 Research Implications and Future Directions

In examining the breakdowns of the MV Veteran and its repair and maintenance, this thesis adds to a growing body of Science and Technology Studies (STS) and geographic literature concerning infrastructure and the practices of repair and maintenance undertaken to ensure their preservation. My thesis presents a case that brings novel insights to the ways in which infrastructure and repair and maintenance can be conceptualized by researchers. Here, I highlight insights my case contributes to STS and geographic literature suggesting directions for future research.

First, this thesis advocates for further studies on the implementation and repair and maintenance of rural infrastructures in the Global North. While many scholars have undertaken research on the practices repair and maintenance, cases are frequently based on the infrastructural systems of urban areas in both the Global North and South (Graham and Thrift, 2007; Ureta, 2014; Denis and Pontille, 2015; Tironi, 2015). Moreover, in cases where repair and maintenance are examined in relation to rural infrastructures, this

research primarily focuses on regions in the Global South (de Laet and Mol, 2000; Jackson et al., 2012; Barnes, 2017). My examination of the repair and maintenance of MV Veteran demonstrates how these practices fundamentally change in rural regions of the Global North. In doing so, I strengthen and nuance existing calls for attention to local solutions and practices (Mol et al., 2010). As discussed in Chapter Three, Fogo Island-Change Islands (FICI) residents considered the MV Veteran to be contextually inappropriate for the long-term, operational goals of the FICI ferry service. The limited provision of infrastructural systems and the time required to provide adequate back-ups within the rural context of FICI necessitates that repairs can be made as quickly as possible given its centrality in the everyday practices and social relations of FICI residents. However, this was not possible given the structure of Damen Shipyards warranty which itself is premised on their understanding of the interactive complexity of the MV Veteran.

Moreover, as discussed in Chapter Four, the residents of rural island communities such as FICI have willingly chosen to live and contend with the inconveniences and contingencies brought by ferry mobility. FICI residents readily acknowledge their differentiated positioning in relation to the mainland infrastructural networks and social relations in which they are enrolled and have come to rely upon. As one Fogo Island resident explained when discussing the ferry service comparing it to the use of a mainland highway:

> "I often wonder what it would be like if you were on your way to work some morning, but every morning. You're driving along on the highway and all of a sudden somebody stands in front of you and says "You've got to stop right there." And not only that, you're going to be there for 3 hours. Would you ever get used to it? Would you ever just take it as "Oh well that's just part of my daily routine" and just sit there because when it comes to a highway this is what we have to do here on the island. If we can't get on the ferry, we have to sit there and wait until the next one comes along right. Now there's also the other side of the coin. We live on an island. And I wouldn't have it any other way. I would analyze the ferry

> system, but I would never bitch and complain about it because I love living where I'm to. I love Fogo Island. I love the island syndrome if you want to put it that way" (Fogo Island Resident Interview – July 1, 2016)

Here, the resident points to the contradictions and difference that FICI residents encounter in their everyday practices of mobility attributing their willingness to endure these to their attachment to place (Massey, 2005; Sengers, 2011; Vannini, 2012). That is, FICI residents are acutely aware of the "self-evident vulnerability" of rural island living which requires continuous negotiations and adaptations in practice for infrastructures to work as intended (Baldacchino, 2007: 165; Watts, 2014). Moreover, these adaptations in practice are necessary for FICI residents to claim a space for themselves amidst the spatial arrangement imposed upon them by the ferry service, which itself is tied to the repair and maintenance of the MV Veteran (de Certeau, 1984). To this end, my thesis highlights the potential slippages that can occur in attempts to upgrade rural infrastructural systems in the Global North without appropriate consideration of their repair and maintenance given the different spatialities in which they will operate. I encourage future research on repair and maintenance practices to consider rural sites within the Global North as the assumption that infrastructures exhibit ubiquitous functionality and reparability when implemented in the Global North is demonstrably flawed.

Second, this thesis demonstrates the importance of considering space in the practices of repair and maintenance and the potential intersections with STS approaches. Frequently, studies examining the practices or repair and maintenance render space as a neutral backdrop in favour of emphasizing the timeliness and restorative character of these practices (Jackson, 2014; Tironi, 2015). FICI and Newfoundland however, present pronounced logistical challenges to the repair and maintenance of the MV Veteran. Space as Doreen Massey argues is the product of relations that are "embedded material practices which have to be carried out" (2005: 9). In keeping with the place-based insights above, the MV Veteran's breakdowns and incidents and Damen Shipyards' warranty demonstrate how repair and maintenance are deeply spatial practices as they foster, uphold, and cease connections between disparate sites and entities which manifest at

FICI. My findings are congruent with the assertions made by Lepawsky et al. (2017) who conceive of repair as a relation-making practice which constitutes and produces spaces. Thinking of repair and maintenance as spatial processes encourages thinking of these practices in flux, characterized by multiplicity, difference, and a broad swath of interrelations on several levels of address (Massey, 2005; Lepawsky et al., 2017).

Emphasizing the spatial dimensions of repair and maintenance allows for a conception of a politics of repair and maintenance in considering the different sites brought together by these practices (Massey, 1993, 2005; Lepawsky et al., 2017). The MV Veteran for example, points to the increasing globalization of parts, units, and subsystems of infrastructural systems that operate in specific, place-based contexts. As I discuss in Chapters Three and Four, the potential consequences of this globalized distribution are made clear by the impacts of the MV Veteran's breakdowns and the subsequent time required for repairs have on the livelihoods and mobility practices of FICI residents. The differentiated positioning of FICI within the power geometries of space are made apparent based on their connections and relations to the sites necessary to repair and maintain the MV Veteran (Massey, 1993).

