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The Canterbury Tales:
An insider's lessons and reflections from the Canterbury Earthquake Sequence to
inform better public communication models

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Sara Kelly McBride

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Abstract

Researcher: Sara K. McBride

This research evaluates the public earthquake preparedness communication before the Canterbury Earthquake Sequence (2010-present) and examines communication learnings to create recommendations for improvements in implementation for these campaigns in future. The research comes from an “insider” perspective from someone who worked on these campaigns in Canterbury before the earthquakes. In this research I use this insider lens to analyse the Q-Files booklets, developed by the Public Education Public Information group (PEPI) and coordinated by the Canterbury Civil Defence Emergency Management (CDEM) Group, both groups in which I worked professionally before the earthquakes. These booklets aimed to communicate the geological hazards and risks in Canterbury to persuade publics to prepare. For my analysis, I developed a “best practice matrix”, derived from the most relevant literature, to determine how closely these booklets aligned to best-practice academic research. I also used readability tests and word counts to triangulate the data. I interpreted that the Q-Files were overly long, jargon-laden text filled with little positive outcome expectancy messages, and would have failed to persuade most people that earthquakes were a real threat in Canterbury.

Paradoxically, it is likely these booklets created fatalism in publics who read them. While the overall intention was positive, to scientifically explain geological risks to encourage the public to prepare for these events, my analysis identified that the implementation could have been greatly improved. After summarising my findings, I shared these insights with my community of practice and found that many of my former colleagues shared with me their frustrations, concerns and disappointments with not only the Q-Files but the overall management of public preparedness communication within Canterbury. Finally, I reflect on what it means to have been part of the development of a failed risk communication campaign. I interpret that scientism was the fundamental belief system inspiring the PEPI group in Canterbury to create the Q-Files. I argue that the PEPI group created echo-chamber-like effects, supporting and reflecting their own belief systems in their public communication. The group’s self-containment led to the creation of documents filled with jargon, gobbledegook and scientificism. Based on my findings, I highlight areas for improvement in strategic approaches for more successful campaigns in future as well as potential research pathways.

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Table of Contents

<i>Chapter 1: The Outside Insider</i>	<i>1</i>
<i>A Disastrous Childhood</i>	<i>3</i>
<i>My life and work in Canterbury</i>	<i>6</i>
<i>Motivation, relevance and challenges of this thesis.....</i>	<i>12</i>
<i>Narrative Structure.....</i>	<i>15</i>
<i>Research Questions.....</i>	<i>16</i>
<i>Methodology and theoretical perspective</i>	<i>17</i>
<i>The human history and demographics of Canterbury.....</i>	<i>19</i>
<i>Governance and relevant legislation</i>	<i>22</i>
<i>National Preparedness Communication Campaigns and Canterbury Emergency Preparedness Programmes (pre-2010)</i>	<i>24</i>
<i>Public perceptions and emergency preparedness before the Earthquake Sequence.....</i>	<i>28</i>
<i>The Geological Setting of the Canterbury Region – the multiple perspectives.....</i>	<i>30</i>
<i>Key Terms</i>	<i>35</i>
<i>Thesis Structure.....</i>	<i>36</i>
<i>Summary.....</i>	<i>37</i>
<i>Chapter 2: Bridging the Literature.....</i>	<i>39</i>
<i>The review process.....</i>	<i>41</i>
<i>Communication and Emergency Management: twins separated at birth?.....</i>	<i>43</i>
<i>Disaster preparedness communication – the status of knowledge</i>	<i>44</i>
<i>Communication, Public Relations, Media Relations and Marketing</i>	<i>46</i>
<i>Chronicling and exploring contemporary communication theories</i>	<i>49</i>
<i>Persuasion and propaganda</i>	<i>51</i>
<i>Risk Communication.....</i>	<i>53</i>
<i>Emergency Management</i>	<i>57</i>
<i>Public education and public information.....</i>	<i>59</i>
<i>Civil defence preparedness campaigns: Historic and contemporary case studies.....</i>	<i>61</i>
<i>Best-practice Matrix.....</i>	<i>66</i>
<i>Source</i>	<i>67</i>
<i>Messages</i>	<i>74</i>
<i>Channel.....</i>	<i>81</i>
<i>Publics.....</i>	<i>85</i>
<i>Setting</i>	<i>89</i>
<i>Summary.....</i>	<i>93</i>
<i>Chapter 3: Research Pathways</i>	<i>95</i>
<i>Research Position.....</i>	<i>97</i>
<i>Epistemological Position: Social Constructivism</i>	<i>99</i>
<i>Theoretical Perspective: Interpretivism.....</i>	<i>100</i>
<i>The Insider.....</i>	<i>102</i>

<i>Methodology</i>	<i>105</i>
<i>Research Goal One: Identifying Best-practice from the Literature.....</i>	<i>107</i>
<i>Research Goal Two: Identifying the Lessons.....</i>	<i>109</i>
<i>Readability Tests.....</i>	<i>115</i>
<i>Member Checks.....</i>	<i>117</i>
<i>Research Goal Three: Interpreting the Lessons</i>	<i>120</i>
<i>Ethical considerations and procedures</i>	<i>120</i>
<i>Summary.....</i>	<i>122</i>
<i>Chapter 4: Analysing the Q-Files.....</i>	<i>123</i>
<i>Methods and Processes of Coding</i>	<i>125</i>
<i>The Q-Files.....</i>	<i>135</i>
<i>First Coding of the Q-Files.....</i>	<i>138</i>
<i>Second Coding Phase.....</i>	<i>145</i>
<i>Findings.....</i>	<i>157</i>
<i>Messages: the prevailing theme</i>	<i>161</i>
<i>Channel.....</i>	<i>174</i>
<i>Source</i>	<i>179</i>
<i>Publics.....</i>	<i>185</i>
<i>Setting</i>	<i>189</i>
<i>Readability Tests.....</i>	<i>191</i>
<i>Assessment of the Q-Files.....</i>	<i>194</i>
<i>Summary.....</i>	<i>200</i>
<i>Chapter 5: Reflections from the Community of Practice</i>	<i>203</i>
<i>About my member checks.....</i>	<i>205</i>
<i>Using SurveyMonkey</i>	<i>206</i>
<i>Reflections from the members</i>	<i>230</i>
<i>Findings from Member Checks</i>	<i>241</i>
<i>Summary.....</i>	<i>243</i>
<i>Chapter 6: Discussion and Reflections</i>	<i>245</i>
<i>Answering the research questions</i>	<i>246</i>
<i>Source: Persuasion</i>	<i>248</i>
<i>Source: Scientism.....</i>	<i>249</i>
<i>Echo Chambers</i>	<i>252</i>
<i>Messages: Scientificism</i>	<i>256</i>
<i>Messages: Gobbledygook</i>	<i>258</i>
<i>Messages: Jargon and technospeak</i>	<i>259</i>
<i>Messages: Fear/Threat appeals</i>	<i>261</i>
<i>Channels.....</i>	<i>266</i>
<i>Publics.....</i>	<i>268</i>
<i>Publics: Exclusive Narratives.....</i>	<i>268</i>
<i>Setting</i>	<i>275</i>
<i>Summary.....</i>	<i>276</i>
<i>Chapter 7: Conclusion and Futures.....</i>	<i>279</i>

<i>Solutions - The power of reflection</i>	<i>283</i>
<i>Solutions - Participatory communication strategies</i>	<i>286</i>
<i>Solutions - Including other disciplines and narratives.....</i>	<i>286</i>
<i>Limitations.....</i>	<i>287</i>
<i>Future Pathways</i>	<i>289</i>
<i>Learning the Lessons</i>	<i>289</i>
<i>Emergency management – exploring identities and philosophies</i>	<i>290</i>
<i>Extreme preparedness: Preppers</i>	<i>292</i>
<i>How prepared are “experts”?</i>	<i>293</i>
<i>Natural Hazards: Scientists as responders.....</i>	<i>293</i>
<i>Operational Earthquake Forecasting and Early Earthquake Warnings.....</i>	<i>293</i>
<i>Persuasion and Science.....</i>	<i>294</i>
<i>Updating readability tests.....</i>	<i>294</i>
<i>Communication research: new approaches to preparedness campaigns</i>	<i>295</i>
<i>Supporting future insider researchers: insider research is tough.....</i>	<i>296</i>
<i>Final Thoughts.....</i>	<i>298</i>
<i>REFERENCES</i>	<i>300</i>
<i>Appendices.....</i>	<i>342</i>
<i>Appendix 1: The Best-Practice Matrix.....</i>	<i>343</i>
<i>Appendix 2: Public Education and Public Information (PEPI) Strategy 2009 – 2012</i>	<i>355</i>
<i>Appendix 3: Literature Review Table (sample).....</i>	<i>359</i>
<i>Appendix 4: Social media from 04 September 2010</i>	<i>363</i>
<i>Appendix 5: SurveyMonkey Survey from Member Checks.....</i>	<i>364</i>
<i>Appendix 6: Ethics Documents.....</i>	<i>379</i>
<i>Appendix 7: The Q-Files.....</i>	<i>384</i>

FIGURES

<i>FIGURE 1.1: PHOTOGRAPH OUTSIDE CHRISTCHURCH CATHEDRAL WITH EARTHQUAKE DAMAGE TO SPIRE.....</i>	<i>1</i>
<i>FIGURE 1.2: PHOTOGRAPHS OF DAMAGE FROM SEPTEMBER 2010 – 22 FEBRUARY 2011.</i>	<i>10</i>
<i>FIGURE 1.3: RESEARCH GOALS AND METHODS.....</i>	<i>18</i>
<i>FIGURE 1.4: CANTERBURY REGION WITHIN NEW ZEALAND</i>	<i>23</i>
<i>FIGURE 1.5: CANTERBURY REGION WITH TERRITORIAL AUTHORITY BOUNDARIES</i>	<i>23</i>
<i>FIGURE.1.6: TECTONIC SETTING OF NEW ZEALAND, 2015.</i>	<i>31</i>
<i>FIGURE 1.7: NATIONAL SEISMIC HAZARD MODEL FOR NEW ZEALAND; 2010 UPDATE.....</i>	<i>32</i>
<i>FIGURE 2.1. RESEARCH GOALS AND METHODS</i>	<i>41</i>
<i>FIGURE 2.2: PUBLIC RELATIONS FAMILY TREE</i>	<i>48</i>
<i>FIGURE 2.3: SOURCE, MESSAGE, CHANNEL, PUBLICS MODEL OF COMMUNICATION</i>	<i>49</i>
<i>FIGURE 2.4: THE 4 RS.....</i>	<i>59</i>
<i>FIGURE 2.5: THE HYDROGEN BOMB.....</i>	<i>63</i>

FIGURE 2.6: GRUNIG 'S (1992) NESTED MODEL OF SEGMENTATION.....	86
FIGURE 2.7: A MODEL OF COMMUNITY RESILIENCE	91
FIGURE 3.1: RESEARCH GOALS AND METHODS.....	97
FIGURE 3.2: RESEARCH POSITION.....	98
FIGURE 3.3: Q-FILES BOOKLETS DURING THE FIRST CODING, WITH COLOURED TABS ILLUSTRATING THE FIRST INTERPRETATION OF THEMES IN THEIR CONTENT	111
FIGURE 3.4: THE HYPERRESEARCH INTERFACE DURING CODING OF THE Q-FILES.....	113
FIGURE 4.1: THE ORIGINAL SPIRE AND THE DAMAGE DONE BY THE EARTHQUAKE OP SEPT. 1, 1888.	123
FIGURE 4.2:RESEARCH GOALS AND METHODS.....	124
FIGURE 4.3: OVERVIEW OF THE PROCESSES USED FOR THE CODING PROCESS	125
FIGURE 4.4: FRONT COVER AND IMAGES FROM THE Q-FILES BOOKLETS.....	137
FIGURE 4.5: LIQUEFACTION PROCESS.....	175
FIGURE 4.6: THE CANTERBURY MAP OF FAULTS AND EARTHQUAKES FROM THE Q-FILES BROCHURE 2008.	176
FIGURE 4.7: CHRISTCHURCH CATHEDRAL.....	177
FIGURE 4.8: ETHNIC GROUPS IN THE CANTERBURY REGION, 2006 CENSUS	189
FIGURE 5.1. RESEARCH GOALS AND METHODS.....	205
FIGURE 5.20: BARRIERS TO COMMUNICATING.....	231
FIGURE 6.1: BUILDING BLOCKS OF AN ECHO CHAMBER.....	254
FIGURE 6.2: THE ECHO CHAMBER IN CANTERBURY	254
FIGURE 6.3: FORONDA 'S (2008) MODEL OF CONCEPT ANALYSIS OF CULTURAL SENSITIVITY.....	274
FIGURE 7.1: PHOTOGRAPH FROM THE PRESS, 16 MARCH, 1932	279

TABLES

TABLE 1.1: CANTERBURY PRE-EARTHQUAKE PREPAREDNESS STUDIES	29
TABLE 2.2: SUMMARY OF THE MORE SIGNIFICANT HISTORICAL CANTERBURY EARTHQUAKES AND THEIR IMPACTS (MODIFIED FROM POTTER, BECKER, JOHNSTON, AND ROSSITER (2015)	33
TABLE 2.1:DEFINITIONS OF PROPAGANDA, PERSUASION AND EDUCATION	52
TABLE 4.1: THE BEST-PRACTICE MATRIX.....	127
TABLE 4.2: PHASE ONE CODES	138
TABLE 4.3: FIRST CODING ANALYSIS.....	139
TABLE 4.4: DIFFERENT MESSAGES FROM THE BOOKLETS ABOUT EARTHQUAKE ACTIONS.....	145
TABLE 4.5: DIFFERING DEFINITIONS OF NATURAL EVENTS, NATURAL HAZARDS, NATURAL DISASTERS, AND RISK FROM THE 2001/2008 DEFINING MOMENTS IN NATURE BOOKLETS	152
TABLE 4.6: FINAL CODING FREQUENCIES, BP=BEST PRACTICE, PP=POOR PRACTICE	158
TABLE 4.7: FREQUENCY OF CODED THEMES	161
TABLE 4.8: MESSAGES SUBTHEME CODING	162
TABLE 4.9: MESSAGE: LOCALITY WITH EXAMPLES FROM CODING.....	164
TABLE 4.10: MESSAGE: SCIENCE INFORMATION WITH EXAMPLES FROM CODING.....	165
TABLE 4.11: EXAMPLES OF MESSAGE: OUTCOME EXPECTANCY WITH EXAMPLES FROM CODING...	166
TABLE 4.12: MESSAGE: MITIGATION WITH EXAMPLES FROM CODING.....	167
TABLE 4.13: EXAMPLES OF BEST-PRACTICE AND POOR PRACTICE OF MESSAGE LENGTHS.....	167
TABLE 4.14: EXAMPLES OF IDEAL MESSAGES.....	168

TABLE 4.15: EXAMPLES OF BEST-PRACTICE AND POOR PRACTICE OF COUNTERARGUMENTS	169
TABLE 4.16: EXAMPLES OF MESSAGE: GUILT WITH EXAMPLES FROM CODING	169
TABLE 4.17: EXAMPLES OF MESSAGE: PROPAGANDA WITH EXAMPLES FROM CODING	170
TABLE 4.18: MESSAGE: ACRONYMS WITH EXAMPLES FROM CODING	171
TABLE 4.19: MESSAGE: FEAR WITH EXAMPLES FROM CODING	172
TABLE 4.20: MESSAGE: JARGON WITH EXAMPLES FROM CODING	173
TABLE 4.21: CHANNEL SUBTHEME CODING FREQUENCY	174
TABLE 4.22: EXAMPLES OF CHANNELS: ONLINE PRESENCE WITH EXAMPLES FROM CODING	178
TABLE 4.23: EXAMPLES OF CHANNELS: PRINTED MATERIAL WITH EXAMPLES FROM CODING	178
TABLE 4.24: EXAMPLES OF CHANNELS: FACE-TO-FACE WITH EXAMPLES FROM CODING	179
TABLE 4.25: EXAMPLES OF BEST-PRACTICE OF ENTERTAINMENT	179
TABLE 4.26: SOURCE SUBTHEME CODING FREQUENCY	180
TABLE 4.27: POWERFUL SUBTHEME WITH EXAMPLES FROM CODING	181
TABLE 4.28: MULTIPLE AGENCY SUBTHEME WITH EXAMPLES FROM CODING	182
TABLE 4.29: SOURCE: SPOKESPERSON: PERSONAL STORIES WITH EXAMPLES FROM CODING	183
TABLE 4.30: EXAMPLES OF SOURCE: SPOKESPEOPLE WITH EXAMPLES FROM CODING	184
TABLE 4.31: PUBLICS SUBTHEME CODING FREQUENCY	186
TABLE 4.32: EXAMPLES OF PUBLICS: INVOLVEMENT IN PLANNING ABOUT RESPONSE	186
TABLE 4.33: EXAMPLES OF PUBLICS: TWO-WAY WITH EXAMPLES FROM CODING	187
TABLE 4.34: EXAMPLES OF PUBLICS: RESILIENT COMMUNITY WITH EXAMPLES FROM CODING	188
TABLE 4.35: EXAMPLES OF PUBLICS: DIVERSITY EXAMPLES IN THE CODING	189
TABLE 4.36: SETTING SUBTHEME CODING FREQUENCY	190
TABLE 4.37: EXAMPLES OF SETTING: RESILIENT COMMUNITY WITH EXAMPLES FROM CODING	191
TABLE 4.38: AGE EQUIVALENCY FROM THE U.S.A. TO NEW ZEALAND SCHOOL SYSTEMS	192
TABLE 4.39: READABILITY SCORING BASED ON TESTS; INCLUDES AGE/GRADE EQUIVALENCY	193
TABLE 4.40: ASSESSMENT OF THE Q-FILES	195
TABLE 5.1: QUESTION ONE	207
TABLE 5.2: QUESTION TWO	207
TABLE 5.3: QUESTION THREE	208
TABLE 5.4: QUESTION FOUR AND FIVE	208
TABLE 5.5: QUESTION SIX	209
TABLE 5.6: QUESTION SEVEN	210
TABLE 5.7: QUESTION EIGHT	210
TABLE 5.8: QUESTION NINE	212
TABLE 5.9: QUESTION TEN	214
TABLE 5.10: QUESTION ELEVEN	216
TABLE 11: QUESTION TWELVE	218
TABLE 5.12: QUESTION THIRTEEN	219
TABLE 5.13: QUESTION FOURTEEN	221
TABLE 5.14: QUESTION FIFTEEN	222
TABLE 5.15: QUESTION SIXTEEN	224
TABLE 5.16: QUESTION SEVENTEEN	226
TABLE 5.17: QUESTION EIGHTEEN	228

Chapter 1 : The Outside Insider

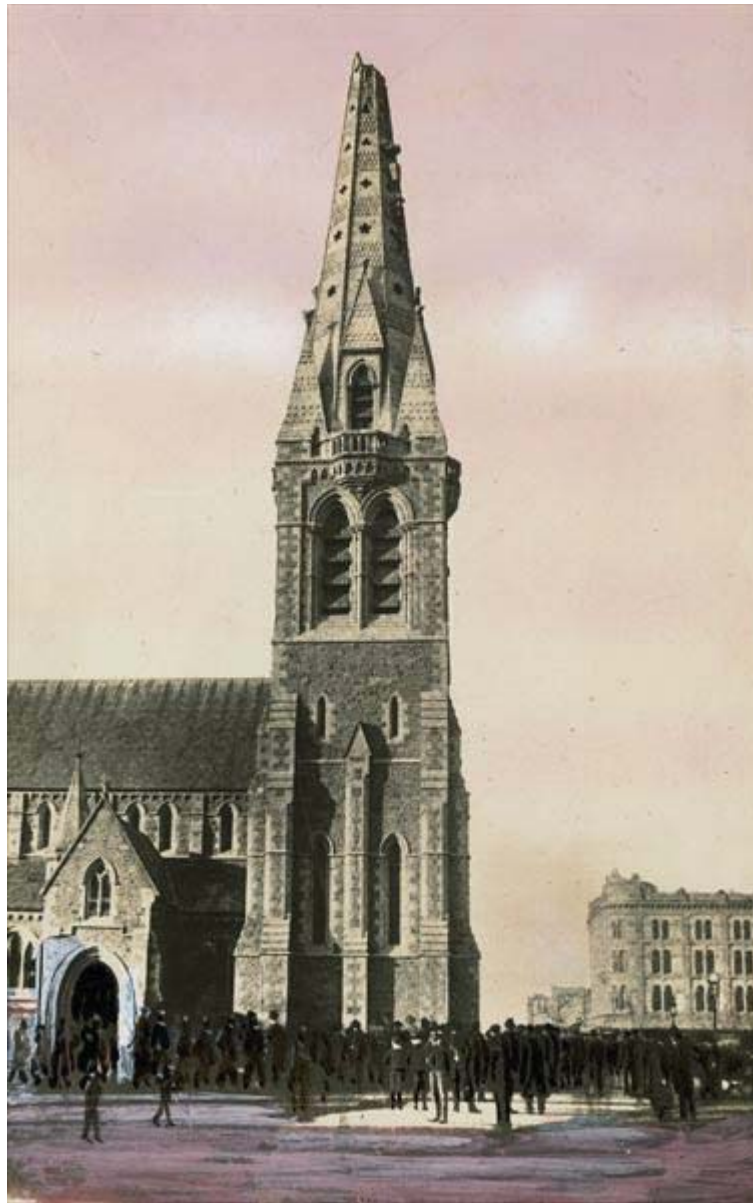


Figure 1.1: Photograph outside Christ Church Cathedral with earthquake damage to spire.

*Damage related to the 1888 earthquake. Retrieved from:
<http://info.geonet.org.nz/display/quake/M+7.0++7.3,+North+Canterbury,+1+September+1888>*

Chapter 1: The Outside Insider

On 4 September 2010 at 4:51 a.m., a magnitude (M)7.1 earthquake rumbled through the Canterbury Plains. It was the largest earthquake in Canterbury since 1901. Christchurch, New Zealand's second largest city, was 30 kilometres from the earthquake's epicentre. The city was damaged, with masonry buildings collapsing and infrastructure buckling under the seismic waves' power. While there was shock in Christchurch about the earthquake, no lives were lost and people likely assumed that the earthquakes would be over soon. But the M7.1 earthquake was the beginning of an earthquake sequence. During this sequence, which is still on-going in 2017, an entire city was reduced to rubble, lives lost, and billions of dollars in damages ripped from New Zealand's economy for years.

Beyond the damage caused by the earthquakes, the Darfield earthquake also awoke New Zealanders to the possibility of large seismic activity outside the more notoriously known earthquake zones, the capital city of Wellington and Napier. I discovered evidence that people were largely unaware of Canterbury's seismic history and were shocked by the size and damage caused by the earthquakes.

I have an "insider" perspective, in relationship to this earthquake sequence. It was my job, as the public education coordinator for the Canterbury Civil Defence and Emergency Management (CDEM) Group, to inform people living in Canterbury about earthquake risks in the region before the sequence, from 2006 to 2010. I also worked during the sequence for the national emergency response. This thesis is an exploration of that experience and what I have learned in the subsequent years.

In this chapter, I demonstrate my place in this research and explore my research questions. I also provide the socio-cultural and geological setting for Canterbury pre-Darfield earthquake (2010). I include a brief summary about the Canterbury Earthquake Sequence from 2010 to 2016, the terminology used, and this thesis' structure.

More than simply providing structure, definitions and other mechanical aspects of the research, I also provide my motivation for this thesis. My theoretical perspective for this research is from an insider, which means that I have knowledge and understanding gained as someone who worked in the field. Insider research is an unconventional but still valid researcher position in emergency management as discussed by Phillips (2014) and Boje (2001) for communication research. This thesis is a reflection on a journey of understanding,

of perceiving the issue, inspired by the lenses of ancient and contemporary scholars who, like me, have struggled with questions about how to communicate to encourage people to prepare for emergencies.

To provide context to my research and insider perspective, I now explain my background and early experiences with disasters.

A Disastrous Childhood

“My family never talks about feelings, and we certainly never talk about plutonium. It's hard to take something seriously if you can't see it, smell it, touch it, or feel it. Plutonium is a cosmic trick. The invisible enemy, the merry prankster. Can it hurt you or not? None of us know.”

— Iversen (2012), *Full Body Burden: Growing Up in the Nuclear Shadow of Rocky Flats*

I am not originally from Canterbury or New Zealand. I was born and raised in Eastern Washington State, on the West Coast of the U.S.A. My mother was originally from Besançon, France. I was raised in a bicultural family, speaking French at home and spending summers in France. My father was from Utah and a trained nuclear chemist. His professional life would become influential on my interest in the emergency management field. My childhood had a hazardous overlay from the constant presence of an ageing and threatening nuclear facility, the second-oldest on earth. The Hanford Nuclear Site is where uranium was enriched and plutonium bred during World War 2. The plutonium from the Hanford Site was used in the first atomic tester bomb and the Nagasaki bomb in 1945 (Gerber, 2007). The decades since World War 2 have not been kind to Hanford as it has become a highly toxic, contaminated area (Gerber, 2007). My family home, where we lived until I was 13, was located inside the nuclear facility's 10-mile radius.

Two years after my birth in May 1980, the skies blackened overhead at midday, in West Richland, Washington. Mt. St. Helens erupted, covering Central and Eastern Washington in a thick layer of ash. I have few memories from the eruption; however, my family frequently spoke of it. My father said that after the skies darkened suddenly, ash began to fall from the skies and covered the windshield of his Volkswagen van. Ash covered my hometown, which created a month of mayhem and clean-up for my community.

A much clearer memory involving emergencies occurred four years later when, aged six, I watched my house burn down. My father was driving our van home; I was sitting in the

passenger seat. He parked the van in front of our garage, which was below our house and grabbed me out of the van. As my father carried me away, I looked back to see flames shooting out from the back of the vehicle. He took me into the house and while he was getting the fire extinguisher, the van exploded lighting the wood façade on fire. The fire quickly spread throughout the house through our air conditioning ducts.

While I had practised emergency drills with my parents, those drills involved evacuating to the barn approximately 100 metres from the family home. I was too scared to follow instructions that day. I did go to the barn but seeing no one there, I continued to what I believed to be a much safer place. I ran to my cousin's house and hid under her bed. From there I could crawl out from under the bed and watch through the window as the local fire brigade members battled to save my house and when the experience became too intense, I hid underneath the bed again. My father, not knowing where I was, searched desperately through a burning house for me. Finally, the firefighters told him that it was too dangerous to go back inside to look for me. My cousin returned home from school, investigated the scene to see what was going on and had the foresight to look for me in her bedroom. Fortunately, we were all safe and the house would be rebuilt four months later.

A further overlay from my experience includes being raised in the Church of Jesus Christ of Latter Day Saints, colloquially known as "Mormons". Church members are encouraged to make emergency preparations, including food supplies for a year. This practice is likely an extension of the church's teachings of existential risk and living in the "latter days" (F. R. Johnson, 1979). The concept that at any moment, the world would end and Jesus Christ, a central deity in the Church's teachings, would return to protect the faithful was a familiar trope in my childhood. Upon reflection, these events formed my early interest in, later to become a professional fascination with, the disaster management and communication field.

Beginning in 1994 (age 16), I attended both community college (Columbia Basin College) and high school (Hanford High School) through the Running Start programme. This programme was intended to alleviate over-attendance in high schools and counteract a decrease in community college attendance. The concept was that the Washington State paid for tuition and college fees while the students paid for books, transportation and other needs (Meld, 2000). Running Start students received dual academic credits at their high school and in the university system.

By the time I finished high school, I had also completed my Associate of Arts degree, which is the first two years of tertiary education in the U.S.A. system. I decided to keep my university loan debts low, so attended a small, local state university, Central Washington University. I graduated with my B.A. in Law and Justice: Pre-Law (with a speciality in Psychology and Constitutional Law). I was accepted into Gonzaga Law School in Spokane in 1998 and began my first year. By the second term, I realised I was in trouble. My grades were poor and I did not seem to be able to write effectively. While I received passable marks (B average) in my other courses, I failed my legal writing course (D). I was placed in academic suspension and told that I would have to take my first year over again. I decided to take a year and work on my writing. I took a journalism course at Eastern Washington University in Spokane, while working at a computer-aided design software company as a marketing assistant. My professor took me aside one day and told me that he thought I would make a good writer and an excellent public relations person. He suggested I take his public relations course in the evening. I received a B in the course, which was better, but I was still unsatisfied with that grade. It would take me another year to attempt academic study again.

During that year, I worked several different jobs. I worked at a crisis youth facility as a youth counsellor as well as at the computer-aided design (CAD) software company. I also decided to try other occupations. I applied for a job as a weekend internet content producer at a local television station. At one point, I was working full-time (graveyard shift) at the crisis youth facility, full-time during the day at the CAD company and working weekends at the news station. I also decided to study again and was taking the public relations course in the evenings between my two jobs. I recall getting very little sleep during that time but it was very productive and I learned a great deal about how much I could push myself. Operating in highly emotional environments (the crisis youth centre) has served me well subsequently as an emergency manager.

When I received my grades from my public relations course, I had an A. I remember going to my professor's office and bursting into tears explaining to him that I had failed law school. My professor told me he had a similar experience; he had wanted to be a doctor but could not pass chemistry, a requirement for medical school. So, instead, he went into journalism and public relations and that was the career for him. He told me something very important that day: that failure can be turned around and lead you to what you were meant to be doing with your life all along. I have always held that conversation emotionally close when I have been faced with failure. It has also helped me during the research for this thesis, when I have had

to critically reflect on my own work as a risk communicator. My professor mentored me through the course and I passed with excellent grades, while working three jobs.

In one year, I had paid off my debt and decided to save money to take a year travelling around the world. I quit my jobs, packed up my apartment in Spokane and booked a round-the-world trip ticket, leaving the U.S.A. on 10 September 2001. My first destination: New Zealand.

My life and work in Canterbury

My introduction to Canterbury would be marked with unexpected disaster and tragedy; a similar theme as my exit nine years later. I arrived in Canterbury on 12 September 2001. I was 23 years old. I had just flown in from Los Angeles, and when I arrived in Auckland, bleary eyed and sleep-deprived, I was greeted by television cameras and reporters. I walked past the group. I stopped at a “hospitality” booth, where a kind man offered me tea or coffee. I said tea, thinking, “what a great country this is! Free tea on arrival!” The man heard my accent and immediately said “your country has been attacked. 50,000 people are dead in the World Trade Centre in New York and the Pentagon is destroyed. I’m so sorry, I’m Canadian, and so we are neighbours...I’m very sorry.” At this time, thousands more were thought to have been killed than the approximately 3,000.

I did not believe him. It sounded like a horrible, twisted joke. But sure enough, when I left customs, I heard more about the attack on my country. I talked to Air New Zealand about returning immediately to the U.S.A., as my family were very distressed, but no flights were leaving the country due to the attacks. I continued my journey to Christchurch. The airline attendant stayed with me and said that she did not know what to say to me. I just wanted to return home, to my family. I arrived at Christchurch airport and was interviewed by NewsTalk ZB, a New Zealand radio station, about my feelings and thoughts on the attacks. The reporter sat with me and conducted the interview in the airport café as I watched, for the first time, the planes hit the towers.

Although I had intended to travel to Australia, all flights were cancelled for some time. With my plans forcibly disrupted, and no travel insurance to cover my costs, I decided to stay and look around – and look for work. From 2002 – 2003, I lived in Christchurch, working for the New Zealand Blood Service as the Donor Recruiter for Canterbury and West Coast. I travelled throughout both regions, going to small farming towns, villages and cities to promote blood donation. During that time, I became familiar with the South Island

landscapes and people. Given my interest in disaster and crisis, the national organisation asked me to develop a plan for communicating during a disaster. After working on the plan for several months, I realised how completely unprepared I was to write a national plan. With my work permit coming to an end, I decided I wanted to pursue more knowledge in this field. I researched and found the University of Hawai'i programme in Disaster Management and Humanitarian Assistance, paired with a Public Administration Masters (M.P.A) Degree.

I relocated to Honolulu, Hawai'i, a recipient of the Herman S. Doi scholarship. I was also hired at the University Library as their public relations specialist. During my final year, while I was finishing my disaster management courses, the University suffered its own disaster, when the Manoa Floods in 2004 destroyed the library's bottom floor and buildings nearby. The damage was more than US\$100 million, and the University lost rare collections including 70 percent of its photo and map collection, 90 percent of the Government Documents collection, and the Kingdom of Hawai'i legal papers (Bazzell, 2005). I worked in the floods, taking news crews around the wreckage and, during breaks from media attention, hand-pumping water out of the basement or carrying map case drawers and placing them in containers to see what we could salvage.

This experience solidified my commitment to the field. When I graduated from my Masters in 2005, I returned to Canterbury where I now had personal connections, and looked for further work in disaster communication.

After returning to New Zealand, I was employed at Environment Canterbury as a communication officer. My main role was public education and public information coordinator for the Canterbury Civil Defence and Emergency Management (CDEM) Group. I also had seven other communication portfolios: hazards, waste, contaminated sites, hazardous substances, environmental enforcement, resource consents and maritime oil spill. Half my time was dedicated to CDEM and the other half split among the other portfolios listed. During my time at Environment Canterbury, I joined the Rescue and Technical Support Team (RATS) which specialised in Urban Search and Rescue from heights. I learned how to rescue people from tall buildings using ropes and other devices as well as becoming pre-hospital and emergency care (PHEC) certified.

My role at the Canterbury CDEM Group was mainly to develop and support preparedness campaigns. For four years, my role was creating, managing, and coordinating communication projects for the CDEM group. I had only \$25,000 a year for my public education budget

which was provided by the regional council through property rates. Approximately \$9,000 annually was spent on Yellow Pages telephone book advertisements, which was mandated nationally by the Ministry of Civil Defence and Emergency Management (MCDEM), further limiting my budget. Other complications were the regional council's coordination role. The CDEM Act 2002 provides powers to regional councils but these are limited, as I will explore later in this chapter. Politics and relationships were also challenges and because I was not originally from Canterbury and struggled with cultural aspects, it did not make my relationships easier. My time at Environment Canterbury coincided with upheavals in regional government. In February 2010, the New Zealand Government removed the regional council's elected officials and appointed a commission to manage the region (Brower, 2010). This decision publically illustrated the regional and local politics. Those tensions often spilt over into my work environment although, from my perspective, we tried to keep the CDEM group as apolitical as possible.

I left Environment Canterbury on the 10 August, 2010, to take a position as Senior Communication Adviser, as a volunteer with Volunteer Services Abroad (VSA) in the Solomon Islands for World Vision in community resilience building and media relations to support disaster relief. In part, I left Christchurch because I knew that I was no longer as effective as I had once been. In particular, I was not able to meet my goals in all the portfolios assigned to me. These reasons included my marriage's implosion, a relationship which had lasted since I first arrived in 2001. I felt I needed a new beginning.

Three weeks later, the M7.1 Darfield earthquake occurred. At the time, I was in Iceland on a brief holiday with friends and colleagues including Canterbury's regional hazard analyst and the recently resigned MCDEM Recovery Manager for New Zealand. Together, we self-deployed to assist in the response because there was no one managing the earthquake social media response, as I still had access to Twitter and Facebook accounts I had created for the Canterbury CDEM Group. Working from a hotel room more than 12,000 kilometres away and feeling helpless, we did the best we could. The initial communication situation seemed under control after three days and we continued on our journeys. I travelled on to the Solomon Islands, where I worked for World Vision for six months before the unthinkable happened.

One otherwise ordinary morning on 22 February 2011, I received a text message from the Solomon Islands Country Manager: "earthquake in Christchurch, serious. Many fatalities

expected. Do you want to go home?” I immediately contacted my old manager at Environment Canterbury via email and asked whether he wanted me to come. 24 hours later, I got the phone call from another colleague, the Public Information Manager for the Christchurch Earthquake Response. After a minute-long conversation, she asked me to come back to work as the community relations manager for the response, a role that no one had yet filled.

I flew back to Christchurch several days later. For eight weeks, I worked in the Emergency Operations Centre, first as the Community Relations Manager, then as the Public Information Manager (Second in Command). I faced the reality of the outcomes of the preparedness work I had been attempting previously, for four years from 2006-2010 as the public education coordinator for the Canterbury CDEM Group. At the time of the second quake (M6.2, 22 February 2011), only 13 percent of Cantabrians were at levels of disaster preparedness that would be considered minimal by standards set by MCDEM (Colmar Brunton, 2013). While this was an increase from the baseline in 2005 (from five percent preparedness to 13 percent), it was still low. My role now was to manage the immediate situation, but it was also apparent to me the links between the situation we faced now and our communication work conducted before the earthquakes.



Photo: Cycle Building damaged on 4 September 2010. Retrieved from: <http://www.ceismic.org.nz/search/33695937>



Photo: Building damage from 04 September 2010. Retrieved from: <http://www.ceismic.org.nz/search/33695916>

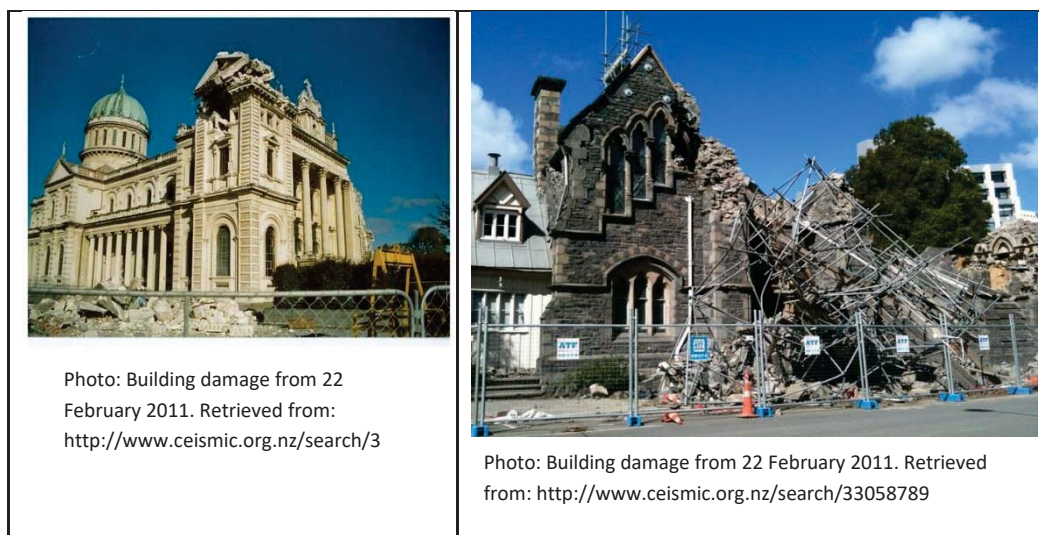


Figure 1.2: Photographs of damage from September 2010 – 22 February 2011. Courtesy of UC Ceismic Digital Archive, 2015.

As I reflect on the above photos, I remember my time working in Christchurch after the February earthquake. At the time of the earthquakes, I was writing an online blog titled *Stilettoes in the Solomons*. I wrote three blog posts about my time in Christchurch during the February 2011 earthquake response. I will use these excerpts as these are the rawest impressions I have from that time, unfiltered and unchanged by the passage of time or modified for more palatable memories. Here is an excerpt from one blog about my impressions of working in Christchurch (McBride, 2011a):

For months I had been fantasising about my return to Christchurch. I longed for a cocktail at Fat Eddy's on open mic night or to go climbing at the YMCA with my friends. I wanted to go to the Knox Church on Sunday and have Eggs Benedict at Vic's Café, chatting away with my best mate, Helen. I wanted to buy Epoisse at the Cheese Mongers and jog through Hagley Park in the morning. In the Solomons, there are only a handful of eateries and bars that are acceptable for me to go to. I dreamed of my home, knowing that the places I loved were either gone or going to take a long time to rebuild.

I wrote the above paragraph anticipating working in Christchurch during the emergency in February 2011. During my time in the Emergency Operation Centre, I saw many buildings demolished. Here is one excerpt from the blog that expresses that experience (McBride, 2011c):

One day, I pop outside with one of the hundreds of cups of coffee I must have drunk, just to look down the street and see the remnants of the Cathedral. I watch as St. Elmo, my favourite pink apartment building, is quickly reduced to rubble with a wrecking ball. Okay. So where the #&\$^@& does anyone get a gigantic metal wrecking ball these days? It seems so...1930s depression era or like something from a Looney Toons cartoon. Seeing the wrecking ball slam through the walls of the pink

building is so ludicrous, I almost chuckle nervously at the sight of it.

I see the look on the rescue teams as they go in each day. I want to go with them, desperately, but the work in the EOC is all consuming. I go back inside to get another cup of milk with coffee. I ask the coffee makers how many they have made during the response.

“We lost count at 40,000 two weeks ago,” the barista says grimly.

On working behind the cordon that encircled Christchurch (McBride, 2011b):

Behind the cordon, a gigantic fence that circles the city, there is no movement. There are no people among the rubble, except the occasional rescue or army person. Birds don't seem to want to go there, and even rodents seem too nervous; I don't see a single rat the entire time I am there. In the evening, no lights turn on in the high rises; it is like the heartbeat of the city has gone. The cordon was put there to protect people from going in, while search and rescue and demolition efforts continue.

The cordon takes on an almost mythical status in the city. Rumours fly about rats the size of cats and of strange men who walk in the “Red Zone” at night, staying in abandoned hotel rooms, eating candy out of fridges. These make good stories but aren't true.

(Excerpts from the blog ‘Stilettoes in the Solomons’)

These excerpts indicate the emotional connection I had with Christchurch and its destruction. To me, the loss of Christchurch was not just about bricks or buildings. It also symbolised the end of a decade-long marriage, the loss of friendships, of relationships, of identity. This disaster was far more personal than any other I had worked previously or, hopefully, will ever work on again.

I returned to the Solomon Islands on the 12 April 2011 to complete my contract with World Vision. When my contract ended in November, I moved to Wellington to work for GNS Science as a social science researcher, covering a maternity leave vacancy. While there, I was fortunate to be given the opportunity, via a GNS Science scholarship, to examine questions about why our preparedness communication in Christchurch had failed and future pathways.

I began this thesis journey on the 22 November 2012, with the aim to identify what could be learned, in hindsight, about the public communication I had conducted in Canterbury before the quakes. Given it was not possible to separate my intense personal involvement from the topic, I instead embraced that connection to the topic and adopted an interpretive, participant-insider approach to the research.

Now that I have fully situated myself within this research context, I will explain my motivation for this research.

Motivation, relevance and challenges of this thesis

Early in this research, I had to confirm with myself: Was I doing this research for my ego, to redeem myself and my work? Could I authentically and ethically research the Canterbury Earthquakes? I realised that I would face challenges that other researchers had not: after all, I am not a fresh-faced, young researcher who is critiquing abstract concepts external from their experience. I had worked the long, lonely hours in the middle of the night in the Emergency Operations Centre in the Christchurch Art Gallery. I could not examine Canterbury in an abstract fashion. The events in Canterbury contain some unpleasant experiences for me, memories I would have preferred to leave in the past. Part of the bitterness of my memories comes from the notion that while I felt I had worked very hard in Canterbury to encourage earthquake preparedness before 22 February 2011, now this work was either irrelevant, completely forgotten or dismissed by publics and professionals in my field. At times, I felt less than a footnote in Canterbury's history or worse, part of the "old guard", someone who helped create more problems than solutions.

External critique of this work was much less harsh, at times, than my internal one. I sometimes felt completely overwhelmed by reflecting on my limitations as a professional communicator. I asked myself often: why did I not do more? By prolonging my connection with Canterbury, it felt like an exercise in opening old wounds. I could not move on, I was still tied deeply to my worst professional and personal experiences. After much reflection, I came to a conclusion: I wanted to contribute. I aspired to tell stories from the experience, enlightened by research, to inform how I, and by extension other professional communicators, can improve our communication. In this way, I also can honour those who suffered through the earthquakes.

I was given a unique opportunity in this research. There is pre-earthquake research on the attitudes and beliefs about earthquakes from people in Canterbury including Becker (2012), Leonard, Paton, Johnston, and Mitchell (2004), and Opinions Market Research (2009). Having access to this research is a rarity. This research is a mixture of qualitative and quantitative methods to understand people's pre-earthquake rationale about preparedness, and provides unique, deep and rich insights. Along with academic literature, there are also grey

literature reports and market research to understand the attitudes, beliefs and behaviours of people about earthquakes in Canterbury.

The present study aims to build upon insights obtained from reviewing all this research, along with practical implications applied through my interpretive perspective as a professional communicator, to create a multidisciplinary understanding of best-practice. The uniqueness of the thesis comes not entirely from the new knowledge generated but also from who it is generated by: a practitioner who worked in Canterbury, who assisted in creating and editing written documents and then examined those documents retrospectively after an earthquake had occurred. The research's value comes from this learning experience and reflection, combined with validity from checks with members of the same community of practice. In some ways, this thesis is a process of personal persuasion. Through researching, I learned to challenge many of my own previously strongly held beliefs. I had to shatter my "echo chamber", which is no easy task.

To change cultural and social belief systems is challenging. Emergency management, science and communication fields do have unique cultures, beliefs and systems that are not always informed by research or evidence base. At times, challenging different theories, as I do in this thesis, has been an intimidating journey. Disaster communication has largely been studied by "natural" scientists or those with positivist leanings. This means disaster communication research often has a different heritage than communication research and I address these disconnections in this thesis.

There is already research about the communication during the Canterbury Earthquake Sequence. Some research has been completed, as well as some still ongoing, about communication in Christchurch and Canterbury related to the earthquakes. I am aware of three other Ph.D. students currently researching this area. Two focus on social media.

- Abigail "Abi" Beatson, at Victoria University, in the Media Studies department studied social media and crisis mapping. Her thesis, entitled "New Media, Information Sharing and Crisis Mapping: An analysis of new media based Information sharing Practices during the Christchurch Earthquakes", passed in July 2016.
- Martina Wengenmeir at the University of Canterbury, also in Media and Communication, is currently working on a thesis entitled "Aftermath online: Communication flow and the framing of information in social network communities after the Christchurch earthquakes". Her research is based on case studies of online communities developed during and after the quakes. Her thesis is due for submission in 2017.

- Vivienne Bryner at University of Otago in the Department of Geology has recently completed a thesis entitled “Communicating the sciences of disaster risk reduction: stories surrounding the Canterbury Earthquakes”. Bryner examined media themes and stories related to the Canterbury Earthquake Sequence. This thesis has been submitted and passed in May 2016.

My research is different in several major ways. First, all of these theses focus on aspects of communication during the response of the earthquake sequence and not the pre-event environment. Also, my thesis comes from an interpretivist, insider perspective, rare among the scholars currently studying the Canterbury Earthquake Sequence. I aspire to influence greater understanding between both research and practice, to illuminate pathways and flyovers between emergency management and communication to create a more inclusive approach. Again, this is different in substance from the three theses currently related to Canterbury and communication.

There are challenges, as well as benefits, to being an “insider” researcher. As a public relations practitioner, I was taught that the job of a practitioner is to communicate for organisations, brands, products and research, not my own research or perspective. Particularly as a humanitarian communicator, the stories of others were much more compelling than my own. In considering the epistemology for my thesis, at first the idea of exposing my perspective felt self-indulgent and potentially unethical. The concept of service to others has been ingrained as a cultural belief and my concern was that this thesis would become an attempt at self-service, to somehow re-write history to make it appear as though I was a better practitioner than I was.

My other apprehension, stronger than discomfort with exploring my narrative, was my concern for other people, particularly former colleagues. I felt the Public Education and Public Information (PEPI) Group, which I facilitated, was a successful group and did create and manage well-intentioned campaigns. After all, the Pandemic Survival Roadshow, created by the group, received international attention and support from the World Health Organisation (Humphrey, Mitchell, & McBride, 2011). The campaigns I managed during that time received attention from other researchers as models of best practice (Forsyth, 2008). At the time, I felt people working on the PEPI committee cared about inspiring people to prepare in Canterbury. My relationships with these people, many of whom worked very hard on public education initiatives, have complicated this research. Providing critique is a challenge because I feel that the intention of these people, including my own, was genuine and sincerely aimed to help the people of Canterbury. I certainly would not want any of my

former colleagues to feel blame. We all did the best we could with the knowledge we had at the time. However, we could take something positive from a tragedy if we learn from it.

Now that I have explained my motivation for this thesis, I explore the narrative research's purpose and style.

Narrative Structure

Originally, my proposed research design was more aligned to a positivist approach, including more quantitative methods such as surveys and focusing on secondary data analysis. This shifted when I realised that this kind of work, specifically surveys and etically coded focus groups about people's attitudes and perceptions on emergency preparedness could add little to what was already known. Becker (2012) had already completed a major study with more detachment and proficiency than I could have done as someone integrally connected with the context. I realised my original, largely quantitative, research proposal would not have resulted in a unique contribution to knowledge, as a thesis is meant to be (Mullins & Kiley, 2002). My original proposal would not have taken advantage of the knowledge, experiences, connections and insights that I already held. What would be more beneficial to generating new knowledge was my story, combined with my reflections on "best-practice" research and how this was or can be in the future, implemented more successfully. So this research is an amalgamation of narrative inquiry, as narrative researchers approach written material as a distinct form of discourse, combined with elements of interpretive thematic analysis, influenced by already existing literature.

As stated in the previous section, I cannot be an unbiased observer of this research. Instead of using more "traditional" methods of research, which often require the researcher's personal perspective to be removed from the research, narrative approaches include the researcher and allow the researcher to examine issues through their lens of experience and learning (Denzin & Lincoln, 2005). In some ways, my work aligns with a more autoethnographic approach, where I turn the analytical lens on myself and my interactions with the topic (Crawley, 2002). However, it is not purely an autoethnography but rather includes some elements of this type of narrative inquiry, specifically in areas requiring reflection. More details on my theoretical framework are in Chapter 3: Research Pathways.

The combination of both the narrative and the externalised research together creates the theoretical underpinnings, tone and style of this thesis. As such, I will use personal pronouns and express my thoughts directly throughout the thesis. I also use a narrative structure and

flow for the thesis. As reflection is a process of looking back, this research is not always necessarily presented in a linear manner but, at times, diverges on topics based on relevancy.

Let me be clear: I am going against the norm of research in the emergency management discipline, which often aligns to positivist methodologies. As Blake (2013) suggests, “narrative research may produce rebellious speech acts through the analysis of stories rarely told” (p. 60). This story, from an insider critically analysing their work retrospectively to this depth, has never been explicitly investigated in emergency management and rarely in communication. It may be a story that will be perceived, by some people, as rebellious, challenging or without merit. However, I encourage readers to consider this thesis not as a challenge to positivist approaches but rather enriching and exploring different pathways where positivists, because of their methodological constraints, do not go. To me, a different approach seems complementary, able to add to, rather than negate, what has gone before.

As I have addressed the narrative structure in this thesis, I now present my research questions.

Research Questions

I wanted to know why the discipline of emergency management appeared to shun or exclude persuasive discussions found in the field of communication. This guided me to my research questions:

What are the most relevant best-practice preparedness communication principles from the communication research and emergency management literatures, and in particular what principles in the former literature are missing from the latter?

The next question was an evolution of the first. This question is:

In light of these best-practice principles, what public communication lessons from the preparedness information issued in the nine years before the Canterbury earthquake sequence can be identified through interpretative document analysis and member checks?

This question was by far more personal than the first because it was about reflection. It was where my practitioner lens appears to be valuable as I have some understanding about the constraints and pressures of professional communication and emergency management. This is not merely a research exercise, but one undertaken by a communication practitioner who worked in Canterbury before the earthquake sequence

Now that my intentions for the research have been set out, I briefly discuss my methodology and theoretical perspective.

Methodology and theoretical perspective

My theoretical perspective is interpretivism. As an emergency manager and communicator who had also worked at a science research institute, I felt more comfortable with the empirical epistemology. However, as I proceeded with the research, interpretivism seemed a natural extension of social constructivist epistemology and a logical choice that explains my perspective to answer my research questions. It is where I sit as a researcher: an insider interpreting and making meaning of an experience unique to me. Daymon and Holloway (2002) argue that interpretivist inquiry is different from positivist inquiry because it acknowledges the value of researchers who are not wholly objective, who can use their perspectives and experiences as a resource.

My methodology involved mixed methods, which is a combination of qualitative and quantitative research. This thesis is predominately qualitative, using interpretive thematic analysis, with readability tests, word counts and member checks to further illuminate the findings. More detail about my theoretical perspectives, methodology and methods can be found in Chapter 3: Research Pathways. My research goals and methods are illustrated in Figure 1.3.

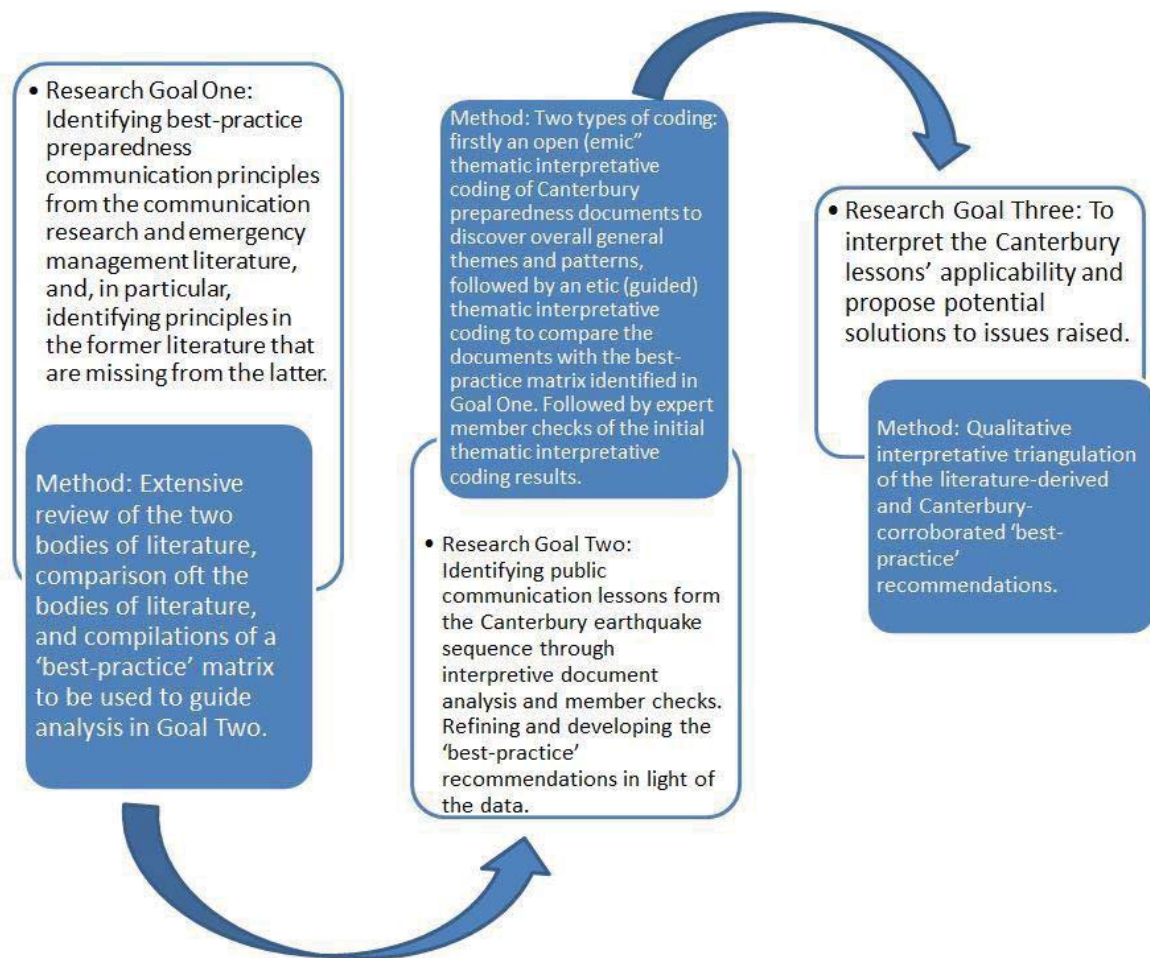


Figure 1.3: Research Goals and Methods

Research Goal One. In the first phase of the research, I reviewed academic journal articles on the topics of best-practice communication in the disciplines of communication and emergency management. I also reviewed other topics including constructivism, persuasion and propaganda, risk and science communication to provide context to my focus on preparedness communication best-practice. I distilled this information to develop a best-practice matrix, which is explored further in Chapter 2: Bridging the Literature and Chapter 4: Analysing the Q-Files. A full version of the best-practice matrix is located in Appendix 1.

Research Goal Two. For this research goal, I used the best-practice matrix as a framework for generating evaluative insights. I evaluated whether these research-based findings and recommendations in the best-practice matrix could be a tool for analysing written communication. I used member checks to determine the validity of my interpretations and to explore further whether these research-based lessons had utility. I explicate these methods

under the section Research Goal Two and in Chapter Five: Reflections on the Community of Practice.

Research Goal Three. This research goal's focus was to interpret the lessons and learnings from Research Goals One and Two, combined with my reflections.

As a key focus of this research is situated in the Canterbury pre-earthquake sequence environment, I now briefly explain my understanding of the human history of that region.

The human history and demographics of Canterbury

New Zealand is officially a “bi-cultural” nation, with two cultural groups: the British/Pākehā and Māori, the indigenous peoples of New Zealand (Sibley & Liu, 2007). The indigenous peoples of New Zealand, the Māori, first came to New Zealand approximately 1,000 years ago, from as yet to be firmly identified islands in Eastern Polynesia (Liu, Wilson, McClure, & Higgins, 1999). Oral histories of Māori indicate seven canoes or waka, made the journey successfully from these islands to New Zealand around the 10th century and Canterbury, as a region, was settled by Māori shortly after the first seven ships arrived at the shores of New Zealand (Evison, 1993). However, the main waves of migration and settlement of Māori in Canterbury occurred around the 15 – 18th centuries, identified as the Ngāi Tahu iwi (Wanhalla, 2007).

The European “discovery” of New Zealand occurred in 1642, by the Dutch explorer Abel Tasman (Sibley & Liu, 2007). The British explorer, James Cook, attempted to survey the shores of New Zealand in 1769 but was not welcomed by Māori when he made landfall. It was not until the 1830s that European settlement of New Zealand began in earnest, mainly with settlers from Great Britain and France. The English were the dominating colonial presence among the Europeans, however, in Canterbury, French colonists settled in Akaroa, a small township in Banks Peninsula, in the 1830s. However, the British secured their dominance as the colonising power in New Zealand after the signing of the Treaty of Waitangi with some Māori leaders in 1840. The Treaty of Waitangi is acknowledged as the legal foundation of New Zealand sovereignty, acknowledging Māori and Pākehā as equal partners who share guardianship over many of New Zealand's resources and contribute equally to its national identity and culture making New Zealand unique by creating a bi-cultural nation during British colonisation and expansion (Sibley & Liu, 2007). The British planning and colonising en masse began in Christchurch in 1848 (Hight, Straubel, Gardner, &

Scotter, 1971). While this seems to be positive, the reality was quite mixed, particularly the experiences for Māori, with historical and on-going racism (Pack, Tuffin, & Lyons, 2015).

As a region, Canterbury provided rich territory for European styles of agriculture, fishing and other economic activity. The expansion of British colonists pushed out existing agricultural and aquaculture practices already in place by Ngāi Tahu, the group of Māori indigenous to the Canterbury region. The settlers were predominately English, from middle to lower economic classes, emigrating to create more financial stability (Hight et al., 1971). While English were the dominant colonising population, Chinese, Scottish, Irish, Dutch and other groups also settled in Canterbury. There is little evidence to support the concept that Canterbury is or was mono or even a bicultural population, but rather multi-cultural (Hight et al., 1971). After a period of extensive growth, large sheep and cattle stations were set up throughout the Southern Alps (Hight et al., 1971). Christchurch became the main urban agricultural service centre for the region, with smaller cities in the south of Timaru and Ashburton and to the North, Rangiora, Kaiapoi, Amberley and Kaikoura.

This is the brief historical narrative of New Zealand, from the perspective I was exposed to when I first arrived in New Zealand. The longer I have lived in New Zealand, the more I became aware that while the Treaty of Waitangi may have been a revolutionary document acknowledging the indigenous rights of Māori, it had been often abrogated or diminished over time (Liu et al., 1999). I had rarely interacted with indigenous issues during my time living in Washington State. There are 13 large Native American reservations in Washington State and, while I had visited some of these, I cannot say I was ever fully aware of social, cultural or historical struggles of the Yakama, Colville, and Spokane peoples. I never had a sense of shared national identity with indigenous peoples in the U.S.A. My father, who was brought up in Central Utah, has stated that it was impressed on him the importance of respecting indigenous cultures by his father. In turn, my parents impressed on me that through the policy of “Manifest Destiny”, the mass extermination and then separation of Native Americans was a shameful and terrible time in the history of my home country. But Native American cultures were never a significant part of my life. This contrasts with my early experiences of living in New Zealand, where I perceived indigenous voices, art, imagery, and political power to be displayed openly. But the longer I lived in New Zealand, the more I noticed subtler ways of exclusion occurring. These include elimination of indigenous narrative in a variety of disciplines, including the absence of knowledge from Māori about the geological setting of New Zealand and narratives of past natural disasters.

One important point is that, as the outsider of both New Zealand and Māori cultures, I cannot re-tell the stories from those communities authentically as they are not my stories to tell. The purpose of the next sections is to acknowledge that stories were there, accessible and yet, there is a silence that I acknowledge. I postulate that these stories would have been valuable, had these stories been included in broader discussions of Canterbury's history and geology. Specific stories are currently being explored by Māori scholars and it is appropriate I not stray into those areas.

About the demographics of Canterbury during the period right before the earthquakes, the 2006 census is relevant as it indicates the most up-to-date demographics that existed at the time of writing the documents that are the objects of study in this thesis. Statistics such as census information can give only superficial impressions of the population in Canterbury. These numbers cannot give rich information about how publics make meaning of hazard or risk information or what their experiences were before the earthquake sequence. I refer to these numbers only as a way to illuminate the background context for my research and illustrate what information was readily available to the group writing the Q-Files (the natural hazards communication and preparedness documents analysed in this thesis) regarding their intended audience, the population of Canterbury.

Canterbury's demographic profile in 2006, at the start of the period when the Q-Files (in Appendix 8) were being planned and produced, was skewed towards more female, older, slightly less educated, and fewer families with young children at home than the national average. Canterbury was culturally diverse, with a range of ethnicities. 7.5 percent of Canterbury identified as Māori. Approximately 20 percent of the population was not born in New Zealand, less than the national average of 27 percent but still a considerable proportion of the population.

My perspective in this research is from neither of these two dominant cultures of New Zealand. As an American immigrant, raised in a French/American household, I cannot claim either culture. I may have felt somewhat differently during my first marriage when I was married to a Pākehā man from North Canterbury. However, once that relationship ended, I felt suddenly culturally adrift in New Zealand. While I do have more linguistic and ethnic similarities with the British/ Pākehā culture, I do not claim the Pākehā identity for myself. And, I cannot claim "insider" knowledge of Māori culture. My identity in New Zealand is rather one of a permanent "guest" in the country. Given my status as a cultural outsider, this

section explores New Zealand's bi-cultural status from that lens. As an outsider, I was exposed mainly to one perspective of the settlement of New Zealand. This is only one possible version of the story of Canterbury but it is helpful nonetheless to setting the context as I experienced it from my outsider perspective.

Governance and relevant legislation

Responsibility for communication of natural hazards in New Zealand is largely based on legislative frameworks. In New Zealand, governance is separated into three levels: local, regional and central. Each level of government has different legislative powers, roles and responsibilities based on different acts of Parliament. At a regional level, the Canterbury Regional Council (Environment Canterbury) was established in 1993 due to two pieces of legislation by the New Zealand Parliament: The Resource Management Act (1991) and the Local Government Act (1991). These acts created frameworks and legislative mandates for regional councils, amalgamating a variety of local environmental and pest management boards with activities of local authorities. Map 1.2 illustrates the various territorial authority boundaries in Canterbury for which the regional council had oversight. It is the largest regional council territory in New Zealand in land mass and number of local councils (10) and the second largest in population (586,000).



Figure 1.4: Canterbury region within New Zealand. Retrieved from: https://en.wikipedia.org/wiki/Canterbury,_New_Zealand

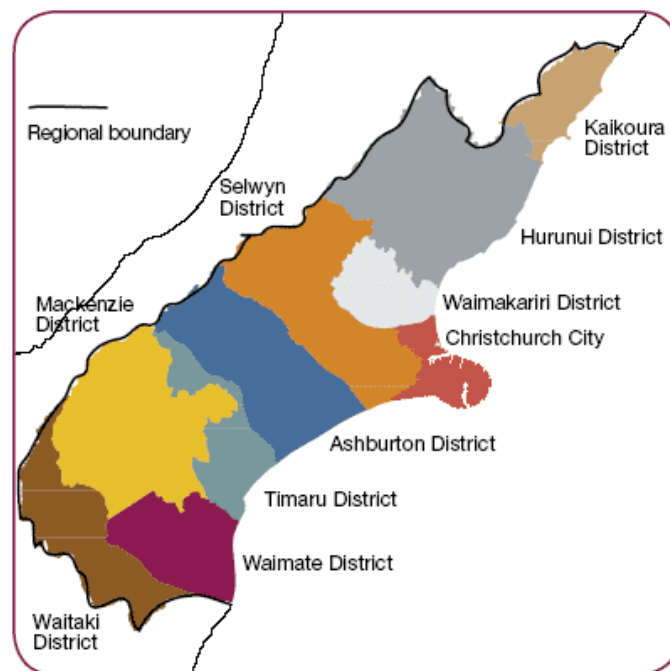


Figure 1.5: Canterbury region with territorial authority boundaries.

(Image retrieved from: <http://ecan.govt.nz/about-us/your-council/pages/other-councils-canterbury.aspx>)

In 2002, the Civil Defence Emergency Management (CDEM) Act devolved most disaster mitigation, planning, response and recovery efforts to local and regional authorities, including the regional council, Environment Canterbury. The Canterbury CDEM Group was founded in 2004, with two governance boards. The Canterbury CDEM Joint Committee comprised political leaders and the Coordinating Executive Group, which included the chief executive officers from local councils, and senior members of relevant emergency management related organisations and agencies.

Work programmes about public education (communication campaigns) were approved by the Coordinating Executive Committee and then those decisions were reported to the Joint Committee. The Joint Committee then approved budget allocations for campaigns and ensured these aligned with the Canterbury CDEM Group Plan. As these two groups met once a quarter (every three months), it meant that any campaigns requiring financial support had to be planned in advance.

As mandated in the Civil Defence Emergency Management (CDEM) Act of 2002, public disaster and preparedness communication is predominately a regional and local responsibility. Section 17 of the Civil Defence Emergency Management Act (2002) established clear local responsibility for public education:

(1) The functions of a Civil Defence Emergency Management Group, and of each member, are to:

(a) in relation to relevant hazards and risks:

(ii) [...] consult and communicate about risks:

(c) [...] Take all steps necessary on an ongoing basis to maintain and provide, or to arrange the provision of, or otherwise to make available information, for effective civil defence emergency management in its area:

(g) [...] Within its area, promote and raise public awareness of, and compliance with, this Act and legislative provisions relevant to the purpose of this Act:

(k) [...] promote civil defence emergency management in its area that is consistent with the purpose of this Act.

As outlined by the Act above, the responsibility for public education programmes (communication campaigns) falls largely to the regional CDEM groups. This means that even if a national campaign had been considered sufficient, the main responsibility for delivering effective campaigns was with the regional CDEM groups.

For the four years before the Canterbury Earthquake Sequence, I was the public education communication officer and the responsibility for development and implementation of those programmes was mine. However, there were simultaneously other programmes being managed nationally. I will now briefly describe those programmes.

National Preparedness Communication Campaigns and Canterbury Emergency Preparedness Programmes (pre-2010)

New Zealand's "Get Ready, Get Thru" campaign was initiated in 2006 by the MCDEM and ended in 2016. The strategy for the campaign was created by Clemenger BBDO (Batten, Barton, Dustine and Osborn), with market research support from Colmar Brunton, an international market research company. Publicised as a "social marketing" campaign, the focus was on raising awareness of emergency preparedness measures at a household level. Preparedness activities and actions doubled nationally during the campaign, from seven percent fully prepared when the baseline was taken in 2006 to 15 percent, according to the market research report produced by Colmar Brunton (2015). "Fully prepared" on an

individual household level is defined as, according to Colmar Brunton (2015), having personal emergency survival items, a survival plan at home, and an emergency plan while away from home. However, subsequent evaluative research of the campaign indicated the majority of respondents had not permanently changed behaviour of preparedness (Colmar Brunton, 2015).

The Get Ready, Get Thru campaign pivoted in 2016 to a new campaign called Happens, focusing instead on impacts of disasters rather than individual hazards but the preparedness messages did not change. Minor additions including “Drop, Cover and Hold” television advertisements supporting the “ShakeOut” campaign, and a tsunami advertisement with children, were added in 2011. The “ShakeOut” campaign is an earthquake drill, which began in California and is now an international activity (V. A. Johnson, Ronan, Johnston, & Peace, 2014). The campaign promotes the “Drop, Cover and Hold” actions during earthquakes. Colmar Brunton, who conducted the initial baseline research in 2016, evaluated the effectiveness on the Get Ready, Get Thru campaign. Colmar Brunton (2014) has recommended revising the strategy to include a segmented approach to increase:

effective engagement with targeted communities and local organisations (e.g., schools, churches, student unions) [which] will help to increase awareness among those groups most at risk (young people, ethnic minorities, and people new to the country). (p. 53)

The Colmar Brunton Campaign Monitoring Research (2014) suggests the main barriers to preparedness continue to be low motivation (31 percent), low perceived likelihood of a disaster (18 percent), complacency (15 percent), and cost (14 percent). Issues of fatalism, which affects preparedness activities because those who are complacent are likely to be feeling secure while those who are fatalistic feel no good can be achieved from taking action, were not explored in the research.