Therefore, thinking of repair and maintenance spatially leads us to question who should be tasked with the responsibility to attend to the material vulnerability of infrastructures and the goals of these practices. Here, the spatial character of repair and maintenance intersects with the insights made possible from STS approaches which emphasize the mutuality of user-technology relations. With the MV Veteran for example, Damen Shipyards takes it upon themselves through their mandatory warranty, but this is ultimately understood to be impractical by the vessel's crew for keeping the vessel operational at FICI leading them to challenge their inscribed role in the warranty. The 'scripting' of repair and maintenance is intimately tied to the spatial characteristics of FICI where the vessel operates for it can facilitate and hinder place-based repairs. Is it 'good' in this case that Damen Shipyards provides comprehensive coverage for the MV Veteran and assumes responsibility for the vessel to prevent unforeseen system interactions or is it detrimental as the warranty entails the mobilization of globally distributed entities lengthening the time required for repairs? Here, as Russell and Vinsel

(2018) observe, accounts of repair and maintenance have the potential to contribute to broader questions and critiques of capitalism and globalization informing debates regarding the goals of repair and maintenance as well as the forms of labour and actors involved and excluded.

The approach I have taken to repair and maintenance in this thesis, if extended to other cases, presents possibilities to discern the politics and power relations across space that can be articulated through the inscription of these practices. Repair and maintenance emphasize continuity and stability amidst an ever-changing world. Further interrogation of these practices can highlight the rationales behind and changes between different maintenance regimes as they pertain to societal change for repair and maintenance constitute essential elements of "human life with things" (Russell and Vinsel, 2018: 7). Thus, I encourage future work on repair and maintenance to question not only what is being repaired, but what is being *repaired to*. Such a focus is not limited to the arena of complex, technical infrastructures for repair and maintenance are intimately tied to human life (Russell and Vinsel, 2018). As emerging works within STS on reproductive labour and care demonstrate, examinations of repair and maintenance possess broad applicability and potential to inform debates of identity and status (Mol et al., 2010; Puig de la Bellacasa, 2011; Russell and Vinsel, 2018). Lines of inquiry such as: who bears responsibility for repair and maintenance, who benefits from repair and maintenance, who decides what repairs are permitted, how practitioners of maintenance see themselves and their work, and how these are understood by societies over time speak to the differentiated outcomes repair and maintenance produce; differentiated outcomes which have tangible and far-reaching impacts for they affect the everyday practices of those whose livelihoods ultimately depend upon repair and maintenance.

Bibliography

ABS Consulting, Vanden Heuvel, L. N., Lorenzo, D. K., Jackson, L. O., Hanson, W. E., Rooney, J. J., & Walker, D. A. (2008). *Root cause analysis handbook a guide to efficient and effective incident investigation, third edition (3rd ed)*. Brookfield, CN: Rothstein Associates Inc.

Adey, P., Bissell, D., Hannam, K., Merriman, P., & Sheller, M. (Eds.). (2014). *The routledge handbook of mobilities*. Routledge.

Akhter, M. (2015). Infrastructure nation: State space, hegemony, and hydraulic regionalism in Pakistan. *Antipode*, *47*(4), 849–870.

Akrich, M. (1992). The de-scription of technical objects. In W. E. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change* (pp. 205–224). Cambridge, MA: MIT Press.

Anand, N. (2012). Municipal disconnect: On abject water and its urban infrastructures. *Ethnography*, *13*(4), 487–509.

Ayres, L. (2008). Thematic coding and analysis. In L. Given (Ed.), *The SAGE encyclopedia of qualitative research methods* (Vol. 2, pp. 867–868). Thousand Oaks, CA: SAGE Publications, Inc.

Baldacchino, G. (2006). Islands, island Studies, island studies journal. *Island Studies Journal*, *1*(1), 3–18.

Baldacchino, G. (2007). Islands as novelty sites. *Geographical Review*, *97*(2), 165–174.

Barnes, J. (2017). States of maintenance: Power, politics, and Egypt's irrigation infrastructure. *Environment and Planning D: Society and Space*, *35*(1), 146–164.

Barad, K. (2003). Posthumanist performativity: Toward an understanding of how matter comes to matter. *Signs: Journal of Women in Culture and Society*, *28*(3), 801–831.

Beck, U. (1992). *Risk society: Towards a new modernity*. London: Sage Publications.

Bernard, H. R. (2012). *Social research methods: Qualitative and quantitative approaches (2nd edition)*. Los Angeles: SAGE Publications.

Bijker, W. E. (1995). *Of bicycles, bakelites, and bulbs: Toward a theory of sociotechnical change*. Cambridge, MA: MIT Press.

Bijker, W. E., Hughes, T. P., & Pinch, T. (Eds.). (1987). *The social construction of technological systems: New directions in the sociology and history of technology*. Cambridge, MA: MIT Press.

Bijker, W. E., & Law, J. (Eds.). (1992). *Shaping technology/building society: Studies in sociotechnical change*. Cambridge, MA: MIT Press.

Bijker, W. E., & Law, J. (1992). General introduction. In W. E. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change* (pp. 1–16). Cambridge, MA: MIT Press.