In terms of written public communication material supporting the Get Thru campaign, there was one brochure created about natural hazards. That brochure provided an overview of all the natural hazards that threaten New Zealand, with earthquakes taking up one page of a 16 page brochure. There was also a website with one small section on earthquakes, but overall the MCDEM national campaign was not heavily focused on seismic preparedness or actions. Other written material produced by MCDEM included an emergency preparedness plan for families but that did not overview earthquake hazard information. I interpret that these were not persuasive materials but rather directive and inflexible in nature, outlining specifically

how people needed to plan for emergencies. They also modelled only preparedness for the nuclear family and did not account for preparing for larger communities or extended families. This exclusion will be discussed further in Chapter 2: Bridging the Literature.

One implication of perceptions about Canterbury as a low-risk area is that the MCDEM supported an earthquake drama-documentary made in 2009, entitled “Aftershock”. This television production was a scenario based on a large earthquake striking Wellington, the capital city of New Zealand. “Eruption”, released on television in 2010, was located in Auckland, and produced by the same production company for television. No similar production was planned for Canterbury or the South Island.

Further, before the Canterbury Earthquake Sequence, there were no national exercises (Tier Four) for Canterbury and Earthquakes. National exercises exist to test government (local, regional and national) capacities (Cartwright, 2005). As part of the planning programme, “tier four” regions that are involved in these exercises, which are coordinated by MCDEM, are provided additional funds for public education initiatives about the risk exercised. The national exercises in the five years leading before the Canterbury Earthquake Sequence focused on earthquakes in Wellington (2006) and a volcano in Auckland (2008). No national exercise was initiated in Canterbury or the South Island during this time period and no special national funding was allocated to prepare Canterbury for earthquakes while Wellington and Auckland both received extra funding for exercises and public education campaigns.

However, MCDEM is not the only national agency in New Zealand to promote preparedness; other government agencies also developed preparedness campaigns before the Canterbury Earthquake Sequence. The New Zealand Earthquake Commission (EQC), which is a New Zealand Government agency providing natural disaster insurance to residential property owners, created and implemented campaigns about household mitigation measures and earthquakes, including a mass communication campaign in the early to mid-2000s entitled “Fix, Fasten and Forget it”. This campaign ended due to lack of earthquake awareness in the population as well as the poor availability of the recommended mitigation items (like strapping for water heaters) (Finnis, 2007). A new campaign began in 2013. The Ministry of Health also had a pandemic preparedness public communication programme, addressing the H5N1 and H1N1 influenza outbreaks from 2006 to 2009, but this campaign made no mention of health issues related to natural disasters like earthquake (Humphrey et al., 2011).

In coordination with national campaigns, there was a committee developed specifically for creating public communication initiatives and campaigns in Canterbury. This group was called the Public Education Public Information (PEPI committee), reflecting terminology typically used in Emergency Management which tends to talk about ‘information’ and ‘education’ rather than ‘communication’, a difference that, as I will unpack in Chapter 6, is I believe telling. The most recent (2009) strategy for this group is located in Appendix 2. The committee began in 2001 and was active until 2009 when it was decided by the PEPI committee itself that it was not as effective as it had been previously due to conflicts between emergency managers and communicators (Canterbury Coordinating Executive Committee Minutes, 2009). Specifically, emergency managers wanted to focus solely on preparedness campaigns and the communicators wanted more public information management (crisis communication).

I drafted and coordinated the public education strategy. It was approved by the Coordinating Executive Committee and the Joint Committee in 2009. I was the main writer of this strategy however I received assistance from the PEPI committee. The strategy shifted the more “traditional” public education model, which assumed that people were simply ignorant of hazards and that they would, if properly “educated” prepare, more towards community resilience strategies. These strategies focused on community development and capacity building. The strategy also supported the Hazard portfolio at the regional council to align its communication strategically with the Canterbury CDEM Group. While the Regional Council managed both units, previously they had been strategically separate.

The public education committee’s designated responsibilities included hazard education for children. One such initiative was the Shaky House, a shaking platform with a small house-like structure that toured the Canterbury region. The aim of the exhibit was to educate children and their parents on the “Drop, Cover and Hold” technique. Other education initiatives managed by the regional council included two educational resources created as part of an “E-Box”, an education publication for teachers in Canterbury. However, this thesis will not focus on education for children as its scope is mass communication campaigns for adults, not education initiatives tailored for children. There are several reasons why I will not be evaluating or discussing the campaigns for children. The first is that my professional experience was focused on campaigns for adults. Recent research has been conducted on disaster education for children (V. A. Johnson, 2013; V. A. Johnson et al., 2014).

Our PEPI committee's region-wide campaigns included the Pandemic Survival Roadshow, a travelling exhibit focused on teaching people about the effects of and protective measures against influenza. This exhibit is currently located at the World Health Organisation headquarters in Geneva in the library foyer as an example of best practice. It aimed to educate adults and appeared to be successful for increasing pandemic awareness and preparedness levels in Canterbury (Humphrey et al., 2011).

There was also a series of campaign flags, sails and other marketing ephemera, predominately used at Agricultural and Pastoral shows (A and P shows). A and P shows are community events which are typically agriculturally focused and are well attended in rural South Island communities (Higham & Ritchie, 2001). There is no evidence yet that attendance at these community events created any further preparedness actions in people. However, it is standard practice in New Zealand for emergency managers to attend these events and offer information at stalls or booths. There is evidence that the practice of attending community events and fairs came from the 1950s models of public education (Preston, 2008). From my experience working in the Council, attendance by members of Civil Defence was considered mandatory, as part of community engagement.

The main printed public education initiative researched in this thesis will be the Q-Files (in Appendix 8), a series of booklets that focused on seismic risk and household preparedness in Canterbury. I use these booklets almost as "archaeological artefacts", to understand more about what the group that created them was attempting to communicate at the time. I describe these booklets in more detail in *Chapter 4: Analysing the Q-Files*.

As I have presented preparedness communication campaigns before the earthquakes, I now provide several research studies conducted before the earthquakes about attitudes and beliefs about earthquakes in Canterbury.

Public perceptions and emergency preparedness before the Earthquake Sequence

One of the more valuable factors of the Canterbury experience is that hazard perceptions and preparedness research had been on-going within the region for more than a decade. There are several quantitative studies in Canterbury including one longitudinal study.

About the studies

Leonard et al. (2004) conducted a study on behalf of the Canterbury CDEM Group. This included organisational, stakeholder and residential research. The main method used for the

residential research was postal surveys. 144 respondents completed the survey. The question was asked “What major (natural and non-natural) hazards are you aware of that could affect you and your family or your community in the foreseeable future?” Earthquakes were the most commonly quoted hazard, at 77 % of respondents (Leonard et al., 2004).

Becker’s (2012) study was conducted in 2009 across the Canterbury region. The main distribution method was a mail survey of 1,500 householders, with Christchurch’s urban centre receiving 1,000 and rural areas receiving 500. 229 respondents completed the surveys. The study combined hazard preparedness, awareness and community resilience questions. Becker (2012) also conducted qualitative interviews. Becker (2012) asked two questions about earthquakes: one related to time scale and the other about likelihood. Below, I report on the timescale question, to be consistent with the other studies.

Opinions Market Research Perceptions study (2009, 2011) is part of a Biennial Monitor for the Canterbury CDEM Group. Opinions Market Research has been surveying public perceptions of emergency preparedness for the Canterbury CDEM Group since 2001. I focus below on the surveys from 2009 and 2011, as those were the more applicable research to my own research questions given their closeness in time to the earthquake sequence and the one immediately afterwards. The data collection method was telephone interviews, with 850 respondents throughout the Canterbury region.

Table 1.1: Canterbury pre-earthquake preparedness studies.

Study	Original Question	Within my lifetime (percent)?	N
<i>Leonard et al. (2004)</i>	What major (natural and non-natural) hazards are you aware of that could affect you and your family or your community in the foreseeable future?	77%	
<i>Opinions Market Research (2009, 2011)</i>	‘Thinking about major disasters that could happen in Canterbury. What types of disaster can you think of that could happen in Canterbury in your lifetime?’	94, 98%	850

Becker (2012)	When do you think that each of these hazard events could next affect your community on the following six-point scale? (earthquake is listed in the hazards)	50% ¹	229

McClure, Willis, Johnston and Recker (2011), conducted a recall study about perceived likelihood of an earthquake in Canterbury. They found that this was much lower (22 percent) than in the research performed before the earthquake (in Table 1.1). These initial findings were further explored in McClure, Johnston, Henrich, Milfont, and Becker (2015), confirming that people in Canterbury were not as aware of seismic risk in the region than other places in New Zealand, specifically Wellington. This disconnect between the results of these studies, pre and post-earthquake, is intriguing.

However, given this disparity between the pre-earthquake perception in Canterbury (50 – 98%) and then the post-earthquake perceptions (22%), I had questions. I became interested in persuasion as a concept after early reflection from my initial review of the literature. While awareness and risk perception about seismic risk seemed high in Canterbury, people did not seem persuaded to take further action to prepare. It was this aspect of the research puzzle that fascinated me. Campaigns were often informational or used social marketing techniques but none of these attempts appeared to have been persuasive overall in generating preparedness behaviour.

With public perceptions of earthquakes now contextualised, I will focus on the geological setting of Canterbury.

The Geological Setting of the Canterbury Region – the multiple perspectives

New Zealand straddles two major tectonic plates: the Pacific and Australian. These two plates interface across the South Island, creating a mountainous spine. The plates shift in different ways. The plate boundary makes New Zealand seismically active, with frequent volcanic and seismic events.

¹ Original study uses a Likert scale; Likert score was a “3” or an “average” for all of Canterbury, translating to approximately 50 percent of respondents believing a major earthquake would affect the population in the respondent’s lifetime.



Figure.1.6: Tectonic Setting of New Zealand, 2015.

Image provided by GNS Science. Retrieved from:
<http://www.gns.cri.nz/Home/Learning/Science-Topics/Earthquakes/Major-Faults-in-New-Zealand>

The above image shows a cross-section of New Zealand and the tectonic mechanisms currently active. Geological scientists are still discovering fault systems throughout the country. Discovery of faults is mainly conducted through geological exploration (trenching), LiDAR (light detection and ranging), aerial maps, topography, geomorphology or an earthquake occurring or through historical written accounts of European settlers.

Geoscientists are still discovering fault systems throughout the country. Discovery of faults is mainly conducted through geological exploration (trenching) or an earthquake occurring or through historical written accounts of European settlers. Essentially, to classify in mainstream records that a fault exists, an earthquake has to have occurred on it in the last 170 years or there has to be an external marker (land deformation like scarps) (Pettinga, Yetton, Van Dissen, & Downes, 2001).

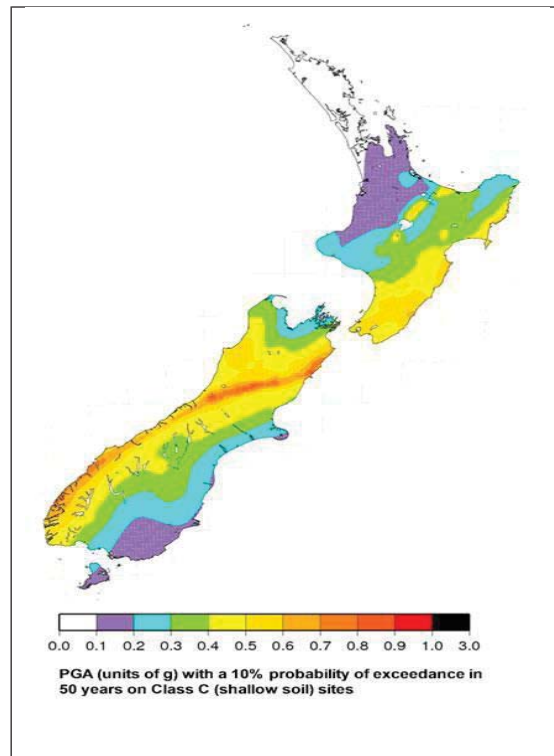


Figure 1.7: National Seismic Hazard Model for New Zealand: 2010 Update (Stirling et al., 2012).

Figure 1.7 above figure illustrates New Zealand's National Seismic 2012 hazard model for earthquakes. The purple to red scale shows potential for shaking over an approximately 500-year time scale (Stirling et al., 2012). According to this interpretation of particular kinds of 'scientific' hazard data, Christchurch has a relatively low probability of shaking, represented in its colouring of light blue. The projected shaking is relatively less severe than in other parts of Canterbury and further north. These projections take no account of indigenous histories of significant shaking in the region.

The earthquake that began the Canterbury Sequence was on a previously unidentified fault, in a relatively lower risk area in New Zealand. While not considered impossible, the earthquake sequence was not considered by geoscientists as being as probable as it was in other places in New Zealand (Stirling et al., 2012). Given the perceived orthodoxy of this kind of 'scientific' information and an ideological reliance upon it as correct and complete, because of discourses of scientific objectivity, this is perhaps why there was less priority and urgency to communicate earthquake risk in the Canterbury region than in other parts of New Zealand.

Table 2.2: Summary of the more significant historical Canterbury earthquakes and their impacts (modified from Potter, Becker, Johnston, and Rossiter, 2015).

Date	Magnitude	Location	Impacts	References
4 June 1869	M 4.7–4.9	Near Christchurch City	MM7. Liquefaction at the Avon–Heathcote Estuary.	(Bannister & Gledhill, 2012)
31 August 1870	M 5.6–5.8	Near Lake Ellesmere, Selwyn District.	MM7	(Downes & Yetton, 2012)
31 August 1888	M 7.0–7.3	Amuri District, North Canterbury; Hope Fault	MM9 near epicentre MM7 in parts of Christchurch. Serious damage to buildings and furniture was overturned. Upper 8m of the Christ Church Cathedral spire collapsed. Numerous landslides and rockfalls liquefaction and fissures.	(H. A. Cowan, 1991)
15 November 1901	M 6.9	Cheviot, Hurunui District	MM7. Caused liquefaction at Kaiapoi and lateral spreading. Cathedral spire damaged.	(Pettinga et al., 2001)
25 December 1922	M 6.4	Motunau, Hurunui District	MM7. Caused liquefaction along the Pegasus Bay coast Leithfield Beach and Waikuku.	(McCahon, 2011)
9 March 1929	Mw 7.0	Arthur's Pass, Selwyn District	35km fault rupture length. Near to the epicentre chimneys were toppled and furniture overturned.	(Doser, Webb, & Maunder, 1999)
26 June 1946	ML6.2	Lake Coleridge, Selwyn District	Minor structural damage to buildings and the Lake Coleridge hydro-electric power station. Numerous landslides and aftershocks.	(Downes & Yetton, 2012)
18 June 1994	Mw 6.7	Arthur's Pass, Selwyn District	70 mapped landslides and rockfalls blocked State Highway 73 for a week. Damage claims of US\$3.2 million predominantly from Christchurch.	(Abercrombie et al., 2000)
24 November 1995	Mw 6.2	Cass, Selwyn District	MM6 near epicentre.	(Bannister & Gledhill, 2012)

I now briefly explain the historical earthquakes in the region and I include different narratives that have been excluded from the “mainstream” science perspective.

Māori have been recording geological events through oral histories in Canterbury, particularly about tsunami (King & Goff, 2010; King, Goff, & Skipper, 2007). However, these oral histories were largely disregarded by colonists and later, the natural hazards science community, when framing science knowledge in Canterbury about natural hazards. King et al. (2007) argue that:

Māori have developed a detailed knowledge of local hazards. This includes oral histories and traditions that record past catastrophic hazard events, place names that designate areas that are high hazard risk, and environmental indicators that inform about the safety and viability of activities linked to changes in the environment (p. iv).

Davis (2012), further states, specific to the Canterbury Ngai Tahu iwi, that “our tupuna [ancestors] were experiencing impacts due to earthquake activity in ancestral times” (p. 14). Several earthquake sequences of note occurred during the time before European colonisation, including one between 1350 – 1390 AD, and others mentioned from the 17th to the 19th centuries (Davis, 2012). One of the later earthquakes may have influenced the changes in Lake Ellesmere from an estuary to the brackish lagoon it is today (McFadgen & Goff, 2007).

Since colonial settlement, beginning in earnest in the 1840s, New Zealand has a written history of large, damaging earthquakes near urban populations. Before the Canterbury Earthquake Sequence, the most well-known earthquake was the 1931 Napier/Hawkes Bay event, which claimed more than 250 lives and destroyed the city of Napier on the east coast of the North Island (Dowrick, 1998). The largest earthquake since British colonisation occurred in the Wairarapa area in 1855, measuring approximately magnitude 8.2 (Grapes & Downes, 1997). The 1855 earthquake caused major collapses of masonry buildings, killing nine people, but most of Wellington region had wooden structure housing stock (Grapes & Downes, 1997).

Because of this exclusion of Māori narrative, which I observed early in my research, I requested the support of Dr. Christine Kenney, Senior Lecturer at the Joint Centre for Disaster Research. Dr. Kenney is a member of the Ngāi Tahu iwi [tribe], the indigenous Māori group who are *mana whenua* [the tribal authority] in Canterbury. Through this relationship, Dr. Kenney has assisted me to broaden my perspective on issues of the sociology of science, particularly regarding issues of inclusivity and silence. A report, written by Davis (2012), was made available through communication with the Ngāi Tahu archivist, with Dr. Kenney’s assistance. With the archivist’s permission, the Davis report is used throughout this thesis as a confirmation of seismic story-telling among Ngāi Tahu before the Canterbury Earthquake sequence occurred. Much of this section is inspired by Dr. Kenney’s helpful insights, which assisted me in understanding gaps in the scientific discourse. I will explore this exclusion of narratives further in Chapter 5: Reflections from the Community of Practice.

In Canterbury, there had been relatively few earthquakes near the urban centre of Christchurch since 1901 (Canterbury CDEM Group Plan, 2005-2012). However, Canterbury had a history of damaging earthquakes from the early Pākehā settlement in the 1840s to the late 1920s. Often these quakes did not directly affect urban European populations. However, the ChristChurch Cathedral spire had been damaged or destroyed three times due to earthquakes before the 2010 Canterbury Earthquake Sequence began. The most dramatic damage occurred in the 1888 Cheviot earthquake, when the Cathedral Spire was severely damaged (see front page of this chapter for illustration). There were indications of faults right underneath the city, based on a 4.7-4.9 magnitude earthquake in Christchurch in 1869 and subsequent earthquakes (5.6 - 5.8 magnitude) in Lake Ellesmere in 1870 (Downes & Yetton, 2012). Those earthquakes indicated Christchurch could have very shallow localised earthquakes that could cause damage. Despite the evidence for earthquakes, Christchurch developed out of a need for more land, as Lyttleton (the original colonial settlement), was quickly outgrown by the influx of new immigrations to New Zealand (Hight et al., 1971).

Now that I have briefly explored Canterbury's human and geological history, I will provide the key terms for this thesis.

Key Terms

Below are key terms that I will use in this thesis:

Communication is a transactional process in which people generate meaning through the exchange of verbal and non-verbal messages in specific contexts, influenced by individual and societal forces and embedded in culture (Alberts, Nakayama, & Martin, 2007, p. 21). Communication is the “umbrella” term for public relations, media relations, marketing and associated sub-disciplines unless otherwise specified. Related terms in emergency management are “public education” (campaigns to educate the public about risk and emergency preparedness) and “public information” (communication in times of crisis).

Public is a term that refers to the key groups and individuals, whether by locality or interest, which a specific communication is intended for and with whom a communicator interacts (Grunig, 1992). ‘Publics’ is the umbrella term for receivers, audiences and communities.

Risk is defined as likelihood and consequences of the hazard. ("Civil Defence Emergency Management Act,," 2002)

Hazards are threats to people and the things they value (Cutter, Thomas, Mitchell, Hill, & Hodgson, 2001).

Resilience is a measure of how well people and societies can adapt to a changed reality and capitalize on the new possibilities offered (Paton & Johnston, 2006).

Preparedness refers to personal preparedness, such as an individual's actions and psychological framework that assist in coping with an emergency (Becker, 2012).

Further exploration of these terms is in Chapter 2: Bridging the Literature. Now that I have provided my key terms, I will explain this thesis's structure.

Thesis Structure

Chapter One. The Outside Insider. I introduce my "insider" perspective which situates me in relationship with the research. I provide a framework for the research questions. The research settings, including geographical, geological and socio-cultural are explained. I then provide a brief description of key terms, structure for the thesis and a concluding statement.

Chapter Two. Bridging the Literature. I explain how I conducted the literature review. I also provide an overview of the main bodies of literature. For communication, I examine literature within communication fields (risk communication, science communication, and communication theory) including concepts, relevant definitions, theories, models and frameworks. Emergency management is explored as the second disciplinary focus. I also provide relevant definitions, theories, models and frameworks from this paradigm.

Intersections and divergences in these two fields are explained and illustrated. I then explain the literature I used to develop the "best-practice" matrix using the Source, Message, Channel, Receiver and Setting framework.

Chapter Three. Research Pathways. I explain the epistemological and theoretical perspectives used for the thesis. The most relevant methodologies and methods are also described to provide an argument for why these methods are the most appropriate to address my research questions. I also provide my ethical considerations and participant protections for the research.

Chapter Four. Analysing the Q-Files. This chapter contains the analysis and findings from the Q-Files, the main source of primary data for the thesis. Development of processes for different rounds of coding and analysis is reported as well as findings. I also present the readability test scores and combine these to create my initial findings. Copies of the Q-files are in Appendix 8.

Chapter Five: Reflections from the Community of Practice. I present insights and feedback from my community of practice. I presented my initial findings from Chapter 4: Analysing the Q-Files to my community of practice using an anonymous online survey. I then provide analysis and brief discussion on their feedback.

Chapter Six. Discussion and Reflections. I synthesise the data from the previous chapters and explain how it addresses the research questions. Member check findings are integrated into the discussion in this chapter. I also provide potential solutions to assist practitioners and researchers going forward.

Chapter Seven. Conclusion and Futures. This chapter summarises the thesis and includes recommendations to inform best-practice. It also highlights gaps, limitations and areas for future research.

All references appear in a “reference” section at the end of this thesis. This thesis complies with the American Psychological Association (APA) 6th edition referencing style.

Summary

In this chapter, I introduced my personal experience with disasters and my relationships with the Canterbury Earthquake Sequence. I described working as an emergency management and communication practitioner attempting to motivate earthquake preparedness in the population. Introducing my placement in the research provides a foundation for my perspective and the introduction of my theoretical framework: interpretivism. I explored briefly my theoretical platform and methodology because it is vital to understand that this thesis is not a complete analysis of all communication and the impacts on the people of Canterbury before the earthquakes. Rather, this is a record of one communication practitioner trying to understand the learnings that can be generated by looking at her own professional outputs through a new research-informed lens.

I then presented my research questions and the reasons for choosing those specific questions. I also provided insights into Canterbury’s geographical, geological and socio-cultural history

before the earthquakes. I also outlined the common terminology to be used and my reasoning in choosing those terms and their definitions.

Chapter 2 : Bridging the Literature

PRECAUTIONS SCHEME

EARTHQUAKE OR OTHER DISASTER

"Don't Panic" is the heading of a small poster dealing with behaviour in emergencies, which is being sent to every home and to all business premises in Christchurch city and the metropolitan area. The poster, together with an explanatory booklet prepared under the public emergencies precautions scheme, will be distributed in Christchurch this week. Although war emergencies are foremost in the public mind at present, the information now being distributed is concerned with emergency measures necessary, as the poster states, in the event of "earthquake and other disaster."

The details have been carefully worked out over a long period, since the Murchison earthquake of 1929 and the Hawke's Bay earthquake of 1931, to provide an organisation and a body of useful information which would assist in meeting such another disaster should it involve a city like Christchurch. Much of the preparation of information was done under the public utilities committee of the Christchurch City Council.

It is only by chance that the instructions are now being issued in a time of war, although the organisation outlined would be applicable to any major disaster and not only to earthquake. It is specifically stated that air raid precautions are not covered in these instructions.

Specific Instructions

The poster deals specifically with individual precautions, and notably in the event of earthquakes, with the breakdown of communications and of such services, as drainage, water supply, gas and electricity, as follows:—

- (1) Get into the open.
- (2) If unable to escape, get under a solid table or other shelter.
- (3) Collect buckets and cans and fill them as soon as possible with water against fire. Loose earth or sand is useful.
- (4) Turn off gas and electricity at meter. Put out all fires. Stop small fires at once.
- (5) Attend to neighbours and injured.
- (6) Keep children clear of danger.
- (7) If water pipes are leaking, turn off water at street boundary if possible. Store water for use. Boil drinking water. Use nearest artesian well.
- (8) Save food. Cover from flies and mice.
- (9) Lock up or batten all water closets until notice is received that they can be used. Dig deep pit and put refuse in it, covering each layer with earth. Put a cover over pit to keep out flies.
- (10) Throw waste water in shallow trenches. Do not run it into drains until approval given.
- (11) Make temporary repairs to damaged roofs.
- (12) Help your family and neighbours in every way possible. Go to nearest school for further instructions.
- (13) Take any injured persons to the nearest school used as an advanced dressing station.

The poster concludes with a list of essential telephone numbers likely to be needed in emergency.

The booklet accompanying the poster gives full information about the organisation under the general emerg-

The Press, 30 July 1940

Retrieved from:

<https://beta.paperspast.natlib.govt.nz/newspapers/CHP19400730.2.70>

ency precautions scheme, and the central, supply, accommodation and evacuation; medical, public, hygiene and hospitals, fire protection, public utilities, transportation, communications, law and order, and other committees set up.

The poster and the booklet are to remain on the premises to which they are sent, and to be placed in a conspicuous position.

Chapter 2. Bridging the Literature

Central to this research is identifying and reflecting on how the disciplines of emergency management and communication converge and diverge. Specifically, I explore the intersections and disconnections between the two bodies of research literature: communication and emergency management, firstly in how they orient themselves around key epistemologies and secondly in how they specifically present knowledge about disaster preparedness. In exploring these connections and divergences, I also review literature from related disciplines including risk communication, science communication, political science, history, computer science, natural hazards sciences and public health promotion that helps to give context to the origins and relationships of communication and emergency management as disciplines.

In this chapter I first explain how I conducted this literature review, including the tools and databases I used to organise the research. I then explore the origins of both disciplines. Next, I investigate key concepts that are relevant to my research questions in the field of communication, examining major theorists and their paradigmatic perspectives. I then focus on the concepts of persuasion and propaganda, and why these two terms are relevant for this research. I then explore another field which informs this discussion: risk communication. Emergency management, as both a discipline and a context, is then investigated. To complement the theory with evidence of its practical applications and implications, relevant case studies from Civil Defence in the 1950s and 1960s as well as more contemporary campaigns are discussed. The final section of this chapter focuses on the literature that contributed and shaped the “best-practice” matrix, a tool I developed for my data analysis.

I now briefly present my research goals and methods to contextualise how these relate to the literature review.

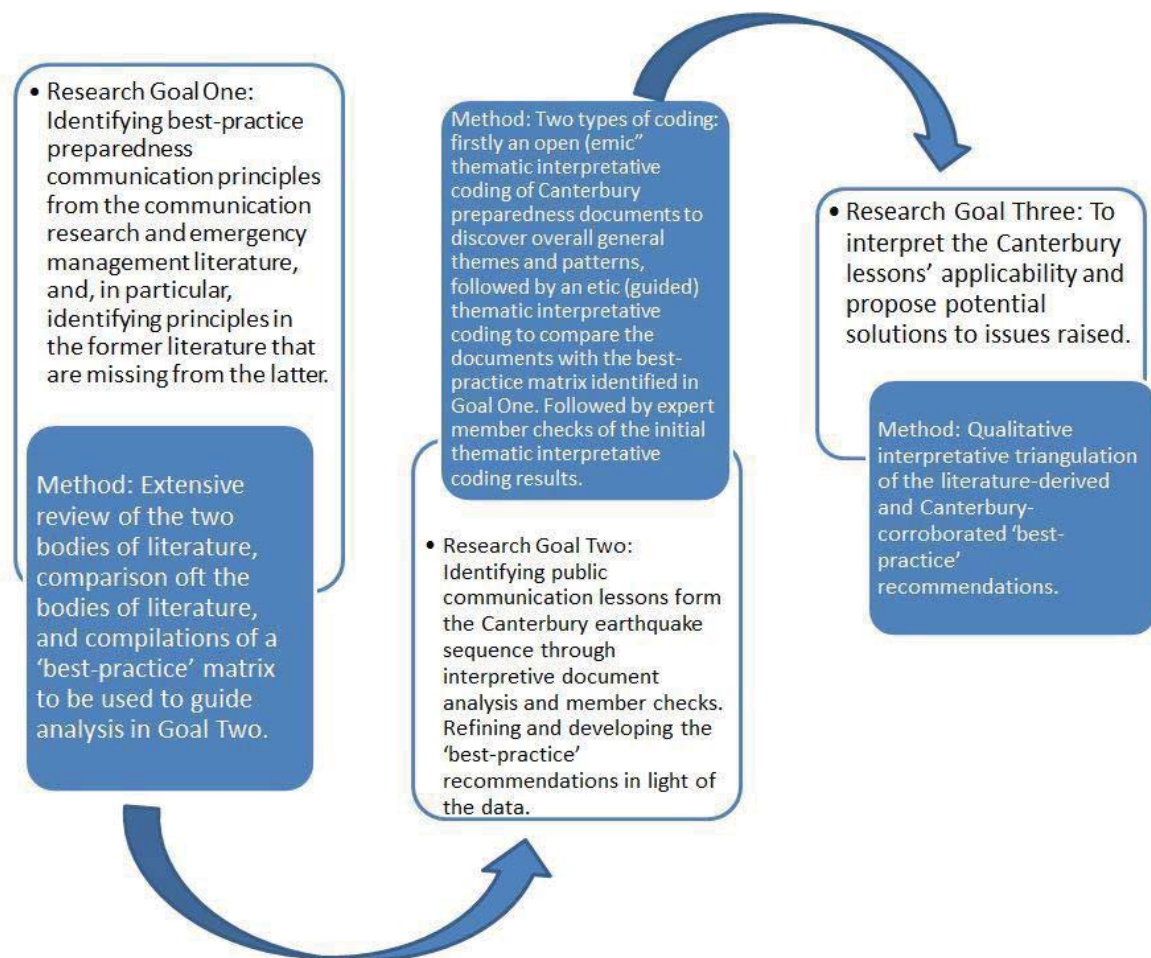


Figure 2.1. Research Goals and Methods

Figure 2.1 outlines my research goals and methods. The literature review specifically informs my first research goal: to determine best-practice attributes based on research. I explore my research design in further detail in Chapter 3: Research Pathways. I now examine the review process of this literature review.

The review process

This literature review is a 'traditional' literature review, meaning I critically analysed and then summarised a specific body of literature. In this case, two bodies of literature were relevant to the research questions and that posed challenges about adequately covering both bodies of literature and related disciplines. Initially, reviewing focused on the research of important scholars in the earthquake hazard area. I reviewed article libraries available at GNS

Science and the Joint Centre for Disaster Research at Massey University. These articles and libraries had utility in the initial phases of my research. My supervisors were also helpful in providing articles central to my research questions.

It soon became apparent, however, that the scope of my research questions would benefit from a wider lens, specifically the disciplinary lens of communication studies. My research in the field of communication was initially guided by my primary supervisor, a communication and media studies scholar. Under her direction and support, I began my research, initially focusing on monographs, then following the directions provided by these scholars, to search databases such as SCOPUS and Web of Science for peer-reviewed journal articles. What became apparent then was that the relationship (or more often lack of relationship) between the two bodies of literature was actually an issue pertinent to the overarching questions of the thesis as a whole – and so my approach evolved to working by looking at key components of the communication process in each of the disciplinary contexts and identifying overlap and difference. I continued this process throughout the majority of the research and writing phases. The literature review chapter became a repository for early ideas, and a way of seeing how they were shifting, documenting my evolution as a researcher. It has undergone several iterations since its inception.

I developed a literature review tool to assist me in summarising essential points and learnings from all the articles I reviewed. I created this tool based on guidance from my primary supervisor and on my experiences researching the articles. This table included headings, tags, keyword searches and types of methodologies used to assist rapid searching to determine major themes in the literature. Using this table, I reviewed more than 240 articles. These 240 articles were considered the “core” of the literature relevant to my research. Other books, journal articles and white literature were reviewed but not considered as central to the research and were not entered into the table. The template with some example articles is in Appendix 3.

By using the literature table to analyse the various conversations within the academic disciplines I was studying, I constructed certain interpretations of the literature. This approach, known as creative inquiry, allowed me to stray from a more traditional “read and summarise” literature review and into a constructed space (Montuori, 2005). I enjoyed the literature review process because I viewed these journal articles and monographs as

conversations that assisted me with constructing my research rather than an exercise to simply learn what had come before me. Of particular interest were the epistemological conflicts and battles between social constructivists and empiricists in the various disciplines I explored. My interest in this ongoing debate has partially framed this research.

I now explore the origins of the communication and emergency management disciplines.

Communication and Emergency Management: twins separated at birth?

Disaster is central to the origins of public relations and communication. On the evening of 28 October 1906, a passenger train heading for Atlantic City, New Jersey, derailed near a small town called Gap, into a creek, killing 53 people (Haine, 1993). At the time of the derailment, press agent Ivy Lee was employed by Pennsylvania Railroad. Lee tasked himself with minimising reputational damage to the company from the accident by providing a positive narrative towards his company (Goldman, 1948). Lee was well-placed to create, develop and promulgate the story. He had previously worked for the *New York Times* as a journalist. In the early hours of October 29, he wrote an article titled “Statement from the Road” and distributed it to newspapers. The article was printed in its entirety in newspapers throughout the U.S.A. (I. Lee, 1906). In doing so, Lee successfully achieved two major accomplishments. First, he had created the world’s first media release during disaster (Harrison & Moloney, 2004). Second, Lee had provided evidence that transparency from organisations in emergencies is a beneficial approach to communication. Previously the railroad companies had attempted to suppress media stories about crashes and accidents (Cutlip, 1994). But this time, Lee convinced his employers to respond to the disaster with transparency, even when the narrative may have implicated the company (Cutlip, 1994). Several weeks later, when another railroad company followed the previous policy of covering up another unrelated incident, Pennsylvania Railroad and Lee received kudos from the media for their handling of the New Jersey derailment (Cutlip, 1994; Goldman, 1948).

Similarly, modern emergency management scholarship began with a disaster. On 6 December 1917, a French WW1 munitions ship collided with another ship in the inner harbour in Halifax, Nova Scotia (Scanlon, 1988). This collision ignited munitions on the French ship and the blast killed more than 2,000 people, injured 9,000, and razed Halifax city. One of the responders, Samuel Prince, later wrote his thesis on the incident, titled *Catastrophe and*

Social Change (Prince, 1920). From Prince's research, the academic field of emergency management is considered to have begun (Scanlon, 1988).

The connections between these two disasters are striking. Both incidents assisted in the creation of new disciplines. Both created or solidified individuals as leaders in new fields. And, briefly, the communication and emergency management disciplines overlapped in time and purpose. But after their initial geneses, communication studies and emergency management would diverge, following different disciplinary journeys. They would converge briefly again and I will examine those spaces in the next sections, beginning by examining the state of disaster preparedness communication research.

Disaster preparedness communication – the status of knowledge

Disaster preparedness communication literature generally falls into three different areas: physical preparedness (e.g. preparedness items), mitigation actions (e.g. fixing items to the wall) and psychological preparedness (e.g. mental frameworks about emergencies). This thesis focuses on the first two: preparedness and mitigation however, I periodically include psychological preparedness literature as I struggled to find clear demarcations within the literature. I found it more useful than obstructive to perceive the literature holistically.

Most disaster preparedness literature fits the first two categories focusing on preparedness items or mitigation efforts. Becker (2012) merged multiple lists of preparedness activities developed by Kirschenbaum (2002), Lindell, Arlikatti, and Prater (2009), Mulilis and Lippa (1990); Ronan and Johnston (2005), and Spittal, Walkey, McClure, Siegert, and Ballantyne (2006). Despite developing this comprehensive list, Becker (2012) warned that using such a prescriptive approach would not further our understanding of earthquake adjustment adoption behaviour (p. 14).

Assumptions are made in the physical preparedness literature. One is that preparing at home, on an individual level, is essential for survival (Paton, 2003). This assumption is challenged by Fox, White, Rooney, and Rowland (2007), who suggest that for certain populations, particularly those who struggle economically, making recommendations for how to prepare may not be the most constructive way to engage with these populations. Another assumption is that the current preparedness advice is based on years of research and is effective.

However, Fox et al. (2007) assert that these messages are based on “expert panels” and stakeholder engagements rather than multifaceted evidence and research. Possibly one of the

negative outcomes of adherence to these message assumptions is the growing body of evidence that preparedness communication does not suit all people, particularly vulnerable communities, despite the messages often being uniform throughout developing countries. Preparedness messages failed to meet the needs of Latino populations in the U.S.A. (Eisenman, Glik, Maranon, Gonzales, & Asch, 2009). Those excluded from preparedness messages often include people with disabilities, as investigated in Newport and Jawahar (2003), Owens, Stidham, and Owens (2013), Fox et al. (2007), Tierney (2006) and Tuohy, Stephens, and Johnston (2014). I will explore this further in the publics section in this chapter.

With mitigation research, most research is specific to motivators of action. McClure, Spittal, Fischer, and Charleson (2014) suggested that cost is an important motivator for people, when choosing between preparing and mitigation, with mitigation often being more expensive than preparedness. Social and cultural influences are an important component of whether people mitigate against natural hazards (Paton, Sagala, et al., 2010). This has been explored by different hazards, including volcanic and bush-fire hazards (e.g. Paton, Sagala, et al., 2010; Paton, Smith, Daly, & Johnston, 2008). I explore this literature at length in the Message section of this chapter.

Psychological preparedness is an evolving area research, focusing on how we can mentally prepare for emergencies. While the term psychological implies only dealing with individual, I found that this category extends to social networks (e.g. Gearing, 2013; National Research Council, 2009; Varda, Forgette, Banks, & Contractor, 2009), community resilience (e.g. Cutter et al., 2008; Norris, Stevens, Pfefferbaum, Wyche, & Pfefferbaum, 2008; Paton, 2013; Ronan & Johnston, 2005; H. Smith & Boruff, 2011; Thornley, Ball, Signal, Lawson-Te Aho, & Rawson, 2015; G. A. Tobin, 1999; G. A. Wilson, 2013), and social capital (e.g. Aldrich & Meyer, 2015; Matheson & Jones, 2016; Yandong, 2007). I explore this area of research in the Settings section of this chapter.

Finally, there are researchers that are highly sceptical of the efficacy of preparedness campaigns. Some scholars suggest that despite research and coordinated campaign efforts, nothing will motivate people to improve their preparedness until they experience an actual disaster (D.S. Mileti, S. Nathe, P. Gori, M. Greene, & E. Lemersal, 2004). But even with experience of a disaster, preparedness can diminish, as is happening in Christchurch as preparedness levels are now diminishing (Colmar Brunton, 2015). The reduction in

preparedness in Christchurch is not entirely unexpected. After World War 2, people were diffident about continuing heightened preparedness; volunteerism and emergency preparedness in Civil Defence fell far below government set expectations (Kay, 1952). Kay (1952) suggested that the government provide other motivators to preparedness and volunteering rather than fear and threat campaigns. I suggest that, despite this evidence from years of campaigns, communities that are traumatised or exhausted from disasters be treated differently than groups who have not yet had an emergency.

Given the growing body of critical scholars of preparedness campaigns, it is important to investigate how we got here. To understand how communication campaigns have evolved, I now explore in more detail the discipline of communication.

Communication, Public Relations, Media Relations and Marketing

Communication practice, including organised and orchestrated campaigns, has a long and culturally diverse history (e.g. Aristotle's *On Rhetoric*, 300 A.D., propaganda found in ancient Egypt (Liesegang, 2013). However, communication first became a formal academic discipline after the inception of mass communication in the 1910s. Welch (2013) states society changed during the 1910s through daily newspapers, cinema, and magazines to become "mass audience" and information could be spread much quicker than before. It was at this time that government communication campaigns were implemented to garner support for World War 1; all countries involved used mass production to create pamphlets, leaflets, and posters to persuade people to support war efforts (Welch, 2013). After the war, researchers began to develop further reasoning that would create the contemporary communication discipline.

One of the longstanding issues in communication studies is the overlap with other disciplines such as marketing, media relations and public relations. Public relations, as a term, is suggestive of "spin" for McNair (2004), while Grunig (1992) focuses on organisational relationships and exchanges with a variety of publics. The term public relations, for this thesis, is understood as a form of organisational communication. For this thesis, I will use communication rather than public relations when referring to organisations' attempts to connect information or ideas with publics.

Media relations is often explained as part of either public relations or communication, focusing solely on exchanging information with one specific public: the media (J. Johnston, 2007). J. Johnston (2007) further explains media relations as being a subset of public

relations and that communication is also a subset of public relations. I observed that many diagrams in the literature illustrate relationships with other sub-disciplines. Inevitably, the definer's background indicated which discipline was the "core" and which were the subsets. For example, if public relations was the discipline from which the researcher was situated, public relations is at the centre (L'Etang, 2008). If communication was the discipline, then it was the centre, and so on (Macnamara, 2012). It appears there is a similar perspective in the marketing discipline (Grönroos, 2004).

L'Etang (2008) graphically illustrates the foundation of communication as a discipline by using the metaphor of a tree, as in Figure 2.2.

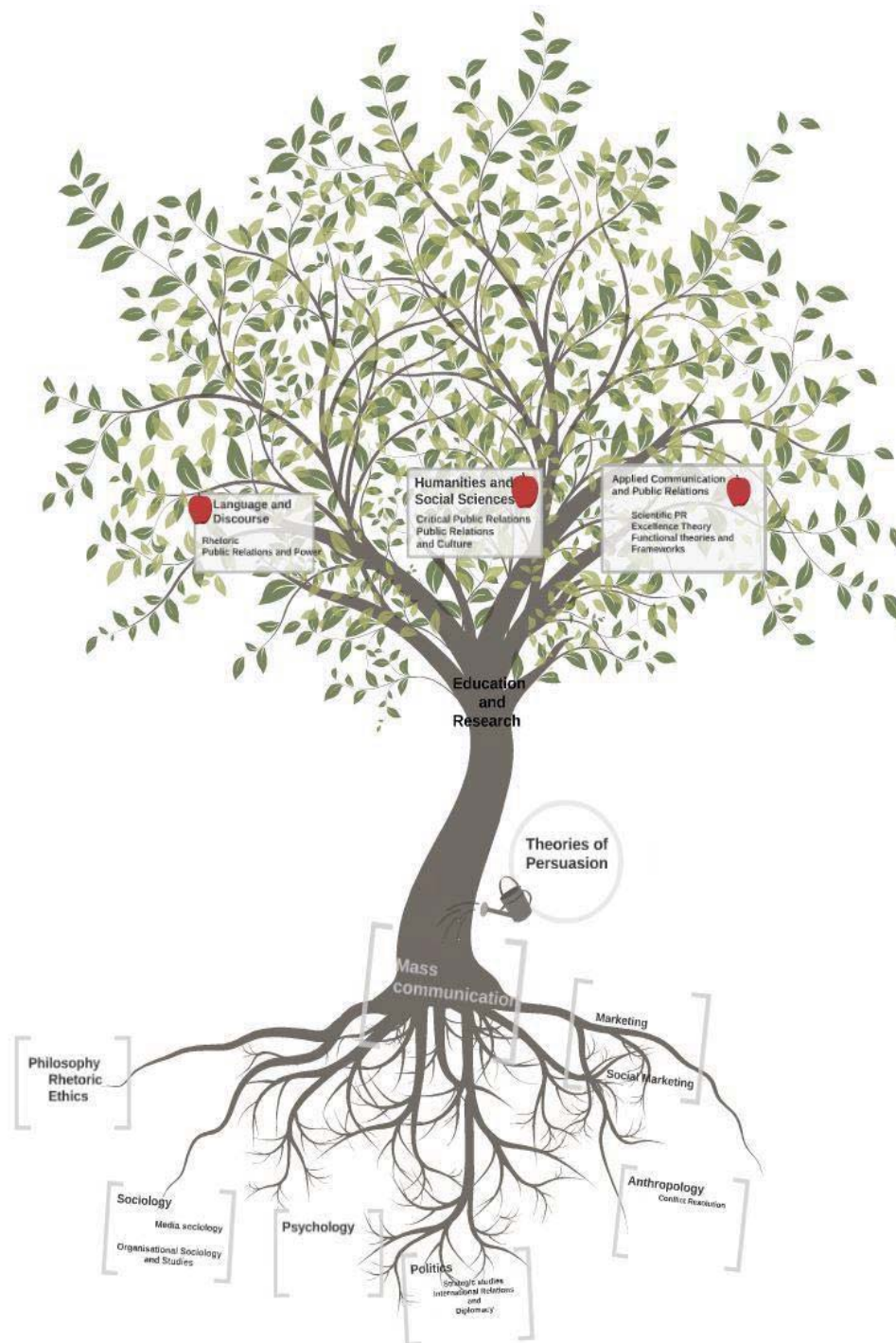


Figure 2.2: Public Relations Family Tree. Revised and redesigned from L'Etang (2008).

The disciplinary roots of communication research are from a mix of areas including sociology, economics, political science, public relations, communications, marketing, history, and anthropology. Different theories are partially inspired from this disparate ancestry. In the context of this research, L'Etang (2008) suggests differences can be brought together to bring about new understandings to improve communication research. This statement directly

relates to the purpose of this research; utilising aspects of differing theories to create a framework for analysis, coding, interpretations and recommendations about disaster preparedness communication. Communication and public relations, as an academic discipline, has been defined more as interdisciplinary (L'Etang, 2008).

For this research, I have chosen Alberts et al.'s (2007) definition of communication. Alberts et al. (2007) defined communication as a transactional process in which people create meaning, from both verbal and non-verbal messages, which are also influenced by society and culture. I chose this definition because it explores communication through the various lenses I use in this thesis, specifically, that of the making of meaning, individual perceptions, societal influencers and cultural norms.

I will now explore the theories in the communication discipline relevant to this thesis.

Chronicling and exploring contemporary communication theories

Diversity and contradiction exist among major contemporary theories and theorists in communication. Researchers in communication range from strict positivists to socio-cultural theorists. One “side” of the discipline bases itself in the cybernetic tradition, which perceives communication as a transactional process, from source to publics (Griffin, 2003). Some major theorists in the cybernetic tradition are Shannon and Weaver (1949), Weiner (1967) and Berlo (1960). Often quoted as the first major theory in communication, the cybernetic theory has its detractors, due to its linear nature (L'Etang, 2008). However, while not suggesting it is adequate as a model, I use aspects of the cybernetic tradition throughout this thesis as a framing device, as I found it useful for naming components of the communication process, as seen in Figure 2.3.



Figure 2.3: Source, Message, Channel, Publics model of communication (Berlo, 1960).

The above model indicates that communication is linear, and clearly privileges the source. However, my review of the research indicates the relationship between the components was neither linear nor as simple as implied by Figure 2.3 (Durant, 1999; Jacobson & Servaes, 1999; SADC, 2004).

Lasswell (1935), Lewin (1947), McGuire (1961a), and Cacioppo and Petty (1979) are also from the socio-psychological tradition, and they hypothesise that every communication can be quantified and tested with responses measured with universal laws. The goal or focus for the theorists in this theoretical space is the “source” changing the perceptions or behaviours of the “publics”, where communication is perceived as purely transactional (Barney & Black, 1994). The methods used by these scholars may provide some stability in the construction of communication but universal laws cannot explain how meaning is created across societies and cultures. The concept of finding a universal theory of communication was abandoned by researchers in the 1980s (Griffin, 2003). Empiricists have become less relevant in some areas of research, given the increase in sociological and cultural research perspectives. With the rise of “big data”, now empiricists seek to re-establish the search for the communication unifying theory once again, although already this has been met with criticism from socio cultural communication researchers (Boyd & Crawford, 2012).

At the other end of the communication disciplinary spectrum are theories inspired by constructivism. From this area, theorists such as Malinowski, Crookshank, Ogden, and Richards (1923), define communication philosophically as the way we generate and construct meaning. In this model, meaning, as further investigated in the methods chapter, is created and owned by the publics, not the source of the messages. The socio-cultural and phenomenological traditions support this theory, arguing particularly that publics are not just “injected” with messages and information from the source, as though they were empty vessels waiting to be filled with information. Publics make meaning based on a variety of conditions, lenses, filters and connections (Van Ruler, 2004). Broom and Dozier’s (1990) Coorientation Model of Communication (1990), suggests communication is a matter of relating. Specifically, publics and the source must share something in common, for example, a shared history, culture, story or even place they occupy (Broom & Heath, 2005). This theory is in the sociocultural area of communication. These scholars provide strong evidence that the source has little or no control over interpretation of messages after these have been disseminated, and that the reliance on messages misses the point of how communication occurs relationally and socially.

However, no single theory or position is the “best”. Each disciplinary lens provides new and exciting ways to examine communication. These disciplinary lenses also appear to be supported by different geographic locations of the researchers. The North American researchers have a tendency towards quantitative methods and a more empirical perspective, driven by advertising and marketing theories, while Australian, New Zealand and European researchers are more often, although certainly not exclusively, in the socio-cultural tradition (Griffin, 2003). This disconnect may lead to missed opportunities for exploring across both geographical and theoretical distances. Further cross-pollination of ideas and theories across geographical borders would be beneficial to increase understanding and growing the discipline.

Now that I have briefly examined the broad umbrella of different communication theoretical perspectives and some controversies about these theories, I focus on persuasion, and propaganda.

Persuasion and propaganda

Part of this research examines best-practice, specific to communication. Persuasion has long been part of the communication discourse and is relevant for this research. Persuasion has myriad definitions and attributes that change based on the disciplinary lens. Persuasion has ancient philosophical origins. In Aristotle’s (350 B.C.) *On Rhetoric*, persuasive rhetoric had three components: logos, an appeal to reason; pathos, an appeal to emotions; and ethos, an appeal based on personality, values or character. In Aristotle’s epoch, persuasion often applied to arguments created in speech rather than those in written form; for this section, I limit persuasion to modern usage focusing on mass communication and persuasion. Finding a prevailing definition is not easily accomplished, given its relationship and potential interchangeable uses with propaganda.

According to Larson (1995), the term “propaganda” began in the mid-16th century with the Roman Catholic Church in an attempt to persuade people to accept church doctrine. Macnamara (2012) states that the Roman Catholic Church established the *Commission de Propaganda Fide*, or the Sacred Congregation for Propagating the Faith, in 1572 by Pope Gregory XV. The use of propaganda, before 1918, was largely for gaining support for wars, with leadership seeking public support for actions such as the Napoleonic Wars and the Reformation of England (Welch, 2013). After WW1, influential researchers such as Lippmann (1920), Lasswell (1935) and Grunig (1992), as well as some of the founders of the

practice of public relations in the U.S.A., Lee and Bernays, began critiquing propaganda (Jowett & O'Donnell, 2012). Most of the critique was about aspects of power and control. B. Russell (1941), in particular, cited propaganda's potential for abuse of media and public perception. It was not until after the end of WW1 that major critique and philosophical reflection about propaganda began to occur (Rutherford, 2000).

Part of this negative perception of propaganda can be found in how it was defined by scholars and practitioners. Bernays (1928) defined propaganda as the intelligent manipulation of habits and opinions of the masses. The abuses of propaganda have been the subject of historical debate; however, shortly after WW2 propaganda began to be perceived by researchers as universally negative and unethical (Jowett & O'Donnell, 1986). Marková (2008) argues that within the discipline of social psychology, the term "propaganda" created a negative reaction among scholars and was replaced by "persuasion". From that point on, the two became conflated and connected, used interchangeably (Jowett & O'Donnell, 1986).

In Table 2.1, I provide my preferred definitions, for the terms propaganda, persuasion and education to illustrate the differences and similarities as I will apply them in this thesis.

Table 2.1: Definitions of propaganda, persuasion and education.

	Propaganda	Persuasion	Education
<i>Definitions</i>	Source seeks to control publics; outcome is to have publics think as the source does (Jowett & O'Donnell, 2012).	Co-creates meaning with the public (Larson, 2013).	Teaches people to think openly about an issue, from differing perspectives (Lasswell, 1935).

The above definitions illustrate the differences between three concepts: propaganda, persuasion and education. Larson's (2013) definition aligns with the constructivist perspective, while the propagandistic model is authoritarian in nature. Persuasion has traditionally been a subject explored by positivists (Erwin, 2001; Hovland, Janis, & Kelley, 1953; McGuire, 1962; Perloff, 2010; Petty, Rucker, Bixler, & Cacioppo, 2003; Rimer & Kreuter, 2006). Larson's (2013) constructivist-inspired definition indicates new directions for persuasion studies.

However, one key feature separates persuasion, propaganda and education: who benefits most from the communication. Severin and Tankard (2001) clarify further the differences

between persuasion and propaganda, stating that the main difference between the two is how the source benefits versus how the receiver gains from the exchange.

Jowett and O'Donnell (2012) confirm that when the source benefits most from the communication, even with the best of intentions, it is propaganda. Jowett and O'Donnell (2012) further segmented propaganda into three distinct ethical categories: white, black and grey. White propaganda comes from a source that is identified correctly and the information in the message tends to be accurate, looking to build credibility with the audience (Jowett & O'Donnell, 2012).

Linking my research questions and the context of earthquakes, specific to persuasion there have been research efforts suggesting the need to persuade people about earthquake risk. This activity should not be solely an awareness building exercise as successful campaigns need to inspire people to prepare (Kohn et al., 2012; Marshall et al., 2007; Mulilis & Lippa, 1990). But, through the analysis of current models used in New Zealand, awareness generating models of 'public education' appear to be the preferred approach of emergency managers and scientists. To be clear, for a communication to be propaganda it does not necessarily indicate that the source has nefarious intentions. Examples of this will be explored further in this chapter, examining Civil Defence case studies. However, the source may simply be communicating for only the source's benefit. I will examine this further in Chapter 6: Discussion and Reflections, as this distinction has relevancy in my findings.

Now that I have briefly explored persuasion and propaganda, I will explore a related discipline of communication: risk communication.

Risk Communication

According to database searches in SCOPUS, the term "risk communication" first appeared in titles of journal articles in 1972. A brief analysis of articles indicates that in the Scopus catalogue alone, there are 62,162 articles with "risk communication" as search terms as of September 2016, an increase of 5,157 articles than published in 2015. A large portion of these articles is in the public health disciplines with approximately 38 percent of the articles found in this field, followed by engineering (10 percent), social sciences (9 percent). The other disciplines that comprise the remaining percentages are computer science, biochemistry, pharmacology, and environmental science. Given that several disciplines have an academic investment in risk; it is not surprising that there are myriad definitions.

Risk communication research began in the early 1970s, from the environmental protection discipline. The nuclear incident at Three-Mile Island and other environmental disasters in the U.S.A. and U.K. inspired researchers to examine risk communication from their disciplinary lens (Fitzpatrick & Mileti, 1994; Mileti & Fitzpatrick, 1992; Plough & Krinsky, 1987; Sandman, 1987; Slovic, Fischhoff, & Lichtenstein, 1980). Social psychologists have dominated the study of risk communication, predominately as an extension of risk management and social-scientific risk research (Rohrmann, 1992). Thus, the epistemology trends towards positivism in its theoretical perspectives and methods for risk communication research. Major theorists include Sandman (1999), Fischhoff (1995), Bostrom, Atman, Fischhoff, and Morgan (1994), and Slovic et al. (1980).

Risk communication research appears theoretically isolated from major trends in communication theory, other than the cybernetic model from Berlo (1960). After an extensive review of bibliographies in foundational journal articles, there is very little evidence to suggest communication research from other theoretical perspectives, such as socio-cultural, has been used to inform risk communication scholarship or practice. The field of risk communication is most commonly referenced from other disciplines such as health, health promotion, natural and technological hazards, computer sciences and security, and emergency management. Communication itself is not a major contributor academically to this field, suggesting that risk communication evolved on its own without much reference to or theoretical support from communication studies.

The majority of risk communication's core theories focus on the mental processes that govern risk judgements and behaviours. This includes risk perception, belief, trust, decision-making, hazard ranking, risk management, and planning. Finding commonalities in the literature is challenging because risk communication has grown to include any risk that requires communication, ranging from public health risk to technological risk, terrorism, and beyond (Fischhoff, 1995; Fitzpatrick & Mileti, 1994). However, evaluation of risk communication campaigns has identified varied but mainly limited successes, from seatbelt-wearing campaigns, to the more-than-50-year battle to promote smoking cessation, to natural hazard risk reduction (Revere et al., 2011).

There is research on how to evaluate risk communication campaigns however these studies vary in methodological and theoretical quality. Rohrmann (1992) analysed ten risk communication campaigns and their evaluations to determine effectiveness. Rohrmann

(1992) determined that effectiveness criteria were incomplete, and that the campaigns contained insufficient evaluation designs, and no rigorous analysis for success or failure of risk communication strategies existed.

Many models seek to organise the risk mental process in a linear and logical progression. Few theories account for the complexity of risk communication, containing social and cultural elements, except for two: the mental models theory and community resilience models created by Paton (2003) and further explored by Becker (2012). Lindell and Perry (2012) do include social cues in their Protective Action Decision Model (PADM). However, in the PADM model, social cues are framed in the Berlo (1960) model; hence it is only a linear expression of the effect of social/cultural factors. It is a limited perspective of the importance of social AND cultural influences on risk communication. Given its limitations, I will discuss the two theories that have more complete models of social/cultural influences: mental models theory and community resilience models.

The mental models theory hypothesises that the human brain constructs a model of hazards based on experience, information and other inputs (Bostrom, Fischhoff, & Morgan, 1992). Exploration of the mental models theory has included research about how communication strategies could be created to amend incorrect or incomplete mental concepts of the hazard (Atman, Bostrom, Fischhoff, & Morgan, 1994; Bostrom, Atman, Fischhoff, & Morgan, 1994; Bostrom et al., 1992). By determining and mapping participants' mental models, these researchers argued that communication campaigns could then be created to fill in the missing knowledge, to restructure a person's mental model when it is too general or overly focused on peripheral information and dispel misunderstandings by "deleting inaccurate pieces" of information (Bostrom, Atman, Fischhoff & Morgan, 1994, p.789). This approach, that people understand information akin to an algorithm, does not account for cultural, social or experiential differences. It also assumes that the expert mental model is the correct mental model to have, which is debatable. This exercise, to make people think as the source does, is concerning as it sounds similar to the definition of propaganda rather than persuasion, seeking to enforce views rather than understand publics' worldviews and value their relevance, in order to co-create meaning.

Another issue with the mental models theory is the definition of successful campaigns. According to Bostrom et al. (1994), the "gold standard" of successful campaigning is behaviour change in publics based on the campaign. However, this implies that the "source"

does not need to adapt to meet the needs of its publics, that the source is completely correct in its motives and understanding. Change is only required is from the publics. This one-sided perspective appears not to acknowledge the interplay between publics and the source and that in order to have relationships, mutual adaptation and change is required by all parties (Broom, Casey, & Ritchey, 1997). Some scholars, specifically relational communication theorists, suggest that mutual adaptation is the substance of all interpersonal interaction (Broom, Casey & Ritchey, 1997; Ledingham, 2001). Bostrom et al.'s (1994) approach is predominately top-down, authoritarian and directive rather than inclusive, relational and conversational. While this may be a necessary approach in times of crisis, it may have limited use during pre-emergency times. In the last three generations, there is evidence to suggest that authority and expert perspectives are increasingly challenged and held with scepticism by audiences (McCrindle & Wolfinger, 2009). Tilley, Murray, Watson, and Comrie (2014) found that increasingly people are turning away from experts, even in the face of increasing disease, such as with the anti-vaccination issue. Another example of the increasing marginalisation of experts is also found in the climate change discourse (Sundblad, Biel, & Gärling, 2009; Weingart, Engels, & Pansegrau, 2000). These examples display the complexities of communication and the some of the challenges faced by scientists.

However, the studies by Bostrom, Atman, Fischhoff and Morgan (1992, 1994) are valuable for their useful guidance on structuring information and use of exploratory qualitative methods including focus groups and one-to-one interviews about material created for risk communication (Bostrom et al., 1994). Their evaluation standard of “best-practice” success is also useful: they argued that if a recipient understands the message and perceives it as relevant to their circumstances, this is the minimum criterion for success. Another useful finding is that many risk communication initiatives are written, inadvertently, for people similar to the source (Atman et al., 1994), rather than in language familiar or comfortable to the intended audience. I suggest that the writing of documents was for the writers, rather than the publics the document is attempting to communicate with, is one of the features of echo chambers. Echo chambers are ideas, information or beliefs that are amplified due to these being in an enclosed system that eliminates opposing opinions or voices (O'Donnell, 1992).

A defining characteristic of risk communication research is direction on what not to do in risk communication campaigns, rather than advice on what appears to be successful. Fischhoff (1995) suggested that common mistakes or misconceptions made by practitioners included,

among others, focusing on the numbers, explain these, use comparative risks, and be friendly to publics.

Löfstedt and 6 (sic) (2008), supported Fischhoff's (1995) analysis, and provided further critique, stating that risk communication is particularly fragmented. As researchers focus on their particular fields of interest, there is little discourse across fields and even less overarching theory development that would support a unified effort to address the concerns of all risk scholars or professionals (Löfstedt & 6, 2008). What is disheartening about Löfstedt and 6's (2008) critique is that it appears not only is the research community not further along in finding answers but that it is more fragmented than Fischhoff's (1995) critique of the field 13 years earlier. Indeed, Löfstedt and 6 (2008) stated that as a result of silos in research, the field of risk communication research paradoxically remains in a state of frenetic and diverse activity but is weak in theoretical and methodological maturity.

Now that I have investigated some origins and various major theorists within risk communication relevant to the thesis, I will further delve into the other main discipline explored in this thesis: emergency management.

Emergency Management

Similar to communication, the academic discipline of emergency management interdisciplinary, often crossing into transdisciplinary areas. Transdisciplinarity is a fusion of disciplinary knowledge with the know-how of lay-people that creates a new hybrid which is different from any specific constituent part (Lawrence, 2004). Alexander (1997) argued that as many as thirty academic disciplines involved in emergency management research and suggested it was a transdisciplinary field, given the influence of practitioners on the discipline.

Defined as a “discipline that deals with risk and risk avoidance”, emergency management has evolved from only a response function to being responsible for the reduction, preparedness and recovery of emergencies (Haddow, Bullock, & Coppola, 2013). In the developed country context, the origins of organised, governmental management of disasters began with an organisation named “Civil Defence”. (Vale, 1987) argued that, while Civil Defence was first coined in the 1930s, types of civilian protection groups have ancient roots that include any civilian group protecting their home. Finding the exact origins of Civil Defence is problematic; I found evidence of civil defence agencies in Russia in the 1920s (Slepyan, 1993). However, from a legislative perspective, civil defence as an agency in 1935

and officially defined as part of the Air Raid Precautions Act in 1937 in the U.K. as part of their response to WW2 (Hilliard, 1986). The organisation gained popularity post-WW2, across the U.S.A., Canada, New Zealand, Australia and the United Kingdom. There was one main objective of these new Civil Defence organisations: to prepare the public against a nuclear threat (K. Tobin, 2002). These seem rational and supportive aims for governments to have: to protect their people. But was the purpose of Civil Defence altogether altruistic? Evidence suggests that the government authorities supervising Civil Defence may have had ulterior motives. Alexander (2002) argued that Civil Defence in the U.S.A. used propaganda methods to keep publics in a continual state of fear against the Soviet Union and nuclear war in general, which increased compliance among the population. K. Tobin (2002) argued that stating the fear of nuclear war was part of urban planners' justification to create massive suburbs in the U.S.A., with the rationale being that if cities were too densely populated, these could be destroyed easily through a nuclear bomb. However, it is Preston (2008) who stated that Civil Defence pedagogies were used to enforce the cultural dominance of whiteness, the nuclear family and suburbia. Preston's (2008) assertions of government organisations using these campaigns to support normative whiteness have relevance and saliency to this research.

The military structure and messaging of Civil Defence from the 1950s and 1960s became unpopular with government officials and researchers in the 1970s (Horlick-Jones, Amendola, & Casale, 1995). The new Civil Defence focused on more civil protection models and included broader hazards, such as earthquakes, storms, fires, floods rather than focusing solely on nuclear warfare (Alexander, 2002). This decrease in popularity of Civil Defence is evident in Australia, the U.S.A., Canada, New Zealand and the United Kingdom. Only New Zealand continues to use the term "Civil Defence" in the title of emergency management organisations. However its models align more with the civil protection movement rather than the more traditional "Civil Defence" models. The current model, based on the Civil Defence Emergency Management Act (2002), focuses resources and planning on local and regional levels, rather than overarching central government command and control (B. Y. Lee, 2010).

The main emergency management model in New Zealand is a linear model proposing a "cycle" of disasters. This is evident in the "four Rs", a widely used framework for emergencies in New Zealand in Figure 2.4.



Figure 2.4: The 4 Rs (source: New Zealand Ministry of Civil Defence and Emergency Management, National Plan 2005).

Figure 2.4 displays how the 4Rs are deployed in practice and what activities MCDEM argues should be prioritised during each phase. Specific to communication, there are two types of communication activities within emergency management that intersect with communication theory: public education and public information.

Public education and public information

In emergency management, communication is the term used for telecommunications e.g. radios, satellite phones and communication cabling infrastructure. This differs from the scholarly communication discipline's various concepts of communication, which refers to communication as the human interaction and communications as telecommunications (Henstra, 2010). While understanding that emergency managers have their unique terms for communication, in this thesis, I chose a definition that aligns more to communication research rather than emergency management research. However, it is important to explore how emergency management defines and utilises communication.

The concepts of post-war Civil Defence are now largely absent in contemporary emergency management theory and practice, with the exception of the terms public education and public information. Public education refers to a campaign that raises awareness of emergencies and encourages people to prepare for emergencies during the "readiness" stage of emergency

management (Paton, Smith, & Johnston, 2005). Public information occurs during the “response” phase of the emergency (Blanchard, 2008). To clarify further, “public education”, in the emergency management discipline and profession, does not refer to education in the word’s lay sense. It is not taught as part of a course curriculum, by teachers to students within classrooms or equivalent spaces, but rather refers, within the Civil Defence/Emergency Management vernacular, to broad public communication campaigns to stimulate preparedness behaviours or risk awareness.

According to Mileti et al. (2004) the terms “public education” and “public hazard education” are largely used in the natural hazard and emergency management literature to explain communication to the public about hazards before events occur. In turn, public information is often defined as crisis communication or information communicated by emergency management organisations, like Civil Defence, during a disaster (Henstra, 2010). However, the use of “education” to define preparedness campaigns may be an inaccurate or, at least an incomplete understanding of the term. Lasswell (1935) defined education as the transmission of skill and acceptable attitudes, but more specifically, teaching people how to think, not specifically what to think. However, preparedness campaigns often tell people what to do rather than how to think about preparedness, providing prescriptive advice.

The language of public education research reflects its assumed pedagogical roots. Coppola and Maloney (2009) defined public education campaigns as seeking to instruct a population that is already aware of a risk, to teach the public “proper behaviour”. This is supported by D.S. Mileti et al. (2004), who suggested that any public education information should focus solely on telling people what they can do before, during and after a disaster. Lindell and Perry (2000), in a review of 23 empirical studies, argued that risk awareness leads to protective action e.g. preparedness. This is supportive of the Lindell and Perry (2012) Protective Action Decision Model (PADM). Similar to the risk communication mental models theory proposed by Bostrom et al. (1994), these theorists all favoured one approach: focussing on changing the public’s thoughts because they need to be “educated” to think and act correctly.

However, not all public education scholars agree with the “instructional” form of public education. D. S. Miller and Rivera (2010) suggested that before hazard, awareness or preparedness campaigns can begin; a community-agency relationship needs to be firmly established and maintained throughout any communication. This community resilience model

is further supported by Paton (2003) who suggests that emergency managers act as change agents, supporters and facilitators of communities rather than a “top-down” approach.

According to many community resilience theorists, an authoritarian approach is unsuccessful and at worst, potentially harmful to developing relationships with communities (e.g. Adame & Miller, 2015; Aldrich & Meyer, 2015; Comfort, 1994; Fletcher & Sarkar, 2013; George, 2013; Grotberg, 1996; Kenney & Phibbs, 2014; Lucini, 2014; Paton, 2013; Paton & Johnston, 2001; Quinn, 2008; Ronan & Johnston, 2005; Sterbenz et al., 2010; G. A. Tobin, 1999; Uscher-Pines, Chandra, Acosta, & Kellermann, 2012).

Marshall et al. (2007) used qualitative research, specifically interviews and focus groups, to determine it is important for people to understand the rationale behind recommendations in emergency situations, not simply receive directives. R. Shaw and Izumi (2014) stated that there is no evidence that behaviours or changes in attitudes occurred after being provided information.

One element is missing in the discourse: that of mutual adaptation by both emergency managers and their publics. The commonality in community resilience theories, mental models and protective action is that the emergency manager, expert, scientist or governance body always has the correct or preferred perspective. However, mutual adaptation from constructivist models is considered crucial for successful persuasive communication: all parties must be changed from the exchange (Broom et al., 1997; Larson, 1995). I will explore this concept further in Chapter 5: Reflections from the Community of Practice.

As I have examined the public education model in both emergency management practice and theory, I now explore historic preparedness campaigns case studies.

Civil defence preparedness campaigns: Historic and contemporary case studies

The use of mass communication for emergency preparedness campaigns began during WW1. These campaigns were inspired by a hurricane in Galveston, Texas in 1900 and the San Francisco earthquake of 1906, and these disasters were used as motivation encouraging American citizens to prepare (Ingram, 1916). These types of preparedness campaigns were predominately funded by the US government and the Red Cross. The Red Cross used “preparedness parades”, beginning in the U.S.A. in 1916 (Cutlip, 1994). These public parades were used as awareness-generating and fundraising activities. The fundraising was successful, raising more than USD \$400 million and increasing active volunteers within the Red Cross membership from 486,000 members to 20 million by the end of WW1 (Cutlip, 1994).

Interestingly, it was Ivy Lee who, as discussed earlier in this chapter as the “father of public relations”, created and managed this Red Cross campaign (Cutlip, 1994).

The first public education Civil Defence campaign aimed to maintain high civic engagement levels, achieved during WW2, among publics post WW2 (Welch, 2013). Jowett and O'Donnell (2012) stated that as tensions rose between the U.S.S.R. and the U.S.A., this motivated the U.S.A. government to develop the campaign *Preparing for the Bomb* (Welch, 2013). However, other motivations may have also been present. Preston (2008) argued that these campaigns were also aimed at creating and sustaining notions of whiteness as the ideal, specific to suburban American life. The use of propaganda, to maintain civil control, patriotism, and political agendas has also been an accusation levelled against 1950s and 1960s public education programmes (Grant, 2011).

These alternate motivations for the public education campaigns did not escape notice from certain people at that time and were met with skepticism (Grant, 2011). Smith (2010) stated that the civil defence campaigns, which began in 1947, met with public mockery, particularly from the media who had a platform to voice their critique of the campaigns in the United Kingdom and the U.S.A.. Public disbelief reached its peak with a pamphlet entitled *The Hydrogen Bomb*, created by Her Majesty's Stationery Office in 1957, advised people of what to do when exposed to nuclear fallout (Smith, 2010). The pamphlet stated, among other inaccurate claims, that radioactive dust could simply be washed off with soap and water.

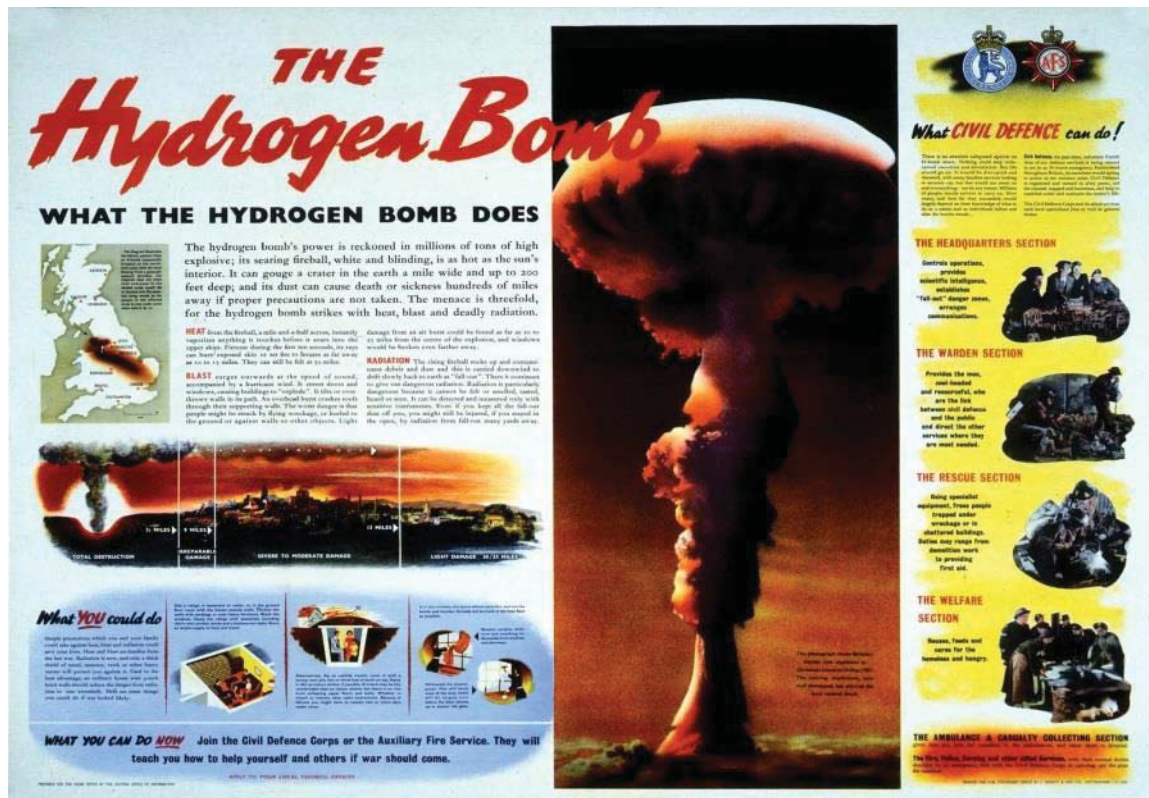


Figure 2.5: The Hydrogen Bomb: What the Hydrogen Bomb Does, (1957).
 From the U.K. National Archives retrieved from
<http://discovery.nationalarchives.gov.uk/details/record?catid=1978506&catIn=6>

According to Smith (2010), this pamphlet downplayed the threat that was perceived by authorities, evidenced by a secret report given to policymakers circulated two years earlier which states that the:

hydrogen bomb war would be total war in a sense not hitherto conceived. The entire nation would be in the front line... Failure to provide adequate protection against radio-activity from fall-out would be disastrous. To remain in the open during fall-out would be suicidal in an area of 1,000 square miles for each bomb. The public should be thoroughly instructed in peacetime on the effects of hydrogen bombing and the precautions necessary to minimise casualties. (p. 149)

Smith (2010, p. 150) stated that the critique in the 1960s against Civil Defence publications was summarised by the *Daily Mirror* (1963) in an editorial that states:

the Home Office pamphlet, in a superb and ineffable paragraph, advises the motorist to 'park off the road if possible; otherwise alongside the kerb' when a nuclear attack seems imminent. And don't forget to take the milk in, post your football coupons and mow the lawn – if you have time.

A report from the House of Commons Select Committee on Estimates supported the *Daily Mirror* later that year, recommending that the pamphlet be withdrawn because it served no

purpose, further suggesting that the advice would not give people a positive impression that the Government's measures were of any value (M. Smith, 2010).

Kay (1952) studied morale during the Cold War, and suggested that publics had become increasingly suspicious of "propaganda" and simply did not believe scientists' advice about safety procedures and the nuclear bomb. Imagery of Hiroshima and Nagasaki bombings had created a public impression that nothing could be done to defend or prepare against such a deadly weapon (Kay, 1952).

Another example of communication and civil defence from the 1950s is a Civil Defence campaign to increase the volunteer base in Britain. Grant (2011) examined rates of civil defence volunteering in the U.K. following extensive volunteering drives. The campaign's goal was to attract 500,000 new volunteers to Civil Defence during the early 1950s. After five years, the campaign attracted 344,845 people, below the goal of 500,000. Politicians of the time expressed their disappointment, with the media supporting their critique (Grant, 2011). Grant stated that the early campaign messages, similar to the WW2 messages, had little or no traction with only 30,000 new recruits in the first year but that this changed when the Korean War began in 1950, when almost 130,000 new people joined (Grant, 2011). One of the main issues with the campaign, according to Grant (2011), was the reliance on the experiences of WW2 as a main reference point but the public wanted to distance themselves from painful memories (Grant, 2011). Only once Civil Defence modified imagery to include pictures of women and re-framed Civil Defence as a "leisure" activity in combination with the Korean War threat, did people join (Grant, 2011).

In West Germany during this time, campaigns by Civil Defence contained more pragmatic messaging. A campaign entitled *Jeder Had Eine Chance* or, translated, *Everyone Has a Chance*, was expounded in pamphlets which illustrated that, with preparation and training, people were more likely to survive a nuclear attack (Biess, 2009). These booklets provided case studies from Japan and illustrations of what to do to survive a nuclear blast but also examined the more likely scenario: that most people would die. Biess (2009) suggested that the pragmatic West German approach appeared more successful in convincing publics to take preparedness actions than attempts by officials to play down the risk, as was the case in the U.K. (Biess, 2009).

Grant (2011), Kay (1952), K. Tobin (2002), Welch (2013), and Preston (2008) all suggested that the nuclear preparedness campaigns in the 1950s – 1960s in the U.K. and U.S.A., appear

to have been a failure in their aims and objectives, specifically to increase preparedness actions and volunteerism. As the campaigns from the 1950s and 1960s were largely unsuccessful in the long term, in the 1970s a more civil protection approach was adopted. However, remnants of Civil Defence remain, specifically in public communication. For example, after examining New Zealand civil defence campaigns, I argue that little has changed since the 1950s and 1960s, particularly about messaging. Messaging has focused on the storing of three days worth of food, water and emergency supplies. Colmar Brunton (2015) stated that the New Zealand national campaign, *Get Ready, Get Thru*, focused on the storing of water, food and emergency supplies. The emphasis on purchasing goods for emergency use has been largely unchanged for decades.

The case studies presented here are of when communication and emergency management converged for preparedness communication campaigns. Since the 1950s and 1960s, divergence has been more frequent than convergence between these two disciplines. I state divergence because as communication research has moved on, current civil defence public education campaigns still maintain a propagandistic flavour, the “tell people what to do and they will do it” ideology. The artefacts analysed in this thesis will provide an example of one such campaign that focused on the prescriptive approach of telling people what to do (see Chapter 4: Analysing the Q-Files). I now investigate examples of preparedness campaign evaluation and suggest how these align or diverge from contemporary communication theory about evaluation.

After an extensive review of the literature, it appears that while preparedness campaigns typically report some ‘practice-based’ evaluations of outputs such as media imprints or copies printed, only a few academic research-based evaluations of natural hazards or preparedness campaigns using communication theory-informed research methodologies to assess outcomes have been attempted. Marshall et al. (2007), evaluated “Make a Kit, Make a Plan, Stay Informed”, a social marketing campaign implemented in the U.S.A. They employed a mixed methods approach, including a telephone survey of 501 respondents and focus groups to determine the campaign’s effectiveness (Marshall et al., 2007). The findings showed a significant (50 percent) rise in awareness among respondents but only 12 percent reported taking any action based on the campaign. The major findings of this study included that publics wanted rationale more than directives from the campaign (Marshall et al., 2007, p.53).

Cismaru, Cismaru, Ono, and Nelson (2011), evaluated 11 climate campaigns on whether these campaigns used Protection Motivation Theory (PMT), developed by Maddux and Rogers (1983). Climate change campaigns are not necessarily preparedness campaigns, but have similar attributes in that threats are communicated and campaigns include “calls to actions”. Protection Motivation Theory (PMT) is related to fear appeals; exploring how and why we take protective actions, including preparing for emergencies (Neuwirth, Dunwoody, & Griffin, 2000). The researchers observed that none of the campaigns used PMT. Indeed, the researchers did not find any communication theory in campaign development, monitoring and evaluation. Eisenman et al. (2014), studied implementation of the Los Angeles Community Disaster Resilience Project by developing an evaluation programme using a community resilience model. The evaluation was based on pre-intervention and post-intervention surveys, and has ongoing yearly evaluation as part of a longitudinal study. The latest evaluation revealed that developing and maintaining relationships has been the major challenge to continued implementation of the project (Cha et al., 2016). Mulilis and Lippa (1990) evaluated of an earthquake awareness campaign. Earthquake brochures were sent to 111 homeowners in California and while there was evidence of short-term improvements in earthquakes awareness in the area, long-term effects were non-existent.

Public health research contains more risk communication campaign evaluations. Moonen, van der Rijt, van Koppen, and van der Gulden (1995) evaluated a risk communication campaign that aimed to inform workers interacting with highly carcinogenic chemicals about safety requirements. The campaign used a variety of channels including booklets, leaflets, brochures, posters and mass media support. The findings of that study concluded that the campaign had little effect on publics.

There are substantial gaps in emergency preparedness campaign evaluation and communication theory, as outlined above. In the next section, I will outline the literature used to create the “best-practice” matrix that I developed as an evaluative tool in this thesis.

Best-practice Matrix

I developed a best-practice matrix, after reviewing more than 240 relevant articles, to determine the consistent themes relating to best and poor communication practice. I took an interdisciplinary research approach, bringing together the different disciplines outlined above and allowing the retention of differing concepts (Lawrence, 2004). I focussed my review on best and poor practice communication of risk and emergency preparedness across the

disciplines of communication studies, risk communication and emergency management. I also investigated a variety of other disciplinary areas including computer science, economics, sociology, engineering, and public health. These disciplinary areas also explore and research communication and preparedness concepts.

Determining the themes across disciplines required the use of several frameworks to assist organisation, collation and analysis. The first device I used was the Source, Message, Channel, and Receiver (SMCR) labels, with the inclusion of setting, because they provided useful descriptors of key actors or attributes in the communication process (Berlo, 1960). While this model, when used in a linear way to guide or analyse communication as a process, does not account for two-way symmetrical communication or the social and cultural nature of communication, and as a model has been superseded by other frameworks including constructivist and participatory models, the labels themselves, that name and describe some basic elements of the communication process, remain useful. Although subsequent models have recognised that the actual process of communication is multifaceted and multidirectional, the names of the components of communication have tended to remain the same. For this reason, without in any way endorsing a linear SMCR model of communication, I will be using the SMCR terminology simply as a useful categorisation device for separating out the components of communication described in this literature review.

Now that I have explained how I reviewed the articles, I present the main themes in my best-practice matrix, beginning with source.

Source

Defined by Berlo (1960) as “where the message originates,” source in the context of this literature review refers to emergency managers, public information managers or other groups who may be involved in creating or disseminating messages about disaster preparedness (Berlo, 1960). In this section and for this thesis, the “source” will be emergency managers, government communication units tasked with preparedness communication, natural hazard scientists, and any others who communicate about hazard preparedness communication both as practitioners and as an academic discipline. Marsh and Buckle (2001) argued that emergency managers are, in some cases, statutorily charged with communicating preparedness messaging yet often have little training, support or funding to understand and interact with their communities. Galloway (2013) supported this, further suggesting that

emergency managers think differently to the rest of the population: they focus on what will go wrong rather than what is currently working.

One reason that emergency managers may struggle with this role is that communication, whether campaign development, implementation and even performing as a key spokesperson during an emergency, is largely absent as a recommended skill set within training programmes for emergency managers in favour of leadership, critical thinking, authority, organisation and navigating organisations (Nicolopoulos & Hansen, 2009). There is little empirical research as to who emergency managers actually *are* professionally, but there is some normative discussion about what their aspirational skill sets should be (Littlefield et al., 2012; Rowan, Botan, Kreps, Samoilenko, & Farnsworth, 2010). As emergency managers are often responsible for developing, implementing and maintaining communication campaigns the existing research suggests there may be a gap in their training (Marshall et al., 2007).

In New Zealand, preparedness communication responsibility is also given to local governments in the territorial authority, regional or national (central) government, as outlined in the legislation from the Civil Defence Emergency Management Act 2002 (Ministry of Civil Defence and Emergency Management, 2006). Similarly, in the U.S.A., the responsibility for communicating emergency preparedness messages is performed by emergency managers at the city, county, state and federal levels (Blanchard, 2008). While non-governmental organisations, such as the Red Cross or Salvation Army, create preparedness campaigns, the legislated responsibility for these are to the emergency management government agencies (International Federation of Red Cross and Red Crescent Societies, 2011). There are also legislative mandates in both countries to inform the public about preparing for emergencies. In essence, while emergency managers are not trained to work in public communication, it can be a responsibility thrust upon them through legislative mandate without, generally speaking, adequate specialist qualifications or support.

Although there is a legal responsibility for emergency managers to communicate preparedness, there are issues in the delivery of these types of campaigns. B. B. Johnson (1999) argued that within preparedness campaigns, there exist two fundamental source dilemmas: many campaigns have authoritarian “top-down” perspectives, and the campaign can be perceived by emergency managers as a “box-ticking” exercise rather than requiring a genuine concern about preparedness. As a source, the primary motivation within the public campaign context for emergency managers is to increase emergency preparedness among

various publics, especially at the household level (Burby, 2003; Galloway, 2013; Ministry of Civil Defence and Emergency Management, 2006). I now examine best-practice when it comes to spokespeople, their influence and how their involvement can support or undermine a campaign.

A spokesperson is someone who is a source of public information or acts as the representative of a source of public information, such as on behalf of an organisation. But a spokesperson does not simply deliver a message directly to publics. Positive attributes appear to be a central theme for how much influence or persuasive power spokespeople have. Spokespeople who, according to the judgements of publics, embody empathy, celebrity, power and relatability, are likely to be more persuasive (Eiser et al., 2012; L. Gray et al., 2012; E. J. Wilson & Sherrell, 1993).

Raven (2008) outlined the power dynamics that can exist between a source and the publics they are trying to persuade. These include: rewards, coercion, expertise, information, referent and legitimate power. Raven (2008) further explained each characteristic in depth. Reward power comes from the source offering incentives. With coercive power, threats are used combined with unwanted consequences. The power of the expertise is discussed throughout this thesis, but in this context, it means that the source has knowledge that publics do not. Information means the source can act as an influencer, using information as a way to change outcomes. Legitimate power is when publics allow and accept the right of sources to demand a change of behaviour, while expert power stems from the publics' acknowledgement that the source has special insight of a specific topic. Waymer and Heath (2014) used the lens of organisational-public relationship theory (OPR) to suggest that legitimate power between the organisation and its publics is foundational to any communication interaction. Finally, referent power is rooted in the influence of affiliations and groups (Raven, 2008).

Another aspect of source power and authority is the extent of co-construction of communication. As explored in the propaganda section, communication that favours and benefits the source is termed propaganda. However, at the other end of the spectrum, is constructivist communication, where publics are active participants in communication campaigns. This dialogic approach is considered “best-practice” by Grunig (1992), but requires sources to genuinely cede some of their power to determine the goals and processes of the communication.

Participatory communication campaigns specific to Grunig and Hunt (1984)'s two-way symmetrical campaigns, where publics are active, involved and engaged participants in campaigns, is not without its detractors. Nessmann (1995) stated that the theory is utopian. L'Etang and Pieczka (1996) argued the two-way symmetrical model is too idealistic and based on assumptive perspectives. Other issues, specific to the practical application of participatory communication theory, include that its implementation is costly, both in human and financial resources, and can take some time for any real impacts to be understood. Further, Servaes and Arnst (1999) argued that participatory communication and its research, particularly in the developing country context, can easily be manipulated by policy makers and special interests. Despite all the drawbacks, Grunig and Hunt (1984) original two-way symmetrical theory had many benefits, including creating robust and energetic dialogue among academics and practitioners alike.

Grunig and Hunt's (1984) model is not the only participatory communication model. Deetz (1995), for example, developed models that included participatory communication, specific to business communication and stakeholder communication. As a constructivist scholar, Deetz (1995) advocated for completely removing the information model of communication in exchange for communication and participation. Servaes and Arnst (1999) argued that constructed models may only be superficial attempts at organisations attempting to be "seen" as doing the right thing, rather than sincere attempts at co-constructed communication. The co-sharing of power and authority appear to be unresolved issues within the literature.

Risk communication, information and expertise (the expert model of scientists) appear to be the most consistent power dynamics. Lombardi (1995) stated that technicians and scientists have high credibility during crisis situations. Lindell and Perry (2012) also argued that if the threat is immediate and local that people will be more likely to believe authority figures, including scientists and technicians. Spokespeople ideally would have positive relationships between themselves and the publics. Sellnow, Ulmer, Seeger, and Littlefield (2009b) suggested that if there is a positive and friendly relationship between the spokesperson and their publics, the participants are more likely to follow the advice provided by that spokesperson but also the opposite may occur.

This means that controversial political figures or even unknown emergency managers, who may be unfamiliar to publics, may struggle for legitimacy to persuade publics when a disaster occurs (Nicolopoulos & Hansen, 2009).

Despite the legislative responsibility for promulgating preparedness messages, there have been very few public communication campaigns with emergency managers as spokespeople; often this role is played by actors, celebrities, politicians, or even cartoon characters (Grant, 2011; Kay, 1952). Examples of cartoon spokespeople include “Bert the Turtle” in the U.S.A. during the 1950s or “Stan, the Civil Defence Dog” from New Zealand (Grant, 2011; Ministry of Civil Defence and Emergency Management, 2006). Both those campaigns focused on school-aged children and were national educational campaigns.

Given this research, a question arises: why are emergency managers only visible during the response phase? One example of this occurred during the Canterbury Earthquake Sequence when John Hamilton was a key spokesperson of Civil Defence as the Controller during the crisis (Cooper, Carter, & Fenwick, 2012). However, he was absent as a key spokesperson in previous public communication campaigns; the Ministry utilised a well-known New Zealand actor instead, with no defining marking as being a member of civil defence (Ministry of Civil Defence and Emergency Management, 2006). Poole (2012) argued that even within the Canterbury Earthquake Sequence, other spokespeople were more visible in media coverage, such as the Mayor of Christchurch, local politicians, and volunteer leaders such as Sam Johnson, the head of the Student Volunteer Army. As such, emergency managers may not be well positioned in emergencies to be effective spokespeople because trust, relatability, and empathy have not been established beforehand. This places emergency managers in a difficult position because they have not developed any of those important spokesperson traits before emergencies with their key publics, so they may not be appropriate experts to call upon for comment once a disaster has struck.

In preparedness campaigns, a growing body of research illustrates another key problem for authorities encouraging preparedness. Ballantyne, Paton, Johnston, Kozuch, and Daly (2000) argued that if people perceive external actors are responsible for their safety, they are less likely to convert intentions to actions. This is supported by Paton et al. (2005), who found that by providing comprehensive preparedness advice, publics assumed that those same authorities, who provided competent preparedness advice, would also be able to help them in an emergency. This led to complacency about personal responsibility for preparedness and response. It appears that emergency managers may be in a “damned if they do, damned if they don’t” situation when it comes to preparedness campaigns.

Best practice suggests campaigns supported by multiple agencies are more successful in meeting their objectives. Eriksen and Gill (2010) argued that by aligning with groups who are trusted, for example the Fire Service, messaging appears to have more authority with certain publics (Eriksen & Gill, 2010). Coppola and Maloney (2009) supported the concept that successful campaigns involved multiple organisations in a campaign.

Attractiveness may be one component influencing persuasion. Petty, Goldman and Cacioppo (1981) stated that despite the message being an important part of communication, more subjective measures including source reliability and physical attractiveness were equally important. Wilson and Sherrell (1993) supported this, stating “members of the target audience may be more likely to identify with and hence adopt the opinions from attractive sources compared to unattractive sources” (p. 102). However, attractiveness is a subjective construct, one that varies between cultures and societies.

Evidence suggests that trust is more persuasive than physical attractiveness. Renn and Levine (1991) proposed that trust is an essential component to have between publics and a spokesperson or agency for the message to be effective and persuasive. Burkart (2004) supported this, stating that trustworthiness is one of the central aspects of persuasion.

How trust is built is still a matter of debate. Rawlins (2007) defined trust as a willingness, from one party, by their behaviour and intention to another party that is benevolent, reliable, competent, open and honest. This definition includes both intent and behaviour, making it a valuable definition to use for the thesis. Luth, Jardine, and Bubela (2013) argued that trust is occurs when people believe that decision makers share their values as well as have confidence in their past performance. R. J. Marshall et al. (2007) supported this stating that mutual understanding and acknowledgement of cultural, social and religious differences are important from emergency managers (R. J. Marshall et al., 2007). L. Gray et al. (2012) confirmed that the quality of relationship and level of trust between authorities and publics was a major determinant as to whether those publics acted on risk messages. Höppner, Whittle, Bründl, and Buchecker (2012) recommended two-way communication campaigns and programmes, where the emergency manager is accessible and has a relationship with their publics, as the preferred model. In one case study, trust was lessened when officials came to community meetings, spoke from podiums and spoke in a technical manner while those officials who interacted openly, gained more trust (McComas, 2003).

Not only does trust affect people following advice before and during a crisis, but P. H. Longstaff and S. U. Yang (2008) stated that “a local population is more likely to bounce back from a crisis such as a natural disaster or terrorist attack if it has access to trusted information” (p. 14). Norris et al. (2008) stated that “trusted communication treats people as a capable ally, invests in public outreach and reflects the values of priorities of local populations” (p. 140).

Lack of trust can have a range of detrimental effects. Frewer (2004) argues that when distrusted sources communicated information, it made that information less trustworthy to publics, having the opposite desired effect. This is supported by Wachinger, Renn, Begg, and Kuhlicke (2013), who suggest that trust is required in scientific experts and authorities for members of the public to have confidence in their advice to take protective measures. This suggests that for people to listen, trust in the spokesperson is a requirement.

Measuring trust is not a straight-forward task. Scholarly endeavours to measure trust have ranged from interpretivist to empirical through attempts to use scales. One of the components of evaluating trust involves measuring relationships. Chia (2006) focused on determined relationship characteristics by reviewing best-practice literature and compared this to traditional public relations practice to gain a better understanding of how to increase trust. The Zaichkowsky (1985) scale, was developed to measure relationship involvement called the Personal Involvement Inventory (PII) which informed consumer behaviour, and has gained popularity to measure trust and relationships in communication (Bortree & Waters, 2010). Bortree and Waters (2010) measured four separate relational constructs: administration, instrumental aid, nurturance and involvement, which have been rarely measured in communication scholarship (p. 11). Glaeser, Laibson, Scheinkman, and Soutter (2000) used surveys to determine that past behaviour, if trust generating, would predict how much publics trusted organisations. This finding indicates that if science and emergency management organisations want to generate trust in future, they need to continually act in a trustworthy manner towards their publics.

Community resilience and social capital researchers are also measuring trust because it is an essential component of resilience (Becker, Paton, Johnston, & Ronan, 2013; Paton, 2008). Social capital is defined as the aggregate of actual or potential resources in any one network (Bourdieu, 1985). Trust is an important component, and is essential for networks to function (Aldrich & Meyer, 2015). Aldrich and Meyer (2015) suggested that trust may be measured

through surveying, to explore attitudinal and cognitive aspects of social capital, as well as behavioural manifestations and more experimental techniques including laboratory experiments, games, scenarios and interactional observations. Unsurprisingly, given the construction of knowledge, not one method has been more effective in measuring trust than the others. However, there are issues with all these studies, which include diverse cultural attitudes across different geographic areas. Also, almost all the studies include smaller groups that act more like key stakeholder groups than more “general publics”.

There are some promising linkages between communication theorists, recovery from disasters and how that relates to social capital (Matheson & Jones, 2016). Matheson and Jones (2016) analysed social networks in Christchurch, specifically the suburb New Brighton, during recovery using communication networks. Varda et al. (2009) also explored social networks and trust in recovery, related to Hurricane Katrina.

Given the relationship and legitimacy aspects of trust, there is evidence that other persuasive people outside official spokespeople or authorities can assist in delivering preparedness messages with credibility. Disaster experiences, told by relatable individuals, appear to have particular influence over many publics’ perceptions of preparedness (S. D. Moore et al., 2004). Y. C. Kim and Kang (2010) elaborated further, stating that “storytellers, such as local media, community organisations and neighbours, should be the first and most critical step in helping residents prepare for various natural disasters” (p. 484). Emergency managers may be advised to create partnerships with reliable and trustworthy community members to tell stories that are persuasive in assisting people to prepare.

Now that I have explained the literature about sources, I will examine messages.

Messages

Messages refer to the information that the source wants to convey to the public (Berlo, 1960). Messaging is a commonly researched aspect of the SMCR model within emergency management (R. Shaw & Goda, 2004; Teigen & Brun, 1999). Messaging research specifically examines risk, probabilities, and hazards (Witte, 1995). Less frequently addressed are specific and local consequences of a specific risk (Becker, 2012; Blood, Tulloch, & Enders, 2000; Christensen, Andersen, Duijm, & Harremoës, 2003; Fischhoff, 1995; Fitzpatrick & Mileti, 1994; Kahlor, Dunwoody, Griffin, Neuwirth, & Giese, 2003; Weinstein, Sandman, & Blalock, 2001).

Inclusion of consequences and vulnerabilities in messages suggests that realistic outcomes are a key factor for publics taking risk mitigation and preparedness actions (Eriksen & Gill, 2010; R. Shaw, Kobayashi, & Kobayashi, 2004; K. Smith, Barrett, & Box, 2000). While realistic consequences and impacts are an issue, there is evidence that locality-based messages are persuasive because this provides context and personal connection with the risk (Buckle, Marsh, & Smale, 2002; Lindell & Perry, 2012).

However, some research indicates there is a careful balance that has to be maintained when writing messages. When disaster consequences are communicated to the public, these messages can have a tendency to become extreme, thereby creating fear, threat or guilt campaigns. This type of campaign is common but has mixed results and needs to be utilised with caution (Mulilis & Lippa, 1990; Turner & Underhill, 2012). Examples of fear appeals are warnings on tobacco products that include graphic imagery of cancer patients, directing threats at one's personal wellbeing on an individualistic basis (Peters, Ruiter, & Kok, 2013). McClure and Sibley (2011) explored negative threats and determined these were not persuasive unless people felt that the actions they took to mitigate consequences would be an effective use of time, skill and effort. McClure's findings are supported in another study about fear and threat campaigns, by C. H. Miller, Adame, and Moore (2013) who stated that "successful campaigns must focus on stressing the immediacy and salience of potential outcomes and especially the certainty of personal consequences, should individuals' self-efficacy remain low or public ignorance of the importance of preparation remain unremitted" (p. 24).

The main messages that are communicated by the source, for the purposes of this research, are about risk and hazard.

Risk

One prevailing issue that plagues the discourse about risk communication is the definition of risk. This is relevant to the thesis because one of the central questions concerns best-practice communication for earthquake preparedness. As discussed in previous sections, risk communication theories tend to privilege the source, rather than model a co-created exchange. However, in the spirit of comprehensiveness, I now explore some academic conversations specific to these definitions to acknowledge the field's complexity.

Defining risk is a complex exercise. To provide some context to the challenges of determining a decisive risk definition, the Federal Emergency Management Agency (FEMA), the agency in the U.S.A. responsible for responding and assisting in large-scale emergencies, has a training guide that contains more than 61 definitions of risk (Blanchard, 2008). This section, therefore, is not an attempt to determine which definition “rules them all” but rather to comprehend how each discipline perceives risk within its domain and which definition is most appropriate for this thesis.

Aven (2011) determined that risk could be categorised in three main ways: based on events, consequences or uncertainties, a quantitative concept to create models and subjective. The United Nations Strategy for Disaster Reduction’s definition of risk as the “combination of the probability of an event and its negative consequences” (United Nations International Strategy for Disaster Reduction, 2009, p. 25):

$$\text{Probability} \times \text{Negative Consequences} = \text{Risk}$$

This definition is not as simple as it may first appear as it focuses on the consequence of a hazard occurring as well as probability – but does not consider vulnerability, which may complicate communication.

In the risk communication discipline, risk is popularly defined (e.g. Sandman, 1999; Weinstein et al., 2001) as:

$$\text{Hazard} + \text{Outrage} = \text{Risk}$$

Weinstein et al. (2001) define the individual components of the equation as “the technical assessment of risk and outrage is the emotional response to the hazard” (p. 19). The Sandman (1999) definition suggests the risk is the emotional response (outrage) of publics. Risks may be loss of trust, rage and political change due to outrage. This is by no means the only definition of risk within the risk communication discipline but it has utility for this thesis because of its incorporation of publics as part of the concept and it includes dimensions of communication e.g. emotional response. For clarity, I will refer to this concept as “communication risk”, to avoid confusion with the more physical definition of risk.

The New Zealand Civil Defence Emergency Management Act (2002) defines risk as:

$$\text{Likelihood} + \text{Consequence} + \text{Hazard} = \text{Risk}$$

Chapter 2: Bridging the Literature

The above definition is from current legislation about emergencies in New Zealand.

As well as disciplinary differences in the definition of risk, there is an added layer of implication in regards to the policy interpretation of risk. The ISO Standard 31000 (2009) for risk management simply defines risk as:

$$\textit{Effect} + \textit{Uncertainty on Objective} = \textit{Risk}$$

This is too broad to be useful for this thesis. For example, it does not help define risk specific to natural hazards except in the broadest terms.

In natural hazards research, specifically volcanology, risk is defined as a “description and measure of potential harmful consequences to life and health, livelihoods, property, the economy or environment” (Francis & Oppenheimer, 2004, p. 484). Risk results from the interactions between natural hazards and human conditions for a given area and reference period.

Ultimately definitions of risk for this thesis need to be assessed by their utility and relevancy. I will use the CDEM Act (2002) definition of risk because it is the most commonly used definition in the New Zealand emergency management context, where this thesis is mostly situated. As noted, when using Sandman’s definition of risk, using the lens of communication, I will call it “communication risk”; the risks that can occur during communication or the risk of not communicating. This is different from “risk communication”, which is the communication of risk e.g. about earthquakes, nuclear incidents, volcanoes, and landslides.

I now investigate a component of risk: hazard.

Hazard

Hazard is another term used across disciplines. A hazard, in waste management, for example, has a different definition than a hazard in volcanology or geology. White (1974) argues that hazard is the product of interaction between the severity of the natural event and human activities in the afflicted area. Cutter et al. (2001) defined hazards as threats to people and the things they value.

The definition of natural hazards differs between social and physical science definitions. For example, in volcanology, a hazard is often defined as the existence of a condition under

which a potentially dangerous process might occur (Sigurdsson, Houghton, McNutt, Rymer, & Stix, 2000). Researchers from the social sciences focus on outcomes for people while the natural sciences tend to focus on the natural process leading up to that outcome. Supporting the social science approach, it is a widely held axiom among researchers and practitioners to state that natural hazards cannot exist without humans (Wisner, Gaillard, & Kelman, 2012). For simplicity, clarity and relevance in this thesis, I will use Cutter et al.'s (2001) definition of hazard.

Other types of messages

Fear-based messaging campaigns can encounter reactions when intense emotion is communicated, and sometimes that negative emotion can be re-directed at the source, rather than at the risk itself. An example of this was given earlier in this chapter, during the campaigns by Civil Defence about preparing people for hydrogen bomb warfare. The advice provided by scientists was either so unrealistic as to be perceived as comical by publics or so terrifying, that it created anger towards the organisation (M. Smith, 2010). Creating fear-based messages can be a significant detriment to the effectiveness of the campaign; publics may lower their trust levels towards the source which could, in turn, be disadvantageous in times of significant crisis (Whiting, 2009). This could also be a barrier to undertaking advice or recommendations issued by the organisation.

There are several challenges that scientists and technicians may face. (T.L. Sellnow et al., 2009b) stated that science can be perceived “as complex and access can be difficult for different audiences or highly technical terms used making it out of reach for some people” (p. 149). The presence of jargon can be a challenge for scientific or technical information; however, Covello (2003) suggested that the use of clear, non-technical language is appropriate for a general audience. This includes not using acronyms in messages.

A related message device that is not necessarily persuasive with different publics is the use of definitions in communication. Plough and Sheldon (1987) argued that publics do not compare events or emergencies strictly regardless of actuarial risks.

Length of messages is also important. Covello (2003) suggested all communicators should strive for brevity as most publics have limited time. Saaty and Ozdemir (2003) provided further reasoning for this, stating that messages should have seven or less elements, so the messages are consistent and lack redundancy.

Positive outcome expectancy messages address mitigation and policy issues. Frewer (2004) stated “assessment uncertainty is an important factor in deciding how to act, i.e. whether to reduce risk (through risk mitigation action) or reduce uncertainty (through focused research activity)” (p. 395). Martin (2008) conversely argued that other risk communication should be a part of policy decisions, focusing on first addressing the publics’s needs. But how can communicators or emergency managers know the needs of the publics without their inclusion in designing messages?

One way could be through participatory communication. Servaes and Malikhao (2005) suggested participatory communication attributes include listening to develop trust and reduce social distance between the source and publics. This new approach requires a shift in thinking by communicators and emergency managers (Servaes & Malikhao, 2005). Sellnow, Ulmer, Seeger, and Littlefield (2008) acknowledged the role for more risk communication campaigns to be based on participatory communication. The dynamic changes during participatory communication campaigns to co-sharing power between the source and publics (Neuhauser, Rothschild, Graham, Ivey, & Konishi, 2009). When searching for the term “participatory risk communication” and “emergency management” in Scopus and Web of Science, I found three articles. Jahangiri, Izadkhah, Montazeri, and Hosseinip (2010) explored methods and appropriate strategies on earthquakes in Tehran, Iran, which included recommendations to advance participatory approaches in public education. Xu et al. (2016) examined using mobile technology and social media to create a shared participatory spatial analysis during urban emergencies in China. C. Crabtree and Braun (2015) focused on participatory research, rather than communication, and developed a “PhotoVoice” project in Hawai’i, to further support the community’s tsunami planning and was deemed by the researchers as successful.

Further, one area has more research and case studies for participatory risk communication: case studies from developing countries. Ramaprasad (2005) designed, implemented and evaluated a social marketing campaign about flooding in Vietnam, where the participatory paradigm was used to develop messaging. Servaes, Jacobson, and White (1996) suggested the prevailing practice in international development, with respect to changing behaviour, has moved from the dominant paradigm of a top-down approach using western experts to a participatory paradigm using consciousness raising and focusing on local input. In Vanuatu, participatory communication was used to develop hazard maps for volcanoes (Cronin et al., 2004). However, I found only a few articles, listed in the above paragraph, as evidence that

this shift towards the participatory communication in the international development discipline and practice can be found in risk communication and emergency management in developed countries.

These gaps in research and practice may have created a lack of longitudinal understanding of the effectiveness and perception of risk messaging before, during and after events. More information about barriers to preparation, risk awareness, and issues of the knowledge-behaviour gap would be valuable to help us understand publics' thought processes when it comes to preparing or not. This would fill the gap currently in the emergency management-specific research specific to persuasive campaigns.

If we can co-create messages and tear down the pretence of separation between the expert and the public, as is required by more participatory approaches, these campaigns may have more value for all involved (Servaes et al., 1996; Servaes & Malikhao, 2005). This aligns not just with participatory communication but also more traditional excellence theory in communication (Grunig, 1992).

Preparedness

Preparedness can be conflated with definitions of resilience, in the same way that hazard and risk are often interchanged. That preparedness and resilience are often perceived as the same phenomena can be supported by definitions popularised by a variety of theorists and organisations. Benson, Twigg, and Rossetto (2007) defined preparedness as activities and measures taken before hazard events occur to forecast and warn against them, evacuate and protect property when they threaten and ensure effective responses (Benson et al., 2007). Although, in (Benson et al., 2007), they neglected to define who is taking those activities or measures, Ronan and Johnston (2005) suggested that emergency preparedness be defined as encompassing individual and community, rather than governmental actions taken to support activities during and after the event (Ronan & Johnston, 2005).

Preparedness is also defined by international organisations. The International Federation of Red Cross and Red Crescent Societies (2011) defines preparedness as “the knowledge and capacity developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely imminent or current hazard events or conditions” (p. 5). This definition is

consistent with the one provided by the United Nations International Strategy for Disaster Reduction (2009a).

Other definitions of preparedness include more public-specific perspectives including household preparedness or individual preparedness (Becker, 2012). Becker (2012) suggested “being prepared for a disaster at a household level typically involves undertaking a variety of activities, from collecting essential survival items through to more complex tasks such as making a household emergency plan or retrofitting a building” (p. 11). Becker’s (2012) definition differs from others in that it focuses on individuals and their actions rather than capacities and knowledge of whole communities or organisations. This critical difference allows preparedness to be confined for the purpose of this thesis. However, it is important to note that Becker (2012) separates this from individual psychological preparedness, which has less to do with outputs (activities and survival items) and more to do with thinking.

Now I have investigated the two major disciplines intersecting in this thesis, as well as risk communication, I investigate several case studies showing how and when these converged in practice. Because of my own orientation as a professional working in this field, and because one of my key aims in this thesis is to apply research to practice in order to make recommendations, I found these case studies useful to explore and illustrate both alignments and disconnections between theory and practice in a professional context.

Now that I have explored aspects of messages and the issues with focusing on messages, I examine the literature relevant to channels.

Channel

Channel refers to “how we receive the message” Berlo (1960). According to Berlo (1960) channels are a largely sensory experience: sight, sound, touch, taste and smell. In the lens of my specific research, channels do take on a more specific meaning about public education and public information in the emergency management and communication literature.

Channels include the different types of media and social media, advertisements, written documentation directly from emergency management or science agencies, television and radio spots, text messages, as well as people like neighbours, friends, and community sources from whom information comes face-to-face (Mersham, 2010). Channels are more than a simple message delivery device. Channels can create or diminish trust, strengthen relationships, collaborations or, in turn, damage credibility (Mersham, 2010). Too many

channels with conflicting information can create confusion or disbelief in both publics and sources (Revere et al., 2011). Mileti and Darlington (1997) suggested that with too many channels containing different messages, people engage in independent “searching behaviour” which may or may not benefit them.

Also, channels carry risks that may either be unforeseen or unintentional for the source. One of these risks includes exclusion. The project in Vietnam, meant to be a participatory communication project, relied heavily on written information among a population who had low literacy rates (Ramaprasad, 2005). Magsino (2009) expanded on risks of channels using network theory research, relevant to disaster preparedness, to state that channels used by community leaders or politicians, had a reverse effect on the channel: community members actively avoided using those channels which were patronised by community leaders. Some channels can be actively avoided by certain publics, truncating or sabotaging two-way communication efforts. Understanding which channels are effective for specific messages during the preparedness phase of emergencies is important as it could assist with behaviour change and motivate action. Without functional and appropriate channels, important public safety information may be lost. But this is only one potential issue; what is more concerning is the loss of trust, relationships and dialogue when channels are inappropriate, untrustworthy or only one-way.

Mileti and Fitzpatrick (1992) advocated a model which prioritised creating a brochure but now, given the age of social media and the internet, this channel appears dated. What could be a valuable lesson from Mileti's work is that people may require materials that are in a meaningful format and from a familiar, trusted ‘go- to’ channel. Mileti has stated that emergency preparedness should be marketed as a “can of Coke” (Mileti, 1999). Mileti and Fitzpatrick (1992) championed the social marketing model, which coincided with a rise in the emergency management literature and community resilience. However, social marketing campaigns, such as the New Zealand government’s ‘Get Ready, Get Thru’ campaign, while effective in increasing awareness of risk, have shown only marginal success in creating the behaviour change required to increase preparedness (Colmar Brunton, 2013). However, other than Mileti’s work, there are few articles that focus specifically on channels and emergency preparedness. Macaulay and Logie (1996) argued for more agility in public education in schools, as schools as a channel had some issues. Their research was about “pre-written messages and educational kits” that teachers rarely used because the information was often out of date and was assessed by those teachers as not local enough to be meaningful to

students. Bainbridge and Galloway (2010) advocated for changing messages and channels based on each emergency, to meet the needs of the publics. Veil, Buehner, and Palenchar (2011) supported Bainbridge and Galloway (2010) by suggesting that emergency managers join online forums to initiate conversation with a variety of publics, as a form of interpersonal communication.

Another channel discussed in emergency management and risk communication literature is the effect of maps and imagery. Eitel, Scheiter, Schüler, Nyström, and Holmqvist (2013) argued that “the general notion of why there should be a mutual influence between text and picture processing is grounded in the fact that text and pictures fulfil complementary functions during multimedia learning, which together contribute to the construction of a comprehensive mental model” (p. 49). In a study of bushfire evacuees and non-evacuees, by McCaffrey, Velez, and Briefel (2013), the researchers asked both groups what the most trusted information channel was. The local fire department, family/friends/neighbours, maps, and meetings with emergency managers/law enforcement were the most trusted channels for evacuees. Radio, television, newspaper, friends/family/neighbours, maps and fire department ranked high for non-evacuees, indicating a difference between those directly affected by the emergency versus those who were not. To summarise, according to evidence in some research, maps are useful devices and trusted for communicating, but like any other channel are open to interpretation.

Social media and emerging communication technologies like apps, given the relatively recent influence within society as a channel of communication, are of growing interest to emergency management researchers. Social media were important channels during the response period of the Canterbury Earthquake Sequence (Flew, Bruns, Burgess, Crawford, & Shaw, 2013; Poole, 2012). Social media research within emergency management research, corresponds to both promulgation of messages and gathering of information for intelligence purposes during response (Briones, Kuch, Liu, & Jin, 2011; Cain, 2013; Merham, 2010; C. H. Miller et al., 2013; Tierney, Bevc, & Kuligowski, 2006). The implication of this is that social media may become more studied as channels of intelligence and situational awareness received by the source from publics rather than the other way around. This in itself is not problematic and could be extremely beneficial however, the focus may remain on one-way transmission where the source assumes passivity rather than using the channels to develop relationships. This is not reflected in other disciplinary areas where social media is being acknowledged for its participatory value (Chou, Hunt, Beckjord, Moser, & Hesse, 2009; Paton & Irons, 2016;

Russo, Watkins, Kelly, & Chan, 2008). Social media to encourage emergency preparedness is still fairly sparse; I found only a few researchers exploring this area (e.g. Merchant, Elmer, & Lurie, 2011; Veil, Buehner, & Palenchar, 2011). Social media were also not used for preparedness communication before the Canterbury Earthquake Sequence by the regional council I worked for.

However, while social media channels were not utilised as channels for preparedness, there were websites that contained preparedness information created by the Canterbury Civil Defence Emergency Management Group. The use of websites is an important part of preparedness campaigns, however, there have only been a handful of research studies to examine their effectiveness (Dunbar, 2007; Tanner, Friedman, Koskan, & Barr, 2009; Uribe, Hidalgo, & Martinez, 2015). These studies have only focussed on their effectiveness in delivering one-way messages, not on the opportunities that websites offer to build relationships, create trust, engage in conversation, develop and support feedback loops or any other action that may co-create communication. Friedman, Tanwar, and Richter (2008) stated that many people search the Internet for health and preparedness information because this can be accessed faster and is more relevant to meeting the specific needs of the searcher than generalised information standardised in print. Yang, Dong, and Liu (2010) argued that for earthquake risk communication messages to be proliferated, more advanced internet communication technology is required to deliver messages to publics. However, Yang et al. (2010) maintained a paradigm that has long been problematic for the co-creation of communication, that channels are merely a message delivery conduit. Grunig (2009) argued that it is not lack of technology that is the central issue but rather that while new technologies are interactive, relational and dialogical, communicators use these new channels the way they used older channels: one-way, message oriented, and ethnocentric (p. 6). In essence, for these new social channels to be examined to their fullest, old ways of communication must be abandoned.

Grunig's (2009) assessment is particularly meaningful to me as it reflected the social media use before the 22 February 2011 for the organisation I worked in. Before that earthquake, social media were largely used as broadcasting tools. This is clearly illustrated in outputs on Twitter during the September 4, 2010 earthquake response in Appendix 4.

Face-to-face communication is an essential channel for communication for many people (Sassenberg, Boos, & Rabung, 2005). While I focus on written materials for this research,

face-to-face or, more specifically, opportunities or invitations for sources and publics to have face-to-face dialogue can be inferred from the written material, for example through provision (or not) of contact details for a real person or invitations to give feedback or meet. But face-to-face communication is not solely the territory of the source and receiver relationship, it is more complex, involving social networks. Face-to-face communication with trusted intermediaries who are not the official ‘source’ of the information is also important to the diffusion of ideas. Friends, family and associates can have huge impacts on how individuals create meaning about a topic E. M. Rogers (1976). Lindell, Tierney, and Perry (2001) argue network and system research is scant within emergency management regarding preparedness.

Moonen et al. (1995), researched risk communication among workers who handled toxic and carcinogenic substances, and argued that exposure to information about working with carcinogenic substances through outside media, resulting in interpersonal communication among their own social group about the campaign subject, had a clear impact. Further, Moonen et al. stated (1995) that face-to-face communication leads to more influence. Eiser et al. (2012) argued that risk judgements, interpretation and action, are not just personal but also interpersonal.

Overall, the literature suggests that face-to-face communication cannot be underestimated as a means to co-create communication. For written materials, best-practice would mean that face-to-face interactions and networks were engaged within the content.

Channels represent more than “message delivery”. Channels can also develop trust and participation between sources and publics (Griffin, 2003). However, channels can also have an opposite effect if they are untrustworthy or used by sources disliked by publics (Markus, 1987). Channels are complex and need to be critically examined before being considered for the development of communication strategy.

I now explore publics.

Publics

Publics, for this thesis, are defined as “the intended receivers or audiences” (Fitzpatrick & Milet, 1994). The term ‘publics’ was first defined by Dewey (1927) as a group of people who engage in discussion about an issue or problem. Public relations practitioners and academics use other terms to describe large groups who share similarities, such as audiences

(L'Etang, 2008). As such, L'Etang (2008) describes publics as a group that emerges in response to an issue.

Grunig (1992) argues that there are subtle differences in the terms publics and audiences, in the levels of passivity: audiences and stakeholders are perceived as groups such as employees, while publics are more aware or active. The development of this definition is related to Grunig's (1992) situational theory of publics and the nested model of segmentation.

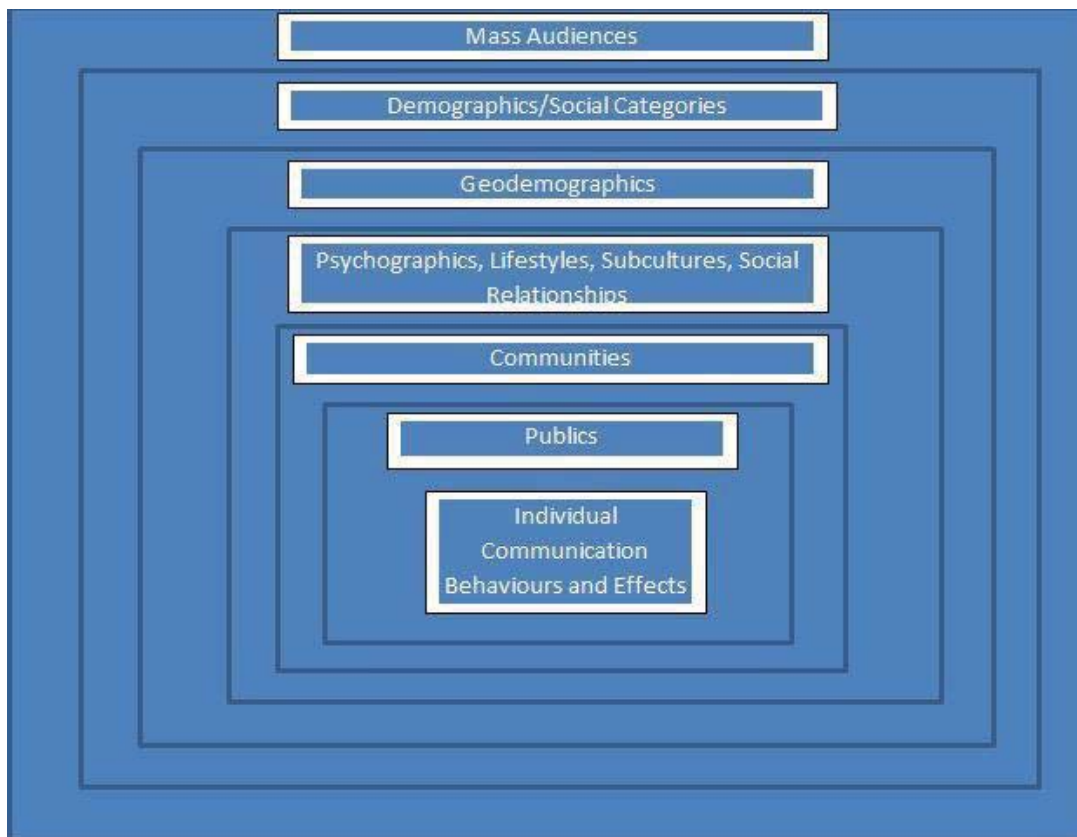


Figure 2.6: Grunig's (1992) Nested model of Segmentation.

Grunig's (1992) nested model (Figure 2.6) organises groups into “nests” that become more general and less connected as one moves from the centre to the outside. However, this is not to underestimate the power of a mass audience when incensed or excited.

Grunig (1992) expands the segmented publics further by defining four more types:

- o All issue Publics. Public active on all the issues.
- o Apathetic Publics. Publics inattentive to all of the issues.
- o Single-Issue Publics. Publics active on one or a small subset of the issues that concerns only a small part of the population. Examples: anti-whaling.

- o Hot-Issue Publics. Publics active only on a single issue that involves nearly everyone in the population and that has received extensive media coverage. (e.g. climate change). (p. 139)

The term “publics” is not without critics. Motion and Leitch (2001) and S. Leitch and Neilson (2001) state that groups of people do not become publics until they are identified as such by public relations practitioners, thereby objectifying, orientating and imposing identity. This is a salient point; by identifying groups, an “us” versus “them” mentality may hinder communication.

Even given these critiques, the term “publics” has more utility than the term audiences. Grunig (2009) and L’Etang (2008) both discuss the passivity and perceptions in the terms audiences and receivers. Audiences’ perceived latency is why I prefer to use the term publics. “Publics” is a more empowering term while audience or receiver implies latency. I chose this term to reinforce the concept that people are not simply empty vessels waiting to be filled with information or direction from emergency managers, communicators or scientists, but rather active participants, with their own ideas, beliefs and attitudes.

Research within the emergency management literature on who publics are, specifically on their characteristics that go beyond basic demographics, is, again, limited. Much of the research in this area is about specific public groups, like vulnerable persons, elderly, gender, youth, or other aspects of diversity (A. Bateman, Danby, & Howard, 2013; J. M. Bateman & Edwards, 2002; Cutter et al., 2001; Gowan, 2011; V. A. Johnson et al., 2014; Vaughan & Tinker, 2009). This research informs emergency management literature regarding the many social, cultural and demographic issues. But it could be extended with a better understanding of how groups are formed around interests, issues, knowledge levels, behaviours and attitudes that cross standard demographic groupings. It would be more useful to determine how publics actively co-construct communication rather than being ‘targeted’ by it, as suggested by situational theory of publics (Fall, 2004; Grunig, 1992; Grunig & White, 2008; Major, 1999).

There is evidence that women and men prepare for emergencies in different ways (J. M. Bateman & Edwards, 2002; Enarson, Fothergill, & Peek, 2007; Eriksen, Gill, & Head, 2010). The research suggests women are more likely to prepare food, water and other emergency supplies while men are more likely to undertake mitigation activities around the home and property (Enarson et al., 2007; Eriksen et al., 2010; Mulilis, 1999). This does not imply that women are more prepared than men but that genders in developed country contexts can

prepare differently. However, Gowan (2011) found that gender was not a factor on preparedness or perceptions of disasters in New Zealand.

Given the evidence for gender-based campaigns, I could find no examples of contemporary preparedness communication campaigns that are gender-specific in a developed country context. The reason for the lack of implementation of this research in gender-differentiated communication strategies is unclear; perhaps it is perceived as socially unpalatable to make sweeping gender generalisations, or that gendered communication is too controversial to operationalise. But Civil Defence in the 1950s and 1960s did use these gender stereotypes and enforced the identity of women as being the one who prepares at home (Preston, 2008). This may be an instance of where a campaign has changed or been influenced by cultural norms.

Similar to gender differences, Tuohy (2014) examined how the elderly people in Christchurch made meaning of preparedness, after the damaging earthquakes in 2010 and 2011. Tuohy (2014) reported that while preparedness messages were well received by the elderly, there was a lack of messages directed to their specific needs to survive a disaster. This finding, which the needs of the elderly were not addressed in preparedness campaigns, is supported by Gowan (2011).

Despite the growing area of audience segmentation research, current public education campaigns tend to focus on a “one size fits all” approach. According to the New Zealand National Strategy for Public Education (2006) and the more recent Colmar Brunton survey in 2013, the “Get Ready, Get Thru” campaign within New Zealand focuses on a more “general public” approach despite including discussions on demographic barriers to preparedness as a demographic issue (Colmar Brunton, 2013). This consistent messaging has changed little since its inception in 2006 (Colmar Brunton, 2013; Ministry of Civil Defence and Emergency Management, 2006). While the “Get Ready, Get Thru” media campaign has added specific commercials about tsunamis, a video to assist those with hearing disabilities, a household planning guide, and a brochure and websites translated into other languages, the messages have remained unchanged. It is also interesting to note that no changes were made to the campaign after the Canterbury Earthquake Sequence (2010 – ongoing), the Cook Strait/Lake Grassmere Earthquake sequence in 2013 or various small volcanic eruptions on Mt. Tongariro, White Island and Mt. Ruapehu. This lack of message adaptation is in direct conflict with research that confirms successful social marketing campaigns change and

evolve over time, especially when the population has experienced an emergency (Crano & Prislin, 2006; Ramaprasad, 2005).

There is evidence for an evolution of messages within the natural hazards sector. T. M. Wilson et al. (2014) updated volcanic information posters based on feedback from the research and practice community. Volcanic hazard maps have also been updated, based on research by (M. A. Thompson, Lindsay, & Gaillard, 2015).

Grunig's (1992) situational theory of publics supported that it is best-practice to recognise publics as diverse, segmented, and arising in response to issues. Further, messages should adapt to meet the needs of the publics. J. N. Kim (2011) tested the use of situational theory and segmented publics model for crisis and found that by developing messages that meet the needs of publics. This is supported by the findings of Sisco (2012) who suggests that NGOs should change messages based on the needs of their publics during times of crisis.

Best-practice approaches to understanding publics include recognising publics as active, highly differentiated, complex, evolving, and arising in response to issues (Grunig, 2009). Publics are not merely latent audiences, waiting patiently to be engaged with by sources and should not be treated as such if the source's goal is persuasion (Larson, 2013).

Now that I have examined publics, I will explain my final area for the best-practice matrix: setting.

Setting

Setting, while not part of Berlo's (1960) SMCR model, is an amalgamation of components within the cybernetic model of communication. I define setting as the time, place, culture, and society in which messages are conveyed to publics. This includes aspects such as noise, culture, access, society, community, and conflict. In the communication literature, knowledge, attitudes, and behaviours are important aspects of the context in which communication takes place.

Emergency management and natural hazards literatures have not, from my review, accounted for different environments such as location and timing that publics will receive preparedness messages. The only direct link that I could find in emergency management, natural hazards and risk communication in the literature was from Petty and Wegener (1999), who discuss distraction as it relates to the elaboration likelihood model (ELM). ELM does contain many

useful constructs as a theory but still maintains a “source/publics” power and authority dynamic. The ELM theory also lacks complexity about the “making of meaning” by various publics that exists in some of the communication theories, including excellence theory. However, communication research contains explorations of how publics make meaning; there is a potential partnership between these communication scholars and Petty and Wegener.

I shifted focus from examining specific time and included using the concept of resilience as a way to understand the “setting” in which publics interact with messages received through channels from the source is a useful concept in this research.

Community resilience

How well a society or a group of people can manage an emergency and continue cohesively afterwards is often termed “resilience”. Paton and Johnston (2006) defined resilience as “a measure of how well people *and* societies can adapt to a changed reality and capitalize [sic] on the new possibilities offered” (p. 234). Resilience is further described as a component of the adaptive capacity of society. Adaptive capacity describes society’s capability to draw upon its individual, collective and organisational resources and competencies to respond to and recover from disasters (Paton & Johnston, 2006).

Resilience is a developing area in emergency management communication research (George, 2013). Community resilience, as defined earlier, includes preparedness and how this affects preparedness beyond an individual level. However, community resilience is more holistic and systems-based than preparedness concepts alone; it is a cross-cutting theme across the 4 “Rs” and impacts all phases of emergencies. Examples of resilient communities responding during emergencies include Ngāi Tahu (Māori iwi in Christchurch) during the 22 February 2011, Christchurch earthquake, where marae (meeting houses) were opened to people to assist with responding to the earthquake (Kenney & Phibbs, 2015). Their actions included preparedness (providing food and water) and response (assisting publics). Ngāi Tahu were also involved in early community recovery planning for Canterbury (Kenney & Phibbs, 2015). The attitudes and actions of Māori are suggestive of resilience.

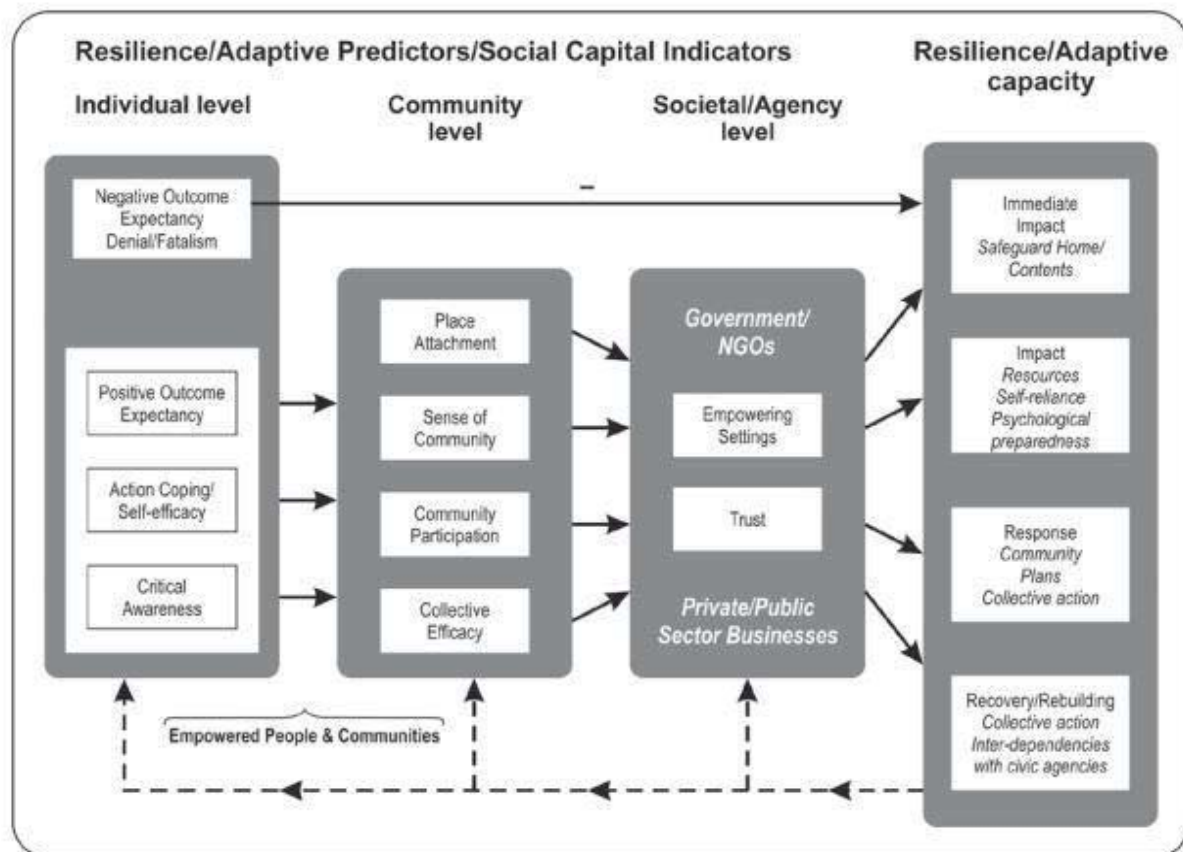


Figure 2.7: A model of community resilience (Paton, 2010).

Resilience provides a framework for the “setting” of communication in that it examines issues of trust, social support, resources, and community efficacy (Paton & Johnston, 2006). Culture has now been included (Paton, Johnston, Mamula-Seadon, & Kenney, 2014). Becker, Paton, and McBride (2012) argued that community resilience programmes present a unique set of communication challenges; message crafting alone will likely not affect resilience. The further inclusion of communication research and resilience is supported by (Burnside-Lawry, Akama, & Rogers, 2013; P. H. Longstaff & S. U. Yang, 2008). Framing communication strategies to increase resilience is an area that is too expansive for this thesis. However, some exploration of measurement is important to this thesis because it is, in part, communication evaluation research that examines aspects of community resilience, specifically positive outcome expectancy. For clarity, when exploring concepts in this thesis about community resilience and preparedness (as opposed to personal or individual preparedness), I will use the term “resilience”. The concept that is central to this thesis’s examination of disaster communication initiatives and their evaluation in New Zealand is however, preparedness.

Further, resilience has emerged from academic discussions to become something quite different than was originally intended. A. Kohn (2009) argued that the discussion of resilience had delved into sinister territory by not allowing students to debate larger policies but were rather encouraged to have more “resilience”. The term may have now lost its original meaning.

Norris et al. (2008) argued community resilience links networks of adaptive capacities after a disturbance or adversity. The value of community resilience is that it promotes the idea of communities as diverse, constantly changing networks to which emergency managers belong to and are not separate from. This challenges the one-way communication, public education model. It should again be noted that ‘publics’ passively obtaining messages is not considered best-practice in the communication literature. Eriksen and Gill (2010) supported communication’s inclusion in adaptive capacity networks, using participatory engagement methods. Eisenman et al. (2014) mapped out networks literally, working with communities to map and chart on computers to visualise relationships, assets and resources.

Further, Tuohy (2014) argued that social networks were valued by elderly to heed emergency preparedness advice. Vallance (2012) further argued that social justice issues in social networks were revealed during the Canterbury earthquake sequence, undermining the community resilience. D. M. Johnston et al. (2005) and Paton et al. (2009) determined that tsunami risk communication strategies must address social contexts to ensure relevancy of messages. Paton, Kelly, Bürgelt, and Doherty (2006) and Paton, Bürgelt, and Prior (2008) argued that community stories about bushfire risk were a significant motivator for preparedness among individuals.

Another issue within setting is distraction and how it relates to the experience of the communication situation by publics. Originally termed “noise”, the concept has been expanded to include any distraction that can alter or distort the message en route (Berlo, 1960). Distractions can be problematic for campaign creators and are difficult to anticipate. For instance, a well-crafted campaign can fail in implementation due to logistical failures that distract from the message, as was the case in Southern California when a well-constructed publication suffered from distribution failures (L. Jones & Benthien, 1995). As well as complex logistical issues, differing priorities for publics can be a barrier to preparedness; publics can be completely aware of the risk and decide other issues are more pressing (Eriksen & Gill, 2010). Campaigns should account for aspects of distraction and factor this

into messaging, as well as into implementation strategies. Again, the participatory communication literature covered in the messages section suggests that involving the public as creators can help to identify their priorities, and thus other interests that may have offered a distraction can instead be leveraged as a way to draw attention to the importance of the campaign goals. Petty and Wegener (1999) suggest using shortened messages that do not demand an extended period of attention from publics. Another way is to place counterarguments into the messaging and deal with them, as suggested by McGuire (1961). Grunig (1992) defines constraint recognition, which discourages communication behaviour when the actor feels they can do little about the outcome. People do not communicate about problems or issues that they believe they can do little about or behaviours they do not believe they have the personal efficacy to change (Grunig, 1992). This is supported by McClure, White, and Sibley (2009) findings, judgements of the general importance of preparation are affected solely by the outcome frame, whereas for survival actions there is an interaction between the action frames and the outcome frame.

In summary, setting includes culture, society, distraction and networks. The source needs to consider physical, social, cultural, and network factors when developing communication initiatives. Many other influencers are active in publics' lives. In other words, publics are not simply waiting in a vacuum to be engaged with by the source.

Now that I have examined the final component of the best-practice matrix, I will summarise the chapter.

Summary

This chapter presented an overview of literature from the disciplines of emergency management and communication as well as other relevant disciplines that have added to the discourse about the communication of earthquake preparedness.

A major finding in this chapter includes the many gaps between emergency management and communication with only a handful of convergences. This is puzzling as these fields would appear to have a natural affinity towards partnership. Communication researchers investigate the types of campaigns, messages, channels and settings that may assist in preparedness campaigns. Emergency managers seek to encourage preparedness among communities. It would appear that these disciplines could be natural allies and partners to achieve increased preparedness behaviours. However, the common theme across this literature review is not one of partnership but of isolation due to disciplinary silos. This lack of information sharing and

synergistic methods is perplexing; through my review of the literature, it appears that emergency management and communication have many similar definitions and were created at a similar time historically, yet have more often diverged than converged, developing distinct languages, terms and concepts for the same phenomena and challenges. Part of this research will examine silos between these disciplines and echo chambers within them, and the consequences of these approaches.

Another issue is that there appears to be an adherence by some scholars, particularly from the emergency management and risk communication disciplines, to a broken paradigm: that if people know about their risk, they will act to mitigate that risk. Risk and knowledge of that risk appear largely irrelevant in influencing preparedness actions among many publics. But is awareness a pointless exercise? Not necessarily. Awareness may lead to other activities, including political activism which includes changes in land-use (Saunders, Beban, & Kilvington, 2013). Evidence of awareness creating political action, although not preparedness, is found in the climate change discourse (Weingart et al., 2000). Political action to reduce risk may be, arguably, more important than storing food and water for emergencies.

What the resilience and preparedness discourses appear to share is the lack of inclusion of the scholars themselves. This may be caused by differences in epistemological traditions. Many of the risk communication scholars adhere to an empirical or positivist perspective, which requires an “unbiased observer”. Part of that epistemological position is the removal of bias so that the researcher is not placed within the research. But, if resilience and preparedness are holistic, network based concepts, and therefore all encompassing, then scholars cannot be removed from its study. I suggest that scholars are part of resilience and preparedness knowledge, not separate observers naming or observing a phenomenon.

Some scholars are moving to a more inclusive approach, to develop a comprehensive view of a resilient society (Becker et al., 2013; Gall, Nguyen, & Cutter, 2015). But I have struggled to find any reference of the researchers reflecting on their role within the literature or their contributions to these exclusions. This observation leads to my next chapter where I explore the research pathways taken in this thesis. Now that I have explored the relevant bodies of literature and provided the foundation for the “best-practice” matrix, in Appendix 1, I will explore my methods in the next chapter.

Chapter 3 : Research Pathways

DUNEDIN, November 26.