Bird, L. (2016, July 22). Fogo Island ferry "nightmare": Second vessel to help with MV Veteran issues. Retrieved December 11, 2017, from http://www.cbc.ca/news/canada/newfoundland-labrador/second-ferry-on-fogo-island-run-to-help-mv-veteran-1.3690605

Boland, A. (2007). The trickle-down effect: Ideology and the development of premium water networks in China's cities. *International Journal of Urban and Regional Research*, *31*(1), 21–40.

Bourdieu, P. (1990). *The logic of practice*. Cambridge: Polity.

Bowker, G. C., & Star, S. L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA.: MIT Press.

Butcher, M. (2011). Cultures of commuting: The mobile negotiation of space and subjectivity on Delhi's metro. *Mobilities*, *6*(2), 237–254.

Callén, B., & Criado, T. S. (2016). Vulnerability tests: Matters of "care for matter" in e-waste practices. *TECNOSCIENZA: Italian Journal of Science & Technology Studies, 6(2*), 17–40.

Carse, A. (2012). Nature as infrastructure: Making and managing the Panama Canal watershed. *Social Studies of Science*, *42*(4), 539–563.

Castán Broto, V., & Bulkeley, H. (2014). Maintaining experiments and the material agency of the urban. In S. Graham & C. McFarlane (Eds.), *Infrastructural lives: Urban infrastructure in context* (pp. 174–196). London: Routledge.

Castells, M. (1996). *The rise of the network society*. Cambridge, MA: Blackwell Publishers.

CBC News. (2015a, December 30). MV Veteran ferry out of commission for day due to thruster issue. Retrieved March 4, 2016, from

http://www.cbc.ca/news/canada/newfoundland-labrador/mv-veteran-out-of-service-1.3384076

CBC News. (2015b, December 21). Residents "in awe" of new Fogo Island-Change Islands ferry. Retrieved February 16, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/mv-veteran-launched-1.3374446

CBC News. (2016a, June 30). Let's try this one more time: MV Veteran to resume service next week, pending inspection. Retrieved June 30, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/fogo-change-islands-ferry-veteran-resume-service-wednesday-1.3660284

CBC News. (2016b, April 4). "We do have a lemon:" Fogo ferry users frustrated by problems with MV Veteran. Retrieved April 4, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/mv-veteran-service-problem-april-2016-1.3519265

CBC News. (2016c, February 2). MV Veteran mechanical problems "not out of the ordinary", minister says. Retrieved February 16, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/mv-veteran-fogo-1.3429821

Chu, J. Y. (2014). When infrastructures attack: The workings of disrepair in China. *American Ethnologist*, *41*(2), 351–367.

Coutard, O., Hanley, R. E., & Zimmerman, R. (2005). Network systems revisited: The confounding nature of universal systems. In O. Coutard, R. Zimmerman, & R. E. Hanley (Eds.), *Sustaining urban networks: The social diffusion of large technical systems* (pp. 1–12). London: Routledge.

Crang, M., & Cook, I. (2007). *Doing ethnographies*. London: SAGE Publications.

Cresswell, T. (2010). Towards a politics of mobility. *Environment and Planning D: Society and Space*, *28*(1), 17–31.

Dalakoglou, D. (2010). The road: An ethnography of the Albanian–Greek cross‐border motorway. *American Ethnologist*, *37*(1), 132–149.

Dalakoglou, D., & Kallianos, Y. (2014). Infrastructural flows, interruptions and stasis in Athens of the crisis. *City*, *18*(4–5), 526–532.

Damen Shipyards Group. (2015, October 27). Damen RoPax Ferry "MV Veteran" for Canadian lifeline vessel replacement. Retrieved April 16, 2018, from https://www.damen.com:443/es-

es/news/2015/10/damen_ropax_ferry_mv_veteran_for_canadian_lifeline_vessel_replacement

Dant, T. (2010). The work of repair: Gesture, emotion and sensual knowledge. *Sociological Research Online*, *15*(3)

de Certeau, M. (1984). *The practice of everyday life*. Berkeley: University of California Press.

de Laet, M., & Mol, A. (2000). The Zimbabwe bush pump: Mechanics of a fluid technology. *Social Studies of Science*, *30*(2), 225–263.

Delaney, A. (2016, April 5). Pack for overnight when you get on the ferry, say Change Islands residents. Retrieved April 6, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/mv-veteran-out-of-service-1.3521803

Denis, J., & Pontille, D. (2014). Maintenance work and the performativity of urban inscriptions: The case of Paris subway signs. *Environment and Planning D: Society and Space*, *32*(3), 404–416.

Denis, J., & Pontille, D. (2015). Material ordering and the care of things. *Science, Technology & Human Values*, *40*(3), 338–367.

Denis, J., & Pontille, D. (2017). Object ontologies and the contrasted in/visibilities of maintenance work. Presented at the Maintainers II. Retrieved from https://hal-mines-paristech.archives-ouvertes.fr/hal-01509631/document

DeWitt, R. L. (1969). *Public policy and community protest: The Fogo case.* St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland.

DeVault, M. L. (2006). Introduction: What is institutional ethnography? *Social Problems*, *53*(3), 294–298.

Dourish, P., & Bell, G. (2007). The infrastructure of experience and the experience of infrastructure: Meaning and structure in everyday encounters with space. *Environment and Planning B: Planning and Design*, *34*(3), 414–430.

Dowling, R., Lloyd, K., & Suchet-Pearson, S. (2016). Qualitative methods 1: Enriching the interview. *Progress in Human Geography*, *40*(5), 679–686.