The Rev. P. W. Fairclough, in an address on "Earthquakes and their Causes," said:—"We have repeatedly heard of the tremendous catastrophes of Japan and South America. Compared with these anything experienced in New Zealand was a mere tremor. Skaptar Jokul, in Iceland, had emitted sufficient lava in one year to build Mount Blanc, and Sumbara, in 1819, threw out sufficient matter to cover New Zealand 5ft deep. The crust adjusts itself either by slow curving or by violent fracture and shock, or, by the slipping of a fault. In 1819 the coast of India at Cutch suddenly rose 10ft. In South America 100 miles of the coast were jerked up 7ft in 1822. A similar rise took place at Wellington in 1853. A great fault runs across Cook Strait through Wellington and Hanmer Springs. The total movement or downcast of this fault is estimated at 10,000ft. At the Canterbury end earthquakes of that region are caused by occasional little slips in this fault. The friction probably causes the heat of the Hanmer Springs. This fault is a safety-valve. It seems to be hung on a hair-trigger, and goes off too easily, to save up for a big burst. Movements of a fault of this kind, when about ready, may be helped off by various things. High tide or high barometer may prove the last straw in a region that wants to sink a trifle. The recent main shock took place at high tide, and so did the second. The shock of thirteen years ago was followed by a lesser shock after fourteen days, when the moon was in a similar position for causing a tidal strain on the crust. Again, fourteen days later, there was a third, and a still weaker shock."

The Press, 27 November, 1901

Retrieved from: <https://paperspast.natlib.govt.nz/newspapers/CHP19011127.2.53.8>

Chapter Three. Research Pathways

In this chapter, I explore the origins and nature of my methodological approach. I also investigate the relevance of the research design. Given the unique perspective I have as a researcher, I demonstrate in this chapter why these methods are appropriate for use in this research.

The lessons discovered, explored and distilled in this thesis come from a particular perspective: that of a practitioner in both the communication and emergency management fields. As this research is from the perspective of an “insider”, it required a full exploration of the ethical and research challenges. In this chapter, I will investigate the complexities and tensions of this “insider” perspective.

I now briefly summarise my research goals and methods. The figure below provides an overview of the tools and tactics I employ to visualise my research position, methodology, goals and methods.

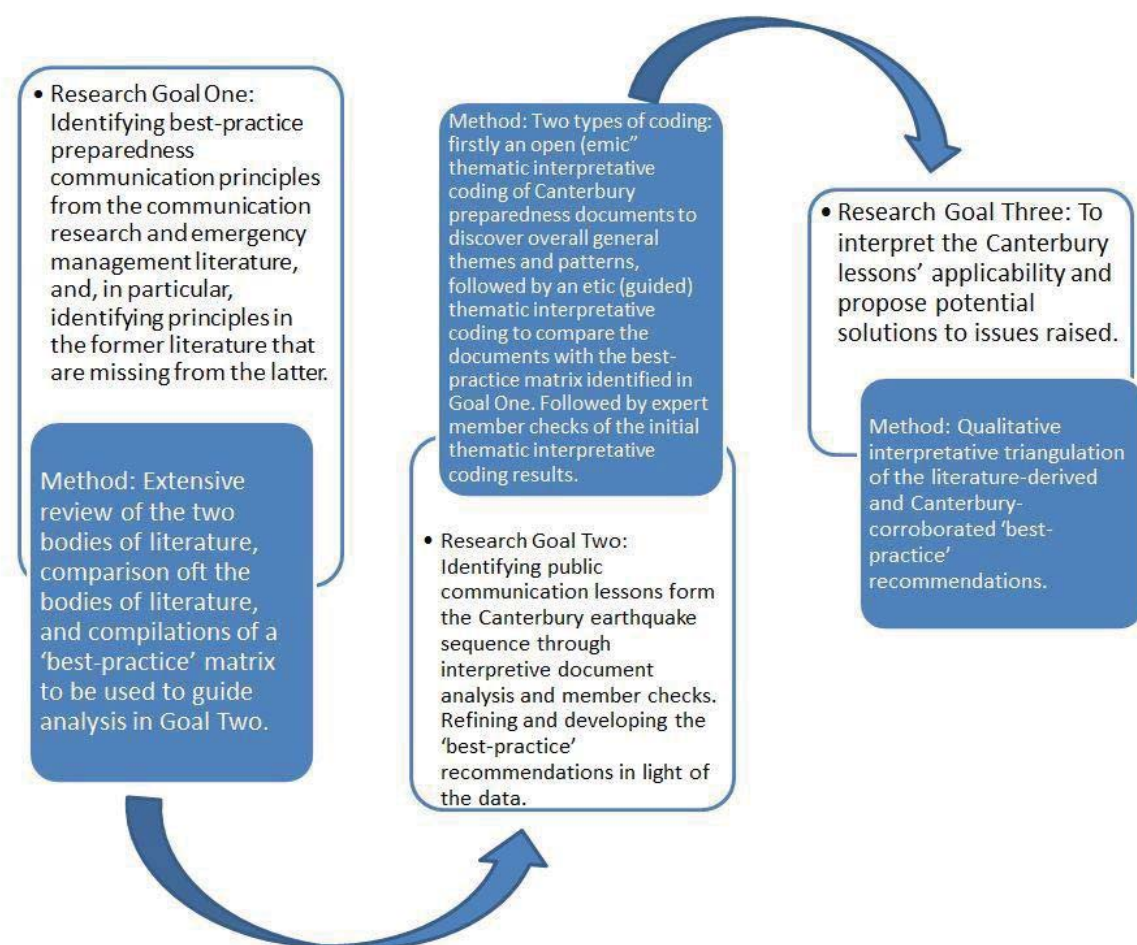


Figure 3.1: Research Goals and Methods.

Research Goal One. As will be expanded upon below and discussed in the literature review, in the first phase of the research I reviewed academic journal articles on the topics of best-practice communication in the disciplines of communication and emergency management. I also reviewed other topics including constructivism, persuasion and propaganda, risk and science communication to provide context to my focus on preparedness communication best-practice. I distilled this information to develop a best-practice matrix, which is explored in Chapter 2: Bridging the Literature and Chapter 4: Analysing the Q-Files. The results of this research are presented in the best-practice matrix in Appendix 1.

Research Goal Two. With this research goal, I used the best-practice matrix as a framework for generating evaluative insights. I did this by applying this best-practice matrix to “real world” examples (i.e. the Q-Files booklets) and interpreting areas of alignment and divergence. I evaluated whether these research-based findings and recommendations in the best-practice matrix could be a tool for analysing written communication. I used member checks to determine the validity of my interpretations and to explore further whether these research-based lessons had utility. I explain these methods under the section Research Goal Two and subsection Member Checks.

Research Goal Three. The focus of this goal’s was to interpret the lessons and learnings from Research Goal Two. The method used to service this goal is investigated further below in the sections entitled Research Goal Three and Member Checks.

I will now explain my research position and design.

Research Position

A research position is a combination of epistemology, theoretical perspective, methodology and methods. Crotty (1998) visualised the research position as a process, where the parts work together to achieve a common goal: to conduct research in a philosophical and academic manner. Crotty (1998) also suggests the framework for research positions as a tool to understand how epistemology, theoretical perspectives, methodology and methods relate to each other. This framework provides a logical progression of research, focusing on how all the components interact.

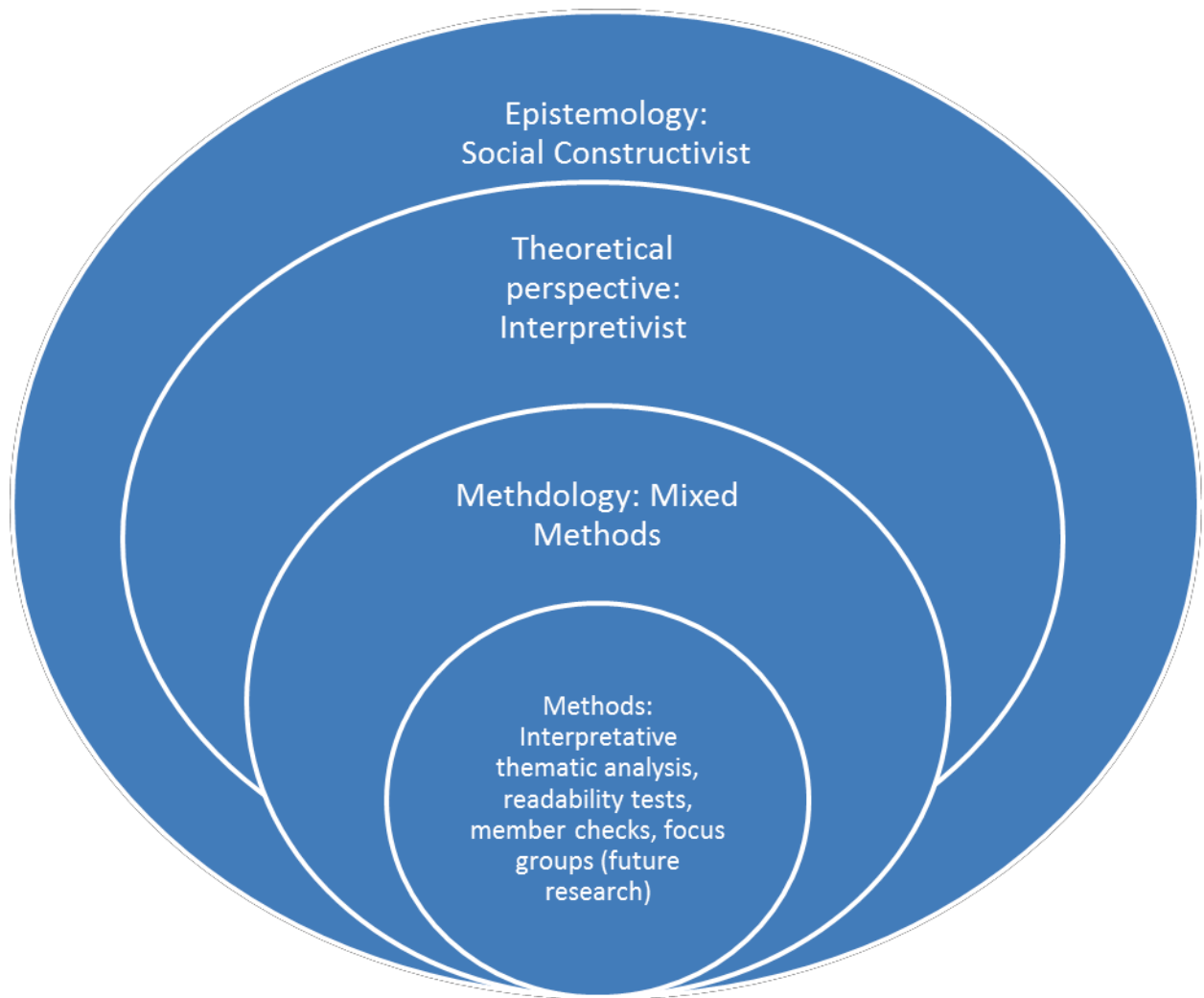


Figure 3.2: Research position (based on Crotty, 1998, p. 5).

I used Figure 3.2 to visualise the interplay between epistemology, theoretical perspectives, methodology, and methods. By using this visualisation, I felt able to connect with how these concepts interact and create a viable process for my research. Given its foundation as encompassing all the research, the largest circle contains my epistemological position for this research: social constructivist. I was influenced by researchers in both the disaster and communication fields as Littlejohn (1999) argues that communication is socially constructed. Mileti (1999) also contends that disasters are social constructs. Daymon and Holloway (2002) define epistemology as the theory of knowledge concerned with the nature of human knowledge. Crotty (1998) describes it as the theory of knowledge embedded in the theoretical perspective and thereby in the methodology. Both definitions identify epistemology as the “how” of knowledge creation, but I chose Crotty’s (1998) definition because it does not isolate epistemology as a lone concept but rather includes it as a part of an overall system of learning and knowledge.

The second circle contains my theoretical perspective; I used interpretivism. Denzin and Lincoln (2005) state that all research is interpretive, guided mainly by the beliefs and feelings the researcher has about the world. As an interpretivist, this theoretical position allowed me to explore mixed methods, using the lens of interpretation to assist with the triangulation of data. The third circle contains my main methodology: mixed methods, with both qualitative and quantitative methods used. The final circle contains my methods as interpretative thematic analysis for documents and focus groups with quantitative tools such as readability tests, and member checks, that includes surveys.

I now explore my epistemological position in greater detail and describe how this relates to my overall research design.

Epistemological Position: Social Constructivism

My epistemological position for this thesis is social constructivism, consistent with a considerable quantity and quality of research within the disciplines of communication and emergency management. I now explore the communication and emergency management disciplines' historical and contemporary uses of social constructivism as an epistemological position. The philosophical posture of much contemporary communication scholarship is social constructivism. Social constructivism allows and encourages researchers to become part of the research process to assist in determining multiple "truths". Krippendorff (1984) states that:

while ontological commitments assign scientific observers the role of discoverers of facts that are unalterably outside themselves, the emerging epistemology for communication assigns such observers the role of co-creators of facts (p. 27).

Littlejohn (1999) argues that social constructivism is the dominant epistemology in the field of communication. L'Etang (2008) supports the concept, stating the field is itself a cultural practice. Grunig and White (2008) suggest that the 'scientific method' is flawed as people cannot be totally objective. I am not implying that objectivism, or the "scientific method" does not have value generally, but it is not the most appropriate epistemological position for my particular research.

The second academic field underpinning this research is emergency management, and researchers in this discipline also employ social constructivism their epistemological foundation. Early in the history of emergency management research, there was a functionalist tendency, focusing on more empirical methods or case studies without qualitative analysis,

however this is now shifting towards acknowledging the value of social constructivism (Phillips, 2014). Mileti (1999) confirms this, stating that:

the largest impact on preparedness and response research has been made by the social constructivist perspective. It views disasters as socially produced through the formation of a common and shared definition. (p.211)

Mileti (1999) further supports the idea of disasters as a social construct, that is, the earthquake happens, but it is people's actions and interactions with and during that event that create the interpretation of a disaster. This is reinforced by other scholars in the emergency management and risk disciplines, including R. W. Perry (2007), Oliver-Smith (1996) and Kruchten, Woo, Monu, and Sotoodeh (2007).

The social constructivist's purpose is not only to observe but also to assist in the creation of knowledge by taking an active, participatory role in the process (Crotty, 1998). About research design, constructivists focus on the context in which a study occurs. Researchers can then adapt to the needs of the study (Phillips, 2014). As discussed in the introduction to this thesis, from my practitioner perspective, creating knowledge without using personal experience would make this research have little meaning. My research is directed not solely as an academic exercise, but I also aspire to assist other practitioners like myself and by extension, their communities. This makes alignment with social constructivism a compelling choice for this research. Social constructivists diverge into different theoretical perspectives, and mine is interpretivism, which I now explore.

Theoretical Perspective: Interpretivism

A theoretical perspective is a philosophical position providing a context for the research, such as positivism or the branches of interpretivism (Crotty, 1998). Daymon and Holloway (2002) explain that unlike positivists, interpretivist researchers maintain that they cannot be value neutral or wholly objective, and, therefore, their experience can be a resource. As L'Etang (2008) explains, it is the intimate relationship between the researcher, the subject of research and the situational contracts, which shapes inquiry. Interpretivist researchers focus on meaning, not measurement (Daymon & Holloway, 2002).

Interpretivism has both modern and ancient roots. Interpretivism came from a combination of Dewey's (1938) pragmatist theory of inquiry and Aristotle's practical philosophy (Craig & Tracy, 2014). Dewey (1938) described the methodology of practical inquiry as a formalised extension of ordinary problem-oriented reflective thinking. In Aristotle's *Nicomachean*

Ethics, Books I and VI, as interpreted by Craig and Tracy (2014), the ancient philosopher conceived of praxis as “practical human activity in spheres of life, such as politics and friendship, that involve choices about how to act in fluid and uncertain situations” (p. 98). These two combined philosophical agreements, both ancient and modern, create a foundation of understanding that states we cannot remove ourselves from the search for knowledge. We are the co-creators of knowledge. Recent examples of employing interpretivism by scholars in emergency management research include Toh, Corbitt, and Beekhuyzen (2014) and Leidner, Pan, and Pan (2009). Toh et al. (2014) explored the use of bush-fires and the development of bushfire preparedness materials. Leidner et al. (2009) investigated the SARS epidemic and Asian Tsunami (2004) case studies to determine what information system resources are valuable in a crisis response.

Emergency management has a history of employing interpretivism as a theoretical perspective. As noted in the introduction, Prince (1920) wrote the first emergency management doctoral thesis about being a first-responder during the Halifax explosion in 1917. He catalogued and dissected the events and social interactions he witnessed during the disaster, from the perspective of a volunteer medic and priest. Prince placing himself in the centre of the research is a good example of how disaster research applies interpretivist perspectives: he used interviews, documents and observations, methods similar to those used in this thesis. Prince’s contribution is widely acknowledged in the field of emergency and disaster research. There is the “Samuel H. Prince” award for top qualitative doctoral dissertations given by the International Research Committee on Disasters (Phillips, 2014).

Interpretivism is a theoretical perspective across a range of disciplines and not the exclusive territory of communication or emergency management. A simple journal database search involving the term interpretivism located in abstracts in Web of Science and Scopus, supported by a supplementary search on Google Scholar, resulted in the following disciplines using the theoretical perspective of interpretivism: information sciences (e.g. Walsham, 1995); organisational and managerial sciences (e.g. Leitch, Hill, & Harrison, 2010); accounting (e.g. Lee, Collier, & Cullen, 2007); media studies (e.g. Evans, 1990); international relations (e.g. Price, 1994); consumer research (e.g. Davies & Fitchett, 2001); communication studies (e.g. Mumby, 1997); political sciences (e.g. Schram, 2007); education (e.g. Ferguson, 1993); tourism (e.g. Decrop, 1999); nursing (e.g. Forbes et al., 1999); psychology (e.g. Ponterotto, 2005); criminal justice (e.g. Travers, 2008); archaeology (e.g. Gómez, 2013); science education (e.g. Boisselle, 2014); marketing research and studies (e.g. Hopkinson & Hogg,

2007); nutrition science (e.g. C. Blake & Bisogni, 2003); medicine (e.g. Goldenberg, 2006); peace studies (e.g. Duffy, 2002); law (e.g. Rosenberg, 1996); and neurosciences (e.g. Francken & Slors, 2014).

This was not an exhaustive search, but rather provides evidence that interpretivist research is neither novel nor isolated in its use within communication or emergency management research. Interpretivism is a valid, robust, and supported theoretical perspective for researchers from almost any discipline studying people.

The Insider

The interpretivist theoretical position supports a specific approach to my research: the insider perspective. As first explored in Chapter 1: The Outside Insider, I am an “insider” in this research. In the emergency management research community, there is ongoing discussion about the “insider” versus “outsider” perspectives, with Phillips (2014) arguing that practitioners tend to prefer “insider” researchers because of the complexity of the field. Emergency managers have their own unique culture, history, and shared experiences. However, other researchers such as Chetkovich (1997), who was an “outsider” studying fire service professionals, have provided valuable insights in the disaster studies field. I agree that “outsiders” can also provide unique perspectives on the field and many “outsider” scholars have made valuable contributions to both emergency management and communication disciplines.

Because of my background, this research involves an “insider” perspective. As detailed in the introduction, I have worked in emergency management for more than a decade as a communication practitioner and as a certified Urban Search and Rescue (USAR) responder. I understand the complexities, pressures, culture and language of emergency managers and this has been both a benefit and a challenge for this research. Through applying this “insider interpretive” perspective, I have gained a greater appreciation of the complexity of research. This process has also changed my thinking about the fields of emergency management and communication, in particular, my previous assumptions, orthodoxies and practices. Many of my deeply held beliefs and ideas, specifically that awareness leads to behaviour, have been challenged and changed through this process.

Hartman (2004) defines qualitative research as an effort to understand people’s interpretation of their experiences. However, this research, although predominately qualitative, is different.

I am not an outsider objectively making meaning of an event. I am making meaning of these events for myself, to understand and enrich the risk communication discourse with the understanding that comes from experience and research combined.

There were some challenges in this research. Creating sufficient emotional detachment to develop multi-layered, comprehensive research was a complex challenge. “Insider” research inevitably involves emotions and for me during this research it was difficult to separate my feelings from my work. In quantitative research, detachment is considered a strength, as knowledge is formed through carefully controlled experimental designs and statistical analysis (Frankel & Devers, 2000). However, working in the social constructivist epistemology and interpretivist theoretical perspective allowed me to explore this research with the understanding that emotions are an important part of this work.

Research that has emotional risks for the researcher is often termed sensitive research (N. Johnson, 2009). Dickson-Swift, James, Kippen, and Liamputtong (2007) state that the researcher’s emotions and experiences are invaluable tools when exploring sensitive research. Given my connection to the resources I was analysing, I would define this process as sensitive research (N. Johnson, 2009). At the time of publication of the second edition of the Q-Files in 2007-2009, the group of booklets I worked on outlining earthquake and tsunami hazards to the general population of Christchurch, I thought we had created excellent publications that would help shift public perceptions about earthquake risk. The discovery, which I will be outlining in my findings and discussion chapters, that these booklets contained few ‘best-practice’ communication elements and therefore may potentially not only have had a neutral but also negative effect on perceptions, was difficult for me. Blame, anger, guilt, pride, defensiveness and shame were all feelings I experienced when reviewing the content during the months of coding and analysis. It would be disingenuous not to admit these feelings – I outline them here because allowing them to surface and critically reflecting on them was an important aspect of my insider research method.

I managed these feelings through several techniques. One approach came through multiple reviews of the content as the repetition of codings provided familiarity, in turn creating emotional distance. Separating my feelings from the analysis became easier during the etic coding process (coding phases three and four – discussed below) when I had created a

structured series of codes. This process was similar to becoming “desensitised”, a feeling that was at times both helpful and harmful, as suggested by Dickson-Swift et al. (2007).

Self-care was another way I managed my emotions (Dickson-Swift et al., 2007). When I found emotions too overwhelming, I stopped my analysis and focused on another component of research, such as writing or reference management. While these techniques were not foolproof, they were beneficial. Also, I took short holidays and exercise breaks as forms of self-care. I employed conceptual or philosophical approaches to managing assumptions regarding authorial intent. I found the concept of the “death of the author”, the focus and title of a paper written by Barthes (1967), helpful. Barthes (1967) and Foucault (1980a) support the concept of separating the author from their works. One central concept is the idea that texts are tissues of meaning collated from culture – a text will typically make use of the dominant social and cultural discourses of its time and place, irrespective of whether authors recognise these as the prevailing discourses of their episteme (Foucault, 1980b).

Foucault (1972) defines episteme as:

the total set of relations that unite, at a given period, the discursive practices that give rise to epistemological figures, sciences and possibly formalized systems [...] The episteme is not a form of knowledge...it is the totality of relations that can be discovered for a given period, between the sciences when one analyses them at the level of discursive realities. (p. 191)

Foucault’s definition of episteme allowed me to emotionally extricate myself from the experience of the reader. The experience of the reader is defined largely by their system of knowledge and the reader makes meaning of the material based on their interpretations, through their lenses of understanding. This was useful to me in recognising the structural impacts on my work in producing the Q-Files.

Another central concept is who “creates and owns” meaning in the text. Both Barthes (1967) and Foucault (1972) argue that meaning is made by the readers or audiences of texts (publics), not the authors. At the centre of the author and publics’ relationship is meaning. An author expresses something they believe meaningful to the publics to create an outcome, feeling, impression or direction. However, once they publish a “version” they have no further control over how it is interpreted. Brummett (2009) supports this concept, stating the reader is the “meaning detective, determining thoughts, feelings, and associations suggested by the

words, images, objects, actions and messages” (p.25). Littlejohn (1999) argues that text has meaning irrespective of the author’s intention; people can read a message and get a meaning from it despite not being present during the initial creation (p.208). Given the support for the metaphorical concept that the “author is dead”, I found it helpful to employ this conceptual device as defined by Foucault (1980b) and Barthes (1967) to infer that I was neither wholly to blame for the content in the texts, nor wholly responsible for their meaning.

The “author is dead” concept was useful because it suggests that it was irrelevant what intentions I, or the other authors of the Q-Files, originally held. Rather, it is more appropriate to acknowledge that meaning is constructed within the crucible of prevailing societal and cultural discourses – over which authors have no direct control. I used the “author is dead” philosophical posture for intellectual comfort and reduction of emotional attachment to my earlier understandings of the data’s meaning. While not faultless, using this philosophical perspective allowed me not to force recollections from writing and editing the booklets but to concentrate on making meaning for myself in my current standpoint as a researcher. It enabled me to make new meaning from the Q-Files, and to allow the meaning to alter greatly during the analysis as I became open to seeing the content from new, research-informed perspectives. In short, it allowed me a conceptually safe space to conduct this research.

I now explore my methodology for the thesis.

Methodology

I chose a mixed methods approach due to the ability to triangulate data for deeper and richer understanding and meaning. My research is exploratory, and adopts a mixed methods approach with a strong emphasis on qualitative approaches, and minor quantitative components. R. B. Johnson and Onwuegbuzie (2004) define mixed methods as any combination of quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study. I will use this definition for the thesis when I use the term “mixed methods”. The origins of mixed methods are relatively recent. Initially, quantitative and qualitative methods were created and explored in separate disciplines using different philosophical foundations (R. B. Johnson, Onwuegbuzie, & Turner, 2007). However, some researchers became influenced by the concept of “triangulation of data” using both quantitative and qualitative methods (R. B. Johnson et al., 2007). Webb, Campbell, Schwartz, and Sechrest (1966) describe “triangulation of data” as providing the

most persuasive evidence. Webb et al. (1966) further explain the product of triangulation of data as especially persuasive, allowing a proposition to go through different tests, measures, and perspectives; if the proposition still survives, confidence is high in its validity.

Part of the discussion about mixed methods is the increased support for pragmatism among scholars. Pragmatism in research is defined as applying whatever method best answers the research question, without necessarily subscribing to one philosophical perspective (Creswell, 2013). This shift from rigid epistemological and theoretical perspectives to more fluid approaches allows the researcher to choose whatever methods best answer the research questions (Creswell, 2013; Marshall & Rossman, 2010; Tashakkori & Teddlie, 2010).

There is controversy about mixed methods and pragmatism which has yet to be definitely resolved. Some researchers argue qualitative and quantitative are incompatible methods (Howe, 1988). Guba (1990) agrees, asserting “accommodation between paradigms is impossible...we are led to vastly diverse, disparate and totally antithetical ends” (p. 81). In contrast, Reichardt and Rallis (1994) suggest that:

some qualitative and quantitative researchers may hold views that are so disparate that they are incompatible. But we do not believe that the views of the majority of qualitative and quantitative researchers are of this nature. Quite the contrary, many fundamental values are shared by the qualitative and quantitative research traditions, and the differences that exist can be used both to enlighten each other and to better serve our clients. (p. 90)

Maintaining the methodological flexibility that mixed methods provide has its benefits. Daymon and Holloway (2002) argue that not only do mixed methods generate more persuasive evidence, they also allow the researcher agility because both forms of method create more robust, ethical and sound research that strengthens both professional and academic disciplines. It is that linkage and acknowledgement of research value between both professional and academic disciplines that speaks most to me as a researcher, as I aspire to further both the realms of academic and practitioner knowledge. Moses and Knutsen (2007) argue that “by embracing methodological pluralism we can best pursue...problem-driven (not methods-driven) science” (p. 290). Daymon and Holloway (2002) suggest qualitative research allows the researcher to reveal dimensions and communication interactions related to strategic, professional and managed communication. Maxwell (2010) summarises the use of numbers as a legitimate and valuable strategy for qualitative researchers when used as a complement to an overall direction of the research. R. B. Johnson and Onwuegbuzie (2004)

contend that a mixed methodology has the potential for greater shared responsibility in attaining accountability and increasing the quality of research. I agree with R. B. Johnson and Onwuegbuzie (2004) and Moses and Knutsen (2007) that mixed methods and the use of pragmatism can generate unique insights that one methodology or one philosophical perspective alone may not provide.

With mixed methods as my research methodology, I now explore my research methods. Research methods differ from epistemology, theoretical perspective and methodology because these are the tools used to conduct the research. Research methods are the step-by-step techniques researchers use in a systematic process; the tools and procedures applied to conduct the research (Daymon & Holloway, 2002).

I now explain my specific research goals and the methods attached to each.

Research Goal One: Identifying Best-practice from the Literature

Identifying best-practice preparedness communication principles from the communication research and emergency management literature, and, in particular, identifying principles in the former literature that are missing from the latter.

The process of applying methods to research goal one was lengthy and multifaceted. Initially, more than 600 articles, books and grey literature were reviewed to determine best-practice communication principles. This process is fully explored in Chapter 2: Bridging the Literature. To review briefly, the largest source of information used in the literature review was journal articles. I searched various databases including SCOPUS, Web of Science and Wiley Library as well as superficial searches on Google Scholar. Examples of these search terms include *communication*, *risk communication*, *earthquakes*, *natural hazards*, *disaster*, *preparedness*, *public education*, *fear campaigns*, *persuasion*, *propaganda*, and *emergency management*. Often these were used in combination, as one term alone proved too large for effective and targeted results.

After the initial brief review of 600 articles, 240 articles were considered the most relevant based on their match with my specific research goals. I used these articles to populate a matrix. I compared and contrasted methodology, analysis, results, and theory (see Appendix 3 for literature review tables) to identify patterns and gaps – that is, areas where there were greater or fewer articles aligned directly with my research. Articles were chosen based on

relevance to the thesis. However, I also chose articles from different disciplines, research perspectives, and epistemologies. For example, I reviewed two journal articles from computer sciences, to provide some different analytical perspectives on my topic areas. The literature review in Chapter 2: Bridging the Literature and Chapter 4: Analysing the Q-Files, contain the results and synthesis of this process, and further explain how the reviewing led to the development of an inquiry framework (in the form of a coding matrix) for application to my textual data sources.

The transactional communication framework of source, message, channel, publics and setting (SMCPS), created by Shannon and Weaver (1949) and refined by Berlo (1960), was used as a structuring device for the literature review. Although it is not an ideal model for persuasive communication, I found it useful simply as a way to separate the literature review chapter into sections, each of which related to a component in the SMCPS framework. Using distinct sections helped me to populate a list of best-practice findings, as it enabled separation of the literature into separate and manageable groupings. Using this as a framing device, I selected 46 ‘best’ and ‘poor’ practice attributes, each supported by multiple articles in the literature review. This refinement process was used to create an instrument, entitled a “best-practice matrix” for my interpretative thematic analysis.

Marhsall and Rossman (2010) consider using findings from a literature review to assist in creating codes for thematic analysis as a valid approach. There are several benefits of using this method to develop codes for thematic analysis. Daymon and Holloway (2002) highlight that this approach to research is an iterative process, which assists the researcher in developing deeper and more complex meanings from the data. However, this method is not without its critics. Rubin, Rubin, and Haridakis (2009) suggest the analysis should be multi-stage and requires an element of “objectivity”. Objectivity is not achievable in interpretative thematic analysis. Denzin and Lincoln (2005) argue objective reality cannot be achieved, rather researchers strive to construct meaning they make from the research. Guba and Lincoln (2005) further explain that while thematic analysis cannot be objective, it can assist the researcher to develop a meaningful construct of the data being analysed. This is where the value is.

As an interpretive insider researcher, I cannot be objective about Canterbury. However, the process of analysing the booklets through an almost year-long analysis, allowed me to look at

the content in a new way. Through this process, I questioned deeply-held beliefs about the booklets, which I will explore in Chapter 6: Discussion and Reflections.

I now explore the coding process of the Q-Files booklets (in Appendix 8), as a part of Research Goal Two.

Research Goal Two: Identifying the Lessons

Identifying public communication lessons from the Canterbury earthquake sequence through interpretive document analysis and member checks. Refining and developing the “best-practice” recommendations in light of the data.

Interpretative thematic analysis is my main method for Research Goals Two and Three. Miles and Huberman (1994), state “words, while being more unwieldy than numbers, render more meaning than numbers alone and should be hung on to throughout data analysis” (p.56). This is especially relevant in the field of communication because numbers are often not the focus but rather the prevailing emphasis is on words and symbols interacting with various publics, who then interpret and find meaning in their expression. Interpretative thematic analysis is a process where the interpreter (myself) determines themes during the analysis.

Previous studies relevant to this research have used interpretive thematic analysis, including research on bushfire communication products by Toh et al. (2014), and smoking cessation campaign responses from ex-smokers using Twitter. Similarly, tweets were analysed from the Queensland floods using this method (Flew, Bruns, Burgess, Crawford, & Shaw, 2013; F. Shaw, Burgess, Crawford, & Bruns, 2013). These are just a few contemporary examples of different studies, related by subject matter, making use of interpretive thematic analysis.

The documents used for my analysis are the Q-Files, booklets originally developed by Environment Canterbury’s hazards team from 2001-2009, before the Canterbury earthquake sequence starting on 4 September 2010. The first series, published from 2001 – 2003, included three booklets. Two of these booklets specifically addressed earthquake and earthquake-associated risks in Canterbury, titled *Exposing Canterbury’s Shaky Future* and *Liquefaction*. The *Liquefaction* booklet included a poster of areas in Christchurch considered vulnerable to liquefaction. The third booklet, *Defining Moments in Nature*, contained more general risk and hazard information for Canterbury, including information on historical floods, fires, landslides, tsunami and other emergencies affecting the region.

In the second series, from 2007-2009, the booklets *Defining Moments in Nature* and *Exposing Canterbury’s Shaky Future* were modified and re-issued. A new booklet was added

to the series, titled *Tsunamis*. The *Liquefaction* booklet was not re-issued. Major changes between the first and second series included more pages (from 12 to 16), and the addition of the Canterbury Civil Defence and Emergency Management Group's logo on the covers, as the group had provided both budget and staffing support for the booklets, which they had not done for the first editions.

The analysis involved five different phases of codings, with the process being continually refined. The first coding focused on messages and was very simplistic and superficial. Coloured tabs were used to identify major themes in each Q-files booklet (Image 3.1). These themes include hazard/risk, scientific, fear/threat, emergency preparedness, organisation promoting and persuasive messaging. A description of these codes, colours and message types is in Chapter 4: Analysing the Q-Files. Each message had a separate coloured tab assigned to it, which provided a visual and cursory analysis of the booklets. According to Miles and Huberman (1994), the purpose of revising codes is for the researcher to learn and develop a greater and deeper understanding of the content. By continually revising codes, some decay and perish in the process while others flourish (Miles & Huberman, 1994).

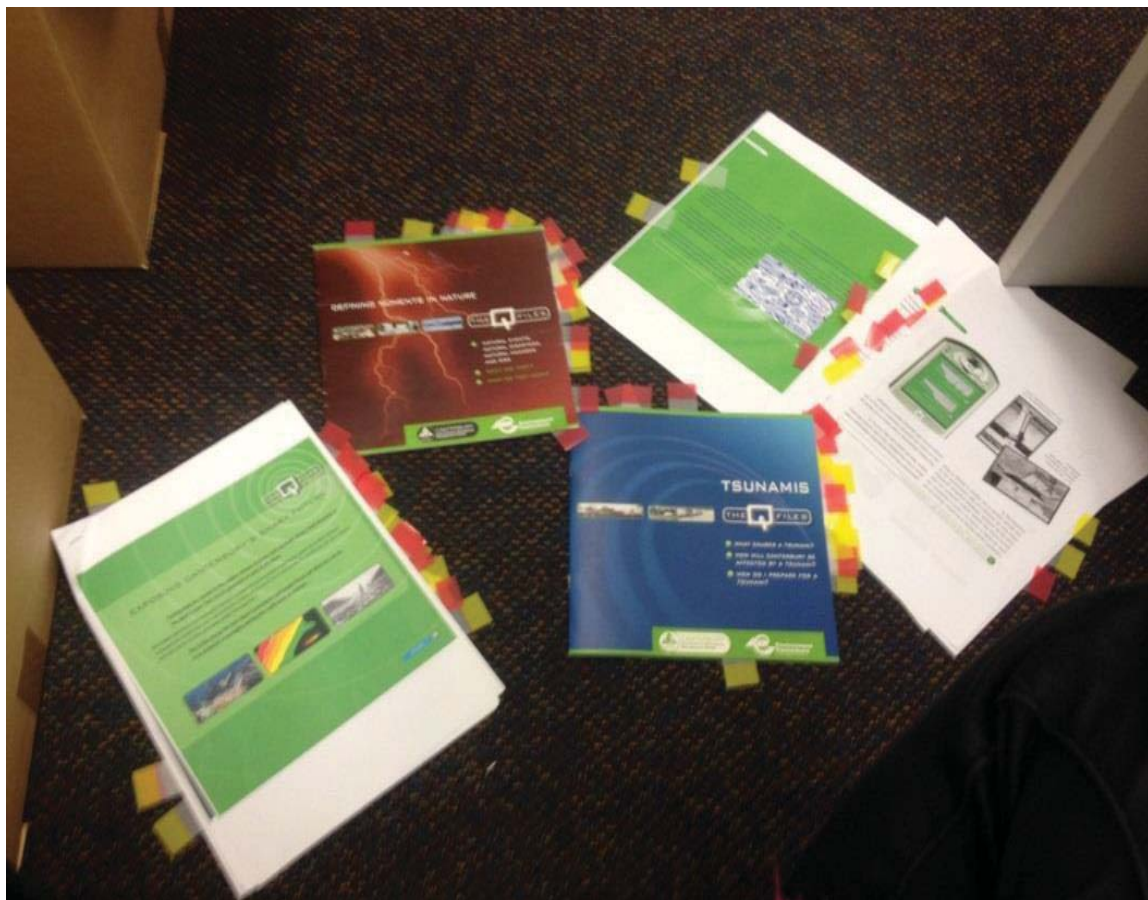


Figure 3.3: Q-Files booklets during the first coding, with coloured tabs illustrating the first interpretation of themes in their content.

This first coding, which began in June 2014, provided, as described by Marshall and Rossman (2010), a process of total immersion, where the researcher becomes engaged with the data. As part of this first “wave” of analysis, a table was created to organise the findings. As a form of analysis, this assisted with immersion in the content and the application of coding using different tools. Examples of these tools include the tabs, as illustrated in *Figure 3.3*. During this first process, my reasoning was inductive rather than deductive. Deductive reasoning begins with a global perspective of a situation and clarifies through further analysis while inductive reasoning finds patterns through fragmental details to create a comprehensive view (D. E. Gray, 2013). Using inductive discovery for my initial exploration of the booklets allowed me to be free of the need for strict hypothesis testing as required in deductive reasoning and enabled me to make discoveries based on emergent themes determined during the analysis (D. E. Gray, 2013).

Once the first phase had oriented me in a general way to the nature and content of the data, a second phase of coding started in September 2014. This second phase was intended to be much more detailed, moving from the “big picture” orientation to a comprehensive recording and collation of themes found in the booklets. I used a qualitative data analysis computer-aided programme, HyperResearch, to keep track of my coding decisions. Each sentence received at least one code during the process, sometimes receiving multiple codes, depending on the theme. I created a report using HyperResearch, to determine the frequency of each code. Marshall and Rossman (2010) suggest that this can be useful, because “numbers serve nicely for identifying frequencies and distribution” (p. 221). These numbers are not meant to be statistically valid but can provide indications of the prevalence of particular interpretations.

Hesse-Biber, Dupuis, and Kinder (1991) state that, before HyperResearch, qualitative researchers manually coded their interviews using scissors, glue, highlighters and other marking techniques to determine themes. With HyperResearch, this eliminated the need for such techniques. A brief search on Google Scholar showed approximately 3,820 research articles that have used HyperResearch for qualitative analysis. HyperResearch is a recognised and accepted qualitative tool for academic studies, used in a wide variety of studies. Salas (2014) utilised HyperResearch to examine power dynamics between faculty and students, specifically using voice thread. Tilley et al. (2014) used HyperResearch to examine views on

childhood immunisation in New Zealand. Davenport (2000) used HyperResearch to explore stakeholder approaches and corporate social performance. Singh, Singh, Park, Lee, and Rao (2009) also used the programme to study information attributes and the relationship with these to catastrophic events. I. Johnston (2015) used HyperResearch to examine traditional warning signs of cyclones in Fiji and Tonga. Kulemeka, Sheehan, Thwaites, York, and Lee (2014) examined how people affected by the Hazelwood Mine Fire in Victoria, Australia, used the internet post fire. HyperResearch is not only used by scholars in communication studies but also in emergency and disaster research. HyperResearch does not automate or restrict coding – I fully controlled all the interpretations of my research. Using this software for coding provides a way to analyse the frequency of codes quickly and efficiently as well as assist in visualising themes. Given this, it was an ideal programme to use for this research.

Using HyperResearch, I then collated findings from this coding for an initial analysis report in October 2014. The purpose of this document was to capture initial analytical patterns, focusing on the interplay between historical context, design, and message comparison. Miles and Huberman (1994) recommend producing interim reports (or analytical memos) during coding to assist with the process of moving from focusing on data to focusing on emerging interpretations or meanings. Analytic memos provide a temporary location to record and collect ideas, feelings, and reflections about the coding process. Gibbs (2008) suggests using memos as a way of tracking progress through research over time. Miles and Huberman (1994) recommend using memos because these memos are raw and unfiltered and serve as an important step in an iterative process. Memos vary in length, size, and focus but typically become more focused and longer over the research process (Miles & Huberman, 1994).

Chapter 3: Research Pathways

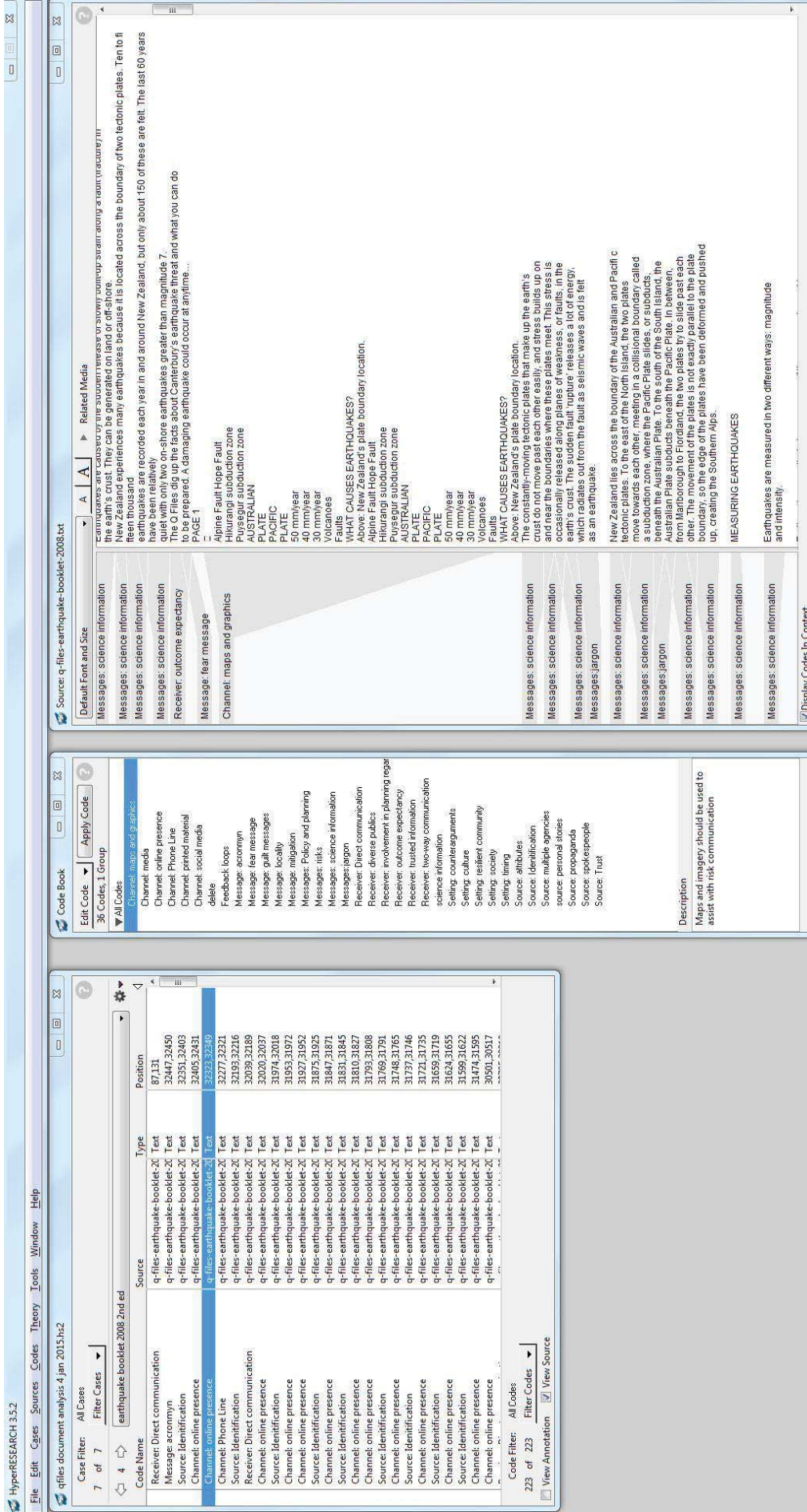


Figure 3.4: The HyperResearch Interface during coding of the Q-Files.

The upper left box indicates how many instances each code was used linearly throughout the document. The middle box contained the list of codes, with code descriptions in the bottom box. It was important for the continuity of the research to develop a method that other people could replicate in subsequent research efforts. The last box splits into two groups. The box to the left contained the codes and their placement in the text. The furthest right box was the text from the booklets. All coding was manual as I did not use any automated systems for actual analysis using HyperResearch, only for recording codes which I generated.

HyperResearch's utility allows for both an emic and etic process. Emic coding is defined as "the insider's account of their own world, assisting the researcher to gain an understanding of their perspective" (Daymon & Holloway, 2002, p. 153). Etic, in this context, means to focus on specific items that are directly observable as matching a pre-set template, rather than the emic process, which allows open coding of anything the insider perceives as relevant (Daymon & Holloway, 2002). Hesse-Biber and Dupuis (2000) argue that by using HyperResearch, a framework can be generated inductively from the data, and then back-coded to test a pre-existing set of theoretical ideas on a given data set deductively.

I developed codes during the second phase based on my open-ended interpretations and decisions. As explained earlier in this chapter, the insider's perspective was applied to this coding. It is important to note at the time of writing the booklets, I believed we had delivered a persuasive document that would educate Canterbury residents about earthquake risk, and they would be adequately prepared. While I was not naïve enough to think it would universally change attitudes in the region, I was fairly certain the booklets would make an impression on many people. I found this assumption challenged during the second coding when I began to recognise problems with the booklets. It was the strength of the emic process that allowed me to reflect in this manner. Organic coding, based on my impressions in a free-form style, is one of the benefits of this approach. I could code themes that I felt were important by taking an inductive approach to the coding. However, as I continued researching throughout the coding process, my codes changed as my ideas shifted. As the coding process continued, the number of codes expanded to more than 30. As Miles and Huberman (1994) suggest, some themes were dominant and required more codes while others decayed in frequency. I created a second analytical report as recommended by Corbin and Strauss (2014), to crystallise and explore the emerging findings. Findings from that report are in Chapter 4: Analysing the Q-Files. I will now explain the third, fourth and fifth coding processes.

The third coding phase switched from an emic to an etic process, to flesh out interpretation of the data from a different perspective and ensure robust interpretations. Etic coding was used here as a schema and focusing tool for matching to criteria. I had determined from the literature review 45 key “best-practice” and “poor practice” attributes, activities or framing for risk communication relevant to my research goals. For the third phase, the best-practice attributes were written as codes and used to assess the Q-Files. This type of analysis has the benefit of creating a robust framework for coding due to its research-based foundation. Marshall and Rossman (2010) recommend this approach, suggesting that “theory-generated codes” are useful as these are derived directly from the literature.

Coding using an etic typology provided a different perspective on the interpretative process and enabled me to compare my position with one generated out of the literature. Also, it is important to note it was during this coding when the “author is dead” concept, as discussed in my introduction and earlier in this chapter, was able to be employed more successfully. Through the use of etic coding combined with the “author is dead” concept, I believe I achieved some emotional distance from the booklets. This process allowed me to critically reflect on my practices and assumptions as a professional communicator. The etic approach, combined with an understanding that texts are a product of their social, political and cultural times not just of authors’ intentions, enabled more detachment in interpreting the text. More detail of this is provided in Chapter 4: Analysing the Q-Files.

As had occurred in the literature review and resultant coding matrix, in this phase of coding, it was helpful to group codes for convenience based on the Berlo (1960) cybernetic model of communication: source, message, channel, publics and setting. I then generated subthemes from attributes I found during the literature review. From this third coding, I wrote another analytical memo, as suggested by Marshall and Rossman (2010), to assist in organising my thoughts about the patterns and themes in the research. The fourth coding was mainly to refine interpretations from the third coding. During the fifth and final coding, I split up the parts of the matrix to focus on best and poor practice attributes. I then could compare frequency counts in a simplified manner. Findings from this analysis are in Chapter 4: Analysing the Q-Files.

Readability Tests

I also conducted six readability tests on the Q-Files. Readability tests are a potentially valuable tool to provide a rough estimation of how “readable” or accessible the Q-Files are in

terms of clarity and content. The term readability has several definitions. Dale and Chall (1949) define readability as:

the sum total (including the interactions) of all those elements within a given piece of printed material that affects the success that a group of readers have with it. The success is the extent to which they understand it, read it at an optimum speed, and find it interesting. (p. 23)

For this thesis, readability is defined as the ease with which a reader can read and understand the text (Oakland & Lane, 2004).

Readability tests are not without deficiencies. The creators of these tests often claim universality of use. However, this is difficult to support since understanding is heavily dependent on culture, gender, and other social lenses (D. Crowley & Heyer, 2011; Rimer & Kreuter, 2006). Most readability tests were developed between 1949 and 1975, with many still being used today, despite changes in society and language. Also, these tests were developed almost exclusively in the U.S.A, using their language and education system. The Q-Files were written for people living in New Zealand, specifically people in Canterbury. Linguistic differences such as the use of colloquialisms are to be expected.

Despite the limitations of readability tests, they can still be useful in providing an indication of how readily broader publics may be able to understand content. Also, these tests can highlight unusual, specialised, or obscure vocabulary, excessive sentence length, and other factors that can create barriers to understanding for non-specialist audiences. Brown, Haun, and Peterson (2014) support using readability tests to improve overall disaster literacy. Despite their potential usefulness, readability tests are not frequently employed to determine emergency preparedness information readability. After searching several databases, I found only two articles that discussed using tests to determine the readability of emergency preparedness information. Keselman, Slaughter, and Patel (2005) stated “the role of background knowledge and experience in comprehension suggests that focusing on text characteristics (e.g., readability) alone will have limited success in explaining and controlling comprehension problems” (p.340). Friedman et al. (2008) performed a comprehensive analysis of 50 online disaster and emergency preparedness resources. Their research indicated that according to two validated and commonly used readability measures, information provided was at an almost inaccessible level for a general public (Friedman et al., 2008, p. 444). In the study, specific natural hazard and relevant preparedness information was

analysed, however, earthquakes, tsunami, and landslides were not among those hazards studied.

Tanner et al. (2009), suggest that “further research is required to determine the readability, using the current tests, of content that encourages people to prepare for disasters” (p.752).

Brown et al. (2014) agree that:

only a few studies have examined existing disaster preparedness or recovery materials for readability levels, understandability of content, acceptability of format, and the ability of community-dwelling, vulnerable adults to act on the information presented. (p.269)

Despite all the support from researchers to use readability tests, there is little evidence these are being actively used in practice. Based on my literature review it appears that the Q-Files are the first earthquake-focussed preparedness documents to undergo readability testing.

Further discussion and findings of this component of the research are in Chapter 4: Analysing the Q-Files and Chapter 5: Reflections from the Community of Practice.

Member Checks

The final component of Research Goal 2 was to determine the validity of my findings from the coding and readability tests. I required what Bernstein (1983) terms a “communal test of validity through the argumentation of the participants in a discourse” (p. 20). I achieved this “communal test of validity” through member checks. My community of practice was people I worked with on the Public Education and Public Information (PEPI) group in Canterbury, as well as public education, emergency managers, communicators and scientists working on earthquake preparedness in New Zealand from 2006-2010.

Member checks are a common approach to constructivist research. Lincoln and Guba (1985) argue that agreements about truth may be the subject of community negotiations about what is accepted as truth. This process is one of the central ways to determine the validity of the “insider” perspective and is performed to ensure triangulation of data and detection of bias. Social constructivists retreat from ultimate truths, refusing to adopt any permanent, unvarying standards (Denzin & Lincoln, 2005). Rather, social constructivists argue knowledge is created from relationships between members of a group to determine validity and agreement. Validity is a sometimes controversial concept in discussions of qualitative research as it is not the same as objectivity (Denzin & Lincoln, 2005). Daymon and Holloway (2002) define validity as “the extent to which the researchers’ findings are accurate, reflect the purpose of

the study and present reality” (p. 369). Denzin and Lincoln (2005) explore validity as an ethical relationship between the researcher and research, stating that the “way in which we know is most assuredly tied up with both what we know and our relationships with our research participants” (p. 209). I used member checks as a way to determine the validity of my research, to obtain further insights into the norms of the professional community of practice within which the documents were produced, and also to ensure that this research was conducted in an ethical manner. I will explore ethics in this chapter on page 120.

Member checks are critiqued as there can be a lack of objectivity and consistency in member checks (B. F. Crabtree & Miller, 1999). Tracy (2013) argues that member checks are insufficient and attempt only to extract validity from members, rather than creating a space for their own interpretations. Tracy (2013) also argues that members can and often do contradict each other. However, objectivity is not the purpose of this exercise; expanding meaning is. I argue that each insider perspective is important as it creates richer understandings of themes. Agreements may eventuate as the result of a dialogue that moves arguments about truth claims or validity past the warring camps of objectivity and relativity toward “a communal test of validity through the argumentation of the participants of discourse” (Bernstein, 1983, p. 221). This approach allows members to assess validity as well as providing their unique perspective to the research, and in itself is illustrative and informative.

My member check group comprised people who contributed to the Canterbury Public Education and Public Information (PEPI) group during 2007-2009, when the second edition of Q-Files was being written, as well as the original authors of the booklets from 2000-2002. I also included people who had insider knowledge of public education campaigns that occurred during that same period elsewhere in New Zealand, outside the Canterbury region. For the Canterbury members, I used PEPI committee minutes to determine which people were active on the PEPI committee in Canterbury during that time. For external people, I utilised existing professional relationships to determine people who could comment on pre-Canterbury earthquake (pre-2010) communication. I consider this group a community of practice. Invitations to participate were sent to 39 people; 20 participated in the member checks. I developed a survey using the online survey programme SurveyMonkey. The results of this process are in Chapter 5: Reflections from the Community of Practice.

Originally, community of practice was defined only as individuals without organisations involved. Lave and Wenger (1991) suggest agencies or organisations cannot form communities of practice. But Roberts (2006) argues that organisations can facilitate communities of practice. However, M. Thompson (2005) supports the argument of Roberts (2006), stating that organisations can also participate in the community of practice's formation.

Wenger (1998) states there are key characteristics of a community of practice:

- Sustained mutual relationships – harmonious or conflictual
- Shared ways of engaging in doing things together
- The rapid flow of information and propagation of innovation
- Absence of introductory preambles, as if conversations and interactions were merely the continuation of an ongoing process
- Very quick setup of a problem to be discussed
- Substantial overlap in participants' descriptions of who belongs
- Knowing what others know, what they can do, and how they can contribute to an enterprise
- Mutually defining identities
- The ability to assess the appropriateness of actions and products
- Specific tools, representations, and other artefacts
- Local lore, shared stories, inside jokes, knowing laughter
- Jargon and shortcuts to communication as well as the ease of producing new ones
- Certain styles recognised as displaying membership
- A shared discourse reflecting a certain perspective on the world (pp. 125-6).

There is evidence that the PEPI group was a community of practice based on the above descriptions. The group used acronyms, even in the written communication to the public. It had, and still has, sustained mutual relationships (which relationships enabled me to readily call upon these people for member checks). There was also local lore, engagement and shared stories about emergency responses through the PEPI meetings. All of these attributes suggest this group was a community of practice.

My member checks took place towards the end of the research programme, once I completed the analysis of the Q-Files. To ensure ethical issues were appropriately managed, Survey Monkey was used as a tool to ensure anonymity of all participants in the response process. I presented the key findings to members of the community of practice using an online anonymous survey. I sent the survey to the community on January 31, 2016, and the end date for feedback was March 1, 2016. I received 18 full surveys, with two incompletes. The consultation method was a survey using yes/no, multiple choice and qualitative questions. There were 24 questions, excluding demographics. All responses were anonymous. The survey can be found in Appendix 5. Ethical procedures and protections about member checks are described in the ethics section later in this chapter.

Overall, the research activities associated with research goal two allowed me to review and analyse the public communication materials created before the Canterbury earthquake sequence. Specifically, I wanted to determine if we had used best-practice techniques in the creation of communication initiatives. Member checks allowed me to compare and contrast my interpretations with those of others from the same professional community of practice to broaden the interpretive lens.

I now explore the final research goal and methods related to it.

Research Goal Three: Interpreting the Lessons

To interpret the Canterbury lessons' applicability and propose potential solutions to issues raised.

This research goal utilised interpretative thematic analysis, as explored thoroughly in previous sections.

Ethical considerations and procedures

I submitted a full ethics application to the Massey University Human Ethics Committee Southern B, to ensure ethical issues were considered and deemed to be acceptable during this research process. The application included a complete risk assessment, ethics questionnaire, cultural and social considerations, and informed consent documentation. I also included all documents from the research including focus group guides, and recruitment and information communication. The application process began in May 2013, and I received approval in July 2013. All research goals and methods were outlined and approved by the Massey University

Human Ethics Southern B Committee, approval number 13/44, in July 2013. I now explore the ethical considerations for this thesis and how I addressed these.

Daymon and Holloway (2002) state that three key ethical considerations need to be addressed: access to relevant information about the study, informed consent, and privacy protection for participants. I addressed these three ethical considerations in several ways. With respect to access to information, in both human research activities in Research Goals Two, participants were provided with an electronic and printed informational flyer detailing the research. The flyer described the research activity, goals, ethical information and contact information for the researcher. Copies of these flyers are in Appendix 7.

Specifically, in Research Goal 2, people involved in the drafting and creation of the Q-Files were consulted as a part of a “communal test of validity” (Bernstein, 1983, p. 221). Christians (2011), argues that requirements for informed consent are that participants voluntarily agree based on full disclosure and open information. I addressed voluntary participation, the first requirement of informed consent, in different ways depending on the activity.

Further, when the study required member checks, individuals were sent a survey via the online survey provider SurveyMonkey, with information stating all participation is voluntary. I provided a research statement outlining voluntary involvement in the study, which stated, in part, “by participating in this member check process, voluntary consent is implied”.

Privacy is a key test that ethical research must fulfil. Christians (2011) argues that it is essential for rigorous privacy protections to be in place for ethical research because the single greatest harm in research can occur if there is a breach in proper privacy safeguards. Hence, all individual identifiers of participants in the member checks have been removed. I notified all participants of this protection of their privacy and this information is available in Appendix 7.

A central ethical concern was the insider perspective that I have as a researcher: in this case, specifically the subsequent self-review of work that I had participated in producing. There is a risk of “tainting” any review of documents that one has helped to create. While the idea of “spinning” my work to present it as more effective than it is a repugnant concept to me, it is an issue which requires addressing. This risk was both to myself and to Massey University, as an institution, so questions about conduct and validity had to be addressed. This risk is one of

the reasons for the “communal test of validity” Bernstein (1983, p. 221) which I conducted through the use of member checks.

I received approval for my ethics application, and this indicates that I considered all the above issues satisfactorily, in accordance with Massey University guidelines.

Summary

In this chapter, I explained my research goals and position. I explored my epistemological (social constructivist) position and theoretical perspective (interpretivist). I then explained my methodology (mixed methods) and my main method (interpretative thematic analysis). My supplementary methods include readability tests, and member checks (surveys). I have explored each of these methods, including their benefits as well as their limitations. In the last section of this chapter, I outlined and explored my ethical procedures and protections for participants required for this research.

With my research framework explained and methods explored, the next chapter will present the findings of the data analysis from coding of the Q-Files.

Chapter 4 : Analysing the Q-Files

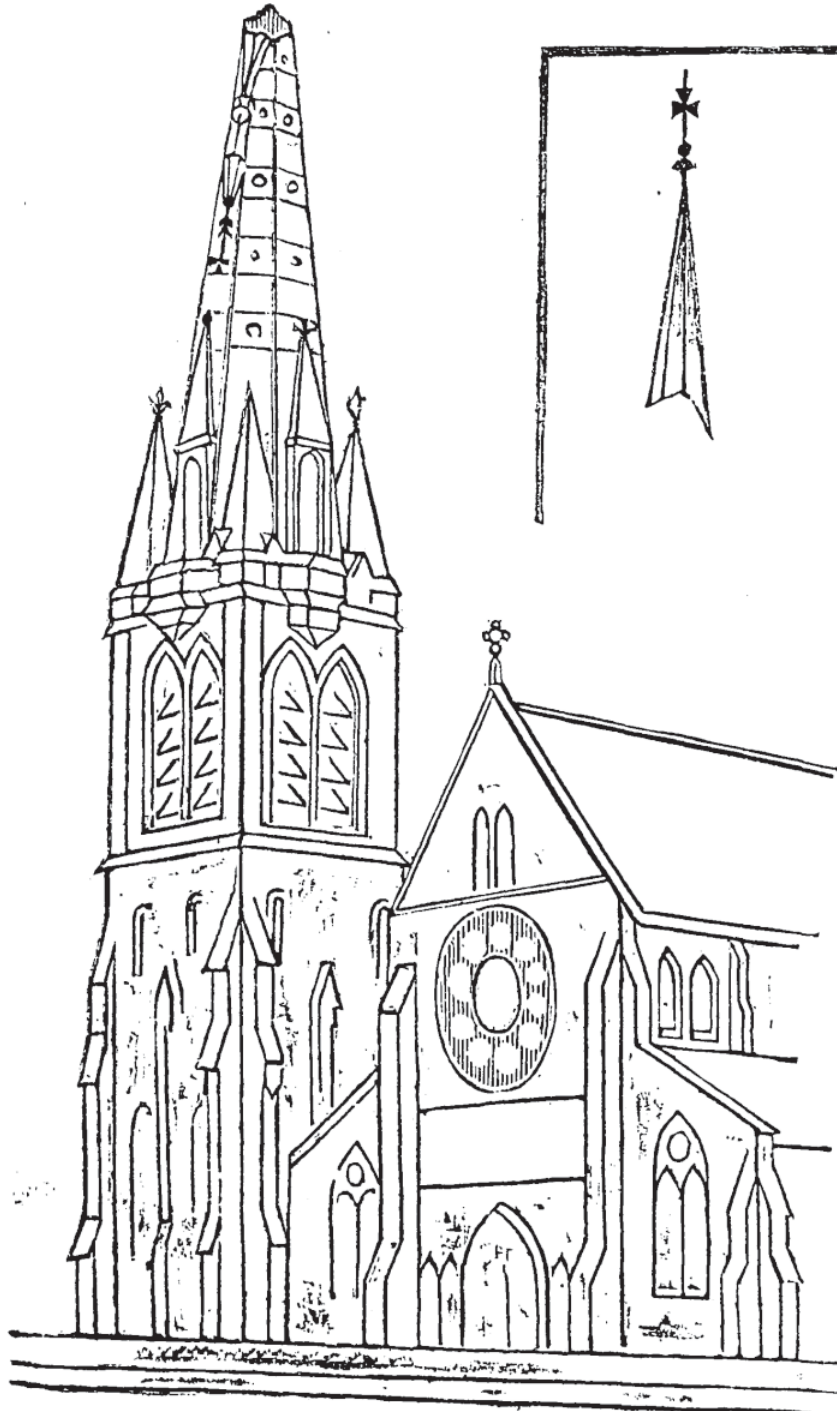


Figure 4.1: The Original Spire and the Damage done by the Earthquake op Sept. 1, 1888. from The Christchurch Star, 17 September 1891. Retrieved from: <https://paperspast.natlib.govt.nz/newspapers/TS18910917.2.45.2>

Chapter 4. Analysing the Q-Files

In this chapter, I present findings from my interpretative thematic analysis and readability test scores from *The Q-Files*, a series of booklets created by Environment Canterbury and the Canterbury Civil Defence Emergency Management Group. I explore the five separate coding processes and the tools used for this analysis. I also provide my interpretations and reflections on this process, from my combined insider and researcher perspective.

Figure 4.2 outlines the research goals of the thesis and the methods used for the research. It is included here to contextualise the results of my analysis, and to illustrate how this chapter contributes to Research Goal Two and the thesis overall.

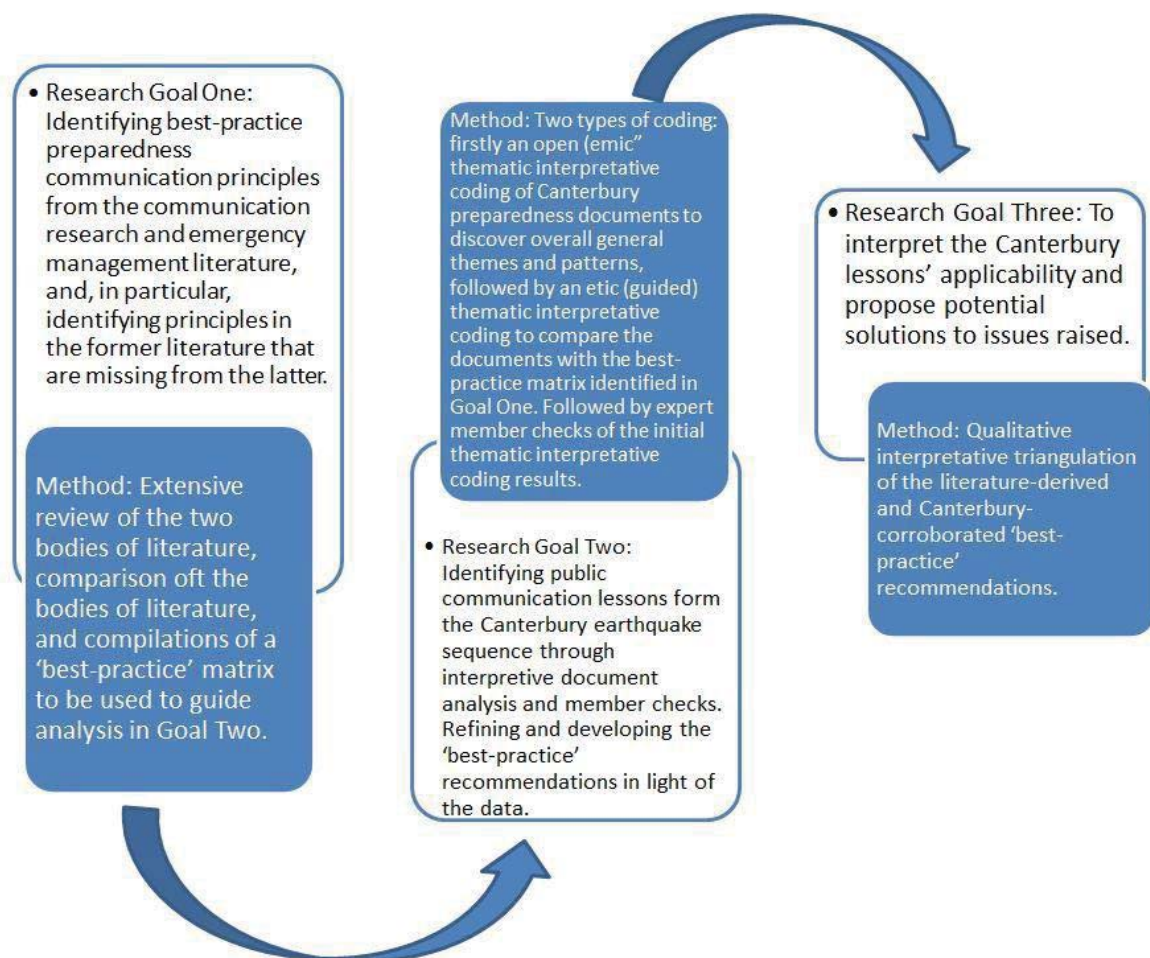


Figure 4.2: Research goals and methods

I present the findings from Research Goal Two in this chapter, with the exception of my member checks, which are located in Chapter 6: Discussion and Reflections. I addressed

findings from Research Goal One in the literature review. Research Goal Three will be further explored in Chapter 6: Discussion and Reflections.

Methods and Processes of Coding

Interpretive thematic analysis, readability tests and word counts are methods used for this analysis. These methods are described in detail in Chapter 3: Research Pathways. For the interpretive thematic analysis, I coded the Q-Files using two different processes: emic and etic. Emic is where I, as the researcher, determine codes based on my impressions of the content without formalised or external structure for the codes (Miles & Huberman, 1994). The etic process, as Pike (1954) defines it, is “non-structural but classificatory in that the analyst devises logical categories of systems, classes and units” (p. 255). As noted in Chapter 3: Research Pathways, I devised a coding matrix from the literature review and then used this tool to analyse content from the Q-Files.