Dunn, K. (2010). Interviewing. In I. Hay (Ed.), *Qualitative research methods in human geography* (3 edition, pp. 101–138). Oxford; New York: Oxford University Press.

Edensor, T. (2010). Introduction: Thinking about rhythm and space. In T. Edensor (Ed.), *Geographies of rhythm: Nature, place, mobilities and bodies* (pp. 1–18). Farnham, Surrey, England: Ashgate.

Edensor, T. (2011). Entangled agencies, material networks and repair in a building assemblage: The mutable stone of St Ann's Church, Manchester. *Transactions of the Institute of British Geographers, 36(2),* 238–252.

Edensor, T., & Holloway, J. (2008). Rhythmanalysing the coach tour: The ring of Kerry, Ireland. *Transactions of the Institute of British Geographers*, *33*(4), 483–501.

Edwards, P. (2003). Infrastructure and modernity: Force, time, and social organization in the history of sociotechnical systems. In T. J. Misa, P. Brey, & A. Feenberg (Eds.), *Modernity and technology* (pp. 185–225). Cambridge, MA: MIT Press.

Edwards, P., Bowker, G., Jackson, S., & Williams, R. (2009). Introduction: An agenda for infrastructure studies. *Journal of the Association for Information Systems*, *10*(5), 364–374.

Ensing, C. (2016, April 7). MV Veteran "does take its toll" on province, says transportation minister. Retrieved April 12, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/al-hawkins-mv-veteran-1.3524596

Feenberg, A. (2002). *Transforming technology: A critical theory revisited*. New York: Oxford University Press.

Ferguson, J. (1999). *Expectations of modernity: Myths and meanings of urban life on the Zambian Copperbelt*. Berkeley, Berkeley, Calif.: University of California Press.

Fernández-Maldonado, A. M. (2008). Expanding networks for the urban poor: Water and telecommunications services in Lima, Peru. *Geoforum*, *39*(6), 1884–1896.

Foucault, M. (1982). The subject and power. *Critical Inquiry*, *8*(4), 777–795.

Furlong, K. (2011). Small technologies, big change: Rethinking infrastructure through STS and geography. *Progress in Human Geography*, *35*(4), 460–482.

Gatrell, J. D., Bierly, G. D., & Jensen, R. R. (2012). *Research design and proposal writing in spatial science: Second edition*. Springer Netherlands: Dordrecht.

Gentile, P. (2009). Resisted access? National security, the Access to Information Act, and queer(ing) archives. *Archivaria*, *68*, 141–158.

Government of Newfoundland and Labrador Department of Transportation and Works. (2016a). *TW-008-2016: Damen Shipyards Group and Genoa Design International.* St. John's, NL

Government of Newfoundland and Labrador Department of Transportation and Works. (2016b). *TW-033-2016: M.V. Veteran.* St. John's, NL

Government of Newfoundland and Labrador Department of Transportation and Works. (2016c). *TW-069-2016.* St. John's, NL

Graham, S., & Marvin, S. (2001). *Splintering urbanism: Networked infrastructures, technological mobilities and the urban condition*. London: Routledge.

Graham, S., & McFarlane, C. (Eds.). (2014). Introduction. In *Infrastructural lives: Urban infrastructure in context* (pp. 1–14). London: Routledge.

Graham, S., & Thrift, N. (2007). Out of order: Understanding repair and maintenance. *Theory, Culture and Society, 24(3),* 1–25.

Grasseni, C. (2007). Skilled vision: An apprenticeship in breeding aesthetics. *Social Anthropology*, *12*(1), 41–55.

Greenberg, P. (2016). Strengthening sociological research through public records requests. *Social Currents*, *3*(2), 110–117.

Gregson, N., Metcalfe, A., & Crewe, L. (2009). Practices of object maintenance and repair: How consumers attend to consumer objects within the home. *Journal of Consumer Culture, 9(2),* 248–272.

Harvey, P., Jensen, C. B., & Morita, A. (2017). Introduction: Infrastructural complications. In P. Harvey, A. Morita, & C. B. Jensen (Eds.), *Infrastructures and social complexity: A companion* (pp. 1–22). New York, NY: Routledge.

Harvey, P., & Knox, H. (2012). The enchantments of infrastructure. *Mobilities*, *7*(4), 521–536.

Hay, P. (2006). A phenomenology of islands. *Island Studies Journal*, *1*(1), 19–42.

Henke, C. R. (2000). The mechanics of workplace order: Toward a sociology of repair. *Berkeley Journal of Sociology*, *44*, 55–81.

Hobbs, K. (2016, April 8). Experts "were never consulted" on new ferries, says master mariner. Retrieved April 12, 2016, from http://www.cbc.ca/news/canada/newfoundland-labrador/nl-provinces-ferry-woes-unacceptable-marine-expert-1.3522766

Hollway, W., & Jefferson, T. (2000). *Doing qualitative research differently: Free association, narrative and the interview method*. London: SAGE.

Howe, C., Lockrem, J., Appel, H., Hackett, E., Boyer, D., Hall, R., Schneider-Mayerson, M., Pope, A., Gupta, A., Rodwell, E. and Ballestero, A. (2016). Paradoxical infrastructures: Ruins, retrofit, and risk. *Science, Technology, & Human Values*, *41*(3), 547-565.