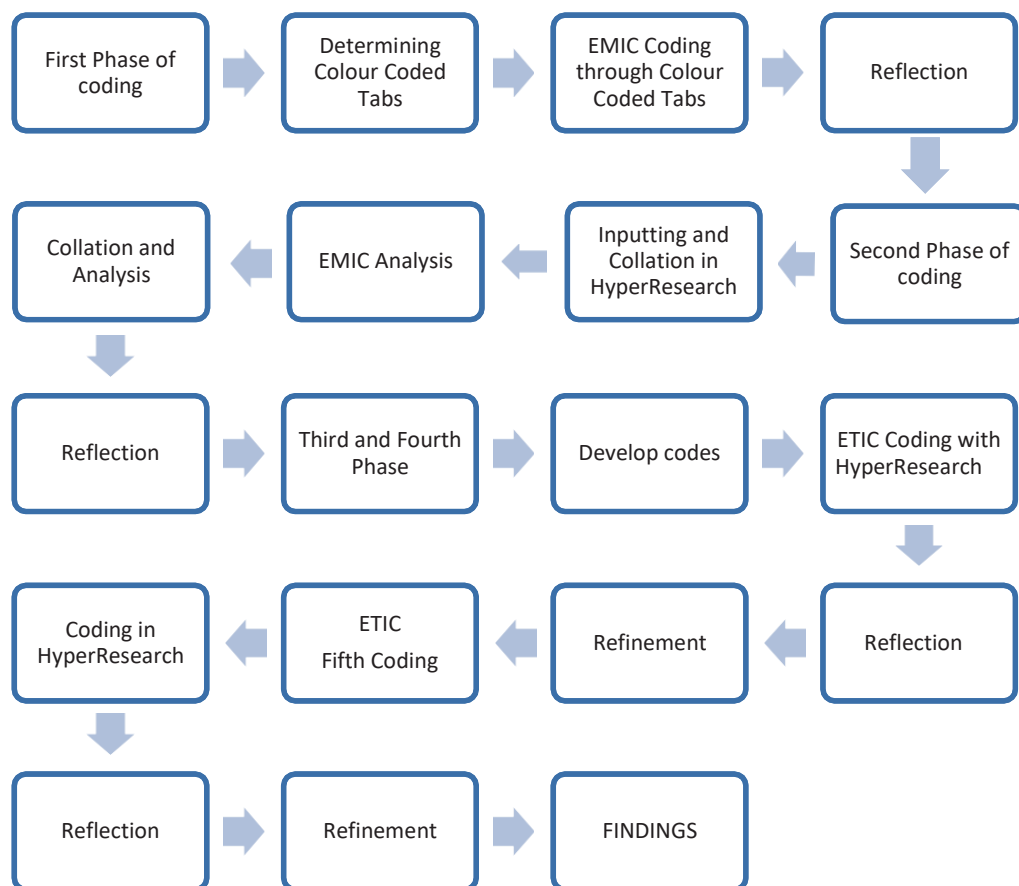


Figure 4.3: Overview of the processes used for the coding process.

Figure 4.3 outlines the evolution of the coding process through the five separate phases. The coding process was largely iterative. From a time frame perspective, coding was a year-long

process, starting in July 2014 and ending in July 2015. The length of this process is due in large part to reflection and refinement of the coding. As noted in chapters 1 and 3, this was a time of intensive learning from me as I shifted my sense-making of the documents in major ways as the coding progressed.

First coding. An emic process was used in the first thematic analysis of the Q-Files. I familiarised myself with the content during this coding, as recommended by both Miles and Huberman (1994) and Daymon and Holloway (2002). The central reason for beginning with an emic process was to determine my personal assumptions about the booklets. I explore this later in this chapter.

Second Coding. Again, an emic process was used during this phase. I compared and contrasted messages from the various editions of the booklets with contemporary messages currently being used by the MCDEM and the Earthquake Commission. This process was to reflect on the ongoing evolution of messages. I explore this further in the section titled *Second Coding*.

Third and Fourth Coding. The third coding was my first attempt at using an etic process. I used the etic process to provide a more robust and thorough analysis of the content. For this phase of etic coding, I created a best-practice matrix based on my literature review, distilling lessons from more than 240 articles. I will explore the matrix further in this chapter in Table 4.1.

Fifth and final coding. The fifth phase was a refinement of the third and fourth. This final coding is used in combination with readability scores and word counts at the end of this chapter to determine my hindsight interpretations of overall appropriateness and utility of these booklets in a pre-earthquake environment like Canterbury.

I have included notes, tables and findings from all the phases of this research to illustrate my research process. However, the fifth phase is the most comprehensive and will be the main source of findings addressed in Chapter 6: Discussion and Reflections. Table 4.1 is the summarised version of the “best-practice” matrix. The full version is in Appendix 1. In this table, I outline all best and poor practice themes and subthemes used in the final coding. I also include the frequency counts from the final coding.

I used the Source, Message, Channel, and Receiver (SMCR) cybernetic model, first described by Shannon and Weaver (1949) and refined by Berlo (1960), as a framework for analysis.

Modifications were made, including changing the term ‘receiver’ to ‘publics’ and the inclusion of ‘setting’. As noted in Chapter 2: Bridging the Literature, I do not suggest the SMCPs model demonstrates how communication should happen, as it is a linear transmission model, but it does provide a list of the fundamental elements of communication, including those from constructivist and socially-engaged models. Best-practice and poor practice examples have been developed and grouped thematically from the literature review. I chose themes based on my interpretation of the frequency of mentions in the literature, using my literature review table and tags. The tags and key words were searchable in the literature review table to guide me in determining themes.

Table 4.1: The Best-Practice Matrix.

Theme	Sub-Theme	Best-practice (BP)	Poor Practice (PP)	References
Source	Spokesperson: powerful	Influential power base comes from impersonal reward, expert/information, legitimate equity/reciprocity, referent, personal reward, legitimate position and legitimate dependence.	Authoritative voice without providing information, reward, or legitimacy by expert.	(Jost & Hardin, 2011; Macnamara, 2012; Raven, Schwarzwald, & Koslowsky, 1998)
	Spokesperson: multi-agency	Fire, police and ambulance rated high in trust; all are included in campaigns.	Isolated communication efforts, not including a multi-agency perspective.	(Coppola & Maloney, 2009; Eriksen & Gill, 2010; McCaffrey, Velez, & Briefel, 2013; McComas, 2003)
	Spokesperson: personal stories	Different people, typically not associated with a government agency, share their stories of disaster.	No personal experiences. Personal experiences but not of people whom the audience will relate to as familiar or as similar to them.	(Bainbridge & Galloway, 2010; Y. C. Kim & Kang, 2010)
	Spokesperson: likeable/similar	Positive relationships between spokespersons and publics. Similar, relatable, and local. Stories or quotes from people with whom the publics relate.	Acrimony between publics and spokespersons. No spokespersons are identified.	(Jost & Hardin, 2011; McGuire, Lindzey, & Aronson, 1985; E. J. Wilson & Sherrell, 1993)

	Spokesperson: attractive	Although the message content may be the most important determinant of persuasion under some circumstances, in other circumstances such noncontact manipulations as source reliability, attractiveness and so forth may be even more important.	Only code when best-practice.	(Frewer, 2004; L. Gray et al., 2012; Höppner et al., 2012; Luth et al., 2013; Wachinger et al., 2013)
	Trust	Trust between both the publics and the source for persuasive discourse to occur.	The source acts in an untrustworthy way. No work to establish the trustworthiness of the source with the intended audience before using in the booklet.	(Covello, 2003; Cutter, Burton, & Emrich, 2010; Lindell & Perry, 2012; Marsh & Buckle, 2001; Paton, 2003)
Message	Sub-Theme	Best-practice	Poor Practice	References
	Localised	Successful risk communication requires an in-depth local understanding of conditions to encourage effective behaviour changes.	Generalised messages that do not include local context.	(Riesch, 2014; Sellnow et al., 2008; P. B. Thompson, 2012)
	Science information	Science explained simply, without jargon, but not so much it is overwhelming to the publics. Paired with positive outcome expectancy messages.	Science presented as complex and inaccessible. Difficult to understand for publics outside the scientific community.	(McComas, 2003; D.S. Miletic et al., 2004; T.L. Sellnow, R.R. Ulmer, M.W. Seeger, & R.S. Littlefield, 2009a)
	Jargon/Definitions	No jargon used. Few or no definitions.	Jargon and technical language that is more appropriate for internal or key stakeholder publics.	(Craig, 1989; Plough & Krinsky, 1987)

			Communicating the risks and educating the public into thinking about the problem from an expert perspective. Public perception must be brought into conformity with scientific rationality (e.g. start with the same definitions).	
Fear message	Messagess should contain both negative consequences and positive outcomes when preparedness action is undertaken.		No positive outcomes communicated can create fatalistic impressions.	(McClure, Walkey, & Allen, 1999; Turner & Underhill, 2012)
Acronym	No acronyms are used.		Acronyms used.	(Covello, 2003; McComas, 2003, 2006)
Outcome expectancy	Outcome expectancy: perceptions of whether personal actions will reduce a problem.		Only threatening or negative messages without any positive outcome expectancy messages. Fatalistic messaging.	(Bürgelt, Paton, & Johnston, 2009; McClure, Allen, & Walkey, 2001; Paton, 2003; Paton & Johnston, 2001)
Mitigation/ Policy and Planning	Positively framed, expressing that risk mitigation efforts can change the outcome of a disaster.		Negatively framed, mitigation efforts have no effect on reducing risks.	(Burby, 2001, 2003)
Propaganda	The communication is co-created and benefits both the source and the publics.		Focuses on organisation activities rather than the benefit	(J.W. Handmer, 1985; B. B. Johnson, 1999; Nielsen & Lidstone, 1998; R. W.

				for the publics. Authoritarian tone, “top down” approach.	Rogers, 2007)
	Frequency/length	Shortened messages to lessen the chance of distraction. Seven or fewer elements, consistent and redundant.		Lengthy messages are more prone to being dismissed due to distraction.	(Covello, 2003; Petty & Wegener, 1999)
	Guilt messages	Guilt campaigns link parental responsibility to preparedness with moderate success (but only when not too extreme).		Messages that imply the publics should “feel” guilty for not taking corrective action.	(L.G. Echterling & M. Wylie, 1999; Mulilis & Lippa, 1990; Peters et al., 2013; Silberbauer, 2003)
	Entertainment	Humour, celebrity, entertainment.		Inappropriate humour or lack of substance in the message (too much entertainment focus). No attempt to entertain and engage – dry content.	(Eveland & Cooper, 2013; Parkhill, Henwood, Pidgeon, & Simmons, 2011)
	Ideal	Culturally sensitive, dialogue encouraging, personal address, localised, and rationale which provides examples as to how preparing benefits their lives. Connected and addressing specific community needs.		No attempt at dialogue, personal address, localised messages, etc.	(Macaulay & Logie, 1996; R. J. Marshall et al., 2007; T.L. Sellnow et al., 2009a)
	Counterarguments	Counterarguments and alternate theories are acknowledged, discussed and addressed, rather than avoidance.		Alternate theories and counterarguments are ignored.	(McGuire, 1961b; Papageorgis & McGuire, 1961)
Channels	Sub-Theme	Best-practice	Poor Practice	References	

	Maps, images, picture or other graphics.	Maps and imagery should be used to assist with risk communication.	No graphics or imagery.	(Bertin, 1983; Eitel et al., 2013; MacEachren, 2004; Marsh & Buckle, 2001; McCaffrey et al., 2013; K. Smith et al., 2000)
	Online presence	Further information is available online.	No online presence.	(Friedman et al., 2008; S. D. Moore et al., 2004; Sellnow et al., 2008; Tanner et al., 2009)
	Face-to-face	Invitations are issued to come in and talk to people face-to-face, to phone for a chat, to attend a community meeting or face-to-face briefing, etc.	No opportunities for face-to-face mentioned.	(I. P. P. Moonen et al., 1995; Raven et al., 1998)
	Printed material	Printed material is available to publics who want these.	No printed material.	(Mileti, Fitzpatrick, & Farhar, 1992)
	Social media	Frequent engagement about this channel.	No social media engagement or presence.	(Briones et al., 2011; Tierney et al., 2006; Veil et al., 2011)
Publics	Sub-Theme	Best-practice	Poor Practice	References
	Two-way communication	Two-way symmetrical communication.	One-way communication, from the source to the publics without a feedback loop.	(A. E. Crowley & Hoyer, 1994; Grunig & Hunt, 1984; Grunig & White, 2008)
	Publics: resilient community	Resilience is a part of the social and personal identity.	Lack of acknowledgement of resilience in a community.	(Becker, 2012; D. M. Johnston et al., 2013; Madsen & O'Mullan, 2013; Sinclair, Doyle, Johnston, & Paton, 2013)
	Publics: involvement in planning and response	Involving the public early once a risk is identified.	No involvement with publics.	(Earle & Cvetkovich, 1997; Eriksen, Gill, & Bradstock, 2011; G. A. Tobin, 1999)

	Publics: diverse publics	Diverse publics require diverse channels and messages.	Using the same messages and channels for everyone.	(D. Crowley & Heyer, 2011; Höppner et al., 2012; McCaffrey et al., 2013; Paton, Bajek, Okada, & Mclvor, 2010)
	Publics: society	Society is addressed in risk communication.	Society is ignored; only personalised messages are communicated.	(Earle & Cvetkovich, 1997; Renn, 2010; R. Shaw & Goda, 2004)
Setting	Sub-Theme	Best-practice	Poor Practice	References
	Location/Time	Explicit mention of location and timing in which messages are received, considered and addressed.	Content is static with no acknowledgement of timing and location of publics when information is received.	(McGuire, 1961a)

About Table 4.1: The Best-practice Matrix

This table is a summary of the different codes I used for my fifth coding. Themes included source, message, channel, publics, and setting. Within these themes were sub-themes. In most of the codes, there was a best-practice and poor practice code. These were my definitions for the coding process. An expanded version of the best-practice matrix, which contains more references, is in Appendix 3. A version with frequencies is provided later in this chapter.

Determining what is best and poor practice was a challenge for me. Heath (2006) defines best practice as activities that create effective, responsible and ethical communication. I chose this definition because it specifically addresses communication issues of ethics and responsibility. This is relevant to communication as the most effective tactics may not necessarily be ethical or responsible. Hitler and Goebbels' use of propaganda in World War 2 was highly effective in gaining support in Germany for inhumane actions but we should not consider their work "best-practice" because it was unethical and irresponsible (Welch, 2013). It was also effective only for a limited time and only influenced certain publics (Larson, 1995). As cited in Chapter 2: Bridging the Literature, there is evidence that the U.S.A. and U.K. Civil Defence organisation's use of propaganda in the 1950s was not only ineffectual but also harmful to those organisations' reputations (Grant, 2011; Kay, 1952; M. Smith, 2010). Even if propaganda is effective, which is not what the evidence suggests, it also is ethically problematic, even when used in the pursuit of a "higher good". Thus, ethical and efficient communication attributes were chosen as best-practice attributes within my coding instrument.

Best practice can be determined using different methods. One method is to engage with a group of "experts" within a particular field or fields to generate standards, principles, codes and laws that contain characteristics of what is effective and efficient (Seeger, 2006). Seeger (2006) also suggests another method is to develop theories of best practice through research. I used a combination of these approaches. Based on Seeger (2006)'s recommendations for the development of best-practice attributes through research, I developed my instrument, the best-practice matrix. This tool was the result of an extensive literature reviewing process. After using this instrument, I also used member checks to explore supplementary views on whether these were best/poor practice from the perspectives of that community of practice.

Poor practice is also included in the matrix; as poor practice can be as informative as best-practice. My definition of poor practice was that it was the antithesis of best practice: it is

ineffective and/or unethical and irresponsible. Research that was used to create the matrix included primary data studies, secondary studies, review and theoretical articles.

Using the matrix to determine best-practice allowed me to apply existing research and theory when coding the booklets. After each phase of coding, I would reflect on the findings and refine the codes further, eliminating some codes or creating new ones that were more appropriate. For example, in the third and fourth coding, only best practice was coded. For the final coding, poor practices were also identified and used to code the content. Overall, the best-practice matrix allowed me to code more openly but also provided focus and rigour to the process.

The following section provides a brief overview of the documents analysed for this research.

The Q-Files

These booklets were first developed by Environment Canterbury's hazards team. The first two Q-Files booklets published in 2001 and 2002 focused on earthquakes and were titled *Exposing Canterbury's Shaky Future* (2001) and *Liquefaction* (2002). These included a poster of liquefaction-vulnerable land in Christchurch. A third booklet, *Defining Moments in Nature* (2001) included floods, fires, landslides, tsunami and other natural hazards that had affected Canterbury in the past or posed a threat to the region in the future. The second series began in 2007 and was completed in 2009, included new editions of *Defining Moments in Nature* (2007) and *Exposing Canterbury's Shaky Future* (2008). *Tsunamis* (2007) was the first booklet in the series focusing on tsunami hazards. The *Liquefaction* (2002) booklet was not re-issued. Changes between the first and second editions of the booklets included more pages (from 12 to 16), and the inclusion of the Canterbury Civil Defence and Emergency Management Group's logo on the covers, as the group had provided both budget and staffing support for the booklets. Further, the focus shifted to include more specific preparedness and mitigation advice.

Chapter 4: Analysing the Q-Files

First edition (2001 – 2002)	Second Edition (2007 – 2008)
The cover is green with white text. It features a timeline of natural events from 1800 to 2000. The title 'Defining moments in nature' is at the top, followed by the subtitle 'Natural events, natural disasters, natural hazards, risk what's the difference?'. The Environment Canterbury logo is at the bottom.	The cover is red with a lightning bolt graphic. It features the title 'DEFINING MOMENTS IN NATURE' and 'THE Q FILES'. It lists three bullet points: 'NATURAL EVENTS, NATURAL DISASTERS, NATURAL HAZARDS AND RISK', 'WHAT ARE THEY?', and 'WHAT DO THEY MEAN?'. The Environment Canterbury logo is at the bottom.
Defining Moments in Nature (2001)	Defining Moments in Nature (2008)
The cover is dark blue with a circular ripple pattern. It features the title 'EXPOSING CANTERBURY'S SHAKY FUTURE' and 'THE Q FILES'. The Environment Canterbury logo is at the bottom.	The cover is dark blue with a circular ripple pattern. It features the title 'EARTHQUAKES' and 'THE Q FILES'. It lists three bullet points: 'WHAT CAUSES EARTHQUAKES?', 'HOW DO EARTHQUAKES AFFECT CANTERBURY?', and 'ARE YOU REALLY PREPARED FOR AN EARTHQUAKE?'. The Environment Canterbury logo is at the bottom.
Exposing Canterbury's Shaky Future (2001)	Exposing Canterbury's Shaky Future (2008)
The cover is green with a circular ripple pattern. It features the title 'LIQUEFACTION' and 'THE Q FILES'. It lists three bullet points: 'WHAT IS IT?', 'WHAT WILL HAPPEN WHEN THE GROUND LIQUEFIES?', and 'WHAT DOES THE LIQUEFACTION HAZARD RATING FOR MY PROPERTY MEAN?'. The Environment Canterbury logo is at the bottom.	The cover is blue with a circular ripple pattern. It features the title 'TSUNAMIS' and 'THE Q FILES'. It lists three bullet points: 'WHAT CAUSES A TSUNAMI?', 'HOW WILL CANTERBURY BE AFFECTED BY A TSUNAMI?', and 'HOW DO I PREPARE FOR A TSUNAMI?'. The Environment Canterbury logo is at the bottom.
Liquefaction (2001)	Tsunamis (2008)
The poster is dark with a map of Christchurch showing liquefaction hazard areas. It features the title 'THE SOLID FACTS ON CHRISTCHURCH LIQUEFACTION' and various charts and maps.	The cover is green with a photo of a flooded area. It features the title 'Living on a floodplain' and the Environment Canterbury Regional Council logo. The tagline 'Everything is connected' is at the bottom.
Solid Facts on Christchurch Liquefaction (2002) Poster	Living on a floodplain (2010)

Figure.4.4: Front cover and images from the Q-Files booklets.

As a member of the team working on these booklets, I was aware that there was no specific strategy for the content in the Q-Files, other than the general Public Education Strategy 2008. The Q-Files would have benefitted from a communication strategy but due to limited resources and staffing, one was not fully developed. However, these booklets were intended to provide scientific information about earthquakes to encourage household preparedness among people living in Canterbury.

As the researcher, co-author and editor of many of these booklets, I can interpret the intention of the booklets. However, it is also useful for me to take a different approach. Barthes (1967) and Foucault (1980b) argue that texts stand on their own (the author is “dead” and their intention is irrelevant), and only the publics’ perspectives or meaning-making are relevant. Foucault (1980b) also addresses issues about texts drawing on the dominant discourses of the time, and the ways in which this limits the scope of content irrespective of author intent – he sees texts as more an expression of collective societal ways of thinking than of individual beliefs or psychology. Hall (1997) states that:

it is discourse, not the subjects who speak it, which produces knowledge. Subjects may produce particular texts, but they are operating within the limits of the episteme, the discursive formation, the regime of truth, of a particular period and culture (p. 55).

As noted in the methods chapter, I found it useful to my research to take meaning from Foucault and supporting theorists like Hall, who appear to absolve the creators of discourse from individual blame for their outputs. In part, this allows me to explore freely and interpret the actual discourse present in booklets without being too focused on past intentions.

In tandem with this, I do have insider knowledge that can be useful in recollecting that the booklets were aimed at a “general public” rather than specific publics. These booklets were intended as a regional resource; the majority of booklets were distributed to local emergency managers to use as they deemed appropriate. Local emergency managers or volunteers distributed the Q-Files to community members at events, and at local or regional service centres. Booklets were also distributed to schools upon request. There was, however, no formal distribution plan, and records of distribution were not kept. It is, therefore, unfeasible to determine how, when or even the numbers of Q-Files that reached publics throughout the region. With hindsight, this illustrates the “output” rather than “outcome” focus that characterised the production of these booklets.

I now explore the value of each of the different coding phases.

First Coding of the Q-Files

The first phase of coding was an exercise in familiarising myself with the content; an exploration phase supported as crucial by several researchers. I coded all the above Q-Files using this process, including the ‘Solid Facts on Christchurch Liquefaction’ poster. This was the only time I coded the poster; after the first coding, it was apparent that the poster was essentially a reprint of the entire ‘Liquefaction’ booklet, with a few minor differences. After considering this information and concluding that it was repetitive, I eliminated the poster from further codings.

Different coloured tabs were used to identify what kinds of messages were in the content. However, the tabs were a blunt and imprecise tool. I used the most common messaging themes from the literature to inform the “message type” in order to get a macro understanding of dominant themes in the Q-Files.

The colours of the tabs and their meanings are below.

Table 4.2: Phase One Codes.

Colour	Message Type
Red	Hazard/Risk. Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage. Risk: the combination of the probability of an event and its negative consequences. (United Nations International Strategy for Disaster Reduction, 2009b, pp. 17, 25)
Green	Scientific. Content relating only to natural processes or technical information.
Orange	Fear/Threat. No positive outcomes communicated; fatalistic messages; sensationalist messaging used.
White	Emergency Preparedness. Advice or direction on how to prepare for any of the hazards in the Q-Files.
Yellow	Organisation promoting. Messages relating only to the organisation involved in creating the Q-Files.
Purple	Persuasive. Attempts at influencing publics into either believing the scientific information about risks, changing behaviour or taking action to prepare for risks.

I did not perform a quantitative analysis e.g. counting the colour tabs after completion of the coding because I wanted to create an overall “impression” of the booklets by being able to glance at them and determine visually what the dominant messages were. I then used these impressions to develop and populate a table with this information as a way to organise initial thoughts from this phase.

In Table 4.3, I provide an overview of specific issues about the booklets in an early attempt to organise my thinking. By using the coloured tabs as a way to reflect on the main messages of the booklets, I picked out specific examples illustrating the messages. In this table, I started with the titles of the booklets and then chronologically analysed each one. I then put the date and the main topic. Then, I placed the main messages based on the coloured tabs, with examples of the messages. After exploring the main message, I then investigated the main secondary message. Finally, I reflected on the booklet as a whole, comparing the main and secondary messages as well as my overall interpretation of the booklets.

Table 4.3: First coding analysis.

Chapter 4: Analysing the Q-Files

Publication	Date	Topic	Prevailing Theme One (Message)	Prevailing Theme Two (Message)	Reflections
Exposing Canterbury's Shaky Future	2001	Earthquakes.	Red and green: hazard and risk information. This brochure contained a large amount of science and hazard information.	Fear messages: this booklet contained a number of threat and fear messages.	This booklet contains fear statements e.g. "Get Ready now or Pay Later". It also includes a number of fear messages about earthquakes.
Defining Moments in Nature	2001	This is a natural hazard-themed book addressing a number of natural hazards including floods, fires, landslides/slips, tsunami, and earthquake.	Red: Hazard and risk information. This booklet focused on the hazard and risks associated with earthquakes. The effects of earthquakes are discussed at length.	Risk definitions: There are several sections in this booklet dedicated to risk and hazard definitions. On pages 9, 10, 11, and 12, case studies are provided that Environment Canterbury worked on to reduce risk. These were organisational examples rather than community-driven initiatives.	This booklet is more of a historical examination of disasters in Canterbury rather than exploring what could occur in future. The connection between past disasters and future disaster is not explored. This was a missed opportunity in this booklet.

Chapter 4: Analysing the Q-Files

Liquefaction	No date; from 2001-2002	Liquefaction.	Red and green (hazard and science) are the main message themes. Example: “Liquefaction (pronounced “lick-wi-fack-shin”) happens during Earthquakes. The ground shaking that occurs during an Earthquake can cause some soils to liquefy. This means during an Earthquake these soils will behave more like a liquid than a solid.” (p. 1)	Mitigation: There is one section on mitigation and the three main ways to reduce the effects of liquefaction: by stabilising the ground, by specific foundation design or by strengthening structures to resist predicted ground movements (if small). This is probably useful information, however, there are no recommended simple mitigation efforts in the booklet to limit liquefaction damage.	Overall this was probably the least relevant booklet for preparedness and personal actions. Also, references to the town of “Port Royale” in the Caribbean that was destroyed due to liquefaction 400 years ago are of questionable value. Given the historical and geographical differences between the Caribbean historical case study and present day New Zealand, it would have been more relevant to include information about the Loma Prieta earthquake in 1989, when areas in San Francisco experienced widespread damage to infrastructure and homes due to liquefaction (Bardet & Kapuskar, 1993).

Chapter 4: Analysing the Q-Files

The solid facts on Christchurch Liquefaction (Poster)	Unkno wn.	Liquefaction	Red and green: Hazard/Risk information and science. A poster with a large map of Christchurch about the liquefaction risk with messaging about mitigation work. Examples: AMI Stadium (formally Jade Stadium) is included as an example of earthquake strengthening. This building experienced widespread damage and closure due to damage during the Canterbury Earthquake Sequence (Wotherspoon et al., 2014).	Mitigation: There is some good information about mitigation but it is essentially a repeat of the Liquefaction brochure.	There is so much content on this poster that it is difficult to read. The information is also mostly repetitive of content in the “Liquefaction” booklet.
Exposing Canterbury’s Shaky Future	August 2008	Earthquakes.	Red and green: hazard and science. This brochure was predominately about the science of earthquakes; more than half the pages were dedicated completely to science messages. Opening sentence: “Earthquakes are caused by the sudden release of slowly built-up strain along a fault (fracture) in the earth’s crust. They can be generated on land or off-shore.” (p. 1)	Risk: the risk was illustrated by the actual events (what has happened in the past) and how we manage earthquake risk in the future.	There is a sizable amount of information about organisational activity to mitigate against an earthquake. Only one page is dedicated to personal preparedness. Half of the personal preparedness messages are household preparedness, and half are mitigation messages.

Chapter 4: Analysing the Q-Files

Defining Moments in Nature	August 2008	A natural hazard-themed book addressing a variety of natural hazards including floods, fires, landslides/slips, tsunami, and earthquakes.	Red: Hazard and risk information. This booklet focused on the hazard and risks associated with earthquakes, and its effects are discussed at length. Examples: “Straddling a tectonic plate boundary, on floodplains between high maintains the coast; Canterbury is vulnerable to many natural hazards. Floods, earthquakes, snow, high winds, tsunamis, landslides, erosions and droughts have affected us in the past and will continue to affect us in the future” (p. 1)	Risk definitions: Two pages are dedicated solely to risk definitions. On pages 9, 10, 11, and 12, there is a group of case studies organisations participated in to reduce risk (but not community driven initiatives).	This booklet has the most positive messages about preparing for earthquakes (White tabs) but also contained the most fear/threat messaging. My interpretation of the focus on technical risk definitions is that it is only of interest for the writers and people with similar interests but not relevant for many of the publics.
Tsunamis	July 2007	Tsunami	Red: predominantly hazard or risk information, with green (science) as another major sub-theme. Example: “Tsunamis are waves caused by underwater earthquakes, volcanic eruptions and landslides. They can be generated close to shore or thousands of kilometres away. In the open ocean, tsunami waves travel up to 900 kilometres per hour and may be less than half a metre high. But when the waves reach the shore, they slow down and become higher – sometimes many metres high. These waves can be very destructive, sweeping away almost everything in their path.” (p. 2)	Examples: “Canterbury in the path of the wave”. (p. 7) “Serious injuries can overload medical facilities after a tsunami which can cause an unexpectedly high death rate.” (p. 5) While this may be factual, it is also fear messaging. The clinical description of a mass causality event “unexpectedly high death rate” does little to comfort to the publics and no positive messaging is given to oppose mental fatalism.	This book has more fear messages than positive outcome expectancy/prepare dness messages overall. There are also very few disaster risk reduction messages in this booklet. The messages range from hazard (risk) to response (warnings) and little focus on recovery, planning or preparedness.

Chapter 4: Analysing the Q-Files

Living on a Flood Plain	2010	Flooding.	Red (hazard/risk) is a dominant theme for this booklet. Examples: “Much of Canterbury is prone to flooding.” (p. 1) “Disastrous floods have struck many areas in Canterbury at some time over the past 100 years.” (p. 2)	White: Emergency preparedness/personal risks. Examples: “What are the chances of a flood affecting my house?” (p. 3) “What you can do” (p. 4)	This brochure is closer to best-practice about the interaction between the source and publics, focusing on personal impacts rather than explaining the science or hazards as in-depth as in other hazard publications like the Q-Files.

On reflection, this first coding revealed some trends that remained consistent throughout the rest of the coding process. The earlier (2001-2002) booklets contain more fear-based messaging, with more information about hazards, science and risk with much less information about how to mitigate the effects of these.

In the second series (2007-2009), science information was prevalent. I interpreted this as the authors attempting to use the persuasiveness of facts and figures to convince publics that earthquakes were possible. These booklets were so overwhelmingly “scientific” that little focus was given to personal preparedness. Personal outcome expectancy messages were saved for the last page of the booklet. Despite good intentions, these were less compelling and more jargon-filled than the earlier editions and overall, these may have been less compelling than the earlier editions. However, I may be more biased towards critiquing the second editions as I had a direct influence in the creation of the second series of the booklets, but not the first.

After a period of reflection, I realised I required a more systematic comparison between the booklets and a more robust process for coding. I then started a second code of phasing, which I now explore.

Second Coding Phase

The second phase of coding was again emic but instead of analysing messages, I changed focus to compare the evolution of the different editions. I compared the *Defining Moments in Nature* (2001/2008) and *Exploring Canterbury's Shaky Future* (2001/2008). The *Tsunami* booklet (2007) and *Liquefaction* (2002) had only one edition each. I wanted to compare editions to explore the evolution of messages and strategic direction of the booklets. I decided to focus on comparison analysis after the first coding as I noticed inconsistencies and conflicts between messages from editions. I found this a rich vein of inquiry, showcasing many of the changes in the direction of messaging between the different editions. The following sections explore my method of analysis and my findings from this second phase of coding.

The Q-Files content was converted to rich text files from .pdfs and input into HyperResearch. I used HyperResearch to code frequently repeated or themed messages for comparison across editions. The coding process was emic; I read through the paper documents several times to identify themes and then coded the text files on a computer as per those themes. Originally only four codes emerged: source, message, channel and publics. This expanded considerably over time; 49 codes were identified and used for the coding into HyperResearch. An image of the HyperResearch interface is in Figure 3.4, in Chapter 3: Research Pathways.

I found it useful to compare messages from the different editions. This illustrated how messaging had changed from the original editions in 2001 to the second editions in 2008. I also compared these messages to current messages provided by MCDEM and the Earthquake Commission (EQC), which were available online.

In the *Exploring Canterbury's Shaky Future* (2001/2008) editions of the Q-Files booklets messages differ as to recommended actions during earthquakes. In Table 4.4, I compared different messages between publication editions, as well as comparing these to current MCDEM guidance.

Table 4.4: Different messages from the booklets about earthquake actions.

Chapter 4: Analysing the Q-Files

Document/Webpage	Organisation	Advice During Earthquake	Advice After Earthquake
Q-Files Exploring Canterbury's Shaky Future (2001)	Environment Canterbury	• KEEP CALM WHILE EVERYTHING AROUND YOU SHAKES (in all caps in original edition) • Stay inside if you're inside. Get under a table or desk, or against an interior wall. • If you're outside, get away from buildings or anything that could fall on you. • If you're driving, do not stop on or under a bridge or overpass, or under trees, posts, power lines or traffic signs.	• Gather your thoughts. • Check for injuries. • Make sure you have strong shoes and adequate clothing. • Account for other household members. • Check for fire. • Turn off gas, electricity and water if necessary. • Check for hazards such as damaged chimneys and exposed electrical wiring. • Be ready for after-shocks. • Turn on your radio and listen for information and advice. • And once you've sorted your own situation out see if your neighbours need help.
Q-Files Earthquake Second Edition (2008)	Environment Canterbury and Canterbury CDEM Group	☐ If you are inside a building, stay in the building but move to a safe place (under a table, next to an interior wall, but move no more than a few steps). ☐ If you are outside, move no more than a few steps, then drop, cover and hold. ☐ If you are driving, pull over and stop. ☐ If you are at the beach or near the coast, drop, cover and hold, then move to higher ground immediately in case a tsunami follows the earthquake.	• Stay calm and check for any injuries. • Check on people around you and, if you can, help those who need it. • Check for fire and turn off gas, electricity and water if safe to If you are in a damaged building, try to get outside and find a safe, open place and if possible take with you strong shoes and adequate clothing. • Listen to the radio for information. • Be ready for aftershocks.

Chapter 4: Analysing the Q-Files

Happens Campaign/Get Ready (Ministry of Civil Defence and Emergency Management, 2016)	MCDEM (2016)	• If you are inside, Drop, Cover and Hold – do not run outside or you risk getting hit by falling masonry and glass • If you are outside, move away from buildings, trees, streetlights, and power lines, then Drop, Cover and Hold • Stay there until the shaking stops • If an earthquake is very strong and/or long and you are near the beach or coast, move quickly to higher ground in case a tsunami follows the quake	Not listed on Happens.NZ but on Get Thru Campaign website: • Listen to your local radio stations as emergency management officials will be broadcasting the most appropriate advice for your community and situation. • Expect to feel aftershocks. • Check yourself for injuries and get first aid if necessary. Help others if you can. • Be aware that electricity supply could be cut, and fire alarms and sprinkler systems can go off in buildings during an earthquake even if there is no fire. Check for, and extinguish, small fires. • If you are in a damaged building, try to get outside and find a safe, open place. Use the stairs, not the elevators. • Watch out for fallen power lines or broken gas lines, and stay out of damaged areas. • Only use the phone for short essential calls to keep the lines clear for emergency calls. • If you smell gas or hear a blowing or hissing noise, open a window, get everyone out quickly and turn off the gas if you can. If you see sparks, broken wires or evidence of electrical system damage, turn off the electricity at the main fuse box if it is safe to do so. • Keep your animals under your direct control as they can become disorientated. Take measures to protect your animals from hazards, and to protect other people from your animals. • If your property is damaged, take notes and photographs for insurance purposes. If you rent your property, contact your landlord and your contents insurance company as soon as possible.

Chapter 4: Analysing the Q-Files

Earthquake (Get Prepared section of Earthquake Commission website)	Earthquake Commission (2016)	What to do during an earthquake • Quickly drop, cover and hold. • Drop to the ground (to avoid falling). • Take cover under something strong, like a sturdy desk or table. • Hold onto it until the shaking stops.	What to do after an earthquake 1. Put your <u>emergency plan</u> into action. 2. Keep yourself safe. • If you're in a damaged building, get outside to a safe open place. • If you're near the coast, there may be a risk of <u>tsunami</u>. Get to higher ground or move inland. 3. Keep informed. • Listen to the radio for official advice. • Keep the phone lines clear – only make short, essential calls. 4. Get your claim underway. • When it feels safe to do so, think about: • organising emergency repairs to your home • putting in a claim • cleaning up.

In Table 4.4, there is a clear evolution of messages and recommended actions between the various editions of *Exploring Canterbury's Shaky Future* (2001/2008) and current messaging promulgated by MCDEM (2016) and EQC (2016). Examples include the 2001 booklet, which does not include the now-standard “drop, cover and hold” message as important actions to take during an earthquake. The 2008 booklet only contains this advice when advising what to do when outside during an earthquake. This aligns with my professional awareness that the “drop, cover and hold” message was not popularised until after the 2001 edition was published and not universally accepted for all environments until after the 2008 edition.

The different editions of *Exploring Canterbury's Shaky Future* contain contradictory advice. In the 2001 edition, it recommends “if you’re driving, do not stop on or under a bridge or overpass or under trees, posts, tower lines or traffic signs”. In the 2008 edition, it states “if you are driving, pull over and stop”. These two statements are in direct conflict with each other. There is no clarification or explanation in the 2008 edition as to why this advice has changed since 2001.

Another example of evolving messages includes the differences between environments publics could be in during an earthquake. The 2001 edition only has three options: inside, outside and while driving. The second edition has four choices: inside, outside, driving and at the beach. Messaging from MCDEM in 2015 includes all of the previous four locations and also includes elevators and mountain areas. This change of messaging may be due to the experiences of the Canterbury earthquake sequence. The addition of locations suggests learning through either research or experience occurred between the various editions and the MCDEM messaging.

For many people, the “drop, cover and hold” message is not an option but this had yet to be addressed in the Q-Files. This is likely because before the Canterbury Earthquake Sequence, little research had been done in this area to analyse the effectiveness of the messaging. Only in very recent studies have researchers addressed this gap suggesting the messaging be adapted for vulnerable people unable to “drop, cover and hold” (D. M. Johnston et al., 2014; Tuohy et al., 2014). This led to a recent change in policy and messaging, now in the revised version of *Working from the same page: consistent messages for CDEM: Earthquakes* (2015). In that new chapter, there is advice for people with disabilities and earthquakes. It is first time earthquake messaging has been created that acknowledges diversity in publics in

Canterbury or for MCDEM. The lack of diversity in message was an issue explored in the ShakeOut Drill research (McBride, Becker, Coomer, Tipler, & Johnston, 2014). These messages for people with disabilities or older people are now being used in campaigns but this is only recently. However, the critiques of this issue have been brought up by researchers for some time, as discussed in Chapter 2: Bridging the Literature (p. 5). New messages, specific to disability and fragility and earthquake actions, have now been included in the document *Working from the same page: consistent messages for CDEM: Earthquakes* (2015). A new website and campaign, called Happens, was launched in July 2016. This new campaign focuses on the impacts of disasters rather than the hazards themselves. While this approach may be novel, there are still no messages that address diversity in the new campaign. This limited nature of addressing diversity in the messaging remains concerning.

The complexity and quantity of messages also changed between booklet editions. In the 2001 Q-Files, there are ten separate key messages, while the second edition contains only five. Authors from the second edition may have taken advice from research indicating that people only have a limited capacity to retain messages. Miller (1956) suggests most people only retain seven messages under normal conditions but far fewer during times of stress. Miller's research was further explored by Fritz and Williams (1957), who stated "people are reluctant to accept and act upon warnings of those dangers which they do not directly perceive as immediate and personal in the disaster context" (p. 43). This research may explain the more focused, simpler messages in the second edition of the Q-Files.

Even from the earliest analysis, I perceived that these booklets focused profoundly on scientific information. How the scientific perspective was communicated varies between editions, but it is always a dominant feature. The first example of this is the focus on what earthquakes are. Each Q-Files booklet takes a differing approach to explaining what an earthquake is in the introduction:

First edition, Q-Files

Our world is built on massive slabs or plates that move relentlessly across the Earth's surface. The energy created by these rigid plates moving against each other is enormous. When the stress becomes too great they break and the Earth Quakes [sic]. The energy is released along weak zones called faults. These faults can rupture abruptly and violently during a Quake [sic].

Second edition, Q-Files

Earthquakes are caused by the sudden release of slowly built-up strain along a fault (fracture) in the earth's crust. They can be generated on land or off-shore.

The first edition uses more words than the second to define earthquakes. Even though the definition in the second edition is more succinct, it still uses more technical terms like “built-up strain”. The first edition also has a much longer explanation and illustrated how strain is created, what faults are and how these relate to earthquakes. This information used space that could have been devoted to other content that may have been more useful for the intended audience and goals of the booklets, for example human stories and everyday community perspectives, simple “can-do” steps, and other relatable information.

There are also different spellings for earthquakes between editions. In the first edition, the authors use a capitalised spelling: Earth Quakes. By separating the words and capitalising these, it makes for an interesting dynamic in the reading, making the term a proper noun or name. The reason for this is not immediately apparent. In the second edition, this is changed to earthquakes.

The *Defining Moments in Nature* series aims to provide an overview of the history of natural hazards in the Canterbury region. The booklets include historical accounts of natural disasters that greatly impacted the region as well as future risks including floods, fires, landslides, tsunami, snowstorms, windstorms and earthquakes. Of all the pairs of booklets, these two contained substantial differences in content, from 12 pages in the original to 16 in the second addition.

Definitions appear to be a major focus for *the Defining Moments in Nature* booklets. The first edition of the *Defining Moments in Nature* booklets contains one page (p. 1), that is entitled: Key Terms Defined. This page is a brief summary of the key terms to be used in the booklet. The second edition contains three pages of definitions as a larger narrative piece; instead of a stand-alone page, it contributes to the flow of the document.

In Table 4.5, I compared the differences in the definitions between the 2001 and 2008 editions. Specifically, I looked at the definitions of natural events, natural hazards, natural disasters and risk. Both booklets have at least one page dedicated to defining those specific terms. In the 2001 edition, there is a statement explaining the focus on defining words “if we are to work together to get the best results for Canterbury’s communities, then we need to make sure we are all talking the same language” (p. 1). In the 2008 edition, the statement is

only slightly different: “we need to make sure we are all talking the same language so that we can work together to get the best results for Canterbury’s communities” (p. 4).

Table 4.5: Differing definitions of natural events, natural hazards, natural disasters, and risk from the 2001/2008 Defining Moments in Nature Booklets.

Terms	2001 edition	2008 edition
Natural events	Extremes of natural processes that can be classified into two groups: -climatological (for example, strong winds, snow, rain and wildfires) -geophysical (for example, earthquakes, tsunamis, landslides and volcanic eruptions) [sic] (p. 1)	Natural processes are happening around us all the time – rain falls, rivers flow, tectonic plates move, the sea builds up and erodes coasts. These processes, day-to-day, generally do not concern us too much. Sometimes though, extremes of these processes occur – heavy rainfall or snow, no rainfall, large earthquakes, tsunamis or strong winds. These are often called ‘natural events’ as they are significantly different from everyday processes. (p. 4)
Natural Hazards	The actual or potential interaction between extreme natural events and human activities [sic] (p. 1)	A natural process, or extreme natural event, becomes a hazard when we choose to live, work or play in an area where it has the potential to affect us. (p. 4)
Natural disasters	The actual impact between extreme natural events and human activities [sic] (p. 1)	We often use the term ‘disaster’ when the effects overwhelm the ability of a community to respond – a situation that can include deaths and injuries, extensive damage to property, infrastructure or the environment, and disruption to normal day-to-day life. (p. 4)
Risk	The combined effect of the probability that an event will occur and the damage it might do [sic] (p. 1)	The combination of the likelihood of an event occurring and the potential consequences of that event. (p. 6)

The above table explores the differing definitions in the various booklets. Given the emphasis on including so many definitions of hazards and risk, I have sought in my research to determine why this is. These definitions would have been engaging for a select group of people including planners, emergency managers, and researchers. It would be difficult to claim that the “public” would have high interest in this kind of definitional information.

Evolving definitions of risk. Even if non-specialist publics were interested in the different definitions of risk, the publications changed their definitions over time. This may lead to confusion among publics. As detailed in Table 4.5 above, there are various definitions of risk in the booklets. As well as providing a text definition of risk, there are also equations.

In the 2001 (p. 1) edition, risk is defined as:

$$\text{Risk} = \text{Probability} \times \text{Expected consequences or damage}$$

In the 2008 (p. 3) edition, risk is defined as:

$$\text{Risk} = \text{Likelihood} \times \text{Potential Consequences/Vulnerability}$$

Probability was replaced with likelihood in the second edition and expected consequences became potential consequences. The first edition definition did not include vulnerability as part of the definition, only what is expected or damage. The second edition is similar to the Francis and Oppenheimer (2004) definition of risk:

$$\text{Risk} = \text{Hazard} \times \text{Value} \times \text{Vulnerability} / \text{Capacity} \text{ (Francis \& Oppenheimer, 2004)}$$

Currently, the Canterbury Civil Defence and Emergency Management Plan (2014) defines risk as:

$$\text{Risk} = \text{Likelihood} \times \text{Consequence} \text{ (Canterbury Civil Defence and Emergency Management Plan, 2014).}$$

The definition of risk in the CDEM Act 2002 is:

$$\text{Risk} = \text{Likelihood and Consequences of a Hazard ("Civil Defence Emergency Management Act,," 2002)}$$

The variety of definitions in itself is not surprising; there are myriad definitions of risk in research and practice. While I find it interesting how the definitions changed over time, the more relevant question to this thesis is why this information was considered essential to include in every edition. If the argument is to speak a “common language”, would it not be more useful to use language used by the majority of publics? I argue that if the purpose is to create a common language, there should be more of an effort to use language common to all publics, rather than enforce language only used by a small group of people. Enforcing language on publics is unlikely to create engagement.

To briefly explore the changes between the different editions, as far as the differences between definitions, the 2001 edition includes components of risks that are not referenced in

the definition used in the 2014 Canterbury CDEM Group Plan. The only similarity is the inclusion of consequences and not even expected consequences but the 2001 definition included what was expected. “Expected” was abandoned six years later.

After all the focus and effort on definitions, a key question that occurred to me during the coding is: what purpose did the inclusion of these definitions in such detail serve? This is addressed in my discussion chapter.

Another issue was the change in use of the term ‘probability’ in the 2001 edition to ‘likelihood’ in 2008. In the 2008 edition, when defining the likelihood, it is explained:

We often ‘measure’ hazards by describing the likelihood, or probability, that an event will occur. The likelihood of a certain size event happening can be estimated by counting how many events of that size have occurred over a given period of time (p.5).

This may present a problem for some readers, especially those who have an in-depth knowledge of statistics. Fisher (1930), one of the modern founders of statistics, states that while likelihood and probability are similar these are not the same concepts; probability refers to all possible outcomes using all data while likelihood refers to all possible outcomes using some controlled data.

Overall, I discovered competing discourses at work in the content. While there are international initiatives to address consistency in definitions for risk and hazard, specifically the United Nations International Strategy for Disaster Reduction (2009a), this may be more evidence of continued adherence to a faulty paradigmatic view of effective communication. Enforcing a world view or defining how publics should perceive risk smacks of the paradigm of the propagandistic model. These initiatives, focusing on commonality of language, may address issues among professionals, but they do not address public communication problems specifically the discourse of simplicity versus a discourse of science, complexity, and governmentality. Foucault, Burchell, Gordon, and Miller (1991), refer to obfuscatory government discourse as “governmentality”. My interpretation of the booklets suggests to me that there is a similar occurrence here, a type of “scientificism”. I will explore this further in Chapter 6: Discussion and Reflections.

Reflections on the second coding

Despite some illustrative findings, the second coding had limited utility. One issue was that HyperResearch was not utilised to the fullest in this second coding, and therefore, the findings are not as robust as they could have been. This is probably due to my lack of experience with coding and coding software. I struggled to determine how to use the programme given the lack of specific codes to apply.

Eventually, I determined that comparing varying messages and their evolution throughout the booklets was a useful analysis to explore better the use of terminology and changes in thinking of emergency managers over time. It also illustrates how an agency can evolve over time, given differing people are involved in writing on the same topic.

This approach also revealed the considerable emphasis given to risk definitions in the Q Files. My interpretive reflection led me to ask why, if connecting with a wider audience was a crucial aspect of the booklets, such concepts were included in the first instance? These types of terms could be perceived as having an exclusive quality to them, given the level of education required to understand them. The focus on definitions also hints to a wider logical fallacy perpetuated in these kinds of communications; that if people understand the concept of risk, they will do something about it (Fischhoff, 1995). There is little evidence to support this inference.

Another possibility is that these booklets extensively use gobbledygook. The use of technical or complex language in communication, to impress upon publics that the source is knowledgeable and intelligent, is defined as gobbledygook (Flesch, 1945). The use of gobbledygook is one of the ways people try to establish their authority: confusing and exclusive language that only they or people like them, can relate to or understand (Flesch, 1945). Flesch (1945) developed the original readability test called the Flesch-Kincaid readability test, one of six readability tests I use in this thesis. Another readability test, SMOG (an acronym): simplified a measure of gobbledygook (McLaughlin, 1969). This test, developed originally by McLaughlin (1969), is also used in this thesis. Given these booklets use liberally jargon and acronyms, this coding sweep suggested to me that there are many examples of gobbledygook within the Q-Files. This will be further explored in Chapter 6: Discussion and Reflections.

Third, fourth and fifth phases of coding

The third, fourth and fifth codings all used an etic coding process, guided by the best-practice matrix, as discussed in Chapter 3: Research Pathways. I will explore the development of the codes, the refinement and reflection of the different coding phases in this section and then proceed to the findings. While the first and second codings provided interesting pathways for discovery, more direction and rigor were required. With the third coding, I refocused the analysis by creating an etic process for coding.

Etic is defined as “interpretations and scientific accounts by the researcher based on that which is directly observable” (Daymon & Holloway, 2002, p. 153). A benefit of shifting towards an etic approach is that I could use a research tool, which I developed, to create external “checks” on the *Q-Files*. While still based on my observations and interpretations, the etic approach provided a focused perspective. However, the etic perspective is narrowly focused, and should be used in balance with an “emic” approach, creating a balance between the “insider” and “outsider” interpretations (Daymon & Holloway, 2002). I interpret this to mean that it is the middle area, between the two extremes of the etic and emic approaches, where potentially some of the most relevant insights may exist. I will explore this middle area in Chapter 5: Reflections from the Community of Practice.

My etic approach began by developing a “best-practice matrix”. After the initial reviews of literature, I found main themes emerging from the literature review that were chosen for codes as “best-practice” and “poor practice” elements. I used the Source, Message, Channel, Publics and Setting categories as explored by Berlo (1960), as a framing device to organise similar or associated findings in the literature. This approach was confirmed by Marshall and Rossman (1999), who argue that coding can come from literature reviews as a useful way of structuring analysis. While not a perfect exercise, this matrix provided codes for the third and fourth codings.

With the best-practice matrix codes determined, text from the Q-files booklets was imported into HyperResearch. As noted above, HyperResearch is a computer assisted qualitative data analysis programme. I used HyperResearch to determine the frequency of the codes, as well as context, but coding is still conducted manually based on the coder’s interpretations.

In my first etic coding sweep, I found 26 subthemes. Each sentence of the text was coded individually. Descriptions of each subtheme were also created in HyperResearch to ensure

continuity of research. As well as sustaining consistency of my interpretations over time, it is important for the validity of qualitative research (Denzin & Lincoln, 2005). This ensures the resilience of the research; if I were unable to complete my research, another researcher could read my definitions and continue coding on my behalf.

There were several challenges coding the text and I made some refinements to my process after the third coding. One change was coding maps, graphics and pictures; I decided to code images as “Channel: Maps”; as some images had text, and this text was coded as part of the image. It is not explicit in Berlo’s (1960) model whether images are a message or a channel; I chose to interpret images as channels. My reasoning is that the image is a delivery device for the message, not a message itself. I coded these maps to determine the frequency of images appearing in the booklets. Other subthemes were added including science information, acronyms and jargon. The new codes were critical additions to the coding as there was an abundance of scientific information and jargon in the booklets.

One challenge during the coding was that certain concepts, including risk, science information and jargon were at times difficult to categorise separately from each other; there were overlaps within these particular codes. This was addressed by exploring the definitions further in the literature and refining the descriptions of the code. Three coding sweeps were required to refine the coding and determine delineation between best practice and poor practice. Using the matrix enabled me to reflect and refine the processes each time. It took three etic coding sweeps to refine the results sufficiently to ensure robust findings.

The fifth and final coding is reported here as findings.

Findings

In this section, I present my full findings from the fifth coding. These findings are the code frequencies; first presented as themes with the number of times that specific theme was used in the analysis in Figure 4.1. The theme name represents a component of the communication process as explained in the methods section (SMRCS). I also include text examples from the documents to illustrate some of the phrases that were coded in a specific subtheme. There is a brief analysis for each subtheme; more in-depth discussion is provided in Chapter 5: Reflections from the Community of Practice.

It is important to note that the number of times a code was used is not the primary focus of the reporting however it does illustrate intriguing patterns of interpretation within the data.

Specifically, messaging dominated any other aspect of the communication. I determined this by the frequency in the coding. While using numbers is primarily the realm of quantitative research, some researchers suggest that qualitative studies can also find utility in using numbers in a different way. Maxwell (2010) suggests that frequencies can be useful for qualitative analysis, not as a statistical measure but as a guide to general emphases identified in the researcher's interpretation. Maxwell (2010) argues that the "use of numbers is a legitimate and valuable strategy for qualitative researchers when it is used to compliment an overall process orientation to the research" (p. 480). To that end, I have used frequency counts in my coding to assist me in determining dominant themes and sub-themes. I also use the frequency to illuminate to myself thematic issues I may have overlooked previously.

Table 4.6: Final coding frequencies, BP=Best Practice, PP=Poor Practice.

Theme	Sub-Theme	Frequency
Source	Spokesperson: powerful	BP: 5 PP: 88
	Spokesperson: multi-agency	BP: 18 PP: 0
	Spokesperson: personal stories	BP: 16 PP: 0
	Spokesperson: likeable/similar	BP: 1 PP: 0
	Spokesperson: attractive	BP: 0 PP: 0
	Trust	BP: 0 PP: 0
Message	Sub-Theme	Frequency
	Locality	BP: 250 PP: 0
	Science information	BP: 210 PP: 0

	Jargon/definitions	BP: 0 PP: 243
	Fear messages	BP: 0 PP: 97
	Outcome expectancy	BP: 76 PP: 0
	Mitigation/ Policy and Planning	BP: 40
	Frequency/length	BP: 12 PP: 6
	Ideal	BP: 4 BP: 0
	Acronym	BP: 0 PP: 81
	Propaganda	BP: 0 PP: 12
	Guilt messages	BP: 0 PP: 6
	Counterarguments	BP: 0 PP: 5
Channels	Sub-Theme	Frequency
	Maps, images, picture or other graphics.	BP: 75 PP: 0
	Online presence	BP: 38 PP: 2
	Face-to-face	BP: 1 PP: 3
	Entertainment	BP: 1 PP: 0

	Printed material	BP: 0 PP: 9
Publics	Sub-Theme	Frequency
	Two-way communication	BP: 11 PP: 2
	Publics: resilient community	BP: 11
	Publics: involvement in planning about response	BP: 10
	Publics: diverse publics	PP: 4
Setting	Sub-Theme	Frequency
	Location/Time	BP: 4

In Table 4.6, I provide my frequency counts, based on my interpretations of best practice and poor practice for the Q-Files. These frequency amounts assisted me in reflecting and interpreting best or poor practice, based on individual codes. I will provide more detail on the individual codes and the frequency counts in the next sections.

I also used readability tests to determine how accessible the content was to various publics. As noted in the methodology chapter, readability tests are a quantitative tool developed to provide indicative reading and comprehension levels of content (Coleman & Liau, 1975; Dale & Chall, 1948; Flesch, 1948; McLaughlin, 1969; Senter & Smith, 1967). The concept of most readability tests is that complex words and jargon have more syllables and a test of multi-syllable words compared to word count can provide a basic readability score. The readability score is then translated into grade level and suggested age relevancy (Meade & Smith, 1991). These tests have some deficiencies, including that they were designed in the U.S.A. and not tailored for New Zealand publics. As explored in Chapter 3: Research Pathways, even with these deficiencies, readability tests can be used to provide one indicator of the comparative accessibility of content. At the end of this chapter, I synthesise all the data from the various codings, readability tests and word counts to provide my interpretations as to whether the Q-Files contained predominately best-practice or whether there were elements that, according to the reviewed literature, I would in hindsight interpret as poor practice.

Table 4.7: Frequency of Coded Themes

<i>Theme Name</i>	<i>Number of times Best-practice coded</i>	<i>Number of times Poor Practice coded</i>
Message	594	476
Channel	117	15
Source	44	88
Publics	32	6
Setting	4	0
Total	791	585

In Table 4.7, I present the themes, the number of times these were coded, and whether I judge the examples of each theme to be best-practice or poor practice. The Table 4.7 also displays the findings by frequency from most to least. The most frequent main theme coded was Messages and the least frequent was Setting. I would argue that the most frequently coded theme being messages occurred partly because the Q-Files were essentially perceived by their authors as a message delivery tool. The low Setting score signals they were seldom focussed on localised context or consideration of the setting in which they would be read.

The subtheme frequencies reported below are based on the fifth and final coding.

Messages: the prevailing theme

Berlo (1960) considered messages “the information that the source conveys to the publics”.

More contemporary research suggests that messages are not conveyed to publics in the simple transmission manner imagined by Berlo (1960) and others when they coined these categories – however the term “messages” remains a useful shorthand way of categorising content occurring in the Q-Files that provides information and directives intended for the reader. As referenced earlier in this chapter, messages were coded many times, the most frequently coded theme, meaning the booklets were heavy on giving information (as opposed to, say, inviting feedback or participation). The subthemes were used to further categorise specific types of messages. Science information was the most frequent sub-theme and is the prevailing subtheme of the entire Q-Files analysis.

Although messages were the dominant theme, the coding of subthemes was problematic. I found it challenging to determine the differences between risk, science information and jargon during the initial etic sweep (third coding) of the content. These three subthemes are similar and upon reflection, I thought the coding could have been clearer during the third sweep. However, I addressed these issues in the fourth sweep by modifying the descriptions and focus for a more robust coding.

Despite a more robust process in the fourth coding, one central issue persisted: I recognised that the entire purpose of the booklets was about risk communication, and risk itself would be impossible to code separately. Risk was eliminated as a code and replaced with other codes including definitions, locality, counterarguments, jargon and ideal. The data from the final coding is in Table 4.8.

Table 4.8: Messages Subtheme coding frequency as identified in fifth and final sweep

Code	Best-practice	Poor Practice
Message: locality	250	General information; not coded.
Message: science information (see combination codes for more detail)	210	Coded as jargon, fear/threat messages, definitions, propaganda, guilt messages, acronym
Message: outcome expectancy	76	Coded as fear/threat or guilt.
Message: mitigation/policy and planning	40	Coded as fear/threat or guilt messages.
Message: message length	12	6
Message: Ideal	4	Coded as guilt, fear/threat, propaganda, acronym, jargon, definitions, and all other poor practice.
Message: Counter arguments	2	5
Message: guilt messages	Not coded	6
Message: propaganda	Not coded	6

Message: acronym	Not coded	81
Message: fear message	Not coded	97
Message: jargon/definition	Not coded	243

Best-practice Codes. In Table 4.8, the dominant best-practice subthemes were locality (250) and scientific information (211). Outcome expectancy (76) was the third most frequent code, necessary for avoiding fatalism, with mitigation/policy and planning (40) as the fourth, message length (12), ideal (4) and counter arguments (2) were closer in frequency.

Poor Practice Codes. Jargon was the most frequently coded poor practice at 243 instances throughout the booklets. Fear messages were the second most frequently coded poor practice at 97, with acronyms at 81. Propaganda was coded 12 times. Message lengths and guilt messages were both coded in six instances, and counterarguments coded five times.

Combination codes: Simple, accessible science information is best-practice, but in some instances, I interpreted the overabundance of these codes as poor practice if it is not equally coded to outcome expectancy. Without equal parts positive outcome expectancy with science information, it can lead to fatalism in the thought process of publics (McClure, Allen, & Walkey, 2001). I made the decision to code this occurrence by determining when outcome expectancy and science information were equal. When science information had a greater frequency than outcome expectancy, this was coded as poor practice. I also tested the readability of content coded as science information. If the content scored higher than 14-15-year-old readability, it was re-coded as jargon. Further explanation is in the section about jargon in this chapter.

I now explore the individual subthemes, their frequency in the booklets and a brief analysis.

Message: Locality. Description: Providing publics with localised information facilitates absorption of hazard messages and providing publics a context they care about gives a better chance of publics relating and internalising information provided (Lindell & Perry, 2012). Without giving locality, concepts can be held in abstraction, a distant issue without personalised implications for publics.

Locality was coded 250 times, a common theme in the content. Locality was coded more frequently in the fourth coding due to more segmentation in the coding (multiple codes in one sentence rather than just one). Anytime a locality within Canterbury was mentioned, it was coded. Poor practice was not coded for this theme, because it would have included far too much content to be useful; essentially everything else in the booklets did not mention locale.

Local information such as previous damage to the ChristChurch [sic] Cathedral occurring on three separate occasions due to earthquakes could have been compelling to publics had it been placed more prominently in the booklets. If this information was internalised by some or most people in Canterbury, the destruction of the cathedral in the 22 February 2011 earthquake might have been less shocking given its past. McClure et al. (2011) state many people in Canterbury were not aware of the previous damage to the ChristChurch Cathedral or that there had been damaging quakes affecting the city in the past.

Table 4.9: message: locality with examples from coding.

Message: locality	In Christchurch, the Waimakariri River overflowed into old channels near Halkett and flowed through Avonhead and Fendalton to the Avon River. Floods are the most common and, for many areas, the most significant natural hazard in Canterbury. Many settlements are built on floodplains, including Christchurch. The North Canterbury coast, especially around Kaikoura, is also exposed to local source tsunamis generated by offshore faults or undersea landslides. In contrast, the last 80 years have been unusually quiet with no earthquakes larger than magnitude 7 in the region.

In relation to the above examples, there was no specific or local preparedness information supplied. I found almost all preparedness information in the booklets did not address specific hazards or locations but rather were consistent “key messages” referring to generic household or individual preparedness. While I think consistency may be beneficial in some instances, rigorous adherence to consistent messaging without considering contexts may alienate publics.

Messages: science information. Description: science explained simply, without jargon, and not so much it overwhelms the publics. Simplifying science information is supported by T.L. Sellnow et al. (2009a) “science can be seen as complex and access can be difficult to

different audiences, or highly technical terms are used making it out of reach for some people” (p. 149). Coded 210 times, it is the second most frequent code in the best-practice group in all the analysis. Each time science information was coded, the section was tested for readability. Using readability tests assisted me to re-interpret content by providing a different way of analysing the content. I used readability tests determine when content was science information versus jargon. When content was beyond 14-15-year-old readability, I decided it was jargon. I made this decision based on that the majority (74.3 percent) of residents in Canterbury had achieved the level of education of between 14-15 years, based on the 2006 New Zealand Census.

As such, science information was coded 268 times in the fifth coding but once those codes were tested for readability, I determined 58 codes were jargon or definitions. The remaining science information was, in my interpretation, and based on readability scores, simple enough to be accessible. In Table 4.10, I provide examples from the coded content of science information.

Table 4.10: message: science information with examples from coding

Messages: science information	It is the ‘on-land’ boundary of the Australian and Pacific Plates. It is New Zealand’s largest active fault, running underneath the Southern Alps for over 500km. Faults of this length can produce magnitude 8 or larger quakes. The magnitude of a quake tells you how much energy is released at its centre. The magnitude is the strength of the quake. Magnitude is measured by seismographs and is plotted on the Richter Scale. The strength of a quake does not necessarily reflect the damage it will do. Tsunami waves are not like normal waves – they do not usually curl and break. They may arrive as a ‘wall’ of water, or appear like a rapidly rising and falling tide. Sometimes sea water may withdraw, leaving the sea bed exposed, before the first tsunami wave hits.

Messages: Outcome expectancy. Description: The content describes the positive outcomes that can arise from taking preparedness action. Outcome expectancy was coded 74 times. Often embedded in preparedness messages, these messages are aimed at encouraging or specifying preparedness or mitigation actions for a good outcome (e.g. being able to respond to a disaster, survival). Originally coded as a subtheme of publics, I determined this to be a

better fit within the messaging theme because these were often more information-based rather than attempts at engagement directly with the publics.

One of the more problematic issues about the Q-files is the difference between “outcome expectancy” or preparedness/mitigation measures and science/fear/risk information. Research into best-practice from a variety of researchers including McClure et al. (2001), Mulilis and Lippa (1990), and Peters et al. (2013) indicates that negative or threatening information can be expressed to publics but only with immediate follow up positive outcome expectancy messages. Also, outcome expectancy messages were predominately placed on the back pages of the booklets rather than dispersed throughout the content to create a balance with the science, risk and fear messages. Given that the science/fear/risk message frequency counts outnumber the outcome expectancy messages almost six-to-one, it is unlikely these booklets followed best-practice.

Table 4.11: Examples of message: outcome expectancy with examples from coding.

Message: outcome expectancy	Being prepared means reducing the impact of an event, in addition to coping with it as well as we possibly can when it does happen. Readiness involves preparing and developing systems to cope with and minimise the effects of a natural hazard event. Develop a Household Emergency Plan and prepare emergency survival supplies so that you can cope with being on your own for at least three days.

Message: mitigation/planning and policy. Description: messages addressing either mitigation efforts by councils, organisations or individuals. Similar to outcome expectancy, this subtheme focuses on engineering, planning or governance solutions to hazards, claiming these lessen the impact of a disaster. The purpose of these, from my knowledge of the preparation of these booklets, was to reassure readers that the council and other organisations were taking responsibility for areas within their control – however as we do not have readership surveys we do not know how this information was interpreted by the audience and whether it was meaningful to them.

The mitigation subtheme was merged with the policy and planning subtheme during the fourth phase of coding, as the differences between the two were often indecipherable. The combined subtheme was coded 40 times.

Examples of mitigation efforts through building strengthening for earthquakes that were discussed in the Q-files included AMI Stadium and the Canterbury Civil Defence Emergency Management Group Emergency Coordination Centre (EOC). The EOC had to be demolished after the 22 February 2011 earthquake due to extensive damage and the fate of AMI Stadium (previously known as Lancaster Park and Jade Stadium), is, as of March 2016, still uncertain but one of the larger stands, the Hadlee stand, has been demolished. These remain interesting choices to highlight given the benefit of hindsight.

Table 4.12: Message: mitigation with examples from coding.

Message: mitigation/planning and policy	Equipment spares are stored in a secure location and an emergency contractor is engaged to respond to emergency events. Today, monitoring, warning systems and structural works like stop banks mean that floods in Canterbury claim few lives but they still regularly cause millions of dollars of damage to buildings, infrastructure and agriculture. Mitigation means moderating or reducing a natural hazard that the effects a natural event could have.

Message: message length. Best-practice means shortened messages lessen the chance of distraction, with seven or fewer elements (N. Cowan, 2010). Covello (2003) supports this concept, stating risk communication should “strive for brevity” (p. 7). Saaty and Ozdemir (2003) state that “to serve both consistency and redundancy, it is best to keep the number of elements to seven or less” (p. 356). In the Q-Files, best-practice was coded 12 times, with seven or fewer elements in messaging.

Poor practice is when lengthy messages occur; these are more prone to being dismissed due to distraction (Petty & Wegener, 1999). Poor practice was coded six times. I coded this based on the length of sentences as well as how many words were required to communicate one message.

Table 4.13: Examples of best-practice and poor practice of message lengths.

Messages: message length (Best-practice)	Stopbanks can be breached or overtopped by flood events larger than they have been designed for. Seismographs are used to measure ground motion. They are literally vibration writers.

	A tsunami is not a single wave.
Messages: message length (Poor Practice)	Warning signs in low lying coastal areas can also help educate people about the tsunami hazard, especially for local source tsunamis where there may be little warning time. The two most active faults in New Zealand – the Alpine Fault to the west of Canterbury and the Hope Fault in North Canterbury – move on average every few hundred years, creating large earthquakes and many metres of permanent offset of the ground across the fault.

Message: Ideal. Description: Culturally sensitive, dialogue encouraging, personal address, localised, rationale plus simple steps plus the benefit to them for their lives, connected to the community. Ideal messages included many attributes in the literature. I coded ideal when it met at least three of the above attributes. I only interpreted this four times in the booklets.

Table 4.14: Examples of ideal messages.

Messages: ideal	The Q Files go deep into the ocean to uncover the facts about tsunamis and find out what you can do be prepared. Share this knowledge with your family and friends it could save their lives.

These were chosen as best-practice because these were personalized messages, as well as illustrative, intriguing and engaging. The lack of ideal messaging will be explored further in Chapter 5: Reflections from the Community of Practice.

Message: counterarguments. Description: counterarguments and alternate theories are acknowledged and addressed rather than avoided. Papageorgis and McGuire (1961) argue that if the incorrect or incomplete information is provided to publics, contrasted with more complete information, then they will be more persuaded to support the information that is more complete. This theory, named the “inoculation” theory, is based on the inoculation concept in medical practice. The central premise is to expose publics to alternate theories or less complete information first, and then provide counterarguments that “debunk” those theories. Best-practice was coded twice in the booklets.

Poor practice was determined by any discussions of alternate theories and counterarguments ignored. This was coded five times in the booklets, based on my professional awareness of where known counterarguments existed but were not included.

Table 4.15: Examples of best-practice and poor practice of counterarguments.

Messages: counterarguments (Best-practice)	Do not try to surf a tsunami! It is not a regular wave.

Messages: Guilt. Description: guilt campaigns link parental, social or cultural responsibility to preparedness. Guilt was coded six times. The difference between fear and guilt messaging is fear messaging is directed more universally to a larger range of publics than guilt messaging. Guilt messaging usually attempts to appeal to a particular public e.g. mothers are directed to use a particular type of soap to protect their child, or they are an inadequate mother (Turner & Underhill, 2012). Guilt messages were not widely used in the Q-Files.

Table 4.16: Examples of message: guilt with examples from coding.

Message: guilt messages	Living next to the Alpine Fault is like living next to a sleeping giant. One day we will be shaken out of our apathy – hopefully it won't be too late by then.

Messages: Propaganda. Description: Messages for the benefit of the source only.

Propaganda, as explored in Chapter 2: Bridging the Literature is defined as messages existing only to benefit the source, not the publics. Propaganda was infrequently coded in the content, only occurring 12 times.