Hughes, T. P. (1983). *Networks of power: Electrification in Western society, 1880-1930*. Baltimore, MD: Johns Hopkins University Press.

Hughes, T. P. (1987). The evolution of large technological systems. In W. E. Bijker, T. P. Hughes, & T. Pinch (Eds.), *The social construction of technological systems: New directions in the sociology and history of technology* (pp. 51–82). Cambridge, MA: MIT Press.

Innovation, Science, and Economic Development Canada. (2017). Fogo Island Co-Operative Society Limited - Complete profile - Canadian Company Capabilities - Industries and Business - Industry Canada.

Ishii, M. (2017). Caring for divine infrastructures: Nature and spirits in a special economic zone in India. *Ethnos*, *82*(4), 690–710.

Jackson, S. (2014). Rethinking Repair. In P. J. Boczkowski, T. Gillespie, & K. A. Foot (Eds.), *Media technologies: Essays on communication, materiality, and society* (pp. 221–239). Cambridge, MA: MIT Press.

Jackson, S. J., Edwards, P. N., Bowker, G. C., & Knobel, C. P. (2007). Understanding infrastructure: History, heuristics and cyberinfrastructure policy. *First Monday*, *12*(6).

Jackson, S. J., Pompe, A., & Krieshok, G. (2012). Repair worlds: Maintenance, repair, and ICT for development in rural Namibia. In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work* (pp. 107–116). New York, NY, USA: ACM.

Jarzabkowski, P., & Pinch, T. (2013). Sociomateriality is "the new black": Accomplishing repurposing, reinscripting and repairing in context. *Management (France)*, *16*(5), 579–592.

Jensen, C. B., & Morita, A. (2015). Infrastructures as ontological experiments. *Engaging Science, Technology, and Society*, *1*(0), 81–87.

Jensen, O. B., Sheller, M., & Wind, S. (2015). Together and apart: Affective ambiences and negotiation in families' everyday life and mobility. *Mobilities*, *10*(3), 363–382.

Kaika, M. (2005). *City of flows: Modernity, nature, and the city*. New York: Routledge.

Kallianos, Y. (2017). Infrastructural disorder: The politics of disruption, contingency, and normalcy in waste infrastructures in Athens. *Environment and Planning D: Society and Space*

Klein, H. K., & Kleinman, D. L. (2002). The social construction of technology: Structural considerations. *Science, Technology, & Human Values*, *27*(1), 28–52.

Kleinman, D. L. (1998). Untangling context: Understanding a university laboratory in the commercial world. *Science, Technology, & Human Values*, *23*(3), 285–314.

Kooy, M., & Bakker, K. (2008). Splintered networks: The colonial and contemporary waters of Jakarta. *Geoforum*, *39*(6), 1843–1858.

Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology*, *42*, 327–343.

Latour, B. (1990). Technology is society made durable. *The Sociological Review*, *38*(1), 103–131.

Law, J., & Bijker, W. E. (1992). Postscript: Technology, stability, and social theory. In W. E. Bijker & J. Law (Eds.), *Shaping technology/building society: Studies in sociotechnical change* (pp. 290–308). Cambridge, MA: MIT Press.

Lepawsky, J., Liboiron, M., Keeling, A., & Mather, C. (2017). Repair-scapes. *Continent*., 6(1), 56–61.

Leung, A., Tanko, M., Burke, M., & Shui, C. S. (2017). Bridges, tunnels, and ferries: Connectivity, transport, and the future of Hong Kong's outlying islands. *Island Studies Journal*, *12*(2), 61–82.

Lévi-Strauss, C. (1966). *Du miel aux cendres.* Paris: Plon.

Liboiron, M. (2017). Compromised agency: The case of BabyLegs. *Engaging Science, Technology, and Society*, *3*, 499–527.

Lin, W. (2015). 'Cabin pressure': designing affective atmospheres in airline travel. *Transactions of the Institute of British Geographers*, *40*(2), 287–299.

Marine Log. (2016, January 14). A look at the best passenger ships of 2015. Retrieved June 20, 2016, from

http://www.marinelog.com/index.php?option=com_k2&view=item&id=10386:a-look-at-the-best-passenger-ships-of-2015&Itemid=230

Martin, A., Myers, N., & Viseu, A. (2015). The politics of care in technoscience. *Social Studies of Science*, *45*(5), 625–641.

Massey, D. (1991). A global sense of place, *Marxism Today (June)*: 24–29.

Massey, D. (1993). Power geometry and a progressive sense of place. In J. Bird (Ed.), *Mapping the futures: Local cultures, global change* (pp. 59–69). London: Routledge.

Massey, D. (2005). *For space*. London; Thousand Oaks, CA.: SAGE.

Matthews, R. (1976). *"There's no better place than here": Social change in three Newfoundland communities*. Toronto: Peter Martin Associates.

McIntyre, S. L. (2000). The failure of Fordism: Reform of the automobile repair industry, 1913-1940. *Technology and Culture, 41(2), 269–299.*

McMorran, C. (2015). Mobilities amid the production of fixities: Labor in a Japanese inn. *Mobilities*, *10*(1), 83–99.

Mellin, R. (2003). *Tilting: House launching, slide hauling, potato trenching, and other tales from a Newfoundland fishing village* (1st ed.). New York: Princeton Architectural Press.

Merriam-Webster. (2018). Definition of LEMON. Retrieved March 10, 2018, from https://www.merriam-webster.com/dictionary/lemon

Mol, A. (2002). *The body multiple: Ontology in medical practice*. Durham, NC: Duke University Press.

Mol, A., Moser, I., & Pols, J. (2010). Care: Putting practice into theory. In A. Mol, I. Moser, & J. Pols (Eds.), *Care in practice: On Tinkering in clinics, homes and farms* (pp. 7–26). transcript Verlag.

Morita, A. (2017). Multispecies infrastructure: Infrastructural inversion and involutionary entanglements in the Chao Phraya Delta, Thailand. *Ethnos*, *82*(4), 738–757.

Murphy, M. (2015). Unsettling care: Troubling transnational itineraries of care in feminist health practices. *Social Studies of Science*, *45*(5), 717–737.

Okes, D. (2009). *Root cause analysis: The core of problem solving and corrective action.* Milwaukee, Wisconsin: ASQ Quality Press.

Orr, J. E. (1996). *Talking about machines: An ethnography of a modern job*. Ithaca, N.Y: ILR Press.

Oudshoorn, N., & Pinch. (2003). Introduction: How users and non-users matter. In N. Oudshoorn & T. Pinch (Eds.), *How users matter: The co-construction of users and technologies*. Cambridge, MA: MIT Press.

Perrow, C. (1999). *Normal accidents: Living with high-risk technologies.* Princeton, NJ: Princeton University Press.

Puig de la Bellacasa, M. (2011). Matters of care in technoscience: Assembling neglected things. *Social Studies of Science*, *41*(1), 85–106.

Raju, V. R. S., Gandhi, O. P., & Deshmukh, S. G. (2012). Maintenance, repair, and overhaul performance indicators for military aircraft. *Defence Science Journal, 62(2)*, 83–89.

Reeves, M. (2017). Infrastructural hope: Anticipating 'independent roads' and territorial integrity in Southern Kyrgyzstan. *Ethnos*, *82*(4), 711–737.

Robinson (2013, November 22). Fogo ferry contract ensures best value: government. Retrieved from http://www.thetelegram.com/Business/2013-11-22/artic

Rosner, D. K., & Ames, M. (2014). Designing for repair?: Infrastructures and materialities of breakdown. In *Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing* (pp. 319–331). New York, NY, USA: ACM.

Russell, A. L., & Vinsel, L. (2018). After innovation, turn to maintenance. *Technology and Culture*, *59*(1), 1–25.

Sanne, J. M. (2008). Framing risks in a safety-critical and hazardous job: Risk-taking as responsibility in railway maintenance. *Journal of Risk Research*, *11(5),* 645–658.

Sanne, J. M. (2010). Making matters speak in railway maintenance. In M. Büscher, D. Goodwin, & J. Mesman (Eds.), *Ethnographies of Diagnostic Work* (pp. 54–72). Palgrave Macmillan UK.

Sanne, J. M. (2014). Vulnerable practices: Organizing through bricolage in railroad maintenance. In A. Hommels, J. Mesman, & W. E. Bijker (Eds.), *Vulnerability in technological cultures: New directions in research and governance* (pp. 199–216). Cambridge, MA: MIT Press.

Saxton, D. (2015). Strawberry fields as extreme environments: The Ecobiopolitics of farmworker health. *Medical Anthropology*, *34*(2), 166–183.

Schwenkel, C. (2015). Spectacular infrastructure and its breakdown in socialist Vietnam. *American Ethnologist*, *42*(3), 520–534.

Scott, J. C. (1998). *Seeing like a state: How certain schemes to improve the human condition have failed.* New Haven: Yale University Press.

Sengers, P. (2011). What I learned on Change Islands: Reflections on IT and pace of life. *Interactions*, *18*(2), 40–48.

Sheller, M. (2016). Uneven mobility futures: A Foucauldian approach. *Mobilities*, *11*(1), 15–31.

Shorefast Foundation. (2018). Our activities. Retrieved March 30, 2018, from http://shorefast.org/our-activities/

Smallwood, J. R., Pitt, R. D. W., Horan, C., & Riggs, B. G. (Eds.). (1984). Ferries. In *Encyclopedia of Newfoundland and Labrador*. (Vol 2, pp.43-50). St. John's, NL: Newfoundland Book Publishers (1967) Ltd. Retrieved from http://collections.mun.ca/cdm/ref/collection/cns_enl/id/3532

Smith, D. E. (1987). *The everyday world as problematic: A feminist sociology*. Toronto: University of Toronto Press.

Smith, D. E. (2001). Texts and the ontology of organizations and institutions. *Studies in Cultures, Organizations and Societies*, *7*(2), 159–198.

Smith, M. L. (2016). Urban infrastructure as materialized consensus. *World Archaeology*, *48*(1), 164–178.

Sormani, P., Strebel, I., & Bovet, A. (2016). Reassembling repair: Of maintenance routine, botched jobs, and situated inquiry. *TECNOSCIENZA: Italian Journal of Science & Technology Studies, 6(2),* 41–60.

Star, S. L., & Ruhleder, K. (1996). Steps toward an ecology of infrastructure: Design and access for large information spaces. *Information Systems Research*, *7*(1), 111–134.

Statistics Canada. (2017a). Population and dwelling count highlight tables, 2016 Census. Retrieved March 10, 2018, from http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/pd-pl/Table.cfm?Lang=Eng&T=301&SR=1251&RPP=25&S=3&O=D&CMA=0&PR=0#

Statistics Canada. (2017b). Population and dwelling count highlight tables, 2016 Census. Retrieved March 10, 2018, from http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/pd-pl/Table.cfm?Lang=Eng&T=301&SR=3876&RPP=25&S=3&O=D&CMA=0&PR=0#2016A00051008024

Stratford, E. (2008). Islandness and struggles over development: A Tasmanian case study. *Political Geography*, *27*(2), 160–175.