As explored in Chapter 2: Bridging the Literature, not all propaganda is necessarily negative. Jowett and O'Donnell (2012), argue that there are white, grey and black types of propaganda. Overwhelmingly, any propaganda messages coded in the Q-Files were white propaganda. White propaganda is defined as coming from a source that is identified and the information in the message is fairly accurate, with no immediate harm to the publics if they follow or support the message (Jowett & O'Donnell, 2012). Content coded as propaganda included statements like “everyone has a part to play in managing natural hazard risk. Are you doing yours?” This statement is an example of bandwagon, one of seven different types of

propaganda technique (Jowett & O'Donnell, 2012). It is interesting to note any attempts at persuasion are rare in these documents and when used, it appears to rely on propaganda. Propaganda, for all its negative connotations (as explored in Chapter 2: Bridging the Literature) can be either negative or positive, and there is variability in its use (Jowett & O'Donnell, 2012).

One sentence, in particular, is of concern: “Environment Canterbury’s job is to plan to avoid or lessen the effects of these events”. While attempts to reassure publics those authorities are doing something about the risk, this kind of communication also presents complications. Paton and Johnston (2006) suggest that there is unrealistic public expectation of response efforts during emergencies from members of the public. Attempts to reassure publics can have the reverse effect in discouraging them from personally preparing for emergencies.

Other examples include statements only benefitting the source. This code was used to identify content focused on the source and what the source does without showing any benefit to the publics.

Table 4.17: Examples of message: propaganda with examples from coding.

Messages: propaganda	Everyone has a part to play in managing natural hazard risk. Are you doing yours? We make ourselves more vulnerable to natural hazards by choosing to live, work and play in areas where natural events are likely to occur.

Messages: Acronyms. Description: Use of acronyms in the text. This is poor practice, even when explained, unless these are widely accepted acronyms like SCUBA (Covello, 2003). There were 81 acronyms coded in the text. I interpret the use of acronyms as a barrier to understanding for certain publics, especially those who may be new to New Zealand or who had not come across these organisations before.

Given my experience as a practitioner who used these acronyms regularly, it was difficult to identify acronyms for coding. I coded repeatedly through the documents to finally identify that GNS Science and NIWA were acronyms. This revelation as to my struggles to identify acronyms illustrates a problem for me as a communicator. It may have been an important factor in the allowance of acronyms in the content; the people involved in producing these

booklets were too familiar with the subject matter and struggled with understanding the perspective of the publics. There was no pre-testing with target audience focus groups, or any attempt to involve the community in producing the communication.

This issue will be further explored in Chapter 6: Discussion and Reflections.

Table 4.18: Message: acronyms with examples from coding

Messages: acronyms	The MCDEM pass any confirmed distant source tsunami warnings from the PTWC on to the Canterbury CDEM Group. Modelling by GNS Science indicates that a 2-metre high tsunami can be expected to reach Christchurch on average every 100 years, and a 4-metre high tsunami on average every 500 years. UNESCO NOAA

None of the above acronyms or their relevance to the publics was explained in the booklets.

Messages: Fear messages. Description: no positive outcomes linked with actions communicated and a focus on fatalistic messages. This was coded 97 times and is considered poor practice and unlikely to stimulate positive preparedness (Emery, Szczypka, Abril, Kim, & Vera, 2014; Y. C. Kim & Kang, 2010; McClure et al., 1999; Mulilis & Duval, 1995; Turner & Underhill, 2012).

These kinds of messages can create anxiety in the reader and increase fatalism (McClure et al., 2001). The first edition of *Exploring Canterbury's Shaky Future* (2001) and the 2008 editions had similar instances of threat or fear-based messaging, at 23 and 27, respectively.

As I have discussed, intentions are not necessarily the primary driver of content, and may have little or no connection with the meanings generated by readers. It is worth noting from my perspective as a member of the team producing these booklets, that this is the opposite of the conscious goals of the booklets' authors. These booklets were intended to provide information about earthquakes to encourage people to prepare. It appears the 2008 edition, with fewer examples of fear messages, was an improvement and closer to best-practice.

Table 4.19: Message: fear with examples from coding.

Message: fear	a situation that can include deaths and injuries, extensive damage to property, infrastructure or the environment, and disruption to normal day-to-day life. When an extreme natural event interacts with human occupation and use of an area then the outcome may range from a nuisance to a catastrophe. There is a hidden threat inside the Earth. This threat is so great, so powerful that it is almost impossible to understand. THE EARTH MOVES A TICKING BOMB BENEATH THE SURFACE [capitalisation in original]

Messages: Jargon. Description: technical or specialist terms that are difficult for all publics to understand or relate to. Jargon was coded 243 times during the fifth coding and was especially prevalent in the *Tsunami* booklet and the *Exploring Canterbury's Shaky Future* (2008) booklet. Jargon was another addition to the fourth phase of codings as “science information” was too general. There is no best-practice for jargon other than the elimination of it altogether. When best-practice occurred, this was coded under the theme science “ideal”.

Determining jargon can be an extremely subjective exercise; what is jargon to one person may be acceptable to another. Due to my level of education and familiarity with the terms, I needed a more etic process. Hence I used readability tests each time I thought a sentence was jargon. I inputted individual sections to determine readability into www.read-able.com. This website performs calculations based on six readability tests. I found that the highest level of education for one section of text was at grade level 17 or for 25-26 plus years old.

Terms like subduction, subsidence and articulated pins were coded as jargon. However, there was some visual assistance provided to publics. Graphics accompanied some of the technical terms to assist in understanding the content. Despite the addition of these graphics, my interpretation in light of what I have learned through reviewing the literature is that the jargon would have remained ineffective in changing perceptions or encouraging preparedness actions.

One example in the *Exploring Canterbury's Shaky Future* (2008) has a particularly personal meaning to me as a researcher: “There are several of these folds or warps in the gravels of the

Canterbury Plains, indicating faults in the bedrock underneath.” (p. 4). The Darfield Earthquake in 2010 was the first large earthquake in the Canterbury Earthquake Sequence and occurred on a fault similar to what is described above (Bannister & Gledhill, 2012). To give context, the complete paragraph is:

Many faults, however, are entirely underground and are difficult to detect. Sometimes underground faulting produces folding or warping of the ground surface above. There are several of these folds or warps in the gravels of the Canterbury Plains, indicating faults in the bedrock underneath. Often though, these underground faults remain undetected until an earthquake occurs on them (p. 4).

What the above paragraph described is exactly what happened on the Darfield earthquake (the Greendale fault) (Pettinga et al., 2001). As the above paragraph was rated at 18-19 years old reading age, it was not incorrect but it was dense and almost inaccessible, even to me, who has worked in emergency management communication for 12 years.

Also, I combined jargon and definitions, as both had similar high readability scores. Further, I found that given definitions are often associated with language used by a specific group, it is not difficult to combine these with jargon. Use of definitions was coded as poor practice because it continues to propagate the fallacy that if people simply understand the definition of risks or hazards, they will do something about those risks. Plough and Krinsky (1987) argue that lay people do not compare events strictly using actuarial risks. Definitions were coded 32 times in the fifth coding.

This will be explored further in Chapter 6: Discussion and Reflections.

Table 4.20: Message: jargon with examples from coding.

<i>Messages: jargon</i>	Local topography, geology and soils also influence shaking intensity. For example seismic waves are often amplified in soft sediments, or can be focused along ridgelines. (readability age: 21-22-year-olds) This includes measures that reduce vulnerability to hazards such as land-use planning, building design and construction, minimum flood levels, and planting or retaining vegetation. (readability age: 22-23-year-olds) The owners and operators of the engineering lifelines and emergency services are using this information to assess the vulnerability of their lifelines or services and to make them more robust. (readability age: 23-24-year-olds) Two new concrete shear walls (walls that give lateral support) have been constructed in the transept area and another two concrete shear

	walls have been constructed against the west wall. (readability age: 20-21-year-olds)

Channel

Channels are defined as “how information flows from the sender to the publics” (Berlo, 1960). Through the literature, I interpreted that there were six codes relating to channels. These are: maps and graphics, face-to-face, online presence, other printed material, mass media and social media. Best-practice channel subthemes were coded 137 times and four times for poor practice in the fifth and final phase of coding. The poor practice codes were about online presence and face-to-face. Examples and my reasoning are located in the sections related to those codes in Chapter 2: Bridging the Literature, in the Channels section, as these require more detail and discussion.

Table 4.21: Channel Subtheme coding frequency

Channel: maps and graphics	Best-practice: 75 Poor practice: 0
Channel: online presence	Best-practice: 38 Poor practice: 2
Channel: written material	Best-practice: 9
Channel: Face-to-Face	Best-practice: 1 Poor practice: 2
Channel: entertainment	Best-practice: 1
Channel: social media	Best-practice: 0 Poor practice: 0

In Table 4.21, maps and graphics were the most commonly coded sub-theme, with 75 graphics, maps or other imagery used in the booklets. Online presence was the second most common theme with 38; this is mostly due to websites being included in organisational contact details. Brochures and printed material were mentioned nine times, specifically about tsunami planning brochure developed by the Christchurch City Council. Face-to-face, or the opportunity to actively engage with council staff was coded one time as best-practice and twice as poor practice. Social media was not coded once as social media outlets like Twitter which started in 2006, were not a major channel to deliver information for Environment Canterbury, and were not mentioned in any of the booklets.

Channel: maps and graphics. Description: includes imagery such as pictures, diagram and maps. It is considered best-practice to include maps and graphics. McCaffrey et al. (2013) suggest maps and graphics were rated highly in their study of bushfire survivors, as successful devices to convey risk information.

In the theme of channel, maps and graphics were the most frequently coded subtheme, with best-practice coded 75 times. I did not identify any poor practice examples, as the lack of imagery was difficult for me to establish without extensive further research into best practice design and cartography. This highlights a potentially positive aspect of the booklets. The Q-Files used graphics extensively in the booklets, at least one per page. These images included a number of maps, pictures and diagrams. Used to express complex issues, such as liquefaction, tsunami and earthquake activity, these images conveyed different natural processes.

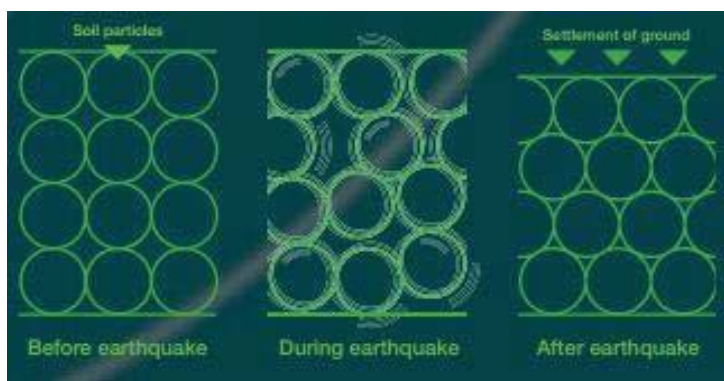


Figure 4.5: Liquefaction process. Caption (from Defining Moments in Nature 2008 booklet): When the ground shakes during an earthquake, soil particles are rearranged and the soil compacts and decreases in volume, causing water to be ejected.

There is also a map in both editions of *Exposing Canterbury's Shaky Future* showing historical earthquakes and known fault lines in the region. While it does not show fault lines in Christchurch, it does reveal a medium (5+) intensity earthquake occurred historically underneath the city. This is in both editions of the booklet. The map also reveals the many known fault lines in the Canterbury region and highlights some of the larger earthquakes in the past. To some readers, these maps may give a graphic impression that Canterbury is a seismically active region. However, this map was not compared to other regions, with the exception of the West Coast. Comparing one region against another may have been a useful device to provide publics with different contexts. Wellington could have been used to create a graphical impression for a higher frequency area of large earthquakes, compared to

Auckland, an area with a lower frequency of earthquakes. Canterbury would likely have been in the middle of these two extremes.

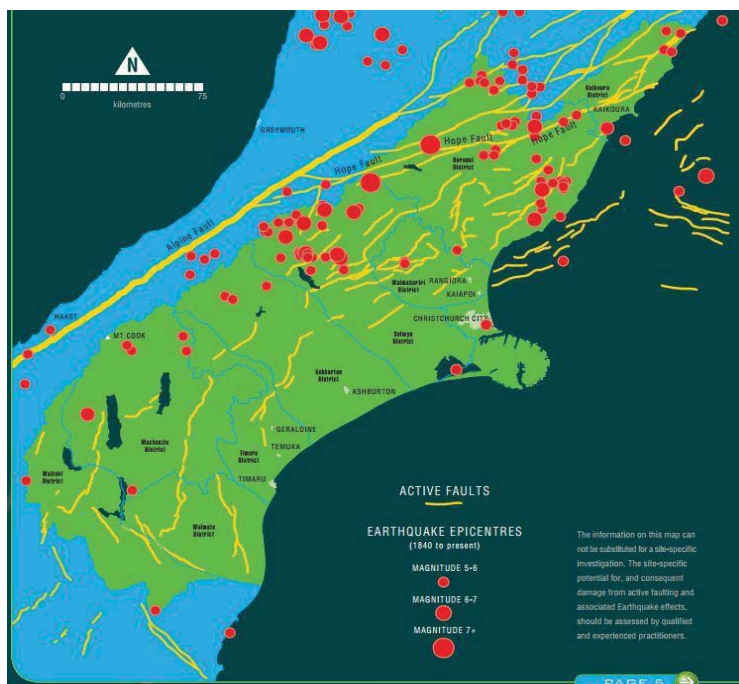


Figure 4.6: The Canterbury Map of Faults and Earthquakes from the Q-files Brochure 2008.

One of the more iconic images in the content illustrates Christchurch's vulnerability to earthquakes using the ChristChurch Cathedral Spire. However, this image of damage to the Cathedral spire did not seem to create much of an impact for people in New Zealand.

McClure et al. (2011) state:

Many New Zealanders, including Cantabrians, did not know that the spire of Christchurch Cathedral, which collapsed in the February earthquake, had been knocked down by earthquakes twice before, in 1888 and 1901. The Cathedral was damaged less significantly by earthquakes in 1881 and 1922. As this all happened some time ago, people had either never known about it or forgotten. (p. 8)

This statement contradicts the surveys conducted before the earthquake; those findings overwhelmingly indicated that there was earthquake awareness among many publics in Christchurch (Becker, 2012; Leonard, Paton, Johnston & Mitchell, 2004; Opinions Market Research, 2009). In Chapter 6: Discussion and Reflections, there is a section further exploring pre-earthquake survey findings.

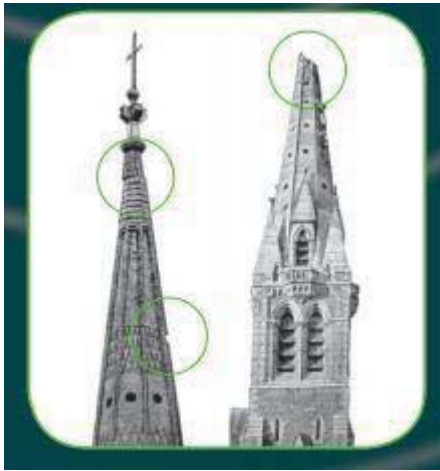


Figure 4.7: ChristChurch Cathedral. Caption (from Defining Moments in Nature 2008 booklet):

The ChristChurch Cathedral has been damaged by earthquakes on three separate occasions. The most notable was the 1888 North Canterbury earthquake, which caused the partial collapse of the spire. A four-year strengthening programme, completed in 2002, included significant cross-bracing and strengthening to the roof of the side aisles. Four concrete shear walls (walls that give lateral support) were constructed in the transept area and against the west wall.

Channel: online presence. Description: web presence. This subtheme was coded 38 times as best-practice and twice as poor practice. Best practice was coded when the website highlighted as a location to retrieve further information. Poor practice was coded twice, specifically when a website was referenced, but no reasoning was provided as to what publics might find on the website.

I located an archival version (2012), retrieved from the Canterbury Civil Defence and Emergency Management Group (CCDEM) website. This archival version, updated last in December 2011 is available via the UC Ceismic archival website. The website has since been redesigned. The website was referenced multiple times in the Q-Files content, referring publics to go online to find more information from the Canterbury Civil Defence and Emergency Management Group. However, based on the archival version, there was no information about earthquakes or natural hazards on the site. PDFs of the Q-Files were also not available on the CCDEM website, although these were available on the Environment Canterbury website. The CCDEM website contained less specific information than was already contained in the Q-Files. Given the website did not have any further information to offer, it is difficult to infer that inclusion of the web address would have contributed to increased understanding of earthquakes. NIWA and GNS Science likely provided more

information on their websites about earthquakes, but this was not the case with the Canterbury Civil Defence and Emergency Management Group.

Table 4.22: Examples of Channels: online presence with examples from coding.

Channel: online presence (Best-practice)	The following websites have lots of information on tsunamis or ask at your local library for tsunami resources.
Channel: online presence (Poor Practice)	For more information, visit www.eqc.govt.nz

Channel: printed material. Description: this code was for references to other written information, usually a brochure or poster. Printed material was coded nine times. The use of printed material was considered best-practice by Mileti and O'Brien (1992) but has changed subsequently due to the rise of digital and social media platforms (Briones et al., 2011; Veil et al., 2011). Five times in the coding, poor practice referred back to other Q-Files brochures. The other two referred to a tsunami evacuation booklet created and distributed by the Christchurch City Council for residents in tsunami-prone areas.

Table 4.23: Examples of Channels: printed material with examples from coding.

Channel: printed material.	The Council distributed a brochure to residents in 2007 which shows areas that will be evacuated if a warning is received, along with recommended evacuation routes and advice on where to go, what to take, what to do with pets and which radio stations to listen to.

Channel: face-to-face. Description: interpersonal or encounter based communication between the source and their publics. In the coding of the booklets, face-to-face interaction was never alluded to, except for one place where publics are encouraged to contact local emergency managers or local councils for more information. Poor practice instances include when publics are encouraged to “seek professional advice” from another source, not related to the main source. But publics are never given any explanation of who that might be, or where they could find another “professional”. Publics are left to seek further information but not to engage or interact with the source. This is why I determined it to be poor practice.

Table 4.24: Examples of Channels: face-to-face with examples from coding.

Channel: face-to-face (Best-practice)	For more information on tsunami hazard management in your local area, contact your city or district council.
Channel: face-to-face (Poor Practice)	• Seek professional advice • If unsure, contact a professional

Channel: entertainment. Description: Humour, celebrity or other forms of entertainment. Eveland and Cooper (2013) support the concept of using entertainment in risk communication, stating “entertainment media that contain persuasive messages can reduce these forms of resistance through greater involvement with the narrative” (p. 58). Humour, a component of entertainment, “should be given far greater salience and relevance than it has been accorded in previous risk research in order to investigate further how emotions and affect work in relation to risk” (Parkhill et al., 2011, p. 326). Entertainment was coded one time. I only interpreted the below statement in Table 4.25 as entertainment, due to the wording and that it was placed as an introductory statement.

Table 4.25: Examples of best-practice of entertainment.

Messages: entertainment (Best-practice)	Quakes are one of the most spectacular events on Earth. They are fascinating, unpredictable and can be devastating.

Poor practice was not found in the booklets, as I could not find instances that were poor taste humour, sexist, or overtly racist. Other channels codes include social media and mass media. I could not find any instances in the booklets.

Source

Source, according to Berlo (1960) is defined as “where the message originates”. In the Q-Files booklets, the main sources of the message are Environment Canterbury or the Canterbury Civil Defence and Emergency Management Group. However, the source also refers to stories from people, experts, and statistics from previous research. As a major theme, source was coded 132 times. I coded source more frequently for poor practice (88) than best-practice (44).

Table 4.26: Source Subtheme coding frequency

Code Theme	Best-practice	Poor Practice
Source: spokespeople: powerful	5	88
Source: spokespeople: multiple agencies	18	0
Source: spokespeople: personal stories	16	0
Source: spokespeople	4	0
Source: spokespeople: likeable/similar	1	0
Source: Trust	0	0
Source: spokesperson: attractive	0	0

In Table 4.26, the most frequent subtheme was spokespeople: powerful; I coded these more frequently as poor practice rather than best practice, due to the use of authority without providing value or context to publics. The next most frequent is the subtheme of multiple agencies, but I considered these best practice. Personal stories were coded the third most frequently, again as best practice. The final four were spokesperson, spokesperson: attractive, spokesperson: likeable/similar, and trust. It is important to note that in the context of coding, a zero finding is as illuminating as coding. I will explore this further in Chapter 6: Discussion and Reflections.

I now explore the codes in more detail, beginning with Source: spokespeople: powerful. I will begin with the most frequent codes and progress to the least frequent.

Source: spokespeople: powerful. Description: influential power comes from: impersonal reward, expert/information, legitimate equity/reciprocity, referent, personal reward, legitimate position and legitimate dependence (Raven, 2008).

Initially coded more generically as spokesperson, I determined that “powerful” was an important attribute of a spokesperson. Jost and Hardin (2011) maintain that “communicative sources who are seen as credible, trustworthy, attractive, likeable, similar, familiar, and powerful are more likely than those who are not to effect behaviour change, all things being equal” (p. 37). Further, Raven et al. (1998) explore different types of influential power including: expert/information, legitimate equity/reciprocity, referent, personal reward, legitimate, position and legitimate dependence. This is fully explored in Chapter 2: Bridging the Literature.

I coded best-practice when I reflected a legitimate attempt to provide value to publics, which can produce feelings of reciprocity from publics towards the source. My reasoning was that when personal reward was perceived by publics, this was more persuasive than simply providing basic information.

However, best-practice was only coded five times. The more frequent code was poor practice, coded 88 times. Poor practice of powerful sources is defined as an authoritative voice without providing information, reward, or legitimacy (Macnamara, 2012). I interpreted poor practice to included when the source was authoritarian without providing any adequate reasoning or qualifying statements from experts. Mostly, I interpreted little evidence of the source providing evidence they were scientific experts. One example of this is referring to GNS Science and NIWA without explaining what those agencies are and what kinds of experts work for these organisations (these are science agencies located in New Zealand). Another example is change or interesting choice in language to create increased attention on a word, like Quake becoming capitalised throughout the content of the brochure. There is no explanation provided; it is merely an incorrect style choice that is never explained or rationalised. These types of decisions, when the source claims authority without providing adequate support for those assumptions, were coded as poor practice. However, I found throughout all the booklets there was a sense of “assumed authority”, without explanation or evidence to support this position of authority.

In *Table 4.27*, are examples of both best and poor practice.

Table 4.27: Powerful subtheme with examples from coding.

Theme	Best-practice	Poor Practice
Source: spokespeople: Powerful	We can provide you site-specific information on your property. What Environment Canterbury can do for you:	Environment Canterbury promotes community preparedness for disasters. New Zealand is a world leader in earthquake engineering – we have resilient houses and high standards for buildings and other structures such as dams. The MCDEM pass any confirmed distant source tsunami warnings from the PTWC on to the Canterbury CDEM Group.

Note: the last example of poor practice was coded twice, once for the above theme and once for acronyms.

Source: spokesperson: multiple agencies. Description: It is best-practice to have multiple agencies supporting messages when it comes to preparedness messages (Coppola & Maloney, 2009; Eriksen & Gill, 2010; McCaffrey et al., 2013; McComas, 2003). In the *Q-Files*, this occurred as an explanation of coordinated response or planning for Canterbury. Coded 18 times, this was not a major concept in the content.

I did not code poor practice for this subtheme, because everything that was not coded as best-practice was poor practice.

Table 4.28: Multiple agency subtheme with examples from coding.

Source: sub-theme: multiple agencies.	Environment Canterbury is also a member of the Canterbury Civil Defence Emergency Management (CDEM) Group, a partnership of local councils, emergency services, district Health boards and other emergency response organisations in Canterbury. The members of the CDEM Group work together to identify and analyse hazards and risks in Canterbury, and to plan how to reduce risk, be ready for, respond to and recover from hazard events. Response involves the whole community but is usually coordinated by emergency services, local government and health organisations. Each local authority, as well as the Police, has local contingency plans for the evacuating people from areas likely to be affected by a distant source tsunami.

Source: spokesperson: personal stories. Description: Different people, typically not associated directly with the source, share their stories and disaster experiences.

Some historical events used in the booklets had statements from people about their experiences. These were coded as personal stories because the personal accounts were not from people who represented an organisation. However, this was not a frequent code, with only 16 occurrences. My interpretation (discussed further in Chapter 6: Discussion and Reflections) was that the lack of personal stories contributed to an overall officious tone for the booklets.

One device to encourage more people to prepare would be to include stories from people who successfully prepared for emergencies and then experienced one. Community spokespersons,

diverse people with different experiences, representatives from vulnerable or special needs communities were completely absent in these booklets. Even people in professional environments, like workplaces, were absent as were their preparedness and emergency stories.

Table 4.29: Source: spokesperson: personal stories with examples from coding.

Source: personal stories.	“A terrible earthquake [magnitude 6.5-6.7] this morning at a quarter to eight. There is a mass of ruins at Cheviot...shook a traction engine over, and a man out of his coffin.” – Diary entry, Harry Richard Willis, 16 November 1901. “The damage to property was enormous, and when the flood abated a desolate picture met the eye – houses levelled to the ground, crops silted over and buried, fences washed away...” – R M Burdon. [February 1868].

I present, in Table 4.29, two examples of stories from people who were involved in disasters in Canterbury. However, there is no indication if these people were farmers or government officials, and what their role was in the emergency. I think these examples, while better than not having personal stories, still lack any relatability for publics.

Source: spokesperson. Description: When the content described identified individuals, instead of organisations, as sources, or quoted named individuals in the content, this was coded “spokesperson”. I coded this four times. The best example is provided in Table 4.30: Kingsbury’s (the only spokesperson working for Environment Canterbury, who is named) comment, illustrating his concerns for people in Canterbury and his hopes that it is not too late to prepare, was the best example I could find in the booklets. In the 2008 edition, there is not a similar quote from anyone, and this is a drawback to that edition; there is no human element that provided empathetic messages.

Context needs to be established for spokespeople to be trusted sources. The best-practice literature suggests sources should be clearly established as experts to enhance their credibility, but also as likeable and familiar, to improve their relatability. Kingsbury was given an official title, providing some credibility, but there was no explanation of achievements or skills he possessed that makes him worth listening to, and no establishment of his humanity. An opportunity was missed to humanise and credentialise Kingsbury. Given

that this was the only time a specific person was referred to as a spokesperson, I think this missed opportunity is important.

I coded poor practice under the powerful sub-theme. My reasoning is that without spokespeople identified, there is an issue with “assumed authority”, as examined under that theme.

Table 4.30: Examples of Source: Spokespeople with examples from coding.

Source: spokespeople	“It’s been 70 years since a magnitude 7 or greater quake has hit the city, which means not everybody is ready, and everybody should be. It was almost a part of life for earlier generations, however, we take the risk lightly, in fact too lightly. Living next to the Alpine Fault is like living next to a sleeping giant. One day we will be shaken out of our apathy – hopefully, it won’t be too late by then.” - Peter Kingsbury, Environment Canterbury

Source: spokespeople: likeable/similar. Description: Similar, relatable, local or similar. The reason for sources to appear likeable or similar is explained by Sellnow et al. (2009): “if the relationship between the spokesperson and public is perceived to be friendly and helpful, the participants more likely will respond positively and follow the instructions for dealing with the crisis” (p. 44).

Best-practice was coded when there was any indication that the source was similar or likeable to the publics. Using the 2006 census information, 77 percent of Canterbury was European at the time. Any indication of other cultures, such as Maori, Pacific, or Asian (approximately 16 percent of the population) was considered best-practice.

I found an example of *spokespeople: likeable/similar* only once in the booklets when there was a picture of emergency management officers in an identified community in Canterbury responding to an emergency. This image of emergency responders assisting the community is the best example of likeability in the booklets.

Source: Spokesperson: attractive. Description: imagery of attractive, friendly or open source members. Petty et al. (1981) explain that “although the message content may be the most important determinant of persuasion under some circumstances, in other circumstances such noncontact manipulations as source reliability, attractiveness and so forth may be even more important” (p. 835). Norman (1976) found that “attractiveness is not necessarily more important than an expert opinion, however, when peripheral heuristic processing is occurring,

it can increase the message persuasiveness” (p.299). More recently, E. J. Wilson and Sherrell (1993) support this stating “members of the target audience may be more likely to identify with and hence adopt, the opinions of attractive sources compared to unattractive sources” (p. 102).

Neither best-practice nor poor practice was coded through the entire series, as no photographs were used to identify the source as a person.

Source: Trust. Description: Trust must be between both the publics and the source for persuasive discourse to occur. Trust was a difficult subtheme to code. Frewer (2004) argues that “at present, however, there is insufficient knowledge about how to develop best practice in risk communication of this type” (p. 395). G. Dietz (2011) argues that the process of trust is universal (the how we trust) but the reasons (the why we trust) is more dynamic with people’s individual and cultural influencers shaping the process of trust.

Developing trust is partly about sharing values and empathy (T. Dietz, 2013). Values to build trust was defined by Schwartz and Bilsky (1990) and further refined by T. Dietz (2013) as:

- a) concepts for beliefs,
- b) about desirable end states or behaviours,
- c) that transcend specific situations,
- d) guide selection or evaluation of behaviour and events, and
- e) are ordered by relative importance (p. 14081)

Of the above framework, for this research, the concepts of beliefs are the most relevant as the booklets rarely discuss beliefs. Further, end states or behaviours (preparedness) are only given marginal attention in the booklets and the booklets only address specific situations but do not transcend these. There is no guide or evaluation of the behaviour about events nor is there any clear hierarchy of information in the booklets.

Overall, messages about shared values between the organisation and the publics it serves, were completely absent in the document. When coding these booklets, I looked for shared concepts communicated by the source or hints to desired outcomes for both publics and the source. But I could not find much evidence of shared understandings, beliefs, concepts or values in these booklets. Given this, trust was not coded in the booklets.

Publics

Publics are defined as “the intended publics, audiences or receivers” (Berlo, 1960). During the coding process, it was difficult to determine what information was meant for specific

publics as the Q-Files aimed for a “general” public even if, with the wisdom of research and hindsight, I now recognize that there is no such group as a generalised public. As such, different publics’ needs are rarely addressed in the text; this may explain why this publics theme had a low coding frequency.

Table 4.31: Publics Subtheme coding frequency.

Code	Frequency
Publics: two-way communication	BP: 11 PP: 2
Publics: resilient community	11
Publics: involvement in planning about response	10
Publics: society	0
Publics: diverse publics	BP: 0 PP: 4

I present, in Table 4.31, the Publics Subtheme coding frequency which reveals there were only 33 instances when the booklets directly addressed publics. However, even when publics were addressed, there were only 24 instances when either involvement in planning response or two-way communication was suggested. Resilient communities were coded nine times. Diverse publics received six poor practice instances, when I interpreted content as suggesting that diversity in publics was not important to the booklets’ aims.

Publics: involvement in planning about response. *Description:* involving publics early once a risk is identified. L. Gray et al. (2012) suggest “the public are more likely to take appropriate action and accept the recommendations if they have been involved in the decision-making process, and the quality of relationship between authorities and the community has a direct effect on the uptake of risk messages, and trust in the message providers (p. 2).” Publics’ involvement was coded as best-practice 13 times in the booklets.

Table 4.32: Examples of Publics: involvement in planning about response.

Publics: involvement in planning about response.	This includes being prepared at home and at work by having adequate emergency supplies, as well as communities and organisations having systems like evacuation plans, warning systems and response plans in place.

Publics: two-way communication. Two-way symmetrical communication. *Description:* publics encouraged to communicate and give input and feedback. Grunig (2009) defines two-way symmetrical communication as using “research, listening, and dialogue to manage conflict and to cultivate relationships with both internal and external strategic publics” (p. 2).

Two-way symmetrical communication is a concept supported by researchers, as discussed in detail in Chapter 2: Bridging the Literature. A case study from Crowley and Hoyer (1994) suggest that “greater openness and responsiveness to citizens’ concern play a role in increased credibility” (p. 1267). Höppner et al. (2012) argue that a two-way format of communication has positive effects on people’s ability to establish and maintain trustful relationships, further networking and cooperation among individuals and organisations. This kind of invitational or participatory content was coded 11 times across all the booklets. The most prominent use of this type of communication was in *Exposing Canterbury’s Shaky Future* (2001), when people were encouraged to enter a competition for a book. The competition lasted one year from September 2001 to September 2002. On reflection, I think it was an attempt at engaging the community to interact either with the information in the booklet or with people at the regional council. It is difficult to determine how successful this competition was as it was not repeated in any other Q-Files booklet, and there are no records available of the entries received. The following examples are not necessarily the best ways to encourage two-way communication, but I interpret these as attempts at encouraging two-way communication. Overall, these, to me, are still weak attempts, as authentic two-way communication would involve asking publics what they think about their risk and having them talk to the source about this, including what publics consider to be the best mitigation efforts and the best communication approaches.

Table 4.33: Examples of Publics: two-way with examples from coding.

Publics: two-way communication	For more information on earthquake hazard management in your local area, contact your city or district council. What does the liquefaction hazard rating for my property mean?

Publics: resilient community. *Description:* resilience is part of social and personal identity. Madsen and O'Mullan (2013) explain “resilient persons in a community contribute to the social resilience of towns in the wake of adverse events” (p. 68). Further, Kim and Kang (2010) suggest “one should construct preparedness messages that focus on community-level

damage” (p. 484). When coded, this theme refers to content that acknowledges the importance of community. This was coded 11 times in the coding process and is the most frequent subtheme for publics.

Table 4.34: Examples of Publics: resilient community with examples from coding.

Publics: resilient community	Hopefully, following recovery, a community will be much more resilient to future natural events than it was before. People and communities will need to be self-reliant for days, if not weeks, after a large earthquake.

Publics: society. Description: society is addressed and included in the communication. Van Asselt and Renn (2011) define risk management as a set of normative principles which can inform relevant societal actors how to deal responsibly with risks. However, society or societal pressures and its impacts are not mentioned. I did not code these in the booklets.

Publics: diverse publics. Description: diverse publics require diverse messages addressing their specific cultural, social and other diverse needs. From an ethnicity perspective, Canterbury was an ethnically diverse region, with more than 15 percent of the population from non-European origins. Diversity was rarely acknowledged as a theme in the text. Different cultural groups living in the Canterbury region was not acknowledged nor was language differences (the booklets were only produced in English). Further, there were no acknowledgements of Aotearoa New Zealand’s official status as a bicultural and trilingual nation. Pack, Tuffin, and Lyons (2015) suggest that:

the linguistic reproduction of the superiority of Pākehā, constructed by individuals and the media, alludes again to Foucault’s state racism in which interleaved racism works on many levels to maintain a specific societal structure. The discourse of superiority also legitimises subtle but powerful marginalisation by individuals working within structures. (p. 8)

As explored in Chapter 1: The Outside Insider, the New Zealand 2006 Census revealed the Canterbury’s multi-cultural demographics.

	Male (%)	Female (%)
European	76.2	78.5
Māori	7.5	7.0
Pacific peoples	2.2	2.0
Asian	5.4	5.9
Middle Eastern/Latin American/African	0.7	0.6
Other ethnicity		
New Zealander	14.8	13.0
Other ethnicity–other	0.0	0.0
Total	14.8	13.0

Figure 4.8: Ethnic groups in the Canterbury Region, 2006 Census.

(from Statistics New Zealand, retrieved 24/06/2015)

There were no mentions or advice for people with disabilities, age fragility issues, or other special needs. The lack of acknowledgement of diversity in human experience in Canterbury concerns me with my new perspective as a researcher.

There were examples of poor practice when groups were either purposefully or ignorantly ignored in the content. For example, a repeated theme identified in my coding is the exclusion of oral histories or other “non-European” perspectives in the content, and privileging print records. This exclusion not only could have had detrimental impacts on the publics who are ethnically diverse reading these booklets, but it also limited human knowledge, indicating hegemonic discourse.

Table 4.35: Examples of Publics: diversity examples in the coding.

Publics: diversity	There is no written record of this type of tsunami happening in the last 170 years. Because large events are infrequent, our written records and experiences sometimes do not give a good indication of the sorts of things that could happen in future.

This will be explored at length in Chapter 6: Discussion and Reflections.

Setting

I define setting as the time, place, culture, and society when messages are conveyed to the publics. Setting acknowledges the state publics may be in when they receive messages. While not part of the original Berlo (1960) model, I interpret setting as referencing aspects of the

model including attitudes, society, culture, and noise or distraction. Distraction refers to interference between the publics and the messages the source is trying to convey (Berlo, 1960).

After several refinements to my coding, I chose to use setting to refer to the “time and place” when publics received the information. I therefore coded it when the booklet appeared concerned about the setting of the public when the information was received. This infrequently happened, only four times overall. The shift in focus of setting will be further explored in Chapter 6: Discussion and Reflections.

The Q-Files were distributed through a number of channels, making it a complex exercise to determine what geographical setting people might have been in when they were reading these booklets. Booklets were initially distributed through local emergency managers, who used their channels for circulating the Q-Files. These were also distributed by the regional council at community meetings, Agricultural and Pastoral shows, and at council distribution centres, where people pay rates or inquire about council-related issues. Thousands of booklets were produced and boxes were stored in council storage facilities because no clear distribution channel was identified for all the booklets.

Table 4.36: Setting Subtheme coding frequency.

Setting: time and location	4

Setting: time and location. Description: location and timing in which messages are received is considered and addressed.

McGuire (1962) suggests timing is an essential component of persuasion because the publics’ resolve deteriorates over time. I chose to use this code to refer to factors such as distraction and time pressure, as publics only superficially process parts of the many hundreds of communications they are confronted with every day (Meijnders, Midden, & Wilke, 2001).

This was only coded four times throughout the booklets. Predominately, this referred to people responding to different emergencies at different time sequences, depending on the emergency. There are no other references to time or publics’ location in the booklets.

Table 4.37: Examples of Setting: resilient community with examples from coding.

Subtheme	Text
Setting: time and location.	During flood Environment Canterbury provides information on rainfall, rivers and flooding via: If you are at the beach or near the sea and feel a strong earthquake move immediately to higher ground or as far inland from the coast as you can. Do not wait for a tsunami warning you may only have a few minutes to get to safety.

Readability Tests

Readability tests are a tool created to provide an indication of how “readable” content is.

These tests rely on an algorithmic analysis that includes syllable, word, and sentence length counts and combines these factors to reveal an average or mean grade level of education required for comprehension of the content. Readability tests are explored in-depth in Chapter 3: Research Pathways.

For these equations, word and sentence length, syllable count and frequency of common versus uncommon words are calculated together to determine a readability score. To determine age equivalency for the readability tests, the New Zealand school system was compared to the U.S.A. school system. This information was provided by the Ministry of Education in Table 4.38.

Overall, there is a dearth of research determining how “readable” preparedness information is, let alone how persuasive or meaningful it may or may not be. The Q-Files may be the first earthquake preparedness documents to undergo this kind of readability testing. For my analysis, I used the www.read-able.com website. This online service provides readability assessment using six different tests. The equations to calculate the readability level of each test are:

- **Flesch Kincaid Reading Ease**
- **Flesch Kincaid Grade Level (Flesch & Gould, 1949)**
- **Gunning Fog Score (Gunning, 1969)**
- **SMOG Index (McLaughlin, 1969)**
- **Coleman Liau Index (Coleman & Liau, 1975)**
- **Automated Readability Index (ARI) (Senter & Smith, 1967)**

The results of the six tests are compared and equivalent age ranges for English as a first language speaker in New Zealand. Table 4.38 provides age equivalency to the U.S.A. and New Zealand.

Table 4.38: Age equivalency from the U.S.A. to New Zealand school systems.

New Zealand Year Level	U.S.A. Year Level	English [as a first language] Speaker Ages
Primary School (Years 1 – 6)	Kindergarten – 5	5-10 years
Intermediate School – Year 7	6	11 years
Intermediate School – Year 8	7	12 years
Secondary School – Year 9	8	13 years
Secondary School – Year 10	9	14 years
Secondary School – Year 11	10	15 years
Secondary School – Year 12	11	16 years
Secondary School – Year 13	12	17 years

Retrieved from: www.minedu.govt.nz.

Word counts and length of the booklets. There is little research-based evidence available about the role of length or word count of a booklet or brochure persuasion. However, Abraham, Southby, Quandte, Krahé, and van der Sluijs (2007) found longer brochures with higher word count may have a counter-intuitive response from publics, with too much content creating overwhelming messages, noise and other distractions. This is the only study I found addressing this particular topic for risk communication. I will explore this further in Chapter 6: Discussion and Reflections and Chapter 7: Conclusion and Future Pathways.

Table 4.39: Readability scoring based on tests; includes age/grade equivalency.

Booklet	Flesch-Kincaid Reading Ease (NZ age equivalency)	Flesch-Kincaid Grade Level (U.S.A. Grade/NZ age equivalency)	SMOG Index (U.S.A. Grade/NZ age equivalency)	Gunning Fog Score (U.S.A. Grade/NZ age equivalency)	Coleman Liau Index (U.S.A. Grade/NZ age equivalency)	Automated Readability Index (U.S.A. Grade/NZ age equivalency)	Mean Grade and Age levels (U.S.A. Grade/NZ first language speaker of English age equivalency)
Defining Moments in Nature (2001)	45.4/16 plus	11.5 US Grade Level (17)	11 (16)	14.2 US Grade Level (second year university required)	13.1 US Grade Level (university required)	10.9 US Grade Level (16)	11.95/17
Defining Moments in Nature (2008)	47.5/16 plus	11.3 US Grade Level (17)	10.6 (15-16)	13.3 (first year university required)	12.9 (second year university required)	10.9 (16)	12.5/18 plus (some university required)
Exposing Canterbury Shaky Future (2001)	59/15	8.7 US Grade Level (13)	8.7 (13 – 14)	9.6 US Grade Level (approximately 16-17)	12.8 (19 + second year university required)	8.9 US Grade Level (approximately 15-16 years old)	9.8/13-14
Exposing Canterbury's Shaky Future (2008)	55.9/16 plus	9.2 US Grade Level (13-14)	8.9 (13-14)	10.2	13.7 (20 + third year university required)	9.7 US Grade Level (approximately 16-17 years old)	10.4/14
Tsunamis	52 /16	11 US Grade Level (16)	10.3 (15)	13.1(university required)	12 (18 +first year university required)	10.9 US Grade Level (approximately 17 years old)	11.4/16
Liquefaction	50.8 /16	9.9 US Grade Level (14-15)	9.6 (14-15)	11.8 US Grade Level (16-17)	14.6 (second/third year university required)	10.4 US Grade Level (approximately 17 years old)	11.2/16
Living on a Flood Plain	62.2/13-15	8.7 US Grade Level (13-14)	8.1 (13)	10.5 (16 years)	12.2 (first year university required)	9.3 US Grade Level (approximately 15-16 years old)	9.6/14-15

The most “readable” booklet was *Living on a Floodplain*, with 14-15-year-old first-language English speakers being able to comprehend the booklet according to these tests. This brochure did not have the same length or word count as the other Q-Files series; this may have contributed to its readability.

The least “readable” booklet according to these tests was *Defining Moments in Nature* (2008). This booklet requires publics to have completed one year of university or more to understand the content. Earthquakes were the number one hazard in Canterbury, according to the Canterbury Civil Defence and Emergency Management Group Plan (2005 – 2012) and this should presumably have resulted in a focus to make information accessible to a more “general” public. According to the New Zealand Census (2006), there were 419,000 adults in Canterbury and the readability scores suggest only a quarter of that adult population could easily understand the booklets, far too few for “general” publics. This figure does not even take into account cultural differences, migrant groups etc. – it bases its calculation on an assumption all the Canterbury residents possessed the same schooling preparation and were first-language speakers of English. Had cultural and linguistic issues, outside the current design of readability algorithms, been factored in, the proportion of people predicted as able to relate easily to the content would likely have been even lower.

Tsunamis and *Defining Moments in Nature* (2001) were not much more readable at 17 years old (English as a first language speaker age). The other booklets range from 14-16 years old for readability scores. This is still too high for a general audience, with readability guidelines recommending public information be aimed at around an 8th-grade vocabulary level or first-language English speaker age of 13 years (Courtis, 1986).

Assessment of the Q-Files

By contrasting best-practice and poor practice codes, readability tests and word count, I reflected upon my hindsight interpretations of the overall performance of the Q-Files.

In Table 4.40, I present the different measures used in assessment.

Table 4.40: Assessment of the Q-Files.

Booklet	Best-practice Codes	Poor Practice Codes	Mean Grade and Age levels (readability tests)	Word Count	Overall Performance – My interpretations
Exposing Canterbury's Shaky Future: Original	152	123	9.8/13-14	2,881	Best-practice is slightly higher than poor practice in this booklet in the coding count and word count. Slightly less difficult readability scores compared to other Q-Files but overall poor practice.
Defining Moments in Nature: Original	58	54	11.95/17-18	1,540	Extremely poor practice outnumbering best-practice almost four-to-one. The booklet had a relatively low word count but also a high difficulty score.
Liquefaction	67	66	11.2/16-17	2,339	I interpreted this booklet to be more poor practice than best-practice. Poor practice codes outnumbered best-practice two-to-one. Combined with high difficulty in readability and high word count, makes it more poor practice than best-practice.
Exposing Canterbury's Shaky Future: 2008	163	120	10.4/14-15	4,910	A slightly higher rate of poor practice codes over best-practice codes. Combined with a high readability score and a high word count would make it overall poor practice.
Tsunamis	145	93	11.4/16-17	3,998	More best-practice than poor practice in the coding count, combined with a high readability score and a high word count. Still overall poor practice.
Defining Moments in Nature: Second Ed	170	123	12.5/18-19	4,658	Best-practice is almost equal with poor practice. Combined with the high word count combined with a high readability score makes it this is overall poor practice.
Living on a Flood Plain	36	6	9.6/14-15	337	I interpreted this to be better practice, had a high best-practice coding, and readability. The best example of good practice.

Chapter 4: Analysing the Q-Files

In Table 4.40, I compiled all the code frequencies, mean grade/age levels for readability and word counts. The coding scores came from the final phase of coding, using the “best-practice” matrix, based on my interpretations of best and poor practice.

With outcome expectancy messages ranging from one-sixth as frequent compared to science information coding, I interpret it as likely that these booklets would create a fatalistic perception from publics. I subtracted science information codes from the overall best-practice scores when these outnumbered outcome expectancy codes.

This next section explores individual interpretations of the strengths and weaknesses of each booklet.

Exposing Canterbury’s Shaky Future (2001). I interpreted this booklet to be equally poor practice and best-practice. The word count was at 2,881, a medium word count. The readability score of 9.8 made it one of the most readable of the Q-Files booklets. However, this booklet also had the highest number of fear messages coded in the series. While not completely poor practice, this booklet is not an example of best-practice either, as research suggests that fear messages are only persuasive when coupled evenly with positive action/mitigation messages.

When I reviewed this booklet, given the hindsight I now have about earthquakes in Canterbury, it probably was one of the most engaging booklets. There were interactive elements, including a “wheel of earthquakes” that the reader could spin around. As well as the wheel, there were other “pop-up” elements to the book. It was an intriguing design, but I felt it was, at times, confusing. This booklet had inflammatory language:

- There is a hidden threat inside the Earth.
- When it comes the results could be devastating – and it will come.

There were also few messages about preparedness or mitigation actions recommended for publics.

However, this booklet did have some elements of best-practice. It was the only booklet to have a named spokesperson from Environment Canterbury directly addressing publics. In this communication, Peter Kingsbury mentioned his fears and concerns for the region. For me, this was a brief interlude of emotion in a sea of bureaucratic text.

Given this, I think this booklet, the first in the series, was probably one of the most persuasive. The points of difference between this and the other booklets were the

interactivity, empathetic and human messages. These additions outweighed other flaws, including the fear or threat inducing messages in the book.

Defining Moments in Nature (2001). I interpret, based on the final coding, that poor practice instances outnumbered best-practice almost four-to-one. The booklet had a relatively low word count but also a high reading difficulty score. This indicates to me that this is poor practice.

On reflection, this booklet focused on risk definitions and explaining natural hazards but focused on one public. Three out of the 12 pages in this booklet were used to explain risk and related definitions. I observed that if someone wanted to know how planners or hazard analysts think about the world or how they create policy, this might have been an excellent primer. I would also determine that this is one of the examples of poorer practice in the booklets.

Liquefaction (2002). Through the coding process, I interpreted this booklet to be poor practice, with poor practice codes outnumbering best-practice two-to-one. This booklet also scored very high difficulty in readability. The word count was neither high nor low. This booklet had the most coded instances of jargon of any of the booklets in the series.

On reflection and based on my interpretation, this booklet probably contained the most examples of poor practice. It contained a case study from a Caribbean settlement, Port Royale, which was destroyed by an earthquake, mostly due to liquefaction, during the 1600s. Despite the compelling story, it may have been difficult for contemporary publics in Canterbury to find commonality with this example.

This booklet also contained instances of jargon. Examples include:

Liquefaction does not occur at random, but is restricted to certain geologic and hydrologic environments. Young (less than 10,000 years old) marine sediments, estuary deposits, some river channel and floodplain deposits, and poorly compacted man-made fills are the most common soils to liquefy. The soils in these depositional environments are predominantly sandy and silty soils. For liquefaction to occur the soils must be loose (unconsolidated) and saturated (be below the water table) (p. 3).

When an extreme natural event interacts with human occupation and use of an area then the outcome may range from a nuisance to a catastrophe.

In a Quake these buildings could have swayed and smashed against each other. To prevent this, the buildings have been connected with special seismically articulated pins.

I interpret the above examples to contain jargon and technocratic language. Overall, this booklet was more poor practice than best-practice.

Tsunamis (2007). When I coded this booklet, I determined poor practice codes outnumbered the best-practice codes more than two-to-one. With a high difficulty readability score and a high word count, it failed to perform well in any of the measures. It is the clearest example of poor practice in all the Q-files. However, this booklet was the first of the re-printed series. It was also the first of the booklets to include detailed preparedness information on the back page and the Canterbury CDEM logo in the back. The combination of Environment Canterbury and Canterbury CDEM Group was beneficial in suggesting that these two organisations worked together.

On personal reflection, this booklet was filled with too much content. On one page, there were more than 700 words, at 8-point sized font. My impression was this overuse of content made the booklet overwhelming to read for many publics. If this booklet had less content, it might have been aligned better with best-practice.

Exposing Canterbury's Shaky Future (2008). During the final coding, I interpreted more best-practice coding in this booklet but still a high rate of poor practice codes. Combined with a high difficulty readability score and the highest word count of all the booklets means it is overall poor practice. However, this booklet contained pictures and images from various historical earthquakes, including pictures of the Cathedral Spire damaged or toppling over. These images, given the cultural impact of the Canterbury Cathedral, could have been highly useful in establishing historical references for the earthquakes. But overall, too much science information without positive outcome expectancy messaging was poor practice.

Defining Moments in Nature (2008). I interpreted this booklet to contain more best-practice than poor practice codes but the high word count combined with a high difficulty readability score, meant that overall it was poor. This is probably the better of the second edition Q-Files but also had the highest count of jargon in the booklets.

Based on my personal reflection, I appreciated this booklet's design, colour, and layout. However, similar to the 2001 edition, the focus on definitions overwhelmed other important messages such as local and real examples of emergencies. It is also the only booklet to have a picture of an emergency manager. This imagery would have been important to include, creating a sense of connection or empathy with publics. Overall,

though this booklet was poor practice, based on the combination of findings from the coding, readability tests, and my reflections in light of the literature.

Living on a Flood Plain. This booklet was not branded as one of the Q-Files due to its emphasis on flooding. It was a tri-fold brochure format, unlike the other Q-Files Booklets. I included this tri-fold brochure in the study as an example of other hazard-specific publications produced by Environment Canterbury's Hazard team at the same time as the second Q-Files publications. The word count was lower, and it also ranked high in best-practice coding as well as containing more accessible readability compared to the other Q-Files. It contained more direct communication to publics. While not perfect, this is probably the best example of good practice produced by the Hazards section for the "general public".

Based on my impressions of this booklet, it is very basic with simple messages. It is not as "informational" as the Q-Files booklets; rather, the content is a series of questions engaging with the public. In some ways, this booklet, to me, is an example of "better" practice.

From the individual booklets, I interpreted six major themes that all the booklets shared. I used the below summaries to develop the survey tool for my members of practice, which I discuss in detail in the next chapter.

The six major themes are:

Jargon and technospeak. The Q-Files contained excessive use of jargon and lengthy scientific explanations, using language inaccessible to most people. Readability tests performed on the documents indicate that most were written at a second year university level. With only 20 percent of Cantabrians (N.Z. Census, 2006) reaching this level of education, 80 percent of the population were excluded by default from easily accessing the information in the booklets. As these booklets were intended to educate as many people as possible in Canterbury, 20 percent is too low a number to meet that aim. In addition to jargon and difficult readability, the booklets contained some acronyms that were not explained to the reader.

Lack of compelling spokespeople or personal stories. The best practice research indicates that personal accounts from people who the general public relates to are more persuasive, as are personable, trusted and respected spokespeople. There was only one reference to an actual person working at the Regional Council. Without relatable spokespeople, the documents lacked a persuasive tone.

Exclusive narrative. The booklets only contained the mainstream, scientifically acceptable narrative. No other narratives, including those of Māori, were

presented in the booklets. This is despite the presence of Māori in Canterbury for more than 1,000 years. There was no acknowledgement that Māori stories do exist about earthquakes in Canterbury before the current sequence began. As most scientific research privileges written stories, to confirm dates, the personal stories were only of European settlers; no other cultures or perspectives were offered. This exclusion may have contributed to different groups not engaging with the booklets.

Fatalism. The booklets contained large amounts of scientific information without supporting positive messages about how to prepare for emergencies. In the later editions (2007-2009), a page at the back of each booklet provided preparedness and mitigation advice, but it was disconnected with the rest of the narrative and did not specifically explain why each action should be taken and how it related to their personal circumstance. Without positive messaging on preparing and mitigation, the reader could easily assume that nothing can be done.

Threat/Fear appeals. According to the majority of research, threat or fear appeals have very little success in creating long term behaviour change. The first edition of Q Files (2001-2002) and some of the second edition (2007-2009) contained fear inducing or threatening language. While it may seem logical that if people are more afraid, they will prepare, the evidence in the literature is to the contrary. Fear/Threat appeals are more likely to disengage, alienate and, in some instances, anger people.

Exhorting people to think like experts. There were many examples of “defining terms” in the booklets. A focus on definitions assumes that people simply do not understand risk and if they did, they would prepare for or mitigate those risks. Or, that if people simply thought in the same way as experts (scientists, planners, engineers), then behaviour change is inevitable. While this is a tempting concept and one often supported by a number of organisations, there is nothing in the literature to suggest that people are simply not scientifically literate enough. Rather, the literature suggests that people are aware of risks (generally), but that there are other priorities overriding preparedness actions. Focusing on educating the people to think as experts, on an individual level, in order to change behaviour, is a theory unsupported by the majority of the behaviour change literature. This strategy also implies that experts are more prepared than non-experts; there is no evidence yet to support this assumption.

I have presented my preliminary findings for the analysis of the Q-Files. Now I will summarise this chapter and discuss briefly my member checks with my community of practice, which is the main theme of the next chapter.

Summary

In this chapter, I have examined the different coding phases and what I learned from this process. I provided my reflections from each coding phase and explained how I refined the research further, based on those reflections. Finally, I presented my findings based on my final coding phase.

Chapter 4: Analysing the Q-Files

My interpretation of the Q-files was that these contained numerous examples of poor practice but also some evidence of best practice. While the content appears largely problematic, the strategic approach of the Q-Files is likely the most important issue. The booklets appear to be written with the concept that if people are provided with information and scientific evidence about risk, they will prepare. As discussed in Chapter 2: Bridging the Literature, this is not necessarily the case and is not supported by evidence found in research. Even when people are aware of a risk, this does not immediately translate to any corrective or protective action (Rimal, 2000; Sligo & Jameson, 2000). However, in the case of these booklets, these were unlikely to have imparted knowledge given the impenetrable nature of the content.

Chapter 5 : Reflections from the Community of Practice

THE GENIAL DEAN

DURING the recent earthquake, when Christchurch rocked like a little boat in a particularly stormy sea—according to some accounts—everyone asked the same question: “Has the Cathedral escaped?”

NZ Truth, 11 April 1929. Retrieved from:

<https://beta.paperspast.natlib.govt.nz/newspapers/NZTR19290411.2.28.15>

Chapter Five. Reflections from the Community of Practice

As part of the process of “insider” and interpretivist research, member checks provide a pivotal perspective on the research. Member checks are often used to confirm findings or support statements made, such as those collected earlier during a focus group or one-to-one interview (Rubin et al., 2009). Initially, I had planned to use member checks as a way to explore my overall findings in Chapter 6: Discussion and Reflections. But my member checks were also a way to check my preliminary findings from the Q-Files coding process, as explored in-depth in the previous chapter, and so I sought their input before finalising my thinking as to what that data meant. When I received feedback from my members, the breadth and depth of insights provided was extensive, worthy of its own chapter. I discovered new perspectives that I had not considered when I completed my initial findings. The findings from the member checks are in this chapter, with analysis. The full discussion of all my findings, combined with the insights from these checks and supported through literature review, is in the next chapter.

Figure 5.1 contains my research goals and methods. I include it here as a reference to where this chapter sits about my overall research programme. Member checks are the final component of Research Goal Two.

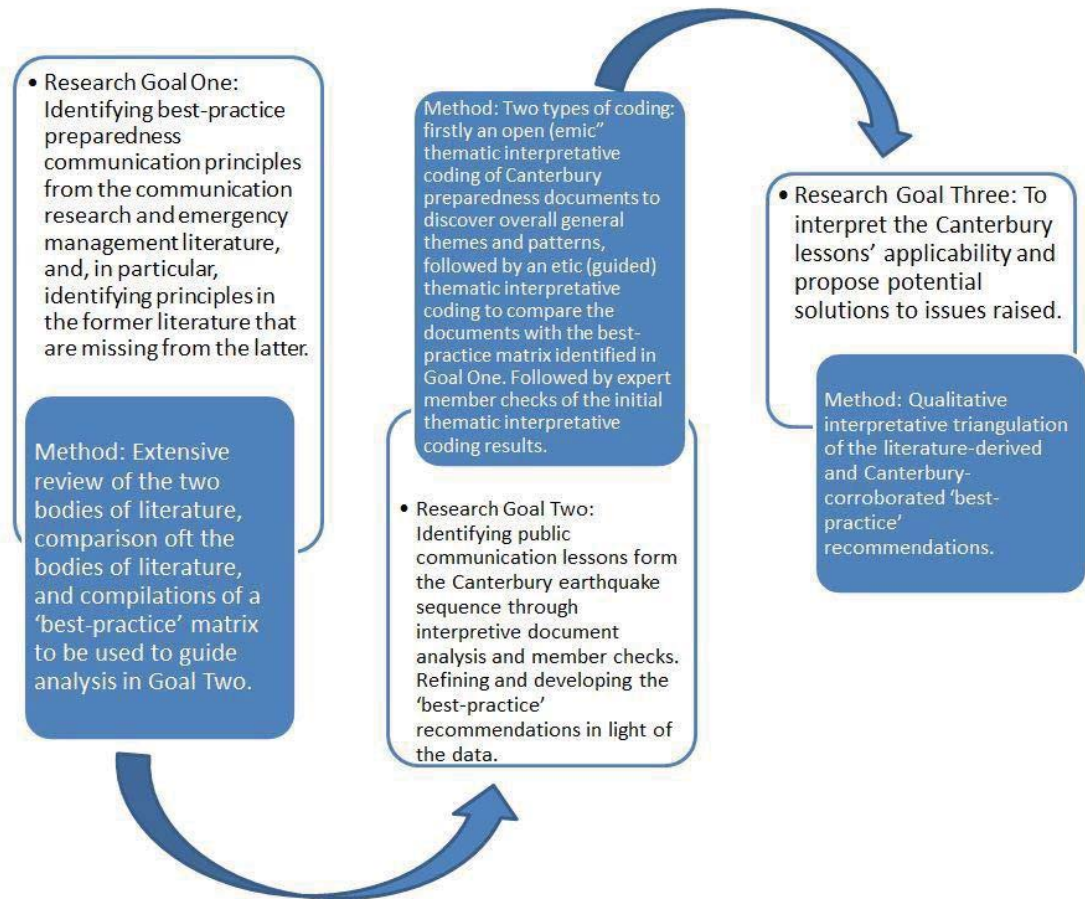


Figure 5.1. Research goals and methods.

As illustrated in the above figure, this chapter relates directly to the final component of “research Goal Two”, member checks. I asked members of my professional community of practice to provide feedback on the initial thematic findings.

Results were presented as six distinct themes. I developed an “executive summary” to distribute to members for feedback. In the executive summary, I provided ethical information and detail on how the research was conducted. I also detailed my major themes, which were described in Chapter 4: Data Analysis.

For each theme I asked respondents to agree or disagree and to comment. I determined that asking for feedback on these potentially provocative themes without providing members with a framework to do so anonymously would have been chaotic and difficult to gain specific insights. Therefore, I developed a survey format to receive responses on my research from my community of practice.

About my member checks

The complexities of presenting my preliminary findings to my colleagues filled me with apprehension and concern. Some of my findings were very critical of the work I had

been part of, and I did not want to damage the reputations of my former colleagues. Development of a way to report back my preliminary findings included several options; a workshop, one-to-one interviews and discussion or an anonymous survey. Anonymity was an important part of presenting my findings as I wanted authentic and honest reflections, unfettered by social pressure or concern for retribution. I discussed “sensitive” research in Chapter 3: Research Pathways and these member checks were the most “sensitive” part of this research. I decided an anonymous survey was the best and most appropriate method.

Selecting members

I was tasked with drafting minutes from PEPI meetings from 2000 – 2009, which are public documents. From those meeting minutes, I developed a pool of participants who had been actively involved in the PEPI group at that time. For external “experts” who worked in the same field, I used minutes from the National Public Education Group. I was also an active member of this group during my employment. I chose, specifically, people at regional governments who had similar roles as mine. Finally, I chose two social science researchers who worked in Canterbury before 2010 in this field. One of my supervisors, Dr. Julia Becker, also worked in this area during that time but I determined that given her close proximity to my project, she should be eliminated from participation, even if it was anonymous.

Using SurveyMonkey

I developed a survey using the online service SurveyMonkey. The survey was pilot tested once by two of my co-supervisors and twice by my primary supervisor, as well as a few trusted external associates who would not be part of the study. After each round of revisions, testing and review took place. When the questionnaire was final, 39 people were sent an invitation to participate. 20 people participated in the survey. The survey was sent out to the group of members, via email, on 1 February 2016, with a closing date of 22 February 2016. Some participants requested that the survey remain open longer than the closing date, so it remained open for another 15 days.

Results were in the form of agree, disagree and freehand comments. When analysing the comment sections in the questions, I found some required further analysis. I used a basic emic thematic analysis in certain sections to further unpack discourse (Daymon & Holloway, 2002). I coded comments from questions that had a variety of comments. I used HyperResearch for the coding process to assist me in my analysis.

Chapter 5: Reflections from the Community of Practice

Now that I have explained the process, I present the results.

Table 5.1: Question One. (Answers: Agreed: 20, Disagreed:0)

Text of Question	Comments
<i>PARTICIPANT CONSENT: I have read the information provided and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time. I agree/do not agree (select one function) to participate in this study under the conditions set out in the Information Sheet.</i>	None.

All members agreed to participate.

Table 5.2: Question Two. (Answers: Agreed: 11, Disagree: 9)

Text of Question	Comments
Were you involved in the Public Education Public Information Committee in Canterbury at any time from 2000 - 2009?	• Regional Emergency Management Office representative • School liaison officer • Hazard Analyst • Committee member endeavouring to improve the CDEM public education of those within Canterbury and Christchurch in particular through a multi-agency approach. • I was a member of the committee in my capacity as Communications and Marketing Manager for Environment Canterbury. Part of my role in that job was to act as regional Public Information Manager during emergencies and to participate and contribute to Civil Defence Emergency Management Public Education. • De Facto Member as the Canterbury CDEM Group Controller • An occasional role as an Emergency Manager, particularly in relation to training and development • Chair of the Canterbury Civil Defence Emergency Management Group • As rep for Hurunui District Council. • I was the MCDEM REMA* and participated 2007-2009

**REMA is an acronym for Regional Emergency Management Advisor.*

The responses indicate that 55 percent were involved and 45 percent were not. This is an even split between the “insiders” of the PEPI group and the “outsiders but insiders in the sector” of that group. 10 members detailed the roles they participated in on the committee.

For the Question 3, I explored how members of the group described their role. The pre-determined options included: Emergency Manager, Professional Communicator,

Scientist, Science Communicator, Project Manager, Administrator, Hazard Analyst and Policy Analyst.

Table 5.3: Question Three.

Text of Question	Comments
How would you identify yourself professionally?	• Emergency Manager (9) • Professional Communication (9) • Scientist (1) • Project Manager (0) • Administrator (0) • Hazard Analyst (2) • Policy Analyst (1) • Skipped (2) Other: • Public Information Manager • Independent researcher – communication and engagement • Elected member • Independent social researcher working in environmental management

Nine identified as professional communicators and nine as emergency managers. As people could choose multiple professional identities, it means that some people consider themselves as having several different roles. This is intriguing, implying that this group are comfortable with the concept of interdisciplinary multi-identities. One member identified themselves in five different ways including as an emergency manager, professional communicator, scientist, science communicator and hazard analyst.

Table 5.4: Question Four and Five. (Answers: Yes: 4, No: 16)

Text of Question	Comments
Question Four Were you involved in writing, editing, project managing or in some other way, in the creation of the Q-Files? Question Five: If so, when?	• Occasional input to content. ○ (Question Five answer was: Hard to say now, but probably about 3 times for each Q-file. • Project manager and lead writer ○ Question Five answer was: 2007-2008 • Commenting on draft versions ○ Question Five answer was: mainly during the development of these documents. • I was involved on the fringes. I was the line-manager for the Communications staff member who coordinated the preparation and production of the Q-files. I did not have direct control of the process or quality of the publications, but I was occasionally consulted by those involved. ○ Question Five was: 2005 - 2008

Only four people actively worked or were involved with the Q-Files. This means that five direct “insider” perspectives including mine exist in this research about the development of the documents. Question Five asked respondents when it might have been, their answers are included in Table 5.4.

Table 5.5: Question Six. (Answers: Agree: 17, Disagree: 1, Skipped: 2)

Text of Question	Comments
Readability tests performed on the documents indicate that some of these were written at a second year university level. Only 20 percent of Cantabrians (N.Z. Census, 2006) reached this level of education. These means potentially 80 percent of the population could have been excluded from easily accessing the information in the booklets due to its difficult reading level. Future preparedness campaigns would benefit from pre-testing readability and aiming for more widely accessible language levels.	• Yes some of them are far too technical. • At the time of production of the documents this would have been a true statement. However, because of recent events, a greater percentage of the Canterbury public now readily understand terms like liquefaction. So although I fully agree there should be pre-testing of readability this should be tempered with an understanding of the local audience's level of experience. • I'm surprised to hear this as I thought they were very easy reading and easy to comprehend. I've never had negative feedback on them and have distributed them widely across two districts of North Canterbury over the past 8 years. However if research suggests otherwise then I agree with the suggestion.

There was strong agreement among people who responded to this question; only one member disagreed completely with this finding. Members agreed that the information was too technical and the readability was difficult. Further, there was agreement that future preparedness campaigns should include pre-testing for readability to have more accessibility. The comments contain some interesting insights, including one respondent who appeared to be surprised with this finding because after eight years of distributing the booklets, this person had not received negative or unsupportive feedback from community members. Perhaps a more intriguing insight is that the technical focus of these booklets may have been poorly timed. This is based on the answer that the possibility is that these booklets may not have been appropriate pre-Earthquake (2010) but were useful now, because people know much more about earthquakes than before. This is a theme repeated by members later in the survey; that perhaps it is about timing rather than the booklets being without value.

Table.5.6: Question Seven. (Answers: Agree: 16, Disagree: 3, Skipped: 1)

Text of Question	Comments
In addition to jargon and difficult readability, the booklets contained some acronyms that were not explained to the reader. Some examples include organisational names like NIWA, GNS Science, and USGS that were not given relevant context for the reader in some, but not all, the booklets. This use of acronyms contributed to the exclusive language of these booklets. Future preparedness communication should avoid using acronyms.	• I didn't cross-check all the acronyms so can't answer • Some acronyms are an accepted part of the language now (CERA, EQC come to mind). • They can be used if they are explained the first time they are used. • A glossary should also be provided too. • Agree - but equally it depends how many booklets communications campaigns that officials want to put out. These are probably OK for people that have been through university - just not for others. • But if necessary, provide context. • You can use acronyms in communication as long as they have been well defined up front and early in the document/communication • unless the acronym is explained first.

This question had a majority of respondents agreeing with the findings presented in the question. However, there was some support for the use of acronyms. Three comments were similar in assertion: to simply further explain acronyms, such as the inclusion of the glossary. Another interesting comment is that perhaps these booklets should only have been printed and distributed to people with university education. It is interesting that rather than considering changing the readability, some respondents expressed the need to simply either change the audience OR provide further education about the acronyms. However, there is no support for the use of acronyms in the language of persuasion, which should be more inclusive, rather than creating barriers to understanding (R. W. Rogers, 2007).

Table 5.7: Question Eight. (Answers: Agree: 18, Disagree: 1, Skipped: 1)

Text of Question	Comments
The Q-Files contained jargon and lengthy scientific explanations. This may have alienated readers	• This is particularly true of earlier Q-files that were developed in a relatively top-down and expert driven manner. • Difficult to get a balance between informative and simple • I agree with avoiding lengthy scientific explanations, but I think scientific jargon can be used if it is well explained. If it is avoided altogether the document can be too dumbed down and almost come across as patronising. People can deal with jargon

not coming from scientific backgrounds and should be minimised in future preparedness communication.	if it is well explained. • Agree - but equally it depends how many booklets communications campaigns that officials want to put out. These are probably OK for people that have been through university - just not for others. • It depends on your audience and how the Q-files were presented to the general public (if they were the audience) for use. There is a place for scientific explanations, as long as it's complemented by plain English versions too. • Not necessarily "minimised" in future, rather presented in accessible language. • In general I do agree with this; however we should also make scientific version available for those people who do want that level of detail. • As per my response at 6 above (refers to answer: I'm surprised to hear this as I thought they were very easy reading and easy to comprehend. I've never had negative feedback on them and have distributed them widely across two districts of North Canterbury over the past 8 years. However if research suggests otherwise then I agree with the suggestion.) • I don't completely disagree - it depends on whether future preparedness is the only goal of the communication. I think that successful up-skilling of people in information that we regard as scientific or technical enables them to take a more engaged part in discussions about natural hazards and risk that affect their lives. Better engagement - leads to better and longer term integration of concepts such as personal readiness and response - as well as greater support for reduction measures.