Strebel, I. (2011). The living building: Towards a geography of maintenance work. *Social & Cultural Geography*, *12*(3), 243–262.

Suchman, L. A. (2002). Practice-based design of information systems: Notes from the hyperdeveloped world. *The Information Society, 18*(2), 139–144.

Swyngedouw, E. (1997). Neither global nor local: 'Glocalization' and the politics of scale. In Cox, K. (Ed.), *Spaces of globalization: Reasserting the power of the local* (pp. 137–166). New York: Guilford.

Strum, S., & Latour, B. (1987). Redefining the social link - from baboons to humans. *Social Science Information*, *26*(4), 783–802.

Tenner, E. (1996). *Why things bite back: Technology and the revenge of unintended consequences*. New York: Vintage Books.

Tironi, M. (2015). Ethics of care of urban resources: Maintenance and repair on a public bicycle system. *ARQ (Santiago)*, (89), 76–89.

Tsing, A. L. (2005). *Friction: An ethnography of global connection*. Princeton, NJ: Princeton University Press.

Ureta, S. (2014). Normalizing Transantiago: On the challenges (and limits) of repairing infrastructures. *Social Studies of Science*, *44*(3), 368–392.

Ureta, S. (2016). Caring for waste: Handling tailings in a Chilean copper mine. *Environment and Planning A*, *48*(8), 1532–1548.

van Oost, E. (2003). Materialized gender: How shavers configure the users' feminity and masculinity. In N. Oudshoorn & T. Pinch (Eds.), *How users matter: The co-construction of users and technologies*. Cambridge, MA: MIT Press.

Vannini, P. (2010). Mobile cultures: From the sociology of transportation to the study of mobilities. *Sociology Compass*, *4*(2), 111–121.

Vannini, P. (2011a). Constellations of ferry (im)mobility: Islandness as the performance and politics of insulation and isolation. *Cultural Geographies*, *18*(2), 249–271.

Vannini, P. (2011b). Constellations of (in-)convenience: Disentangling the assemblages of Canada's west coast island mobilities. *Social & Cultural Geography*, *12*(5), 471–492.

Vannini, P. (2011c). Performing elusive mobilities: Ritualization, play, and the drama of scheduled departures. *Environment and Planning D: Society and Space*, *29*(2), 353–368.

Vannini, P. (2012). In time, out of time: Rhythmanalyzing ferry mobilities. *Time & Society*, *21*(2), 241–269.

Verhaegh, S., & van Oost, E. (2012). Who cares? The maintenance of a Wi-Fi community infrastructure. In T. M. Egyedi & D. C. Mehos (Eds.), *Inverse infrastructures: Disrupting networks from below* (pp. 141–160). Cheltenham; Northampton, MA: Edward Elgar.

von Schnitzler, A. (2008). Citizenship prepaid: Water, calculability, and techno-politics in South Africa. *Journal of Southern African Studies*, *34*(4), 899–917.

Wajcman, J. (2015). *Pressed for time: The acceleration of life in digital capitalism*. Chicago, IL: The University of Chicago Press.

Walby, K., & Larsen, M. (2012). Access to Information and Freedom of Information Requests: Neglected means of data production in the social sciences. *Qualitative Inquiry*, *18*(1), 31–42.

Walsh, D., & Jones, M. (2007). Finding the links: Structure and agency on Twillingate and Fogo Islands. In G. Baldacchino (Ed.), *Bridging islands: The impact of fixed links* (pp. 85–104). Charlottetown: Acorn Press.

Watson, M., & Shove, E. (2008). Product, competence, project and practice DIY and the dynamics of craft consumption. *Journal of Consumer Culture*, *8*(1), 69–89.

Watts, L. (2008). The art and craft of train travel. *Social & Cultural Geography*, *9*(6), 711–726.

Watts, L. (2014). Liminal futures. In J. Leach & L. Wilson (Eds.), *Subversion, conversion, development: Cross-cultural knowledge exchange and the politics of design* (pp. 19–38). Cambridge, MA: MIT Press.

Watts, L., & Urry, J. (2008). Moving methods, travelling times. *Environment and Planning D: Society and Space, 26*(5), 860–874.

Winner, L. (1977). *Autonomous technology: Technics-out-of-control as a theme in political thought*. Cambridge, MA: MIT Press.

Winner, L. (1980). Do artifacts have politics? *Daedalus*, *109*(1), 121–136.

Winner, L. (2004). Technologies as forms of life. In D. M. Kaplan (Ed.), *Readings in the philosophy of technology* (pp. 103–114). Lanham: Rowman & Littlefield.

Wright, M. C. (2001). *A fishery for modern times: The state and the industrialization of the Newfoundland fishery, 1934-1968*. Toronto: Oxford University Press.

Wunderlich, F. M. (2010). The aesthetics of place-temporality in everyday urban space: The case of Fitzroy Square. In T. Edensor (Ed.), *Geographies of rhythm: Nature, place, mobilities and bodies* (pp. 45–56). Farnham, Surrey, England: Ashgate.

Yilmaz, G. G. (2013). Tactics in daily life practices and different forms of resistance: The case of Turks in Germany. *Procedia - Social and Behavioral Sciences*, *82*, 66–73.

Fogo Island – Change Islands – Farewell Ferry Service

Winter– October 16 – May 14

Last updated December 22 2015

Monday, Tuesday, Wednesday and Friday					
Depart Fogo Island		Depart Change Islands		Depart Farewell	
7:00 AM	For Farewell – Direct			7:45 AM	For Change Islands – Direct
		8:15 AM	For Farewell	9:00 AM	For Fogo Island – Direct
10:15 AM	For Change Islands – Combined	10:45 AM	For Farewell	11:30 AM	For Change Islands – Combined
		11:45 AM	For Fogo Island		
2:00 PM	For Change Islands – Combined	2:30 PM	For Farewell	3:00 PM	For Change Islands – Combined
		3:15 PM	For Fogo Island		
4:30 PM	For Farewell – Direct			5:30 PM	For Change Islands – Direct
		6:00 PM	For Farewell	6:30 PM	For Fogo Island – Direct

Thursday					
Depart Fogo Island		Depart Change Islands		Depart Farewell	
7:00 AM	For Farewell – Direct			7:45 AM	For Change Islands – Direct
		8:15 AM	For Farewell	9:00 AM	For Fogo Island – Direct
10:00 AM	For Change Islands – Combined	10:30 AM	For Farewell	11:15 AM	For Fogo Island – DG*
2:00 PM	For Farewell – DG*			3:00 PM	For Change Islands – Combined
		3:15 PM	For Fogo Island		
4:30 PM	For Farewell – Direct			5:30 PM	For Change Islands – Direct
		6:00 PM	For Farewell	6:30 PM	For Fogo Island – Direct

*DG: Dangerous Goods Run – Maximum 25 Passengers. If required, Change Islands will be incorporated into the Dangerous Goods run leaving Fogo Island.

Notes:

Combined Runs: Originate in Fogo Island or Farewell and stop enroute in Change Islands.

30 Minute Rule: On combined runs, traffic going to and from Change Islands must be in the lineup 30 minutes prior to the vessel's departure. This allows space to be reserved on the vessel (up to 15 car spaces depending on the vessel) for the Change Islands traffic.

Fogo Island - Change Islands - Farewell Ferry Service

Temporary Schedule - Beaumont Hamel

Last updated May 13 2016

Monday, Tuesday, Wednesday, Friday, Saturday, Sunday					
Depart Fogo Island		**Depart Change Islands**		**Depart Farewell**	
7:00 AM	For Farewell - Direct			8:00 AM	For Change Island - Direct
		8:30 AM	For Farewell	9:00 AM	For Fogo Island- Direct
10:00 AM	For Change Islands - Combined	10:45 AM	For Farewell	11:15 AM	For Change Island - Combined
		11:45 AM	For Fogo Island		
2:00 PM	For Farewell - Direct			3:00 PM	For Change Islands - Combined
		3:30 PM	For Fogo Island		
4:15 PM	For Change Islands - Combined	5:00 PM	For Farewell	5:30 PM	For Fogo Island- Direct
6:30 PM	For Farewell - Direct			7:30 PM	For Change Islands - Direct
		8:00 PM	For Farewell	8:30 PM	For Fogo Island - Direct

Thursday					
Depart Fogo Island		**Depart Change Islands**		**Depart Farewell**	
7:00 AM	For Farewell - Direct			8:00 AM	For Change Island - Direct
		8:30 AM	For Farewell	9:00AM	For Fogo Island- Direct
10:00 AM	For Change Islands - Combined	10:45 AM	For Farewell	11:15 AM	For Fogo Island - Direct* (DG)
		11:45 AM	For Fogo Island		
2:00 PM	For Farwell - Direct* (DG)			3:00 PM	For Change Islands - Combined
		3:30 PM	For Fogo Island		
4:15 AM	For Change Islands - Combined	5:00 PM	For Farewell	5:30 PM	For Fogo Island- Direct
6:30 PM	For Farewell			7:30 PM	For Change Islands - Direct
		8:00 PM	For Farewell	8:30 PM	For Fogo Island - Direct

Fogo Island-Change Islands Enahnced Temporary Ferry Service

MV Beaumont Hamel

Temporary Schedule - Monday-Tuesday-Wednesday-Friday-Saturday-Sunday		
Depart Fogo Island	**Depart Change Islands**	**Depart Farewell**
7:00 AM For Farewell - Direct		8:00 AM For Change Island - Direct
	8:30 AM For Farewell	9:00 AM For Fogo Island - Direct
10:00 AM For Change Island - Combined	10:45 AM For Farewell	11.15 AM For Change Islands - Combined
	11:45 AM For Fogo Island	
2:00 PM For Farewell - Direct		3:00 PM For Change Islands - Combined
	3:30 PM For Fogo Island	
4:15 PM For Change Islands - Combined	5:00 PM For Farewell	5:30 PM For Fogo Island - Direct
6:30 PM For Farewell Direct		7:30 PM For Change Islands - Direct
	8:00 PM For Farewell	8:30 PM For Fogo Island - Direct
9:30 PM For Farewell - Direct		10:30 PM For Fogo Island - Direct
11:30 PM For Farewell - Direct		00:30 AM For Fogo Island - Direct
1:30 AM For Farewell Direct		02:30 AM For Fogo Island Direct

A3: Fogo Island-Change Islands Ferry Service - Enhanced Temporary Schedule