Overall, respondents agreed with the findings. The comments, however, reveal more complexity within members' reflections. Several members felt that it was part of the campaign to "up-skill" or perhaps even fill gaps in knowledge as a part of preparedness campaigns. Others again suggested that perhaps it was more about choosing audience than modifying the language.

What this indicates to me is that the purpose, and therefor strategy, of the Q-Files is unclear, even to the members involved in its creation and closely related experts in the field. Which is understandable, as no strategy was developed for the Q-Files. Another interesting component of the comments is that while several members recognise meeting the needs of diverse publics, but rather than changing a narrative, simplifying the language appears to be the main solution provided. No mention of using different communication techniques, other than simplifying language, is presented by the members.

Table 5.8: Question Nine. (Answers: Agree: 12, Disagree: 4, Skipped: 4)

Question: No other narratives, including those of Māori, were presented in the booklets. This is despite the presence of Māori in Canterbury for more than 1,000 years. There was no acknowledgement of the Māori oral histories about earthquakes in Canterbury (in Christchurch and Banks Peninsula) even though these stories exist. This exclusion of other perspectives may have contributed to different groups not engaging with the booklets.

Code	Comments
Conflation of Māori with other ethnicities (coded three times).	• I don't think not including other narratives would have contributed much too different groups not engaging in the booklets. However, I agree that the booklets would have been better had they included other narratives. • There is also a large Japanese and Korean population in Canterbury as well. • Thought should also be given to other ethnic groups and those that may visit the region.
Science is the important part of the communication, not story (coded three times).	• History is of little relevance for documents of this type. Information should be aimed at raising awareness of risks and hazards and outlining tips and tricks for preparing for and managing such as these arise. • The more fundamental issue of legibility which is all pervasive in this type of material is what deters all people. That notwithstanding had the quakes not occurred there would have been a degree of cultural cringe involved. • That's a tricky one. By excluding Māori narratives, you may have alienated some Māori. Equally, by including them you may have irritated those who feel that matters of science are "culturally agnostic"
Conflation with language (coded three times).	• I am a Māori although not Ngai Tahu, and both of my sons have found the Q-files that I've shown them easy-enough reading. However, I could imagine a wider Māori audience probably would be captured at least by versions written in Te Reo Māori and/or versions that included reference to the relevant Māori oral histories. • I do think that Māori vocabulary and wording should be used along with oral history. I am not convinced that a full Māori language version is necessary. To me it would be more important to present the material in other languages to meet the needs of those who have English as a second language. • I'm not sure this is accurate. Very few Cantabrian Māori only speak Māori and most are English - speaking too. There is no evidence to suggest that the lack of translation or lack of Māori perspective contributed to a lack of engagement with the booklets.

Agreement/clarification (coded two times)	• This was particularly frustrating for those of us who suggested these narratives should be included where relevant. • Indeed, top-down (science-driven) approach ... without much regard for other knowledge systems and cultures - either providing or receiving communications. Certainly no evidence of listening to other knowledge systems and cultures.

While the majority of the members agreed (12), four disagreed and five skipped the question. When exploring the comments further, there appears to be some conflation between narrative and translation of language. Three of the comments discussed the use of Te Reo, while other comments referenced the need to include other cultures. Issues of ethnicity and language are not the same as the point of the question, which was why did we not include the stories from people who had lived in the area for more than 800 years longer than anyone else? Culture, language and ethnicity were not the arguments being made; however, it begs the question: can we acknowledge Māori expertise without immediately discussing language or other ethnicities? Perhaps, given the response from members, this may be either perceived as too complex or unnecessary to include these histories. There appears to be some binary thinking here, that written material is better than oral histories, that there is story and science, fact and fiction, entertainment and information. Knowledge, however, is more complex than binary designations.

Despite the lack of inclusion of Māori oral histories and perspectives in the Q-files booklets, there is evidence that Māori in Christchurch responded immediately and effectively to the 22 February 2011 earthquake (Kenney, 2015; Kenney & Phibbs, 2014, 2015; Paton et al., 2014). Marae (meeting grounds), were opened, food, water and shelter were provided not only to Māori but also to anyone affected by the earthquake (Kenney & Phibbs, 2014). This immediate response was successful, perhaps, because Māori had oral histories relating to earthquakes in Canterbury and could move quickly into action. Other aspects of successful response were about Māori community focus and the supportive nature found on marae (Kenney, 2015). I perceive that Māori have many insights, both pre-response and during response, that could assist emergency managers; their exclusion from public education documents is detrimental to Māori and non-Māori alike. Their inclusion is not to appease tokenism but rather has real implications for successful response and preparedness. This exclusion of Māori story

and narrative indicates to me that we still have major gaps in understanding and appreciation of what different cultures have to contribute to preparedness campaigns. I will explore this further in the next question.

Table 5.9: Question Ten: Why do you think these exclusions occurred? In future, what additional steps or processes have you used in other work that you would recommend?

Text of Question	Comments
Lack of sensitivity or awareness of booklet developers (six times)	• Lack cultural sensitivity on the part of developers. Coms staff who were not as open to socially and culturally relevant content as desirable. • Lack of engagement or understanding. • Oversight by author and/or the relevant size of the Māori Group in Canterbury could not justify further pages of writing • it just wasn't considered. • Te Reo Māori is not yet widely understood in Canterbury. You have to understand that there was no appetite for hearing that bad stuff was possible. Trying to get risk across to elected members was met with sarcastic remarks about bird flu and y2k which the media was only too happy to gleefully report on. • I think these exclusions occur because those who write and in particular authorize this information concentrate on what ideas they want to put across rather than how this information will be received and what learning they can expect as a result.
Conflation of Māori with other ethnicities or translations (twice)	• Cost in producing them in different languages. In future should work the likes of the CALD community to identify best means to communicate with the ethnic groups • The Christchurch City Council CALD Guidelines
Science is the focus, not other narratives (four times)	• It didn't even really come to mind - the booklets were first and foremost about the science, rather than telling the science as a story, which is maybe what we would do more now. • Authors were probably focused on risk management strategies and plans. • Too much focus on the scientific information. I would recommend keeping it simple, describe events that people or their families can identify with and simply described the risk and hazard. • Too many physical scientists and too few social scientists involved.

Lack of two-way engagement (three times)	• involve IWI in preparation of any public document • Possibly an oversight by the design team and a lack of opportunities for public input into design which might have captured Māori and other audience perspectives. • help officials and researchers to learn to listen and engage in two-way communication
Reflection (once)	• On reflection, there could be a more thorough analysis of the purpose of the publications before preparation begins, i.e. what are we asking people to do as a result of reading the document? Who are the people who most need to read the document? How will the document be distributed?
No clarification/other reasoning	• Can't speculate • Lack of consideration likely, impact of additional cost may have excluded this consideration

When asked this question, respondents expressed a range of different perspectives. I interpret some of the prevailing themes to be about the scientific influence of the booklets combined with the lack of understanding or knowledge among communication staff (which would include myself). That I could not argue with, as when writing these booklets. I was not aware of oral histories that existed about previous earthquakes. Again, language appears to be used as a reason to why this happened. There is an interesting dynamic here, where some respondents simply include Māori with other ethnic minority groups, such as Culturally and Linguistically Diverse (CALD) communities, rather than appreciating the historical value of the stories this group had access to through long familiarity with the region.

I performed a thematic analysis on the comments, using HyperResearch, as several comments contained multiple themes, as illustrated in Table 5.9. My interpretation is that there were some constructive and thoughtful reflections about the lack of sensitivity or inclusion of Māori in the development of the booklets. However, it is concerning to see almost equal amounts of conflation between ethnicity, language and narratives. Rather than the inclusion of Māori as a form of tokenism or political correctness, my proposed concept of including Māori narratives was that these are important stories to tell about the history of Canterbury, Christchurch and earthquakes. Māori had knowledge of earthquakes in and around Christchurch pre-settlement, according to Davis (2012), but these were not included in public communication. One member mentions that there was “no appetite” for hearing that “bad stuff was possible”, yet the Māori oral histories could have provided relevant local evidence, that “bad stuff” was not only possible but had happened before. My reasoning for supporting Māori

narratives is that, if people are not persuaded by the science narratives, perhaps another supportive one based in longitudinal human experience, may be more compelling and persuasive. The inclusion of these stories should not be about tokenism or Treaty obligations but rather strengthening evidence and increasing persuasive influence. However, half the respondents are confused between ethnicity, language and compelling narratives. This, to me, indicates that further exploration may be required to support this community of practice to understanding these differences.

Another issue is the reliance on “science” as the only narrative that these booklets should be aligning with. In many ways, this coding could be related to the above issue about the inclusion of Māori. There seems to be a clear separation between what is “science” and everything else. Often, the “everything else” is framed as “myth” by some members of the science community, even when addressing Māori oral histories (Cashman & Cronin, 2008).

Perhaps the most compelling comment, for me, is a participant stated that the exclusions occurred because the authors cared more about what they wanted to say rather than focusing on how it was received by various publics. This “lack of two-way engagement” was coded twice and I find this insight profound. My major finding, that there was an active echo chamber which the booklets are artefacts of, is reflected in the findings of the coding here.

Finally, only one comment addressed reflection. As the second part of the question, respondents were asked to reflect on how they might address this issue in future and only one focused their statements to answering that part of the question. They answered this question with more questions to ask themselves when developing future booklets, which is, in my opinion, an excellent place to begin.

Table 5.10: Question Eleven. (Agree: 15, Disagree: 3, Skipped: 2)

Text of Question	Comments
The booklets contained predominately scientifically acceptable information.	• While in large I agree. Some of the context, particularly in the Earthquake document, was alarmist and too strong to necessitate the public to undertake the required actions. • The booklets were written as detailed and suggestive commentary. I don't see them as predominately specific

	as also read some quite non-scientific suggestive language. • A bit of a loaded question. "Acceptable" to whom? is the issue here. Approval processes for documents of this type is often given to subject matter experts, some of whom may fancy themselves as Plain English exponents. If a document is intended for a general audience, then representatives of that audience should be involved in auditing content. • While I've never had negative feedback from the public when I've distributed these, I have over the years received positive feedback from people occasionally. I have also occasionally had requests for the booklets from schools suggesting an awareness of them and some confidence in their credibility as a factual resource. • I am not a hazard scientist. I am familiar with broad natural hazards information and they looked consistent with my understanding.

The majority of members agreed with this statement. The comments contain a variety of different themes, none of which appear to be connected or overlap. Further analysing the comments, these range from focusing on the “scientific accuracy” of the booklets to the idea of “plain English”. One comment explores alarmist language, specifically the first editions. Another comment defended the booklets, while another stated that the language was not entirely scientific.

One comment that I think deserves further unpacking is this statement:

- A bit of a loaded question. "Acceptable" to whom? is the issue here. Approval processes for documents of this type is often given to subject matter experts, some of whom may fancy themselves as Plain English exponents. If a document is intended for a general audience, then representatives of that audience should be involved in auditing content.

Approval processes is an interesting comment. While communicators or creators of content can follow “best-practices”, those who implement communication campaigns may not be as well-versed in communication. The other useful statement in this comment relates specifically to creating participatory communication strategies. However, auditing content is not the entirety of participatory communication. Participatory communication campaigns publics involve from the outset. Publics should not be simply approached to “audit” content but engaged collaboratively at the beginning of any campaign as co-creators (Servaes & Malikhao, 2005).

Table 11: Question Twelve. (Agree: 11, Disagree: 6, Skipped: 3)

Question: The booklets contained predominately scientific information with less emphasis on messages about how to prepare for emergencies. This may have alienated people with other perspectives.

Text of Question	Comments
The booklets contained predominately scientific information with less emphasis on messages about how to prepare for emergencies. This may have alienated people with other perspectives.	• The booklets' purpose was/is about the hazards and, to a lesser extent, their consequences, not preparedness as such. Attempting to do too much with each publication is likely to dilute the hazard and guidance respective messages. The assumption that community members need to be told how to prepare and then what to do in an emergency, from an educational paradigm, is not well founded. • Overall, I agree with the idea that some people may have found scientific information off putting. I doubt that anyone felt seriously "alienated" by this. • What other perspectives? The booklets were more about the science rather than being prepared - why would that have alienated people? • Either alienated or just meant people didn't bother to try to read them. More totally ignored than alienated probably. • Strongly agree. • I doubt this. Looking at the Q-files, they appear to be written as information to influence thinking related to likelihood of an earthquake. They don't appear to be predominately about in the moment preparedness. • For readers such as local government planners/policy deciders/emergency management staff the scientific information was very well presented. But for people such as householders/business owners/school staff, perhaps there should have been less science and more about preparedness. • However, what was the real purpose of the booklet? Provide scientific information or advice on how/what to prepare for an earthquake • Neither agree or disagree - were Q-files were about helping people understand the hazard or were they about preparedness? To me they were about the hazard and should have been used as a part of a greater engagement process. • Content is scientific in nature, which is fine if the audience is determined to have been scientifically minded, and not public. • I think the knowledge and information are the perspectives which the booklets purport to offer and I think this are quite valid and from an emergency management perspective are very worthwhile. It allows people to use the information across the 4R's of emergency

	management. Trying to re-create them in the context of one particular R (e.g. readiness) narrows their utility. • Hmm - what do you mean people with other perspectives? I don't understand that part of the question. I DO agree they contain predominately scientific information - although the revised Q-files on defining moments was much more 'human- story' oriented. I found that one more interesting than the others as a result.

11 people agreed, six disagreed and four members skipped the question. It appears the word alienate have been unpopular or inflammatory with members. Others were concerned about diluting the messages about the scientific information while others were concerned with their own frameworks (including the 4Rs). The 4Rs may be a useful framework for professionals working in emergency management, but I have yet to find a compelling argument as to why different public groups need to be aware of or relate to that framework.

One of the more problematic issues with the Q-Files is that no communication strategy was written that would indicate what the purpose of these documents was. While I have vague recollections of discussions about the purpose of the documents, as a researcher, I cannot determine the objectives of these documents because I have no written evidence. Despite the intention of the booklets, the perspective certainly came from the “source”, with evidence provided by this community of practice. In these comments, to me, is evidence supporting the concept that these documents privileged the source. This group is still largely with a couple of notable exceptions supportive of the concept of governmentalism or scientificism in communication, rather than engagement or participatory communication.

Table 5.12: Question Thirteen. (Agree: 13, Disagree: 4, Skipped: 3).

Text of Question	Comments
In the later editions (2007-2009), one page at the back of each booklet provided preparedness and mitigation advice, but did not specifically explain why each action should be taken (e.g. with respect to how it would mitigate the	• Community members are generally able to make the "why" connection quite well without it having to be spelt out for them. A scale from yes to no [sic] might have been more effective here, as I partially agree with the statement. "Mitigate" itself is not a commonly used term in New Zealand, and one which has several meanings. • It was a good start and I'm sure in future further improvements will be made. • Action messages need to align to the Get Thru MCDEM messaging

hazard), or how it related to personal circumstances. The booklets should have contained more positive messaging regarding preparedness actions to engage readers more effectively.	• Depends whether authorities saw the booklet as the only or main way of letting people know about risks. Equally the booklets might have been fine if meetings, school visits, radio campaigns, etc. were sussed to engage with people about what they should do - and the booklets were just a back-up resource for the 20 percent of people that could read them. • Perhaps specific volumes can be designed for respective audiences. For example, individual preparedness, land use planners etc. I feel these documents were attempting to "cover all bases" • People need to understand the benefits to them from changing their behaviours. • or if they did not contain this information it should have referred to where to get it e.g. to the Get Ready Get Thru or similar programmes. As for the question above they needed to be a part of a greater engagement process • And the public messaging should have been placed up-front so as to engage at the outset. • As in 12 above I think the more generic the booklets are in terms of their relevance towards the 4 R's of emergency management, the more utility they offer and to a wider audience. Offering generic quality information enables readers to make of them what they wish. A reader studying disaster recovery versus a reader that is not studying anything but has a curiosity in tsunami for example are both offered the same utility from a booklet that is centric on factual informative information and neither is disadvantaged by the content of the booklet. • Absolutely - the information is so disconnected to effect as to be quite unmemorable.

The majority of members agreed (13) with the findings, while four disagreed and three people skipped the question. There were a number of themes in the comments, as I interpret the members to be expressing. One was that differing audiences require different publications. Others suggested that the inclusion of the preparedness advice is useful so that publics can perceive how valuable the inclusion of this information might be. Others felt that by including too much preparedness information, that publics are potentially being patronised.

What is interesting is the concept that the source is correct in their assumptions about the “scientific” perspective. Again, alternate versions of the book revolved around language, not around concepts or narratives. The idea if we just “dumb down the language, then people will understand and listen to us” is a flawed model. It does not

address inclusion of other narratives or personal stories. And, again, there is only the rare mention of engagement or participatory communication, but at least one respondent agreed that the information was disconnected from people's lives and therefore unmemorable.

Table 5.13: Question Fourteen. (Agree: 11, Disagree: 4, Skipped: 5).

Text of Question	Comments
The first editions of Q Files (2000-2002) and some of the second editions (2007-2008) contain fear inducing or threatening language for some readers. The use of threat or fear inducing messaging can, based on research, alienate or even anger audiences. How would you recommend addressing this in future?	• Positive messages will attract positive actions. • Use language that research shows is better. • Include content that people can identify with like recent storms or small events. Then describe the reality to them with content such as "While these are very rare events it pays to do a few small things to ensure you and your family are prepared." Try and invoke action but don't overstate the risk. • My personal preference is not to use threat or fear inducing language in communications as it can 'switch' people off to the message. • Emphasise preparedness rather than risk. • You will never appease all people. All you can do is present information in a truthful but balanced way • In future authors should start from the end -- what are the behaviours that need to change and then paint a compelling picture of the steps between where people may currently be and where they should be. • A balance is required but with a swing to the more positive. Different people react to messages in different ways. We need to find ways of delivering the message correctly for all the different people out there. • Action based, positive messaging is more engaging and more likely to lead to behaviour change • Just tell it like it is. And show pictures. Show pictures of all the funerals we went to. I blogged every one. • I've never found these booklets did that and in my opinion they did not. If there is evidence that this has been one of the effects, then a deliberate intention to reproduce in future booklets in a neutral tone that is fact-based and solely based on providing information without offering recommendations or deductions leaves it entirely up to readers what they make of that information. Alternatively create different sets of the same booklets; a set that seeks only to provide raw scientific information and a set that deliberately seeks to inform decision-making/actions. • Ok -here is a radical idea - what would this information look like if it tried to convey messages of "gratitude" and "generosity"? These are known to be highly motivational

	concepts. If that is too much for you - than I guess "follow the frog" Sara - i.e. focus on what people CAN do to help improve the situation.

Again, a small majority of members (11) supported the findings. Four members disagreed and five skipped the question. The comments focused on language, messaging and including positivity and even gratitude in messaging. Other suggested shifting from focusing on risk to the value of preparedness. Also, the recommendation for different booklets for different publics has been repeated in previous comments.

However, the way I framed the question, on reflection, may be been off-putting to some respondents. The use of the word “alienate” appeared to have a similar response with some of my respondents, some of whom expressed a dislike of the word.

Table 5.14: Question Fifteen. (Agree: 6, Disagree: 8, Skipped: 6).

Question: There were many examples of providing definitions in the booklets. For example, in the 2001 edition of "Defining Moments in Nature": Risk is the combined effect of the probability that an event will occur and the damage it might do. In the 2008 edition: Risk is the combination of the likelihood of an event occurring and the potential consequences of that event. Do you think providing definitions are necessary for influencing people to prepare for earthquakes?

Codes	Comments
Agreement (eight).	• Absolutely. More detailed, plain language definitions, ideally with a chart distributing hazards on likelihood/consequence scales would be helpful. • No it is not! It makes absolutely no sense at all to the average householder • In everyday language, people need to understand risk to life and property, not technical definitions. • No, providing definitions is not necessary for influencing people to prepare for earthquakes? It is just a definition. • Not a specific definition but shape in the right context. For example, large earthquakes affect NZ frequently however, these most often in occur isolated areas. When these occur in locations close to cities/towns the risk of damage is higher.... • No. Language should be straightforward enough to avoid having to engage in the nonsense of jargon, acronyms, pedantic definitions and the like. • Too technical and complicated. We are in an earthquake prone area. An earthquake will happen sometime soon. This is what we need to know. • Hmm - I am not sure - I suspect not. I think enabling people to prepare has more to do with giving them tools to recognize the risk and ways to respond to that. E.g. Tsunami - Lyall

	Bay campaign (If it's long or strong you should be gone).
Conflation with information and definitions (four).	• Not necessarily, but personally I think the more information people have, the better placed they are to make an intelligent decision and act on it. • I do think it's necessary for influencing people towards a particular direction but I don't think it's necessary for the booklets to want to do this. If in providing definitions within the Q-files people make particular decisions, that's a good thing but it doesn't need to be the reason for giving the definitions. Definitions are equally important for readers giving confidence in the fact-based information that Q-files offer without necessarily seeking any other effect. • It depends what you are defining. If it is something key to understanding why you should prepare, then yes. • Very very brief definitions are helpful, but not if they are not brief.
Publics dependant (three)	• Depends on your audience. Most people won't care or think about the definition of risk (although the insurers will care a lot) • if the purpose is to help people prepare then you don't need to go deeply into definitions of risk. If a person picks up the document then they are doing so because they already have an expectation in mind - so you don't need to provide an argument in the document about why they should "prepare" as they have already crossed that line simply by picking up the pamphlet. • Both - it does depend on the person reading / using the material. Some would use this some would not. Risk conversations with people needs to be in a way that makes meaning for them. I think in general though most people would not engage with the definitions above

This is the only question which used reverse question design. The concept about reverse question design is to break up the logic flow that respondents may have become used to, which creates bias in the answers (Saris & Gallhofer, 2007). Using this reverse question approach, only six of the members agreed that using definitions were useful, with eight disagreeing and seven skipping the question. Consistent with the answers, a small majority of comments appeared to be supportive of this finding, and expressed in a variety of ways. But there are still comments from members expressing the need to define words.

I performed a thematic analysis on the comments. My findings are

- o Agreement (six) that definitions are necessary for influencing people to prepare for earthquakes.
- o Conflation with information and definitions (four). In this code, respondents appeared to be confused between what was informative and definitions or jargon. This is intriguing as there appeared to be difficulty in understanding the difference. One example is in this example:
 - Not necessarily, but personally I think the more information people have, the better placed they are to make an intelligent decision and act on it.

One further finding:

- o Publics dependant (three). There were some comments that partially agreed that definitions were unnecessary but that certain publics may require these.

These comments are useful because they acknowledge that definitions should be used only if the public is appropriate. One example of this is here:

- o Depends on your audience. Most people won't care or think about the definition of risk (although the insurers will care a lot).

This comment hints that one of the reasons why definitions are included is for legal or policy reasons rather than communicating to publics for persuading publics to prepare or on the possibility of earthquakes. In other words, definitions may be included in these kinds of documents as a way to “tick a box” rather than really persuading publics.

Table 5.15: Question Sixteen: Is there value in providing definitions of risk, natural hazards, natural events and disasters in these kind of documents? And, if so, what would that be?

Code	Comments
Disagreement that there is value in providing terms (three)	• In hindsight, no, I don't think these need to be defined in this sort of document. It is too academic. I wouldn't write a long booklet like this again. • No. • Probably limited value.
Agreement (eight)	• Good question. It isn't helpful to refer to the Pyke River coal mine incident and the Canterbury earthquakes as both being a "disaster", for instance. In the new CIMS manual an "event" is a pre-planned activity. Any hazard information should use consistent terminology. • The term 'risk' should be broken down to talking about the likelihood and consequences which the general public would grasp easier. Natural hazards should be defined as should technological and human type hazards (e.g. Pandemics). • Yes there is, but they need to be practical and statistical as well as SIMPLE; i.e., in the past 100 years we have

	seen xxx of folding, xxxx number of Severe Eq's etc. • We can put down the science definition if we want. That's fine ... but need to recognise that the public may see it in different terms - e.g. outrage factors take more precedence. • Yes. The value is in helping reach an agreed understanding across our communities about risks and hazards. We assume people know what words like liquefaction mean because they're in common use. • As above, describe risk to life, property and health. • I think so, if it can be done in plain English • I do think some public education on risk as a concept is important - not sure about providing 'definitions' - certainly not in isolation of richer explanatory information.
Audience dependant (coded five times)	• Depends on the audience and objective of the point to be defined • Yes. For those readers that are studying a relevant field of science or emergency management or other professional or academic interest. Definitions can be verified by readers if they feel the need and when done, help to provide confidence in the reliability of the booklets as a source of quality information. • If the pamphlet is aimed at a general audience and expecting them to be better equipped to prepare for the next emergency, then definitions of risk etc. can be very cursory. However, if the pamphlet is aimed at people like policy-makers, scientists, architects, etc. then yes definitions are essential and should be thorough. • Only if the behaviours needed to plan and prepare for these on an individual, household or workplace basis need to be materially different. • Only if written by a year 9 student.
Neither agree or disagree (one).	• Brevity is a must.

This question was meant to further unpack the perceived value definitions have to the members. Among the responses, I interpret that there is still a drive or desire for consistency in communication. There is also the claim that definitions have their place in communicating with different groups.

When I performed a thematic analysis, here were the dominate themes that I interpreted:

- Disagreement that there is value providing terms (three)
- Agreement (eight). This was an intriguing finding as some comments defended the use of definition, specifically that people should think similarly to members of the community of practice. Some examples of this are:

- “We can put down the science definition if we want. That's fine ... but need to recognise that the public may see it in different terms - e.g. outrage factors take more precedence.” I interpreted this as meaning this person does actually recognise that it is public perception and emotion that matters. It is unclear whether they mean put down as denigrate or put down as write down i.e. include.
- “Yes. There is value in helping reach an agreed understanding across our communities about risk and hazards.”
 - o Audience dependant (coded five times)
 - o Neither agree or disagree (one).

These comments are particularly interesting, because again these privilege the source. The idea that “we can do what we want and the public can like it or not” borders on antagonistic to publics. Also, the desire to have a shared understanding is not entirely shared; it is the understanding that government officials want publics to have.

Other comments further illustrate at the documents being publics dependent (coded five times):

- o Yes. For those readers that are studying a relevant field of science or emergency management or other professional or academic interest. Definitions can be verified by readers if they feel the need and when done, help to provide confidence in the reliability of the booklets as a source of quality information.
- o If the pamphlet is aimed at a general audience and expecting them to be better equipped to prepare for the next emergency, then definitions of risk etc. can be very cursory. However, if the pamphlet is aimed at people like policy-makers, scientists, architects, etc. then yes definitions are essential and should be thorough.

Again, this assumes that the limited number of professional emergency management or policy makers could have been the main publics for this kind of document. The extent that the members wish to adhere to the use of definitions in public documents is slightly discouraging, as there is no evidence that defining things creates a better understanding which then leads to action among publics (Brady & Webb, 2013; Eriksen & Gill, 2010). The Q-Files were produced for a general “public” and not for emergency managers or policy makers.

Table 5.16: Question Seventeen. (Agree: 14, Disagree: 4, Skipped: 2).

Text of Question	Comments
The preliminary findings are that these booklets were written for people who were engineers, scientists,	• This is a difficult, probably impossible challenge to ever fully overcome. I for one tested aspects of the latter publications with my then early teen children. They understood and enjoyed the content. There is a problem here in that overly simplified material is not taken seriously by readers. A

planners, or emergency managers by engineers, scientists, planners, or emergency managers. This is sometimes described as the “echo chamber” effect, where people associate and communicate with like-minded people only, often excluding other narratives, ideas, concepts or beliefs that are contrary to their own.	balanced approach is required, with both sufficient simplicity and technical feel to be both understood and taken seriously. • You have to start somewhere. Unless you're writing for five year olds, a certain level of common understanding has to be assumed in any communication. • This is probably true, but we also got a lot of good feedback from other people about them. • I'm aware of school children having used the Q Files as part of the school project - there are other publications such as Get Ready Get Thru which the Q Files compliment. Not everything needs to be dumbed down. • Very strongly agree • If the people noted above were the audience, and the findings are that the booklets were well written for the audience then this would be deemed a good communication tactic. • Yes, and no. yes to the audience, no to the description of the echo chamber • I could be easily led to believe this is the case but even if it was, I have had feedback from the general public and in particular from schools that suggest the information is well received from an audience much wider than the engineering, science, planning and emergency sectors. • Absolutely

The majority of members agreed (14), with four disagreeing and two skipping. The comments here are widely diverse. Two comments suggest that members have had positive feedback about these booklets and that these were useful outside the “echo chambers”. Comments like “don’t need to be dumbed down” are used in this section, as is the need to not write for “five-year-olds”. Again, the focus of the comments is not on changing any of the narratives or adding personal perspectives but on tinkering with the language. But it is rarely expressed that we need to take a critical approach to what we are communicating and why, not just alter how we are saying it (e.g. change the readability or language).

I interpret from the answers to this question that there is a lack of reflection or questioning of how we function as a group. This is intriguing, given the disconnections between what we communicated versus the needs of the publics. The assumption of authority or the “we were correct” mentality, expressed in some of these comments, suggests authority and power. It can easily become “we were right about the earthquake danger, why did no one listen to us?”, rather than “we were correct but we communicated in ways that were difficult for people to understand.” To me, the sentiment strongly suggests a fundamental dysfunction within the group dynamic.

Table 5.17: Question Eighteen: If you agree that an "echo chamber" was created, how would you recommend "breaking the echo chamber" in future for other groups?

Codes	Comments
Audience or publics testing (coded nine times)	• Testing the content on sample groups of the intended audiences and adjusting to suit. • As stated before; trial/consult the average householder and obtain feedback • You could test future information with target audiences to see whether they understood / believed / would act on it. • I would test the material on "Joe Bloggs" first. • User testing the booklets on people outside of the industry and with assumed knowledge. • Broaden the background of those involved in writing the booklets. Then get a cross section of the community to read and confirm or otherwise that they understand the content before it is published • Material should be sanity-tested by non-technical people. • As previously described, multi-lingual versions and a deliberate design intention to make them neutrally information-based rather than decision-influencing or perspective-biased. • It can be quite costly for any one project to take on testing their ideas about information dissemination with say focus groups- so it needs a cultural practice change among information providers. In particular taking it back to basics. In any one area (say natural hazards communication) examining, with sample stakeholders, who do you want to reach - and what helps you to do this?; What do you expect them to learn/do as a result - and what would motivate them?
Two-way communication (coded four times)	• Reach out - Find out more about the community, its demographics etc., and talk to more people and groups in your community to learn what they know and think, etc. • By actively engaging with people outside that chamber -- usually the people who stand to benefit from personal behaviour change. • Community engagement / public education experts need to be involved with the engineers, scientists etc. in putting these materials together. • Work to develop an organisational culture of two-way communication ... that starts long before books are written. Not that changing culture in this way is easy.
Strategy at the beginning (coded once)	• Define your purpose and audience clearly. Test drafts with members of that audience. Ensure the design and content are suitable and accessible for that audience.

More expertise required, including marketing professionals (coded twice)	• Ensure that those authoring content have the necessary skills to shape content for a range of audiences. This is a rather unconventional concept for local government authorities but professions such as marketing and advertising should be engaged as they invoke action on a day to day basis. • But this requires assistance from comms people or social scientists, as it would have to be done in an appropriate way, and most sciencey types don't have that experience or skill.
Publics dependant and the need for different publications for publics (coded once)	• Two sets of documents. One aimed at kids, one aimed at emergency management professionals. The kid accessible document will nail the reading age and cultural accessibility issue.

More members commented on this question (17), than answered agree (14) to the previous question, even though the question only asked for those who agreed with the statement to answer the question. This was a limitation in my survey design and a learning I will take forward is to use question logic to limit people answering a question when they have said no. Three people skipped the question. Suggestions like inclusion of social scientists or testing were common in the comments. One comment that had saliency with me was when one member suggested that we needed to better define our purpose and our audience first. The Q-Files lacked any communication strategy that would have included such analysis.

I performed an emic thematic analysis on these comments and interpreted the following: The most commonly coded sentiment was “audience testing”. Here are some examples of this:

- Material should be sanity-tested by non-technical people.
- User testing the booklets on people outside of the industry and with assumed knowledge.
- As stated before; trial/consult the average householder and obtain feedback.

There are issues with user testing. Providing participants with documents that are already in draft, without inclusion of differing perspectives at the beginning of document, may be of little value. Jacobson and Servaes (1999) also suggest that user testing alone does not align with the participatory communication model. If participatory communication techniques were used, there may not be a booklet to test with users, as other channels may be more useful for publics. Grunig (1992) further

suggests that user testing alone is insufficient for the two-way symmetrical. But not all models challenge the use of user testing. Lazer and Kelley (1973) suggest that user testing is sufficient for consultation for a social marketing model. This is not to suggest tokenism but rather meaningful inclusion of different publics and their perspectives at the beginning of creating communication campaigns, focusing on the process and outcome rather than the output.

The inclusion of different voices or people was the second most popular code, coded three times. Broadening who “belongs” in the group was an excellent suggestion. One question that could be asked by teams is: who needs to be in the room not already here?

Two other comments other comments highlight how publics may be perceived by some of the members of practice.

- Two sets of documents. One aimed at kids, one aimed at emergency management professionals. The kid accessible document will nail the reading age and cultural accessibility issue.
- I would test the material on Joe Bloggs.

It is interesting that this commenter treats publics who aren’t emergency managers as “children”. Further, the term ‘Joe Bloggs’ refers to an ‘average’ person or someone considered not bright or intelligent (Anton & Zhang, 2011). To consider people outside the members of practice as not very intelligent is suggestive of a paternalistic perspective. I interpret that it could solidify an echo chamber: there is “us” and there is “them”, the outsiders.

Reflections from the members

Question Eighteen was the final question querying members to reflect on the findings of my research. However, even though the main purpose of the survey was to allow members to provide feedback on my findings, I also wanted to provide them with a space for personal reflection on the events that had occurred in Canterbury. It is here that I personally find some of the most powerful and compelling reflections in the survey.

Question 19: On reflection, what do you think were some of the barriers to communicating effectively about earthquakes prior to the Canterbury Sequence? (Four Skipped).

Answer Choices	Responses
No or little political will	68.75% 11
Few people in Canterbury believed an earthquake could happen in their lifetime	62.50% 10
Lack of time	25.00% 4
Budgetary constraints	25.00% 4
No or little direction from the Ministry of Civil Defence and Emergency Management	25.00% 4
No or little support from management in your organisation	18.75% 3
No or little direction from the Canterbury CDEM Group	18.75% 3
Lack of scientific support or information from GNS Science	12.50% 2
Personal conflicts with members in PEPI	12.50% 2
Shortcomings in skillsets from professional communicators	12.50% 2
Total Respondents: 16	

Figure 5.20: Barriers to communicating.

From the answers, lack of political will with 11 responses and lack of belief among the people in Canterbury (10) were the most popular views. Lack of direction from the MCDEM, lack of time and budgetary constraints were all considered relevant. Lack of support internally or from Canterbury CDEM (3), as well as shortcomings in skillsets from professional communications (2), lack of scientific support from GNS Science (2), and personal conflicts on the PEPI committee (2) were the least popular choices.

However, it is the comments that are, to me, most intriguing and complex. Political conflict, whether from elected members or between the councils, appears to be a popular theme in the comments provided. This indicates that the “echo” chamber was not as cohesive and unified as I had perceived it to be; certainly, not everyone agreed with each other.

I have coded the comments; the first grouping is specific to political issues causing issues with communication in Canterbury (coded six times):

- o The most influential factor was the games played by [removed for privacy] staff (communications, hazards, and especially emergency management), reflecting their perversely risk-averse executive and mayor. Resulting in mixed messages and a perverse interpretation of "risk" being applied, as well as the work of the PEPI committee being unduly protracted. I don't know where the belief that Canterbury residents did not believe an earthquake would happen in their lifetime when prior to the earthquakes Canterbury residents had the highest risk awareness and preparedness in the country. The media and political rhetoric since the quakes that people did not expect them is part of the neo-liberal discourse of crisis capitalism. [removed for privacy], for instance, prior to the quakes had rejected a GNS Science quake

serious credible event risk analysis for their 2007 Earthquake Prone Building Policy as the consequences described were too severe. A probabilistic report was ordered and used instead, that drastically down-played the quake risk. This directly contributed to damage and injury toll in the quakes. There is an inherent conflict of interest in territories local authorities being responsible for development under the LG Act and RMA, and hazard and emergency management under the RMA and CDEM Act.

- o I would be speculating here because I wasn't involved in a CDEM role/agency at the time. From the outside I would suggest (i) mindset within agencies such as MCDEM that they will be in charge of everything and people will be directed in the event of an emergency (i.e. rescue oriented); lack of political will at all levels (national to local) that makes natural hazards a low priority in NZ local government.
- o My committee at [removed for privacy] met on 2 September 2010 to consider the findings of a hearings panel on earthquake prone building policy. I chaired that panel which heard submissions and made strong recommendations. We were mocked. Paranoia was one of the words I remember. I knew I did not have the numbers at the table for the [removed for privacy] meeting to get the panel finding through. That all changed on 4 September 2010.
- o It just wasn't seen as a top priority.
- o The PEPI committee stopped functioning prior to the 2010/11 earthquake which meant a key driver disappeared.
- o Lack of political will at local government level.

A further issue is the lack of connection with communities, is raised as well (coded three times):

- o More about organisational and institutional culture sets that work against true participation and learning-based organisational approaches to involve the public. Also that understanding of good two-way risk communication and engagement practices are lacking at all levels among officials and researchers.
- o I think this was difficult to answer. All of the above would have influenced the communication. However, I think that people / community are generally disinterested until it happens. Scientifically and from an engineering context we knew the earthquake could happen but people said they had no idea. I think when trying to inform the community about hazards we need to use as many and varied ways of letting them know as possible - so hopefully one of them will have an impact on any one individual.
- o Not enough liaison with the audience that material is written for. Workshops, interviews, feedback opportunity

Another theme was that publics were uninterested in earthquake risk before the sequence (coded three times):

- o low public expectation in Canterbury of a major earthquake - or really any major natural hazard.
- o As some parts of the country/world are publicised as high risk areas for example, Wellington. Members of the public typically think it will not happen in their neighbourhood.
- o I think the appetite of the general public was lacking towards earthquake awareness and towards disaster preparedness generally. If people don't want to know about something they will close their eyes and ears at which time no amount of education or awareness will be useful. Sometimes it takes catastrophic events to whet the appetite.

However, I question if respondents were uninterested in the topic or in how we were presenting the topic. Respondents expressed that people just did not think damaging earthquakes could happen in Canterbury and Wellington's notoriety of being the "place earthquakes happened". I interpreted that several members were expressing their frustration that they "were not listened to" or even publicly mocked for their stance on earthquake risk. I can relate to this emotion, that people simply "do not listen to us". This could be an issue for this emergency management community, the sense that they are not listened to or even are marginalised because of their perspectives on risk. This barrier can begin from external feedback and then become supported by the professional community itself over time.

Question Twenty: Canterbury's emergency preparedness levels are dropping, from 32 percent (2012) to 22 percent (2014) (Colmar Brunton, 2014). What do you see are the barriers now to earthquake preparedness campaigns? (Three skipped).

Answer Choices	Responses	
Other (please specify)	82.35%	14
Too much work post earthquake to focus on public education/communication	52.94%	9
No or little political will	41.18%	7
No or little direction from the Canterbury CDEM Group	29.41%	5
Budgetary constraints	29.41%	5
No or little direction or support from the Ministry of Civil Defence and Emergency Management	23.53%	4
No or little support from the management of your organisation	17.65%	3
Lack of scientific support or information from GNS Science or other agencies	0.00%	0
Lack of support from the research community	0.00%	0
Total Respondents: 17		

Figure 5.21: Question Twenty.

The most frequent answer was that there was too much work post-earthquake to focus on public education and communication. Other responses included no or little political will (7), with budgetary constraints and no or little direction from the Canterbury CDEM Group (5). No or little direction was cited from MCDEM (4) and no or limited internal support was also listed (3). However, similar to the previous question, it is in the comments that the richness of experience and insight come to the fore.

The dominant theme appears by my interpretation to be that either the public is too exhausted, sceptical, forgetful or traumatised with the earthquakes (coded eight times):

- o Earthquake & hazard fatigue, other priorities.
- o Been involved in resilience assessment project since the EQ in Canterbury. Members of the public are VERY willing to look at and improve preparedness for future events but the right methods/info/funding is just not available to them.
- o Public exhaustion.
- o earthquake fatigue within the community.
- o People forget what happened, don't like to think about it, don't think it can happen again.
- o Again I feel I would just be speculating. Personally - the effort of recovery feels so great that I don't want to think about having to deal with ANOTHER event.

Chapter 5: Reflections from the Community of Practice

- o Are levels of emergency preparedness that closely related to barriers to earthquake preparedness campaigns? I don't really see any other huge barriers to doing earthquake preparedness campaigns. I think you can have the best campaigns in the world and people still won't be prepared, because that's just people, and I would have thought it was natural for preparedness levels to drop off again a few years after an event.
- o The community quickly forget despite CDEM organisations trying to frequently remind them.
- o I'm not directly involved in Canterbury - so hard to comment on this question. However, think that it is in part due to lack of understanding of good risk communication and engagement practice at all levels.

Several participants suggest that it is the public education programme coordinators who are also simply too tired to engage with publics on this issue (coded four times):

- o There isn't a PEPI committee functioning - the CEG and CDEM Joint Committee have not been made aware of shortcomings of public education in Canterbury.
- o There has been an assumption that because residents have been through an earthquake they will know how to face the next one - I believe that is a false assumption. I also think the relevant City Council staff in particular were very tired as a result of several years in a response/recovery phase and lacked the will and energy to initiate and manage new activities.
- o Apart from a lack of time for anyone to do it, and perhaps a lack of coordination (who's responsibility is it?).
- o Public appetite as per 19 above. (Comment linked is: I think the appetite of the general public was lacking towards earthquake awareness and towards disaster preparedness generally. If people don't want to know about something they will close their eyes and ears at which time no amount of education or awareness will be useful. Sometimes it takes catastrophic events to whet the appetite).

Other members suggest that the current preparedness measures and related market research are limited and inadequate (coded four times):

- o Canterbury remains some of the highest in the country [sic]. With approximately 1/3 of Christchurch adult residents being new since the quakes it is not surprising that preparedness is reported to be lacking. This is entirely natural and expected several years into a post-quake context. One lesson from the Canterbury quakes was that the measures of quake preparedness are largely irrelevant to the ability of individuals and households in dealing with the impact of hazards such as earthquakes. A more holistic set of measures would uncover a far higher level of resilience and inherent preparedness than the 50-year-old approach within the current, so-called, public education programmes. The desire to normalize post-quake feelings and actions is likely to be undermining any preparedness messaging. The lack of trust in official organisations due to mismanagement of the response and recovery, and the lack of meaningful community engagement

imposed by the at once hands-off and interventionist neo-liberal recovery model is also influential here.

- o There has been an assumption that because residents have been through an earthquake they will know how to face the next one - I believe that is a false assumption. I also think the relevant City Council staff in particular were very tired as a result of several years in a response/recovery phase and lacked the will and energy to initiate and manage new activities.
- o Firstly, the noted Colmar Brunton is questionably sound - look at sample sizes. MCDEM's consistent messages are too long, there needs to be some sharp, focal slogans.

These comments are intriguing to me. One is that people in Canterbury are experts in preparedness, or at least perceived as such and that no preparedness campaigns are required to support future behaviour. The other assumption is that people see recovery in a phased process, clean cut and simple, rather than a spectrum with the potential of new emergencies occurring and affecting recovery. This is a concerning thought as other emergencies can occur during the recovery period. Where is the support, planning and preparedness for other emergencies during the recovery from a disaster? Some of the comments indicate that resources have now been limited to recovery in Canterbury, rather than including preparedness for new emergencies as well as recovery. There may be a gap in funding or human resources in supporting emergency management agencies in Canterbury.

The final comment indicates that there is confusion as to who is actually responsible now for public education in Canterbury. When the PEPI committee was active, coordination was the responsibility of the Canterbury CDEM Group. But with the inclusion of new agencies, such as the Canterbury Earthquake Recovery Authority (CERA), it is now unclear who is responsible. As this thesis relates directly to communication before the earthquake rather than post-earthquake, I feel it would be too tangential to continue with detailed analysis for this question. However, it is important to understand the environment at the time my findings were presented to my community of practice.

Question Twenty-One: When you reflect on your experience working on public education/public communication campaigns, with the retrospective knowledge you have now, what do you wish you had known then that you know now? (Skipped: 4)

Comments:

- o That the [agency removed for privacy] would act even more to undermine well established disaster recovery processes than it was known to be likely

to. That (disaster) inexperienced [agency removed for privacy] staff would undermine hazard and risk communication efforts during the response and initial recovery to the extent they did. That [agency removed for privacy] leadership, senior management and Emergency Management would deliberately undermine the statutory regional CDEM responsibilities and capabilities, and be allowed to get away with it.

- o Learned that one on one communications with schools worked extremely well. Resulting in NO SERIOUS INJURY at any school in Canterbury. Why not? Teachers WERE prepared thanks to simple, regular and sensible information provided to all schools. A classic example of how it CAN work.
- o That it never ends. We all thought that one effective campaign would be all it took. On anything. Do this one - move on to the next. Done. Wrong
- o That an earthquake was going to happen under Christchurch! But seriously, I would have done something much simpler, and highlighted that no one in New Zealand, no matter where they live, should be surprised if an earthquake happens.
- o Need to include the time recovery takes, the period aftershocks continue of, the emotional impacts that earthquakes have on people- these need to be communicated in future in order to better prepare people for when disasters occur.
- o Wish had better ways to help organisations become learning organisations - changing culture of experts and officials of top-down, uni-directional communication.
- o Keep it simple silly :) A great example is evacuations in Chile.
- o that there actually would be an earthquake. The question is - does a set of booklets (irrespective of how well they are written) change public opinion about likelihood and preparedness?
- o That the people who make decisions about preparedness are householders, small business owners, rest-home staff, school staff etc. and that a lot more emphasis should have been put on reaching those people.
- o The failure/inability of the majority of people to accept personal responsibility for their preparedness and then to help themselves during the respond phase. The only excuse you heard was "it is the Government's fault".
- o Smooth seas never make skilled sailors.
- o that we need to use engagement processes (a two-way conversation) rather than a "we'll talk to you" process
- o Less is more, use simple messages
- o that local government is not the right agent for cdem preparedness. Example – [agency removed for privacy] wilful refusal to be told that their [agency removed for privacy] building risks brittle collapse in an event predicted since 2007 on the [agency removed for privacy] website.

- o There is a repetitive theme of an invalid assumption in some of these questions: that somewhere in our history we go the education and awareness philosophy wrong! I don't buy it. One of the most useful lessons I learned post Sep 2010 earthquake is that the educational, awareness and preparedness messages we'd been espousing in the emergency management sector for decades were valid! Another positive revelation was that the scant science-based info that our councils had provided for many years around liquefaction risk (including map predictions) were valid! What didn't gauge particularly well then and still today is what wets the public's appetite? What will motivate people to want to know or to want to learn? These are difficult questions to answer and research in this direction could be very helpful to educators.
- o I think that the idea of constructing useful "memes" - ideas that are simple, and transforming and self-replicating is one that I am most interested in pursuing.

I attempted to code these comments, but the comments were so diverse that it was difficult to find commonalities or similar threads throughout the comments. It appears that all the respondents took away different lessons, personal to their experience.

Among these the “smooth seas never made skilled sailors”, indicates that perhaps this experience is part of the occupation of working in emergency management and should be expected. Other comments suggest moving away from the more “traditional” model of civil defence campaigns. The statement “we need to use engagement processes (a two-way conversation) rather than a “we’ll talk at you and you need to listen”. Other commentary included that people seemed to “blame the government” or that the approach pre-earthquake was correct but that motivating the public to listen. Again, this appears to be an attempt at continuing to perpetuate a “top-down” approach. Again, politics were also quoted as an issue. Schools were brought up as an example of what worked well. As this research does not focus on schools, it is difficult to address these comments. However, what is useful in that comment is the value of “face-to-face” communication; personalising communication and allowing for discussion.

Another issue brought up was the time it would take to recover; that few had anticipated this process to take as long as it had and that it was still very tiring. Again, the exhaustion of staff and lack of support or direction, can affect current public education campaigns.

Chapter 5: Reflections from the Community of Practice

The final question was to allow members to provide any final feedback. Similar to the previous questions, members provided useful feedback.

Question Twenty-Two: Please leave any last comments here.

Comments:

- o The entire public education model is overdue for a thorough, objective review. Hopefully this piece of research will help to get that review happening.
- o I often wonder why nobody has wondered WHY the school communities fared so extremely well during the Feb 2011 EQ events. That was NOT by chance! It happened thanks to practical, simple communication and education of teaching staff on emergency preparedness. This fact should be investigated and evidence gathered to be used to the wider community on how preparedness education DOES work.
- o I am very much looking forward to reading your results so that we can do a better job in future!
- o Good luck with this work - the findings should be beneficial and useful to emergency managers in particular.
- o Looks like an interesting study - look forward to seeing final results.
- o Great work Sara, I look forward to your findings :) Peace out Brussel sprout!
- o A noble intention, but people rarely spend time reading what may be useful literature when they're up to their ears with alligators. Many people too who are called to action in an emergency event don't have daily roles in this space. This means that they can be dropped into situations where they have to live on their wits, often with no preparation or understanding how emergency management situations need to or should ideally operate. People learn best from mistakes and failures, and in some ways should not be prevented from making these. I feel a thesis of my own coming on, so will now put those hobbyhorses back in the stable and shut the door. Good luck with this!
- o Good for you Sara. Regards, [name removed]. Sing out if you want anything more.
- o Sara I would love to receive a short summary of the results on completion of your research please. Best of luck and regards from [name removed].
- o Hi Sara - happy to have given you my thoughts - such as they are. I hope you find them useful - it was interesting to do this. I would be keen to see the member check results so will send you an e-mail.

It is heartening to read support for my research, as I felt that it could have been difficult for the community of practice to read critical research. There is also support from members to revise and modify the current model, although there is still some adherence

to the traditional public education model. In the next chapter, I explore what this means for public education models. Overall, it appears that the group is somewhat split between the older model of public education, the “listen to us” mentality versus the “two-way conversation” group. However, the latter group still appears to struggle with what that might look like or how to strategically apply those lessons. This mirrors concerns in the literature that suggests two-way communication is complex, naïve and idealistic (L'Etang & Pieczka, 1996).

Recommendations from members

One of the richest areas of the feedback that I received from my members of practice was their recommendations for future public education campaigns. These came through in the comment sections. For me, this is one of the main cross-cutting themes.

Here are some examples of recommendations in a variety of comments:

- Action based, positive messaging is more engaging and more likely to lead to behaviour change.
- a deliberate intention to re-produce in future booklets in a neutral tone that is fact-based and solely based on providing information without offering recommendations or deductions leaves it entirely up to readers what they make of that information. Alternatively create different sets of the same booklets; a set that seeks only to provide raw scientific information and a set that deliberately seeks to inform decision-making/actions.
- Ok -here is a radical idea - what would this information look like if it tried to convey messages of "gratitude" and "generosity"? These are known to be highly motivational concepts.
- I think that the idea of constructing useful "memes" - ideas that are simple, and transforming and self-replicating is one that I am most interested in pursuing.
- Learned that one on one communications with schools worked extremely well. Resulting in NO SERIOUS INJURY at any school in Canterbury. Why not? Teachers WERE prepared thanks to simple, regular and sensible information provided to all schools. A classic example of how it CAN work. *Note: research has been conducted regarding schools and the Canterbury Earthquake Sequence (e.g. Mutch, 2015).*

These comments reflect rich learnings in my community of practice. Creative ideas like memes or engaging with concepts of gratitude and generosity are intriguing concepts. Action based, positive messaging is reflected in my research, which is heartening to read.

This comment suggests that communication should be perceived as a constant activity:

- o That it never ends. We all thought that one effective campaign would be all it took. On anything. Do this one - move on to the next. Done. Wrong.

This comment means that some members understand the communication is a constant action, not limited to one campaign, one booklet or one meeting. Communication is a continuous, sustained effort, requiring many people to be involved.

Emotional impacts of the member checks

Expressions of pain and personal loss are clear in some of the comments. Some comments, to me, hinted at frustrations with politics, while others expressed grief. One comment was particularly poignant to me:

- o Just tell it like it is. And show pictures. Show pictures of all the funerals we went to. I blogged every one.

This was the most grief-stricken comment in my member checks and when I read it, the emotional impact was significant. It was a reminder of what my members had endured, going to funerals of people who had died in the earthquake. We were all witnesses to a sad, terrible moment in New Zealand's history. In some ways, this research is the only record of some of my members' stories. I feel honoured to have been trusted by some of my community of practice to share their stories.

Findings from Member Checks

Overall, members principally agreed with my findings but there were intriguing discussions and insights provided by this group. I now provide a summary of the findings organised by the themes presented to the members.

Finding One: The booklets contained Jargon and technospeak. I explored this finding with my members of practice in three separate questions. Overall, my members supported my finding, that jargon and technospeak should be eliminated from communication with most publics.

Finding Two: The booklets contained unhelpful levels of fatalism. This finding was explored in two separate questions. There was moderate agreement for both questions but some disagreement communicated. I interpret that there could be attitudes within the community of practice to "stick to the facts" without supportive narratives or stories.

Finding Three: Exclusive Narrative. This finding was explored in three separate questions. While respondents overall agreed that the booklets contained only the science narrative, there was some dissent about the inclusion of Māori narratives. Many comments were made in this section, so I cannot interpret there to be agreement but rather this finding is controversial and may require further unpacking with members of the community of practice. I may not have clearly explained how Māori knowledge includes geological understanding with a much longer provenance than recent European scientific narratives. This group of people also fail to recognise the expertise of individuals outside their community of practice. Various publics, including Māori, had experiences relating to preparedness and knowledge of earthquakes but only the members of practices' perspectives seemed to matter.

Finding Four: Lack of compelling spokespeople or personal stories. There was a strong majority agreement that stories, narratives and relatable spokespeople should be included in public communication materials (18). In retrospect, I should have included several questions about this topic.

Finding Five: The booklets inappropriately used threat and fear appeals. There was moderate agreement (11) but some of the members disagreed with this finding. Fear appeals may still be a popular approach with some members of my community of practice.

Finding Six: The booklets exhorted people to think like experts. There were two questions exploring this finding. There was mostly agreement but some comments on this finding contained a variety of perspectives within the group, particularly the inclusion of definitions in the booklets. There was an intriguing amount of discussion about the inclusion of definitions as important, despite some clear statements dismissing definitions as irrelevant.

Finding Seven: Evidence of active echo chambers. The main finding, about echo chambers, had mixed responses (4) and numerous comments explored this finding in depth. I consider it intriguing that the concept of exclusive groups, in the form of echo chambers, could still be controversial among this community of practice. There could be several reasons why the “echo chambers” analogy did not receive wide support, including evidence from the other questions, which illustrated that politics and division

existed in the PEPI committee. Perhaps my interpretation that the group acted as a whole is not entirely representative of what occurred.

Summary

After receiving my member checks and reflecting on these, I interpret that the comments and answers provided a much larger component of the research than originally intended. My members provided thoughtful and thorough comments, more than expected. The personal and professional reflections of this group make, for me, compelling insights. As a reflective exercise, this is perhaps one of the first times in research where communicators and emergency managers have had space where they can discuss, anonymously, their reflections. The value of this research comes, in part, from this final piece of primary research. The findings illustrated that my members of practice grapple with understanding of oral histories, ethnicity and language. There was conflation with language rather than an acknowledgement of their stories as a crucial part of context and communication.

Chapter 6 : Discussion and Reflections

DANGER FROM EARTH- QUAKES

BUILDINGS NOT SHOCK- PROOF

NEW CODE OF BY-LAWS TO BE ADOPTED

Christchurch is the only main centre in New Zealand which has not adopted the model building by-laws requiring all new buildings to be of earthquake-resistant construction, it was stated last evening, when the Christchurch City Council was recommended by its by-laws committee to adopt immediately the New Zealand Standard Code of Building By-laws. The committee stated that, in the last five years many buildings had been erected or reconditioned in Christchurch which must collapse in any major earthquake shock, but that the construction of these "veritable death-traps" could not be prevented under the existing by-laws.

The Press, 20 February
1940

Retrieved from:
<http://paperspast.natlib.govt.nz/newspapers/CHP19400220.2.56>

Chapter 6: Discussion and Reflections

In this chapter, I synthesise findings from the literature review (Chapter 2: Bridging the Literature) with my analysis of the Q-Files (Chapter 4: Analysing the Q-Files), and member checks (Chapter 5: Reflections from the Community of Practice). I then explain why I interpret scientism as the main motivating belief system for the people involved in creating the Q-Files. I also discuss my interpretations of exclusionary groups (using the analogy of echo chambers) who then developed communication artefacts that were filled with scientificism, gobbledygook, jargon and techno-speak. The majority of my discussions relate to the source due to the type of research I conducted: from an insider perspective and using member checks.

I then analyse my role and consider how I too was an artefact of scientism. I reflect on how my belief system was shaped by an exclusive group. I interpret this through my subsequent learning process; I discovered that I had become a product of my environment and, in turn, was, with missionary zeal, attempting to convert others around me to scientism. I was operating inside what I now interpret to be an exclusionary, self-reflecting group.

Answering the research questions

My research questions are:

- 1. What are the most relevant best-practice preparedness communication principles from the communication and emergency management literatures for earthquake preparedness, and in particular what principles in the former literature are missing from the latter?*
- 2. In light of these best-practice principles, what public communication lessons from the preparedness information issued nine years before the Canterbury earthquake sequence can be identified through interpretative document analysis and member checks?*

When exploring my first research question, I discovered through literature reviewing that emergency management and natural hazards literatures lacked references to or integration with principal communication theories, including Berlo's (1960) Source, Message, Channel, Receiver (SMCR) model, Grunig's (1992) excellence theory, McGuire's (1961) inoculation theory, Broom and Dozier's (1990) co-orientation model, and participatory communication theories (e.g. Servaes & Malikhao, 2005). However, some communication theories are included in the emergency management and natural hazards literatures, including Bostrom et al.'s (1994) mental models (for risk communication) and Petty et al.'s (2003) elaboration likelihood model. Models and theories built on empiricist theoretical perspectives seem to have been attributed more

merit within the natural hazards and emergency management disciplines while socio-cultural, largely constructivist theories, have received little or no attention.

One potential reason for this exclusion is that scientists may be supporting theories based on how they interpret the world, rather than include other research epistemologies. I suggest that there may be a scientism-based preferential treatment about theories, indicating to me that other echo chambers (outside the PEPI group in Canterbury) may be active in the wider academic disciplines of natural hazards and emergency management.

I found that emergency management and natural hazards literatures, not just in my Canterbury PEPI community of practice, have largely excluded other fundamental research about media analysis, critical content or discourse theory. I interpret that emergency management and natural hazards literatures lack linkages with the humanities overall as well as support from the social-cultural social sciences. The exclusion of some important theories, due to an epistemological bias, may be limiting research pathways. The lack of creative or exploratory theories may contribute to why some fundamental questions in emergency management, specific to communication, have yet to be answered or adequately addressed. We still do not have widespread success with preparedness communication campaigns, for example.

From the literature, there appears to be little diversity in the philosophies of the scholars involved in natural hazard disciplines or emergency management. Mileti (1999) does suggest that disasters are socially constructed, which implies a social constructivist approach may be included in these two disciplines. Phillips (2014) explored qualitative methods in disaster research, Becker (2012), who performed a qualitative analysis of earthquake preparedness, and Beatley (1989), who explored morality and mitigation. However, a more balanced approach treating both qualitative and quantitative research equally may produce more meaningful insights.

Given that Alexander (1997) suggests that emergency management utilises research from more than 30 different disciplines, this lack of diversity of in philosophical approaches is puzzling. Gall et al. (2015) provide evidence that this is not solely a separation between the fields of communication and emergency management but that is a larger issue with research in the disaster research space; engagement across sectors is scarce. While Gall et al. (2015) suggest this can be mended through strengthening research relationships and partnerships. However, how can we have diverse research

teams when one group demands empirical standards (positivist) and the other suggests there can be no universal standards because knowledge is constructed by diverse perspectives, of which empiricism is only one part? How can we connect such divergent perspectives?

This lack of philosophical diversity may be where communication scholars can contribute to the natural hazard and emergency management discourse. Communication research appears to have more diversity in scholarship, specific to epistemological perspectives. I suggest perhaps communication scholars could provide links for emergency management and natural hazards discourse into the creative and critical discourses. I do not imply that positivism has no value but rather that balanced and diverse perspectives may provide richer understandings. The inclusion of other philosophies and epistemological perspectives in these fields may be a useful endeavour for future researchers.

Now that I have briefly some explained epistemological gaps between the disciplines, I will return to the Source, Message, Channel, Receiver, Setting (SMCRS) structure, as a structure for this discussion.

Source: Persuasion

Emergency management and natural hazards literatures are missing persuasion. And yet, persuasion is a central concept in communication research. In the 1950s and 1960s, persuasion was a dominant theme in communication research (Hovland et al., 1953; McGuire, 1961a, 1962). However, emergency management and natural hazard researchers rarely explore how to persuade people to engage in preparedness activities (Adame & Miller, 2015). Similarly, discussions of propaganda, both negative and positive, are frequent in communication research but not in the emergency management literature. However, Preston, Avery, Chakrabarty, and Edmonds (2011) examined civil defence campaigns, critically analysing the use of propaganda and suggested that historical and contemporary preparedness campaigns feature exclusionary discourse. I found emergency management researchers had not explored the application of ethical persuasion in designing and implementing preparedness campaigns. I suggest that exploration about the use of inoculation theory by McGuire (1961b), may be useful provided these campaigns are engagement-focused rather than attempts to control or diminish other perspectives. As persuasion would likely be a beneficial strategic

approach for emergency managers, they could learn from communication researchers about its value.

Based on my analysis of the Q-Files, combined with feedback from my community of practice and evidence from the literature, I suggest several potential motivating factors as to why documents like the Q-files were developed. I interpret these factors as: scientism (belief in science), exclusionary groups (echo chambers), and scientificism (exclusionary documents). Further, these factors are motivators for creating documents that contain gobbledygook (undecipherable paragraphs and sentences), jargon (exclusionary words), and fear and threat messages. I will explore how, in the Q-Files, we were attempting to exhort publics to think like experts and how this relates to scientism.

Source: Scientism

Hayek (1942) argues that the “slavish imitation of the method and language of science, speak of scientism or the scientific prejudice” (p.269). Sorell (2013) asserts that scientism puts a higher value on natural science in comparison with other ways of learning. Scientism is, based on Hayek’s (1942) and Sorell’s (2013) definitions, the conflation between what science is (a method of inquiry) and a belief system that has values, rules, and cultural norms. Aikenhead and Jegede (1999) argue that scientism contains affectations of a culture within the science communities; they contend that scientism-driven scientists are engaging in a form of cross-cultural communication when engaging with external publics. I argue that scientism, the unfailing belief in science as a superior knowledge system, unnecessarily confounds the objectives of earthquake and preparedness communication: which is to motivate publics to take positive action to reduce their own risk. However, to be clear, not all scientists have a belief in scientism (Lessl, 2007). Ketner (1999) argues that scientism is harmful to the scientific endeavour, limiting areas of inquiry through blind belief.

In the last three generations, there is evidence to suggest that authority and expert perspectives are increasingly challenged and viewed with scepticism by publics (McCrindle & Wolfinger, 2009). Tilley et al. (2014) argue that people are turning away from experts, even in the face of increasing disease, such as with the anti-vaccination issue. Further marginalisation of experts is observed in the climate change discourse (Sundblad et al., 2009; Weingart et al., 2000). One conclusion is that if the focus is solely on the message rather than the audience, messages are doomed to (at best)

irrelevancy or (at worst) counterproductive effects (Jacobson, 2003). Unwanted effects can include reactance, a “boomerang” or push-back attitude against authority that involves resisting perceived pressure to change (Brehm & Brehm, 2013; Mann & Hill, 1984). Aspects of this include counter-arguing e.g. actively thinking up reasons to contradict or undermine a persuasive message, as explored by Eveland and Cooper (2013), and widening rather than narrowing the knowledge/behaviour gap (Sligo & Jameson, 2000).

For me, the concept of scientism arose when I was questioning why there were so many “defining terms” paragraphs in the Q-Files booklet *Defining Moments in Nature* (2001, 2008). I had a personal, negative response to the inconsistent definitions of risk throughout the different editions and I asked myself: “why do I care so much about defining terms? Is this going to persuade anyone, who does not already think similarly to how I did?” I found I was not alone in my strong response about definitions; I interpreted that my members were also somewhat conflicted as to why definitions are thought necessary for effective communication. Before my research journey, I would have agreed that definitions are necessary for the belief that “everyone needs a shared understanding and language to communicate effectively”. Now, while I agree with the sentiment of “shared understanding”, I disagree that printing pages of expert scientific definitions will achieve that aim.

By focusing on definitions, there is an assumption that people do not understand risk and if they did, they would prepare for or mitigate those risks. Or, that if people thought in the same way as experts (scientists, planners, engineers), then behaviour change is inevitable. Brown et al. (2014) advocate for a disaster literacy model however, I argue that science or disaster literacy is not enough to encourage preparedness. Rather, the literature suggests that people are aware of risks in a general sense but rather there are other priorities overriding preparedness actions (Eriksen & Gill, 2010). Focusing on “educating” people to think like experts, on an individual level, to change actions, is a theory unsupported by the majority of the behaviour change literature. There is also no evidence to suggest that experts are more prepared for emergencies than non-experts. Indeed, this may be an intriguing pathway for future research, to determine if expert knowledge motivates behaviour. So while sharing definitions may be useful for people in a sector, there is no evidence to suggest that because we have a shared terminology, this will create behaviour change.

So why are ‘defining terms’ not persuasive? For persuasion to occur, Larson (2013) asserts that both parties must be changed. But if the sources (emergency managers and natural hazard scientists) are the ones determining the channels, the messages and what narratives they will or will not support, how much change can be made in the source? The source utterly controls all aspects of the communication, giving publics no way to engage, other than to act as empty receptacles. The concept that “if you simply tell people, they will listen to you”, is a misperception among emergency managers (Littlefield et al., 2012). However, emergency managers are not the only people who struggle with this issue as some researchers have supported practitioners in this assumption of power and authority. Mental models theory seeks to modify people’s thinking around risks to align better with experts (Atman, Bostrom, Fischhoff, & Morgan, 1994; Bostrom et al., 1994; Bostrom, Fischhoff, & Morgan, 1992). In 2016, the U.S.G.S used mental models as “best-practice” theory intended to change people’s ideas about risk (Perry et al., 2016). However, there is little evidence to suggest the use of mental models in a mass communication context is effective and it requires evaluation. A further growing problem that mental models and similar theories ignore: the degradation of belief in the expert by publics. I argue, based on my experiences throughout this research that it is pointless to attempt to convince publics to think like experts if publics do not trust those experts.

During my member checks, I asked about the definitions and terms that emergency managers use in communication with publics, and there were mixed reactions, as explored in Chapter 5: Reflections from the Community of Practice. I performed a thematic analysis on the comments from respondents and found that eight agreed while five conflated definitions with persuasive information. What I find interesting is how respondents argued that these definitions were the only way to think about risk, that experts or the scientists were always correct. I see this attitude reflected in the booklets. There is ample evidence that scientists have been incorrect or had incomplete information in the past; this is part of the learning process. One of the attributes of science is that it is iterative and ever expanding in its knowledge (Latour, 2000). There is also an evident belief in both the Q-Files and the member checks in ‘facts’ as inherently communicative and persuasive in and of themselves, rather than the need to focus on communication as an additional process to presenting information, requiring additional skills or approaches other than clearly stating ‘facts’. Ironically, despite the reverence for science in my community of practice, my analysis indicated that it is not

Chapter 6: Discussion and Reflections

necessarily well understood within that community that communication itself is a complex science with extensive research and evidence behind it that needs to be given respect as a discipline.

When asked about providing different perspectives and potentially alienating people, here is one comment from a member:

- What other perspectives? The booklets were more about the science rather than being prepared - why would that have alienated people?

The above statement illustrates again, to me, that the booklets were predominately written in a limited, myopic way because of the perspective of the members. The booklets were not about science; they were about earthquakes, tsunami and storms that affect people. Science is one method of inquiry in which we can understand more about earthquakes, tsunami and storms.

I acknowledge that I was likely influenced when working on the Q-Files by a belief in science as all-encompassing rather than understanding the limitations of science, as a human-driven endeavour. The difference in my thinking now is that I see science as one system of creating knowledge, but not the only way. Part of this thesis journey, for me, was exploring the constructed nature of knowledge creation. Understanding that we can create or discover knowledge through different epistemological perspectives was a new concept to me when I began this thesis. I had thought that knowledge was developed and created by scientists and social scientists, largely from a positivist perspective. My viewpoint has now been expanded to include other ways of learning.

The devotion to what is “scientific” and “expert” does not assist us in communicating effectively with our publics. Rather than entering into a dialogue, the Q-files were examples of monologues. But the language used by government and scientific groups to communicate earthquake risk is crucial because by demanding that people think as we do, we can create exclusions and resentment among various publics.

Now that I have explored scientism in the context of this research and how it tainted my own thinking, I will explore echo chambers and exclusive narratives.

Echo Chambers

In academic research, the discourse about echo chambers is increasing. A keyword search on Scopus, using the term echo chamber, returned 72 articles between 1972 and 2015. The bulk of these articles are within the political science discipline, but health,

engineering and other research areas are also represented (Wallsten, 2005). In political discourse, the term has been used to discuss blogs, framing, political discourse and media (Abbas, 2013; Liao & Fu, 2014).

Jasny, Waggle, and Fisher (2015) argue that in a political science context, the analogy of echo chambers is:

comprised of two distinct processes. First, information is an ‘echo’ when it repeats what one already believes. Called ‘confirmation bias’ in the psychology literature, information is perceived to be more credible when it matches the recipient’s world view, or when individuals hear the same information from different sources, even if that information ultimately came from one original source. Furthermore, hearing repeated messages has been found to intensify viewpoints further and push some to extreme opinions. (p. 782)

Sunstein (2009) describes an echo chamber as a social group which isolates itself from divergent ideas. Macnamara, Sakinofsky, and Beattie (2012) explain that echo chambers, in the communication discipline, are a threat to robust political discourse and, given the current environment online increases isolation, excluding divergent opinions.

My use of echo chamber as an analogy is not the first for the emergency management discipline. Cavanaugh, Gelles, Reyes, Civiello, and Zahner (2008) use the term in emergency management literature, to describe how some crisis leaders create decision-making echo chambers during crises. Additionally, Cavanaugh et al. (2008) suggest that emergency management leaders favour staff members who provide them with insulation against difficult issues, favouring people who agree with their world perspective and thereby reduce anxiety about their leadership. What I determined from my research was that the concept of echo chamber provides a good analogy for what occurred in Canterbury PEPI Group. As per Jasny et al.’s (2015) defining features, only people who had similar concerns, education or perspective were allowed to provide feedback on the finished product of the Q-Files. Jasny et al. (2015) developed a model for how echo chambers are developed and sustained.

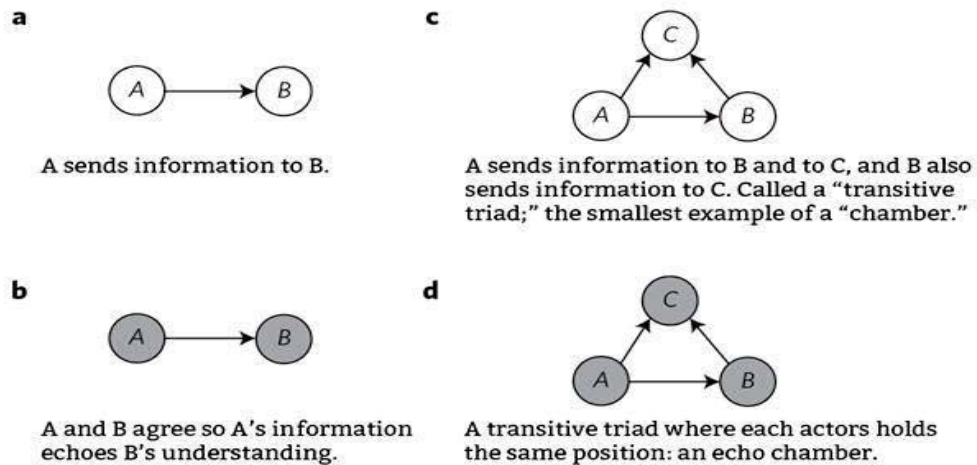


Figure 6.1: Building blocks of an echo chamber from Jasny et al. (2015).

When examining how PEPI functioned, I interpret that the model in Figure 6.2 is similar to what occurred. I use this as an illustration of how the echo chamber may have worked across organisations and have developed my own interpretation of how the echo chamber concept operated for the Canterbury PEPI group.

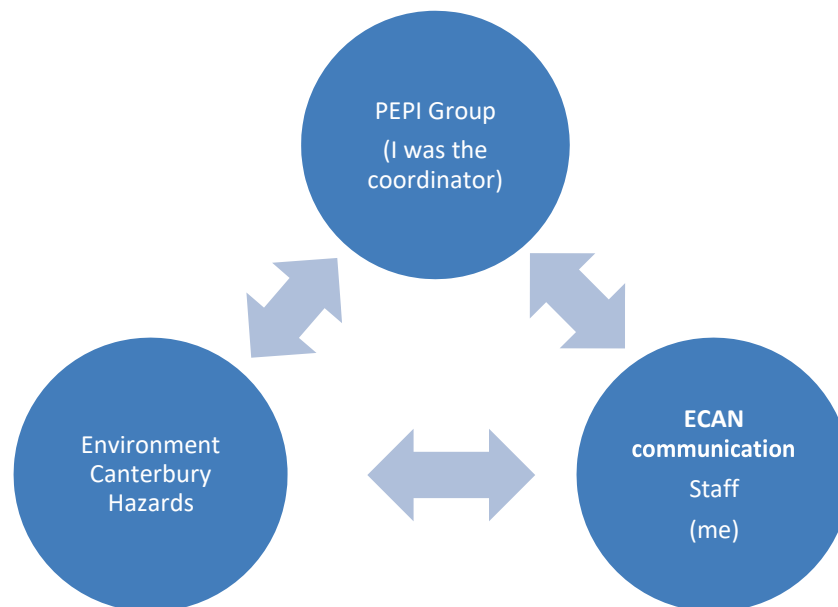


Figure 6.2: The Echo Chamber in Canterbury.

Figure 6.2 indicates the structure and process that I interpret was active for the creation of the Q-Files. Information flowed between the various parties until the final copy was sent to the design firm and then approved by the Coordinating Executive Group (CEG). Although the PEPI committee was an amalgamation of representatives from multiple emergency and welfare agencies, it was not inclusive particularly in ignoring its audience or publics' perspectives. While it may not be practical to be fully inclusive

more could have been done to reach out to other cultural groups and to other sources of local information.

When I interpret the member checks and the Q-Files, with the added benefit of hindsight, new research and theoretical knowledge, it appears that we may have had an echo chamber functioning. We spoke to each other in acronyms using jargon-filled language and reinforced each other's perceptions as to the importance of technical definitions and complex language. I was surprised when I realised that members of the public were not persuaded by the booklets, signalling to me how my perceptions of success had been captured within the echo chamber – and the member checks suggest to me that others have also experienced that moment of surprise.

Messages

There is more research regarding messages in the emergency management and natural hazards literatures, focusing on hazards and risks than on any other aspect of the communication process. While there is no shortage of risk message research, I have yet to find one article, which critically analyses whether current preparedness messages in New Zealand or other developed countries such as the U.S.A., U.K., Canada or Australia in fact appropriate. I refer to the “three days” worth of food/water, emergency supplies”, specific to individual households. Paton (2003) provides evidence for the construction of effective messages but not whether these recommendations of emergency supplies are, in and of themselves, sufficient. The evidence base for these messages is lacking; this may be due to the length of time these messages have been promulgated for, since 1916, so few have questioned the validity of these messages. At the front of Chapter 2: Bridging the Literature, I included an article from 1940 which recommends storing food and water. Given the length of time that these messages have been used, I suggest these messages are embedded within the emergency management discipline. Assumptions by emergency managers and researchers may be made due to the length and investment the discipline has made in these messages. I suggest that these messages require further research.

Other topics yet to be fully explored in emergency management and natural hazards research, specific to messaging, include entertainment and humour. Both entertainment and humour can be valuable framing devices for persuasive communication, and are growing areas in communication research but work is required to explore their utility in the disaster communication area. Humour has been explored, as a coping mechanism,

in the literature about personnel (e.g. emergency managers, fire fighters) (Barnes, 2000; Moran, 1998). Parkhill et al. (2011) explored humour as a coping mechanism for those living with nuclear risk. Further, humour was utilised by the Centre for Disease Control (CDC) to promote pandemic preparedness, with a story-telling device of a zombie apocalypse (Fraustino & Ma, 2015). However, overall, there is limited research on humour, persuasion, and preparedness communication.

Messages: Scientificism

I interpret that scientificism and governmentality were prevalent in both editions of the Q-Files booklets. Gordon, Miller, and Burchell (1991), refer to obfuscatory government discourse as governmentality, an extension of governmentality, as explored by Foucault in the late 1970s. The term scientificism refers to a melange of the use of the scientific method in discourse inappropriately, dogmatically and even unethically, similar to governmentality (Couceiro-Bueno, 2009; Maccia, 1962; Teixeira, 2015; Young, 1982). Building public trust in science is an important part of connecting with communities around issues such as climate change or disaster preparedness. But if the language and communication are exclusive, take for granted that trust exists, and denigrate other forms of knowledge, they obscure exploration of the complexity of connections between scientists, emergency managers and publics.

I suggest two possibly controversial perspectives. Couceiro-Bueno (2009) argues that myth is based on feeling and emotion, and therefor considers it outside the scientific procedure. By examining the meaning of myths of scientificism and governmentality, I have come to perceive that the concept of the “expert” may also be myth. Investigating myths of the experts could be a pathway for future research.

In my member checks, I found comments that suggested scientificism is not yet acknowledged by certain members. I asked my members the question (if they agreed or disagreed with the following statement): the Q-Files contain predominately scientific information. One member agreed but further explained their position:

- Yes there is, but they need to be practical and statistical as well as SIMPLE; i.e., in the past 100 years we have seen xxx of folding, xxxx number of Severe Eq's etc.

What I find intriguing is how the member uses the terms “simple”, “practical” and “statistical”, while some people may find “statistical” simple and practical, others may not. Some members were uncertain about who the Q-Files were for, focusing instead on

how information should be communicated to people within the emergency management and natural hazards disciplines. Some members did acknowledge that the booklets may have missed their intended publics:

- For those readers who are studying a relevant field of science or emergency management or other professional or academic interest. Definitions can be verified by readers if they feel the need and when done, help to provide confidence in the reliability of the booklets as a source of quality information. [Definitions are valuable].

In the above statement, there are several intriguing themes. The first theme was that the Q-Files could be perceived literally as “public education”, for readers who are studying relevant fields or for academic interest. The second theme, providing definitions, perceives a legitimacy or reliability that these documents are from a quality source can be created by including complex definitional formulae. My argument would be: if you are not studying academically, how do you know these definitions are reliable or quality? More importantly, why would it matter to publics to have “legitimate” definitions? Again, there are assumptions and privileges here within the source that certain definitions have legitimacy and others do not.

- If the pamphlet is aimed at a general audience and expecting them to be better equipped to prepare for the next emergency, then definitions of risk etc. can be very cursory. However, if the pamphlet is aimed at people like policy-makers, scientists, architects, etc. then yes definitions are essential and should be thorough.

The above statement further illustrates the concept of how we might have been writing documents for ourselves or similar people.

- For readers such as local government planners/policy deciders/emergency management staff the scientific information was very well presented. But for people such as householders/business owners/school staff, perhaps there should have been less science and more about preparedness.

Publics in local government/planners/policy makers were the main public for the Q-Files. Again, the makeup of the PEPI committee members was policy makers, planners, emergency management staff and scientists.

There was one comment that, I interpret, defensively argues for the use of definitions and scientificism in the Q-Files:

- We can put down the science definition if we want. That's fine but need to recognise that the public may see it in different terms - e.g. outrage factors take more precedence.

Chapter 6: Discussion and Reflections

The first sentence seems self-justifying, but without further explanation as to why it is acceptable to communicate what we want, regardless of other considerations. Further, the commenter suggests that it is fine if the “public” perceives it as different, as long as there is awareness of the disagreement. This comment reinforced the concept of privileging the source and encouraging an “us” (the insiders) versus “them” (the outsiders).

When exploring the use of personal narratives to assist with persuasiveness, one of the members answered:

- History is of little relevance for documents of this type. Information should be aimed at raising awareness of risks and hazards and outlining tips and tricks for preparing for and managing such as these arise.

The above statement supports the concept that narratives, story and the human experience should be divorced from documents of a “scientific” nature. However, this is unsupported in research, as personal narratives and stories are considered good persuasive practice, where “science can be seen as complex and access can be difficult to different audiences OR highly technical terms are used making it out of reach for some people.” (T.L. Sellnow et al., 2009b, p. 149)

Overall, I interpret that some members were confused as to the publics they were trying to communicate with and, further, scientificism (documents reflecting the language of “science only” narrative), was embedded within the Q-Files. Given feedback from my members, combined with my analysis and interpretations, I argue there is ample evidence to indicate that the Q-Files are examples of scientificism.

Messages: Gobbledygook

In partnership with scientificism is the appearance of gobbledygook in content. Gobbledygook is defined as entire sections of text containing jargon, catchwords, euphemisms, redundancy, and lack of concrete, clear language (Sears, 1979). My first indication that gobbledygook was present in the Q-Files was using readability tests on the content. I used the Simple Measure for Gobbledygook (SMOG) developed by McLaughlin (1969) to determine readability. The term “gobbledygook” was one that I had heard before but had not appreciated fully how it related to the Q-Files. The Q-Files scored high unreadability in the indices, meaning that by these measures they contained a lot of unnecessarily complex language structures.

Chapter 6: Discussion and Reflections

During my member checks, I asked about whether members agreed with the readability findings and if future preparedness campaigns should be written in more accessible language. 17 members agreed and one disagreed with this finding. Few had much commentary to add to the finding. Responses to other questions about readability include:

- I'm aware of school children having used the Q-Files as part of the school project – there are other publications such as Get Ready Get Thru, which the Q-Files compliment. Not everything needs to be dumbed down.

The above comment defends the information and language in the Q-Files, suggesting that other documents fulfil the requirement to provide preparedness information.

Further, the last sentence, for me, highlights several issues. From an insider perspective, I have often heard the term “dumbed down”. This term refers to oversimplification of information, for the purpose of easier consumption by publics (Cole, 1999). I argue that using a term like “dumbing down”, when discussing science information, implies a hierarchy of intelligence: the scientists writing the material intellectually superior and they must simplify it for a less intelligent person. The use of gobbledygook does not indicate intelligence by the source but rather an inability to meaningfully communicate with publics. Flesch (1945) suggests that the use of such language is intentional because those using it are not more intelligent but rather gobbledygook is used to make the writer seem important, hide facts, cover mistakes and halt important action. Perhaps we were hiding all that we did not know or all that we could not say easily without political interference? Some comments from members suggest this may have been the case and that some political or managerial members did not want to openly admit or discuss earthquake risk in Canterbury. I will briefly explore political issues in Canterbury in the section *Message: Fear/Threat appeals*.

In summary, I interpret that just as scientificism was the dominant tone in the Q-Files, further, the content included large sections of gobbledygook. I will now summarise a part of scientificism and gobbledygook: jargon and technospeak.

Messages: Jargon and technospeak

Jargon exists as a way to exclude, confuse or to share a connection or “talk shop” (Helmreich, Jané, & Farwell, 2005). Helmreich et al. (2005) suggest that jargon can provide insights into the author’s political, social or personal beliefs. Sears (1979) argues that “jargon is a language of false values” (p. 25). The use of jargon indicates

that the author(s) are making no attempt to communicate but rather the opposite (Sears, 1979). Techno-speak is a specific type of jargon, specific to fields related to science and technology (Kirby, 2003). I argue that jargon and techno-speak exist in the Q-Files, because they are the manifestation of a belief system that produced them: scientism.

I consider jargon to be specific terms or words, which are used to construct gobbledygook. From my analysis, I developed this summary statement:

Jargon and techno-speak. The Q-Files contained excessive use of jargon and lengthy scientific explanations, using language inaccessible to most people. Readability tests performed on the documents indicate that most were written at a second-year university level. With only 20 percent of Cantabrians (N.Z. Census, 2006) reaching this level of education, 80 percent of the population were excluded by default from easily accessing the information in the booklets. As these booklets were intended to educate as many people as possible in Canterbury, 20 percent is too low a number to meet that aim. In addition to jargon and difficult readability, the booklets contained some acronyms that were not explained to the reader.

In my member checks, as discussed in *Chapter 5: Reflections from the Community of Practice*, there was agreement with this finding within the community of practice with some minor disagreements or qualifications. I also interpreted that some members suggest that modifying language was all that is required to change behaviour. However, the supposition that “if our information is worded better, people will behave the way we want them to”, is still flawed, despite calls from researchers to increase “disaster literacy” (Brown et al., 2014).

I have found little evidence that understanding definitions or jargon alone leads to long-lasting changes in behaviour, indeed the opposite appears to be more valid (Eriksen & Gill, 2010). Understanding a bureaucratically crafted definition rarely creates any action among different publics (Eriksen & Gill, 2010; Rimal, 2000; Sligo & Jameson, 2000). Again, while providing definitions may have some appeal for sources and researchers, there is little evidence to suggest that awareness can modify behaviour or compel people to action (Eriksen & Gill, 2010; von Winterfeldt, 2013). S. Kohn et al. (2012) argue that not only do publics struggle with definitions but so do researchers, practitioners and government officials.

Barriers to behaviour change about emergency preparedness are numerous. In the research I have reviewed, few articles support the current “household” preparedness

messages on an individual household level as they are currently being communicated to publics. Again, this is a reflection of the concept that if you tell people what to do, by “sticking to the facts”, they will make rational and “correct choices” of preparing. Exclusionary language that only the source uses and expects to be used by publics is certainly an issue, but I perceive it to be a symptom rather than the cause, as suggested by my earlier discussion exploring scientism.

I empathise with my members of practice, as analysis regarding jargon was difficult for me. Before immersing myself in the data and reflecting upon it, I had not recognised the language as too challenging for publics because, for me, the terms used were familiar. When I analysed the booklets, it was difficult for me to understand that my everyday terminology might be perceived as jargon by publics not involved in our echo chamber. Acronyms were also challenging for me to recognise; it took me three codings to find all the acronyms within the booklets. This process highlighted to me that I too was the part of perpetuation of jargon.

Messages: Fear/Threat appeals

My earliest interpretations, from my first coding process of the Q-Files, found fear and threat messages. At that time, I was using coloured tabs, with red tabs indicating fear and threat messages. By the end of the first coding, several booklets were covered in red tabs, indicating to me that this was an issue in the Q-Files. Here is one example, from the 2001 edition of the Q-Files:

- o There is a hidden threat inside the Earth. This threat is so great, so powerful that it is almost impossible to understand. However it is real and it is dangerous. When it comes the results could be devastating – and it will come. It is only a matter of time.

I interpret that, in my member checks, my community of practice was somewhat supportive of my finding that threat and fear appeals occurred frequently within the Q-Files. Further, my members also supported the concept that fear and threat appeals are not motivators for preparedness. Given the support of my members, that threat and fear appeals were not conducive to action, why did the booklets contain these messages? The concept of apathy and difficulty in motivating publics was brought up numerous times in my member checks.

- o I think those people/community are generally disinterested until it happens. Scientifically and from an engineering context we knew the earthquake could happen but people said they had no idea. I think when trying to inform

the community about hazards we need to use as many and varied ways of letting them know as possible - so hopefully one of them will have an impact on any one individual.

The above statement contains an appealing “lessons learned” by this member. Variety in communication is important, as people engage with content differently, based on a number of factors (Massey, 1995; Severin & Tankard, 2001). Uses and gratification theory suggests that people seek out certain media or sources to satisfy a variety of needs (Severin & Tankard, 2001). Here, the member appears to understand that meeting the needs of a range of publics is critical to communication.

However, some members expressed that it was difficult to address issues of apathy, even in the post-earthquake environment in Canterbury:

- I think the appetite of the general public was lacking towards earthquake awareness and towards disaster preparedness generally. If people don't want to know about something they will close their eyes and ears at which time no amount of education or awareness will be useful. Sometimes it takes catastrophic events to whet the appetite.

The above sentiment indicates that, potentially, the member felt that nothing could be done to encourage people to prepare other than the experience of an emergency.

However, there is ample research to suggest that publics prefer realistic consequences and discussions of vulnerabilities rather than focusing on catastrophic events (Eriksen & Gill, 2010; Eriksen et al., 2011; Paton, Bürgelt, et al., 2008). Further, people can and do take actions to mitigate against a risk that they have no personal experience with.

People may never have personally witnessed someone with small pox or measles and yet they still agree, although this is waning in some developed countries, to inoculations. Others take actions that have little or no evidence to be effective to diminish health risks, like taking supplements or vitamins for longevity. Experience alone is not the sole factor as to why people take action but may be part of a larger motivation structure (Sniehotta, 2009).

The concept that “something is wrong with people”, is reflected in other statements:

- I think you can have the best campaigns in the world and people still won't be prepared, because that's just people, and I would have thought it was natural for preparedness levels to drop off again a few years after an event.

The statement that social memory of disasters and related preparedness corrodes over time is supported by several researchers (Mileti et al., 1992; Mulilis & Lippa, 1990; Saaty & Ozdemir, 2003):

Chapter 6: Discussion and Reflections

- o The community quickly forgets despite CDEM organisations trying to frequently remind them.
- o People forget what happened, don't like to think about it, don't think it can happen again.

Researchers tend to agree that people forget about their emergency experiences of time (e.g. Atreya, Ferreira, & Kriesel, 2013; Siegrist & Gutscher, 2008). Based on statements from some of my members, they appear to blame publics for their lack of memory.

However, I suggest that this is further evidence that instead of leveraging the history of an emergency to support community cohesion and strengthen relationships with emergency managers, emergency managers only perceive the value of past experiences as a way to “teach” preparedness. What if, instead, the discourse around the emergency experiences shifted from “remember when this happened, we need to prepare now!” to “remember when we all worked together during that difficult time?” This shift in conversation may create a different dynamic: from an authoritarian tone to one of partnership and equality.

Furthermore, I interpret that my members expressed frustrations and disappointments when they attempted to develop partnerships with publics to the best of their ability at the time. Some of those frustrations may be self-generating or based on negative experiences.

However, this leads me to question how emergency managers perceive themselves. I interpreted an almost negative tone in self-perception of the emergency management profession. My interpretations from my Canterbury experience, combined with my member checks suggest that emergency management can be a “poisoned chalice” profession.

Frustrations and challenges expressed by emergency managers including exhaustion, stress, and a sense of community responsibility, have been reported in the literature (Kowalski-Trakofler, Vaught, & Scharf, 2003; Paton & Flin, 1999). I know, from my experiences, that lack of adequate funding, political support, understanding from publics, and occupational stress, are part of the job. Emergency managers can be held responsible for effects of disasters, as was the case with former FEMA director Michael Brown in Hurricane Katrina (Malhotra & Kuo, 2008). More recently, in Flint, Michigan, a state emergency manager was held legally accountable for changing water suppliers, which caused lead to contaminate the city's water supply (Bellinger, 2016).

Chapter 6: Discussion and Reflections

One of my members also explored their own political struggles:

- o My committee at [committee name removed for privacy] met on [removed for privacy] to consider the findings of a hearings panel on earthquake-prone building policy. I chaired that panel which heard submissions and made strong recommendations. We were mocked. Paranoia was one of the words I remember. I knew I did not have the numbers at the table for the [removed for privacy] meeting to get the panel finding through. That all changed on 4 September 2010 [the date of the M7.1 Darfield earthquake].

Politically, emergency management can be a complex and thankless endeavour. Without political support, it can be difficult to reduce disaster risk (Kleinberg, 1999). Political interference was mentioned by several members as part of the complexity of communicating:

- o The most influential factor was the games played by [removed for privacy] council staff (communications, hazards, and especially emergency management), reflecting their perversely risk-averse executive and mayor. Resulting in mixed messages and a perverse interpretation of "risk" being applied, as well as the work of the PEPI committee being unduly protracted.

A different source of political tension was mentioned in this comment, which was more internal political differences, between different council staff. However, the political tensions between various PEPI members were not frequently reflected in comments, suggesting they were not felt by all members.

I suggest that there may be other motives influencing these fear and threat appeals. They may reflect how emergency managers feel about their profession. While I am not surprised by these self-perceptions, I am curious as to how these internal perceptions affect outward communication. Given the potential recrimination and the lack of support by decision-makers, this anxiety may be justified. Emergency managers have a veneer of control but on examination, they have little power or authority outside an emergency response. Emergency managers have struggled with the lack of power, authority and control according to Wamsley, Schroeder, and Lane (1996), so it may not be surprising that some of their messaging is fatalistic.

There is no evidence, that I could find, for supporting fear appeals as a way to increase disaster preparation - rather, this may have the opposite effect (Feinberg & Willer, 2010). Yet some emergency managers still employ fear and threat appeals (A. M. Jones, 2013). Rather, the overwhelming evidence suggests that supporting empathetic and inclusive communication with communities, rather than frightening or threatening people, will be more effective (Jacobson, 2003; Russo et al., 2008; Servaes et al., 1996).

I interpreted that the Q-Files contain excessive amounts of scientific information, including fear and threat content, without supporting equal numbers of positive preparedness messages. In the later editions (2007-2009), a page at the back of each booklet provided preparedness and mitigation information, but I interpreted that it was disconnected from the rest of the narrative and did not specifically explain why each action should be taken and how it related to publics' personal circumstances. Without positive messaging, publics could easily assume that nothing can be done to prepare for earthquakes. Feinberg and Willer (2010) argue that, specific to climate change mitigation communication, dire messages reduce belief in the likelihood of the threat and heavily fear-based appeals "especially those not coupled with a clear solution, can backfire and undermine the intended effects of the messages" (p. 37).

In the booklets, the first editions contain little or no preparedness advice to publics. There was advice on what to do during an earthquake but not how to prepare for one. Instead, strong yet abstract language was used regarding earthquakes, suggesting readers:

- o GET READY NOW OR PAY LATER (pg. 2, capitalisation in original)

From the member checks, there was some agreement that the Q-Files were too fatalistic without being connected to clear actions leading to positive outcome expectancy. As explored in Chapter 2: Bridging the Literature, fear and threatening messages can create fatalism in publics, leading to a lack of action rather than encouraging it (McClure et al., 2001; McClure et al., 2011).

I found the following statement to be a creative and intriguing suggestion:

- o In future authors should start from the end -- what are the behaviours that need to change and then paint a compelling picture of the steps between where people may currently be and where they should be.

Starting at the end of a positive outcome narrative and working through a progression backwards, may have good results. First, it provides the positive outcome immediately and illustrates how that positive outcome can be achieved. Further research could be explored to determine if this approach has viability.

- o A balance is required but with a swing to the more positive. Different people react to messages in different ways. We need to find ways of delivering the message correctly for all the different people out there.

Within the diversity of attitudes, the overall group appeared to support the focus of positive messaging. Emergency managers' perceptions and how these are reflected in their communication with publics could be an intriguing future pathway for inquiry.

Now that I have explored aspects of fatalism, I investigate my findings related to channels.

Channels

One area where emergency management, communication and natural hazards appear to have synergy is the study of channels. For example, the persuasiveness of hazard maps research to various publics (M. A. Thompson et al., 2015). Toh et al. (2014) examined levels of trust in images, maps and other graphical devices during times of crisis and found that maps were the most trusted channel. Social media, as channels, is currently a major avenue of research in emergency management and natural hazards research (Briones et al., 2011; Dufty, 2012; Flew et al., 2013; Latonero & Shklovski, 2011; Mersham, 2010; Perko, van Gorp, Turcanu, Thijssen, & Carle, 2013; Veil et al., 2011).

However, when referring to channels, natural hazard and emergency management researchers often refer to these as “products” rather than channels. The term “communication products”, defined by Gerbner (1956) as anything that a communication activity creates, for example, brochures, booklets, posters, cards, is problematic. I disagree with the use of communication “products”, as the term implies that the critical component of communication is the “end product”. This focus on the end product is an unsuccessful approach, mentioned by one of the Canterbury members, who suggest:

That it never ends. We all thought that one effective campaign would be all it took. On anything. Do this one - move on to the next. Done. Wrong.

I interpret that one of my members understood the continual nature of communication efforts from their experience. However, I extend that the most crucial first step in any communication is to focus on the relationships, rather than on delivering messages to publics. Without positive relationships and their essential by-product, trust, the likelihood that the “experts” will be respected, is slim (Fiske & Dupree, 2014; Perko et al., 2013). If there is no relationship or even trust then this suggests to me that the current model we are operating under, that people need to heed the advice of experts delivered as ‘products’, is broken. This is a focus on ‘outputs’ from communication not

‘outcomes’, which multiple authors have pointed out is inadequate (e.g. Macnamara, 2012; Watson & L'Etang, 2008).

Larson (2013) suggests that persuasion only occurs when both the source and publics change their attitudes, perceptions or behaviour. I interpret the key aspect of this definition is that the source needs to change if they want to become persuasive with their communication, adjusting perceptions on what communication campaigns are: not the creation of “end product” or “end results” but rather an ongoing process of relating. As I argued earlier, with the Q-Files, the group that had all the control in the communication was the source. The source chose the terms of engagement with publics, decided on the channel (booklets), language (jargon/scientificism), and science only narrative (exclusionary narrative). The source was privileged in the communication. Changing the power dynamic is not easy, as illustrated by one of my members:

o This is difficult, probably an impossible challenge to ever fully overcome. Yet I disagree, partially, with this statement. It may be difficult to change but I suggest there are pathways, rarely taken in emergency management and natural hazard literatures that can create a more equitable relationship between the source and publics. I suggest that first, before we focus on changing publics, we work towards changing our sectors and disciplines to make it easier for us to communicate with publics, including the types of channels we use. This shifts the focus from consistent messages to conversation.

The use of emergent channels in emergency management or natural hazards researchers, including which channels are more persuasive, trusted, and inclusive, is an avenue for future investigation (Mersham, 2010). For example, face-to-face communication has yet to be investigated specifically for preparedness campaigns in the emergency management and natural hazards disciplines. Channels research exists in emergency management, natural hazards and communication disciplines. However, emergency management and natural hazards tend towards research that explores channels simply as a way to deliver messages to publics whereas communication research explores aspects of trust and relationship building with publics.

Now that I have explored channels, I will discuss publics.

Publics

Emergency management and natural hazards discourse tends to focus on “what the expert or source” has to say rather than on how publics make meaning of information. There is limited research on publics, other than superficial explorations of basic demographics. As publics are not simply waiting to receive information but rather are complex and wholly formed individuals with a variety of opinions and lenses which they use to make meaning of information, publics research is essential to developing communication campaigns (Grunig & White, 2008; Larson, 2013). I suggest that emergency management and natural hazard researchers could learn more about publics-centred approaches from communication researchers.

Publics: Exclusive Narratives

In my member checks, I presented this finding from my analysis of the Q-Files:

- No other narratives, including those of Māori, were presented in the booklets. This is despite the presence of Māori in Canterbury for more than 1,000 years. There was no acknowledgement of the Māori oral histories regarding earthquakes in Canterbury (in Christchurch and Banks Peninsula) even though these stories exist. This exclusion of other perspectives may have contributed to different groups not engaging with the booklets.

The responses contained a variety of themes about this finding. While there was general agreement, several themes emerged from the comments of my members. Some comments indicated, to me, conflation of ethnicity, culture and language. I found several examples in my member checks of this conflation:

- There is also a large Japanese and Korean population in Canterbury as well.
- Thought should also be given to other ethnic groups and those that may visit the region.

These two above statements provide evidence that some members conflated ethnicity and the oral histories of Māori. I interpreted, from the comments I received, that some members either did not recognise the finding or fully appreciate the depth of their own conflation between ethnicity, language and oral histories, as further evidenced by these comments:

- I do think that Māori vocabulary and wording should be used along with oral history. I am not convinced that a full Māori language version is necessary. To me it would be more important to present the material in other languages to meet the needs of those who have English as a second language.

Chapter 6: Discussion and Reflections

This member was clear that inclusions could have been useful, but again, expands this to other ethnicities and cultural groups, similar to the two comments above. Further, this member suggested a hierarchy of communication priority where Māori were of less priority.

Only a few were directly opposed to the inclusion or the finding in the comments:

- I'm not sure this is accurate. Very few Cantabrian Māori only speak Māori and most are English-speaking too.

Again, thematically, this member expresses a similar sentiment: that simple translation is what I implied by my finding. Further, the member also appears to seek evidence that the inclusion and translation would have been productive for communication but does not establish what kind of evidence would have been sufficient.

There was one member who identified as Māori and suggests that it may have been useful to include oral histories in the Q-Files:

- I am a Māori although not Ngai Tahu, and both of my sons have found the Q-files that I've shown them easy-enough reading. However, I could imagine a wider Māori audience probably would be captured at least by versions written in Te Reo Māori and/or versions that included reference to the relevant Māori oral histories.

What is intriguing is that, again, oral histories are mentioned in equal reference as language. My finding did not mention language, but the inclusion of Te Reo was mentioned multiple times by members. Te Reo is the one Māori language most commonly spoken in New Zealand, but it is not the only language (Reedy, 2000). I find it interesting that I only made mention of oral histories, not Te Reo, but this appears to be immediately interpreted by my members as part of my finding. This logic leap, between language, ethnicity and culture, is what I will now explore. When the exclusions were presented to my members, rather than responding that Māori knowledge is valid, as I had anticipated, some members instead made statements that all ethnicities, including Culturally and Linguistically Diverse (CALD) communities, should be included. If science is a different culture already, then we need to bridge multiple cultures. There is research on how to work with people from diverse communities available to support emergency managers. Guidelines did exist before the Canterbury Earthquake Sequence for engaging with Culturally and Linguistically Diverse communities (Mitchell, 2003). Marlowe and Lou (2013) argue that CALD communities were excluded during the Christchurch Earthquake response because of

the exclusionary language used in written documents. One of the reasons provided for this exclusion was a lack of cultural sensitivity and diversity among emergency managers and first responders (Marlowe & Lou, 2013).

I agree that diverse communities need to be considered and included, but not that linguistic translations alone achieve this. The narrowness of the responses (it is just about translation) suggests to me that there is a problem within the emergency management community: a lack of understanding of diverse communities and how to incorporate them into decision-making about communication so as to genuinely bridge cultures, not just languages. International disaster management policy suggests that diversity should be a foundational concept, as outlined in the United Nations' Hyogo Framework for Action (2007) that states cultural diversity means engaging with relevant communities in disaster risk reduction planning, not just considering different publics at the end of the process. The Sendai Framework for Disaster Risk Reduction (United Nations Office for Disaster Risk Reduction, 2015) further supported this, stating:

Governments should engage with relevant stakeholders, including women, children and youth, persons with disabilities, poor people, migrants, indigenous peoples, volunteers, the community of practitioners and older persons in the design and implementation of policies, plans and standards. (p. 10)

I interpret, as was illustrated by the comments from some of the participants, that the problem with the community of practice's limited understanding of how to incorporate cultural diversity is partly because Māori were considered the same as other ethnicities, without the understanding of the unique historical perspectives that Māori have as Tangata Whenua. Māori, as previously mentioned in Chapter 1: The Outside Insider, hold valuable histories about earthquakes in Christchurch by the Ngāi Tahu iwi (Davis, 2012). There is also increasing evidence of oral histories saving lives of indigenous peoples during times of disaster. During the Boxing Day Tsunami in 2004, indigenous peoples on the island of Simeulue fled the tsunami, based on previous experiences in 1907. The sound of the tsunami and unusual ocean behaviour warned the Simeulue people, because of their oral histories natural warnings. People took action and only seven people died (McAdoo, Dengler, Prasetya, & Titov, 2006). The tsunami arrived quicker than an automated warning system, which could only provide 15 minutes warning.

Media reports of the Christchurch rebuild have also suggested that there is long-held oral knowledge about which parts of the land were susceptible to disaster, including

tsunami and liquefaction, which could have contributed to planning. For example, Carpenter (2011, para 4 & 5) wrote:

Māori learned this lesson the hard way about 1450AD and retreated from seaside and low-lying sites following a catastrophic tsunami.

Another area of Māori wisdom was that the swamp that is Christchurch was never a place for them to live, rather a place to pass across. They viewed this swamp as just another food source. As one of the biggest natural swamps on the Canterbury Plains, its future would have been better used for farming, such as occurred in early settlement.

Kenney and Phibbs (2014) have also written of the value of Māori cultural approaches to effective disaster management and recovery, knowledge which they note “is rarely acknowledged” (p. 46). Kenney and Phibbs (2014) further argue that the “Māori disaster management response to the Christchurch earthquakes and subsequent urban recovery process constitutes an exemplar of best practice” (p. 46). When I was working in disaster preparedness and recovery in Canterbury, no attempts were made by the various units I worked across to find out about oral histories, the cultural knowledge and make any acknowledgement of their potential value as a resource for the region. So why do these exclusions occur?

The answers are complex, but I found some illuminating impressions in my member checks. One issue was the lack of understanding of cultural specificity and the difference between culture and language, which may be reflected in our collective inability to communicate with various ethnicities about preparedness. Imagining a single amalgamation of ‘other’ ethnicities as an ‘add-on’ public at the end of the communication planning process is not only culturally problematic, it also has risks during crisis communication. There is evidence that different ethnicities access diverse media through different channels during times of crisis and emergency (Lindell & Perry, 2003; R. W. Perry & Green, 1982). Without developing those linkages pre-emergency, it was difficult to establish meaningful relationships with these groups, during an emergency (Mitchell, 2003).

Ethnicity and cultural exclusions may also be reflected in preparedness measures among these publics for emergency preparedness. Colmar Colmar Brunton (2014), in its annual survey report for New Zealand, suggests that the most unprepared group of people in New Zealand is non-English speaking immigrants from “Asian” countries. The amalgamation of “Asians” strips away the cultural diversity and experiences of this

group of people, many of whom may be well aware of earthquakes, given how many large, damaging earthquakes occur in “Asia”; seven of the ten most damaging earthquakes in the last 100 years were in that region (Daniell, Khazai, Wenzel, & Vervaeck, 2011). Despite this evidence of the importance of communicating with diverse communities, emergency managers struggle to communicate ‘our’ messages ‘to’ the ‘Asian’ community group, rather than perceiving communication as a two-way or dialogic process. That continued emphasis on one way propagandising rather than knowledge exchange is intriguing given the wealth of earthquake experience in some of those communities. It suggests that there are issues connecting with communities, perhaps due to lack of diverse representation within the emergency management community of Asian groups. It may also have something to do with how Asian groups perceive preparedness. I suggest it is a combination of those issues: particularly the perception that all ethnicities are a unified “other” group outside emergency managers.

The other issue with the exclusion of Māori narratives is that oral histories are, in general, not acknowledged within the scientific community (King & Goff, 2010). There are encouraging signs within the literature that this is changing, given the research of King and Goff (2010) and broader calls in the wider academic community to recognise indigenous epistemologies as valid in their own right (Bala & Joseph, 2007; Love & Tilley, 2014). But there is still an exclusion of story and narrative from science. Avraamidou and Osborne (2009) define story or narrative as fictional written text. Already, this puts story in opposition to science, rather than perceiving these as differing ways to explore knowledge, one is simply “true” (science) and one is false or imaginative (fiction, narrative, story and even oral histories). By extending to the stories told in oral histories, even if these oral histories are based in grounded experience, these stories are from and of the “others”. This exclusion is damaging both to those whose stories these are and to science. It creates and promotes contrived separations. The elimination of story may link to another finding in my analysis of the Q-Files, which is the lack of personal narratives in the content.

From the review of the literature, there may be more subversive reasons for exclusions to occur. Preston (2008) suggests that, in the 1950s and 1960s, Civil Defence played a role in enforcing social norms of ‘whiteness’ and suburban ideals. Preston et al. (2011) further argue that, when analysing contemporary preparedness campaigns, there is still a race-centric ideal of what a family should be e.g. nuclear, male/female gendered parents with children. Non-white institutions are rarely included in preparedness materials (e.g.

mosques, marae). Preston et al. (2011) allege that preparedness materials, by nature, are concerned with protecting only white systems, businesses, and community structures, rather than extending preparedness information to all and that this is a contemporary as well as historic issue.

This leads me to question: is there a problem with emergency managers and cultural diversity? Demographic information about emergency management professionals is scarce. Weaver et al. (2014) surveyed more than 1,000 emergency managers in the U.S.A.: 94 percent of respondents listed their race as Caucasian. In the same study, 80 percent of respondents were male (Weaver et al., 2014). Although New Zealand has a much smaller emergency management community, due to the size of the nation's population (4.6 million), I could not find a study a demographic study of this group. I am not suggesting that individual white male emergency managers are sexist or racist but rather, the lack of diversity in the sector may be problematic.

Other fields have made advances in cultural sensitivity and inclusiveness. The term cultural sensitivity is not without challenges, as it has become a “buzz” word (Foronda, 2008). Foronda (2008) defines cultural sensitivity as knowledge, consideration, understanding, and respectful communication. Figure 6.3 is Foronda's (2008) model, which explores the concept of cultural sensitivity and how it can develop effective communication.

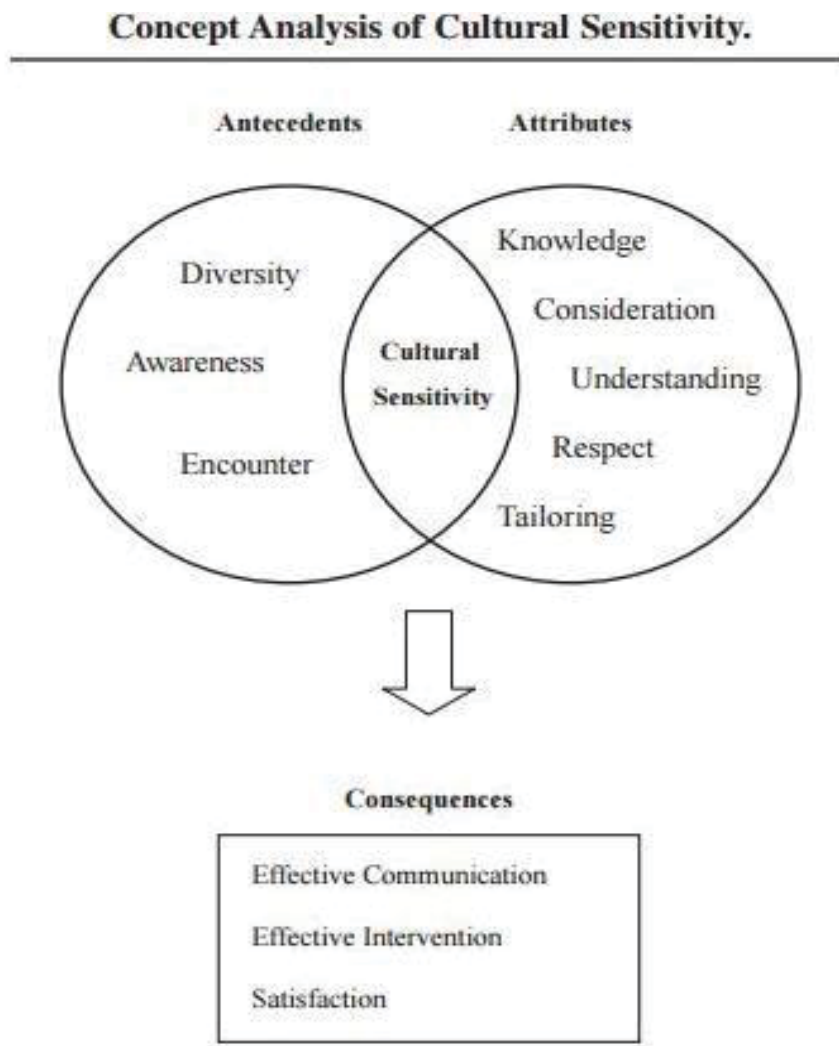


Figure 6.3: Foronda's (2008) model of concept analysis of cultural sensitivity.

The above diagram (Figure 6.3) is a model of how cultural sensitivity can help achieve effective communication, as well as potentially increase satisfaction among the various groups involved.

Emergency management, as a discipline, may suffer from over-representation of one gender (male), and one ethnicity (Caucasian/European). Why the sector suffers from a lack of diversity and what its effects are represent a rich and complex future area for research. However, I assert that the lack of diversity may be one of many influencers on exclusionary language and narratives in the Q-Files. But have the earthquakes in Canterbury changed the exclusion?

There have been some changes in the Civil Defence sector since the Canterbury earthquakes, about the inclusion of Māori within Civil Defence and Emergency Management. In the Civil Defence National Plan (2015), Māori, specifically the

government department *Te Puni Kōkiri* (formally the Ministry of Māori Affairs), are referenced in the welfare component of the plan. Evidence from responses during the Canterbury earthquake sequence indicates that provision of marae during emergencies is advantageous (Kenney, 2015). But *Te Puni Kōkiri* (TPK) has been critiqued as lacking sufficient resources, “managerial” approaches and policy focus (Humpage, 2005). The lack of resources may make it inappropriate for such a role.

On reflection, had Māori been included in developing communication, it would likely have increased our effectiveness in both telling personal narratives, which are persuasive, as well as acknowledging Māori as key partners in telling the story of previous earthquakes in Canterbury. The use of cultural sensitivity is not merely an exercise in being perceived as “politically correct” but, according to Foronda (2008), can achieve effectiveness in communication. In the field of positive psychology, acknowledging the strengths and gifts of culture can be empowering and provides clinical benefits (Kubokawa & Ottaway, 2009). Additionally, culturally sensitive health care is advocated as a way to provide a more patient centred approach (Tucker, Arthur, Roncoroni, Wall, & Sanchez, 2015). I perceive that cultural inclusion has not only the benefits of reaching out to numerous publics, but could also increase trust, which is required for effective communication.

Now that I have discussed exclusive narratives between communication and emergency management literatures specific to publics, I now explore my findings about settings.

Setting

Emergency management and natural hazards literatures have not, from my review, accounted for different environments such as location and timing that publics will receive preparedness messages within. However, communication researchers have been active in this area. The only direct link that I could find in the emergency management, natural hazards and risk communication in the literature was from (Petty & Wegener, 1999), who discusses distraction as it relates to the elaboration likelihood model (ELM). The ELM theory also lacks complexity about the “making of meaning” by various publics that exists that exists in some of the communication theories, including excellence theory. However, communication research contains explorations of how publics make meaning; there is a potential partnership between these communication scholars and Petty and Wegener’s work.

Setting was rarely invoked in my research; however, there were some insights provided by members. With respect to jargon and technospeak, one member:

- o At the time of production of the documents this would have been a true statement. However, because of recent events, a greater percentage of the Canterbury public now readily understand terms like liquefaction. So although I fully agree there should be pre-testing of readability this should be tempered with an understanding of the local audience's level of experience.

While this comment relates directly to the discussion about jargon and technospeak, it also addresses the importance of setting. I interpret this statement to indicate that while general information may be helpful, this member fully appreciated that now messages and information should also appeal to the experiences of various publics. I agree that local context combined with contemporary material is more suitable than generic information, even if it is written in simpler language. The other theme in the above comment suggests timing and, by extension, the setting of which the message is received, is also critical in the communication. This is consistent with findings from McGuire (1962).

Now that I have explored the findings, using the SMCRS model as a framework, I will summarise this chapter.

Summary

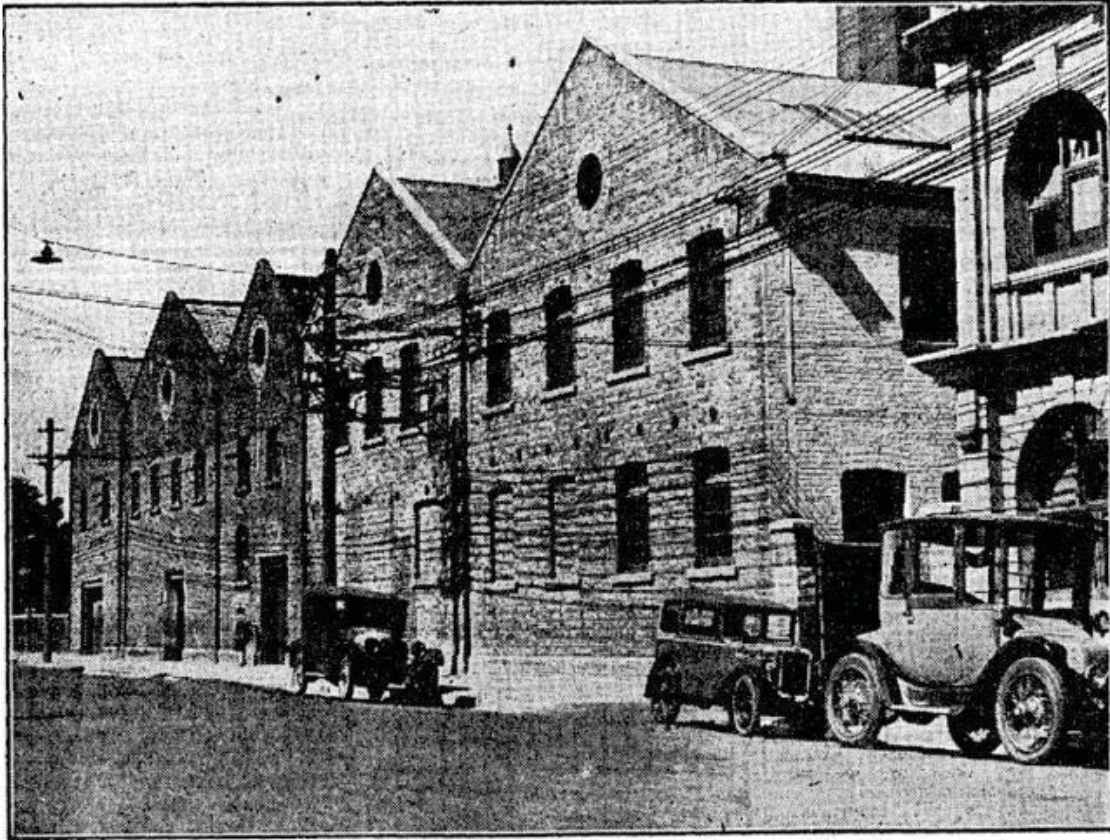
I interpret that scientism or the belief in science with the exclusion of all other narratives or perspectives may have hampered communication in Canterbury pre-earthquakes. Scientism united a group of people who shared the same beliefs, values and perspectives. When a group of people come together with this belief system, they can exclude people who may challenge this perspective, developing into a self-sustaining echo chamber. The tone of these documents is representative of scientificism. Additionally, the content in the Q-Files teemed with gobbledygook, jargon and technospeak. Fear and threat appeals, which I interpreted were common in the Q-Files, are also linked to fatalism in publics. I suggested that the reason fear and threat appeals are in documents like the Q-Files could be linked to how emergency managers feel about their profession, while the pre-eminence of a mono-cultural view could be linked to the homogeneity of emergency managers as a group. I also explored the exclusion of Māori oral histories and perspectives that could have been influential in communicating preparedness information.

Chapter 6: Discussion and Reflections

Further, I explored how I was a contributing member of this system and promoted its beliefs, concepts and ideas throughout the early phases of my research. Discovering and framing the effects of working in exclusionary groups (echo chambers) on me is a foundational finding of this research.

Now that I have synthesised and discussed my findings, as well as provided some potential avenues for solutions, I will now conclude this thesis by summarising the major learnings as well as exploring potential future pathways for research.

Chapter 7 : Conclusion and Futures



STRENGTHENING BUILDINGS AGAINST EARTHQUAKE RISK.—The reconstruction of the converter station in Armagh street is receiving the consideration of the Municipal Electricity Department. The building was erected in 1904 and houses the apparatus for controlling the electricity supply in Christchurch.

Figure 7.1: Photograph from *The Press*, 16 March, 1932. Retrieved from:
<http://paperspast.natlib.govt.nz/newspapers/CHP19320316.2.103.8>

Chapter 7. Conclusion and Futures

In this chapter, I provide a summary of the findings and discussions in this thesis. I also include potential solutions as well as future research pathways, to acknowledge areas that interested me throughout the course of my study but were outside the scope of this research.

One goal of this thesis is not only to provide critical analysis but also to offer potential solutions. In the next sections, I explore potential solutions to the communication challenges I explored in this thesis including:

- o Reflective communication practice.
- o Participatory communication campaigns and strategies.
- o Inclusion of other disciplines and philosophies, including creative modalities.
- o Relatable and multiple spokespeople.
- o Eliminate the use of jargon and gobbledegook in communication.
- o Inclusion of Māori groups in the development of natural hazard communication campaigns.
- o Written materials should be checked for readability and written ideally for 14 year olds and lower.
- o Exclusion of acronyms and definitions.
- o Development of communication for publics, not for the group of people writing these documents.
- o Inclusion of positive outcome expectancy messages to avoid fatalism in publics.

Regarding my findings, the first major “gap finding” moment began when I completed my literature review. During this review, I noticed early on that there were gaps between the three major literatures I was exploring, namely: communication, emergency management and natural hazards science research. Each of these appeared to be operating in isolation of each other, without the acknowledgement or reflection of the value that could be attained from mutually inclusive discourse. I realised that emergency management was still operating in the Civil Defence propagandistic framework that had been initiated some 80 years earlier and is maintained to this day. It felt like scholars have been speaking past each other, and at times, not even acknowledging that entire fields exist.

I suggest we fill the gaps in the literature by encouraging cross-disciplinary research projects and reading each other’s work more. Cross-pollination, of sorts, is in its early stages.

Mersham (2010) and Galloway (2013) represent the first in the contemporary literature, that I have found, of communication scholars engaging in emergency management research. Most communication research in the emergency management and natural hazards spaces tends towards positivism through the discipline of social psychology. I suggest strongly that diverse scholars be included in this research overall for quality research outcomes and outputs.

The second major gap I identified occurred during the coding process of the Q-Files. I found gaps between communication theory and its' practice. The Q-Files had no strategy, underpinning goal, purpose, implementation or dissemination tactics or monitoring or evaluation plan. Further, there were not earthquake "next steps" implied in the Q-Files other than one page in the 2008 editions, which included only the most general advice on how to prepare emergencies. I could not even analyse the communication strategy using well regarding scholarly techniques because there was no strategy to analyse. All I had were these booklets to imply a strategic approach.

I suggest filling this gap by encouraging that emergency management and communication practitioners start with the basics: goals, objectives, publics research, messaging and appropriate tactics and channels to meet the needs of publics, and, importantly, a monitoring and evaluation programme. However, I acknowledge the challenges to practitioners to keep to strong communication techniques are many and illustrated in the thesis. Basic issues like source credibility, localised context, storytelling, creativity, empathetic messages were not applied.

My final major gap is that the communities are not involved in the development of the conversation about them. This is perhaps the most challenging of all the gaps because it involves the sharing of power and authority. The sharing of power and authority may be a challenge for emergency managers. But I argue that this power and authority increases the stress of emergency managers; it is a stressful profession and often, these professionals feel isolated.

Participatory communication strategies can offer much to fill this gap. By utilising this strategy, the creators of communication are not in control but rather co-create communication and shifts communication from a monologue to a dialogue. By incorporating participatory communication strategies, we can share the burden of communicating about emergencies with the public from the shoulders of a few people to including a larger group to talk about emergencies. It also could increase empathy and trust between all groups.

Now that I have explored the major findings of this thesis, I now provide further detail about these my major findings and my contribution to knowledge.

Major findings from this thesis and my contribution to knowledge

My two research questions are:

What are the most relevant best-practice preparedness communication principles from the communication and emergency management literatures for earthquake preparedness, and in particular what principles in the former literature are missing from the latter?

In light of these best-practice principles, what public communication lessons from the preparedness information issued in the nine years before the Canterbury earthquake sequence can be identified through interpretative document analysis and member checks?

The first research question was to understand what were the disciplinary strengths and limitations for emergency management and communication, with some review of other areas including natural hazards. Hence, my literature review served dual purposes in this thesis. I found that emergency management and natural hazards research rarely explores how to persuade people to engage with preparedness messages. I also provided few examples of participatory communication strategies. There were few references to socio-cultural communication models in emergency management and natural hazards research. Communication is not merely an individualistic or psychological event but also a social and cultural phenomenon (Littlejohn, 1999).

From my literature review, I developed a best-practice matrix and used this as part of my analysis of the Q-Files. I analysed the Q-Files, artefacts developed by the Canterbury CDEM PEPI group, using this matrix to assist me with my coding. After I developed preliminary findings, I presented these to members of my community of practice. My interpretations concluded that the Q-Files are artefacts of public communication as written by an exclusive group. From my analysis of Q-Files I suggest that this group, of which I was part, was more interested in perpetuating and broadcasting its own messages, rather than engaging with publics to understand their context and perspectives.

I propose several opportunities for practitioners and researchers. Ironically, current public communication programmes attempt to encourage self-reliance in emergencies, while emergency managers directly specify the way publics need to prepare. These campaigns

include messages about specific items that have to be stored for particular periods. There is no discussion about how people might contribute their ideas about how to be better prepared; rather these campaigns are prescriptive, specific and commanding. Despite the lack of evidence to support the prescriptive preparedness approach, there has been little change in emergency management preparedness campaigns for 70 years. I suggest this framework undermines concepts of resilience and discourages people from thinking and acting for themselves.

What may assist are participatory communication campaigns that include aspects of persuasion. Persuasive campaigns that are inclusive may be developed using participatory communication frameworks. I also suggest that emergency managers, through relationships with other disciplinary groups, make better use of creativity. I further recommend the use of self-reflective communication practice as a way for practitioners to acknowledge when they may be diverging from best practice or their own ethical compass.

Solutions - The power of reflection

Six years on from my experiences in Canterbury, it is only recently that I can unpack and appreciate the experience and recognise some of what could have been done to improve communication. Through this reflection process, I have to concede that I could have been a better communicator. The exclusive narrative, use of jargon, threat and fear appeals, as well as dense language embedded in the Q-Files, was partly my doing.

Given all the faults in the Q-Files and how we approached communication, what can be done to encourage communicators to step outside their echo chambers or challenge their belief systems? One learning I have is the richness and depth from the various disciplines I was able to explore, particularly from outside the emergency management discipline. Bringing in different disciplinary perspectives enabled me to question my viewpoint, as well as to think critically about the assumptions in both disciplines – emergency management and communication. My learning process involved the realisation that it is not about accepting what is in textbooks or journal articles or taught to me by my supervisors as ‘fact’ but rather learning how to think critically across a range of often conflicting sources about fundamental communication issues.

The power of reflection has been critical to my learning during this thesis. Contemplation was not something I had previously appreciated. I had not written journals or recorded my work in a meaningful way. Indeed, that was a challenge in this research as I recalled doing

many activities in Canterbury but when I looked through files I received from the Canterbury CDEM Group, I found little evidence of my work. I rarely reflected on my practices or growth through any professional or personal process.

I have changed through this thesis process. During this research, I have continued to work as a communication practitioner, to ensure that I do not lose touch with my core understanding of the pressures that communicators face. My employment has been predominately as a Public Information Specialist at GeoNet (the geological hazards monitoring project for New Zealand). During my time at GeoNet, I was the Public Information Manager for a M5.8 earthquake on 14 February 2016 in Christchurch. After four years of no large earthquakes in Christchurch, the Valentine's Day Earthquake was a blow to many people in Canterbury. One of our biggest challenges, as communicators, was the mislocation of the earthquake by more than 15 kilometres. Our scientists would have to admit publicly that they got the location of the earthquake needed to be modified, more than six days after the initial earthquake. After internal heated debate, we released the adjusted location and depth. We announced the relocation in a blog post on the GeoNet website. When writing the story, we started by explaining what happened, why we needed to relocate the earthquake and we also interviewed some of the scientists involved in the relocation to explain what happened. I had assumed we would receive a massive media backlash and anger from the public. Instead, we received gratitude from people in Christchurch on social media and email. The story was only briefly mentioned in the local Christchurch media. However, inside the echo chamber, we were concerned, thinking it would cause distress in our publics and that we would end up alienating people by admitting our error. With some internal advocacy for transparency, I perceived we increased, instead of decreased, our relationship with publics. A recommendation would be to encourage practitioners and scientists to increase their transparency and personalising the scientific perspective, made us more relatable and accessible.

While there have been some professional gains, it has been challenging, balancing reflection and the beeping of phones every time a large earthquake or volcanic activity or tsunami or landslide threatens New Zealand. Mixing the two, practice and research, while doing a Ph.D. has meant that at times I have become too focused in my practice, only to realise I have lost sight of my research for weeks at a time. However, with support, I was able to navigate these challenges, particularly with the use of reflective practice that I learned during researching this thesis.

Reflective practice is not a new concept for other professions. Nelson (2012) discusses reflective practice in nursing and T. Russell (2005) argues for its acceptance in education. Van Ruler and Verčič (2005) explore reflective communication management but their discussion was largely theoretical and not on how this could be implemented. Macnamara (2012) argues that reflective thinking, in communication practice, involves self-questioning while analysing perspective, philosophy, and approaches.

L'Etang (2008) also suggests reflexivity is about self-questioning, but further suggests using the practice to explore relationships, interests and experiences to determine assumptions and beliefs. Reflexivity has parallel paths in both practice and research; its role is to question assumptions, beliefs or acknowledge perspectives. The concept of reflective practice is not new but how to provide practitioners with ways to implement it could be a new research pathway, to develop further tools to benefit communication practice.

The development of a set of questions that the practitioner routinely challenges themselves with, particularly in regards to communication, may have value. If I was to generate a series of questions for myself, as both a researcher and a practitioner, I would consider these questions:

- Do I know what I think I know, about how my publics communicate and what they want?
- Who have I not talked to that I do not know much about, but has a role in this communication?
- Have I explored relationships with indigenous groups, who may have a lot of experience living in this area?
- Am I listening to publics or am I more interested in what I have to say?
- How am I building relationships with this communication?
- What is my focus: the process or the outcome?
- Am I telling a story?
- Do I have people on my team who challenge ideas?
- Does everyone have the same background in the project team or is there diversity in perspectives?
- Is this part of an overall strategy? Do I understand when, how, why and with whom I am communicating?

- Do I have members of the publics/community sharing control of communication planning?

I developed the above questions for reflective communication practice, which could be useful when determining whether a specific philosophy (in my case, scientism) is influencing the communication. Determining if these questions are useful or whether some other self-auditing process is more appropriate may be an intriguing next step for this research.

Solutions - Participatory communication strategies

As explored in Chapter 2: Bridging the Literature, participatory communication strategies may facilitate more productive interactions between the source and publics. Thus one key area of inquiry for future emergency management research and practice is participatory communication strategies to include Māori. Participatory communication requires shifts in focus from the source to an equal relationship with publics. However, I found little evidence of any participatory communication strategies in natural hazards and emergency management literatures. By definition, participatory communication requires multiple publics to be actively involved in the development of strategies and tactics (Servaes et al., 1996). Several participatory communication models exist covering a spectrum of involvement of sources and publics.

For effective participatory communication strategy development, the source must concede there are multiple realities, perspectives, and lenses among publics (Jacobson & Servaes, 1999). Without acknowledgement and appreciation of differences, there could be too many barriers to encourage communication. Participatory communication models involve publics, from the outset, as co-designers of the intent and form of the communication. During my research, I did not encounter any groups who were exploring these kinds of models for earthquake preparedness communication, signalling a major vein of communication theory to investigate in future research on preparedness communication. I recommend that future campaigns should include participatory communication strategies, to create and strengthen relationships between the source and publics.

Solutions - Including other disciplines and narratives

The lack of inclusion of these perspectives may be why emergency management and natural hazard researchers struggle to understand communication campaigns fail. However, these exclusions are somewhat common in the disaster risk reduction and emergency management discipline. My finding that communication researchers either self-exclude or are excluded from this emergency management discourse is not solely unique. Gall et al. (2015) found that the separations were widespread throughout this “interdisciplinary” sector; geographers

researched with other geographers, social psychologists with other social psychologists and so on.

Communication has cultural and social implications that would benefit from research using multiple disciplinary lenses. Communication research in turn lacks important theories from the disciplines of emergency management and natural hazards, as source material and information. The emergency management and natural hazard researchers access important knowledges as they explore many impacts of natural hazards. It is vital that stories be told in accessible, participatory and engaging ways, so publics can make important decisions. I suggest greater partnership and discussion across disciplinary and epistemological boundaries would assist in achieving our ultimate goal of encouraging publics to take preparedness and mitigation actions.

Further, partnership with Māori, including the stories and oral histories would be an important step for several reasons. First, as argued in Chapter 1: The Outside Insider and Chapter 6: Discussion and Reflections, Māori have important oral histories of natural hazards that could be important in communicating risks. Further, as part of the Te Tiriti o Waitangi (The Treaty of Waitangi), equal partnership in communicating natural hazards can assist in meeting treaty obligations.

Creative modalities and disciplines may be able to assist emergency management and natural hazards disciplines, not just communication research. Graphic designers, artists, musicians and other creatives were involved in the Hurricane Sandy response as “innovation teams” (J. Crowley, 2013). In developing country contexts, there is evidence that the use of theatre can be a powerful tool in preparing communities for disasters (Elias, Tran, Nakashima, & Shaw, 2009). Including creative perspectives may enhance communication in emergency management and should be explored further.

There are several potential solutions to the issues I have interpreted in this thesis: reflective communication practice and participatory communication strategies, as well as the inclusion of other disciplines. Now that I have provided several potential solutions, I explore my limitations with this thesis.

Limitations

Insider research is not without limitations. As an insider, I analyse and consider research with a different perspective from others. I can, from experience, understand parts of the sector that

are problematic as well as parts that work well. I have empathy, understanding and awareness of political and social limitations that create complexities in this work. This allows me to explore certain spaces that others are cannot. Further, social constructivism suggests that no one perspective or research study can answer questions in a complete way. Another researcher may review my research or the Q-Files, and analyse these documents differently or ask different questions of the members of practice. Further, other researchers may prefer to survey people in Canterbury, in an effort to approach the issue from an empirical perspective or take another approach entirely. Their work can be as valid as mine. Together we aggregate multiple perspectives on a complex issue.

Another limitation was concerning how many documents I could review or analyse. Due to my particular insider perspective, I chose not to review all the documents relating to earthquakes in Canterbury, nor could I review all the media articles pre-Canterbury earthquakes. My focus was on publications that I had been involved in developing. However, I am aware that there were a number of media articles in the ten years before the sequence began, that explored impacts of a large Alpine Fault earthquake, as well as other publications developed by councils and MCDEM.

Further limitations include scope. I decided not to look at materials or information produced during the earthquake response and the recovery period. The reasons for this are that, while I worked during the 22 February 2011 earthquake in the Emergency Operations Centre, I did not remain in Canterbury. My ability to be an inside researcher was compromised by no longer being directly involved in Canterbury.

Finally, insider research is risky. I reflected how captured I was by the social norms of my community of practice when I could not even identify acronyms during my codings until the last sweeps. I was so familiar with the language used that I struggled to see other perspectives. My insider knowledge created a type of blindness to probably very obvious issues to others. I will explore some of my challenges with insider research later in this chapter.

Now that this insider research has been completed, I would be interested in analysis preparedness materials and communication campaigns produced post-earthquake in Canterbury, but this would be from a different research perspective.

Future Pathways

During this research, I was presented with myriad pathways for exploring the boundaries of current knowledge in the fields of communication, emergency management and natural hazards. One of the challenges of this research was keeping it manageable; the possibilities seemed endless and the pathways presented to me were tantalising. Early on in my thesis journey, my primary supervisor suggested I keep notes about the pathways I wanted to explore for future research. I reviewed these notes extensively to develop the next sections that I or other researchers could explore.

This section contains some concepts. It is rather a selection of pathways that I think would have the most viability and interest. Some of the potential pathways are more matured with some preliminary research already completed while others are still concepts yet to be fully formed. Further, some are specific to natural hazards, emergency management and communication but some are not. Future research conducted in the emergency management, communication and natural hazards disciplines will likely be largely interdisciplinary, involving different epistemological perspectives from a variety of researchers, which promise the most opportunity to advance knowledge.

Learning the Lessons

One unresolved question that continues is: given all the evidence we had regarding seismicity in Canterbury, why did we fail to communicate effectively for future earthquakes? Retaining knowledges and learning lessons from disasters appears to be a complex endeavour for many in policy, government and emergency management (Donahue & Tuohy, 2006). Reasons for this lack of learning vary; one may be that those involved are too exhausted by emergencies to adequately reflect on events (Kay, 1952). But what other reasons exist? A full exploration of lessons learned and the way we learn may be highly valuable, in particular, to the Canterbury context. How we, as societies, learn about disasters and change our behaviour towards land-use planning and development, policies and social memory was beyond the scope of this thesis, and likely the scope of my research skillset. Yet I suggest tracking intergenerational learnings from Canterbury may be a valuable exercise, over a long period, to see how and why certain groups retain knowledges while others do not.

I am aware that a “Lessons Learned for Recovery from Canterbury” project is currently underway by the Department of Prime Minister and Cabinet (DPMC) and I have some involvement with this project, advising on aspects of communication. I suggest that

longitudinal tracking of people involved, how they implemented the lessons learned and how long those changes were sustained, would be an intriguing research path. The lack of learning lessons from previous disasters is not only a Canterbury issue, and the type of research I am suggesting could be conducted in other locations that have been affected by disasters.

Now that I have explored Canterbury-specific lessons, I will discuss future research pathways specific to disciplines.

Emergency management – exploring identities and philosophies

Exploring how emergency managers identify themselves, their profession and their relationships with their communities would be an intriguing pathway for research. As explored briefly in Chapter 6: Discussion and Reflections, self-identification and potential projection of anxiety and fears by emergency managers are not well understood. However, in researching this thesis, I found little research on how emergency managers self-identify, further, how their self-perceptions diverge from or match those of their communities. Heath, Lee, and Ni (2009) explore some identity issues, in the areas of crisis messaging and emergency management. Ronan and Johnston (2005) also examine roles in preparedness and resilience, including some identity and relating research with various publics. However, in the preparedness area, there is little research on how emergency managers self-define or how they reflect on their own work compared with how members of their communities view the profession. Research into identity and how emergency managers are perceived by various publics, triangulated with how emergency managers perceive themselves, may be useful research. I argue that understanding identity is important to appreciate fully what kinds of relationships can be built between publics and emergency managers.

Spokespeople attributes such as relatability, authority, power and similarity with publics, are frequently explored in communication research literature (Lombardi, 1995; Rubin et al., 2009; E. J. Wilson & Sherrell, 1993). However, these discussions are lacking in emergency management literature, which is an interesting gap given the frequencies of leadership discussions in the discipline. I find this research gap in emergency management spokespersons and their attributes problematic; effective leadership during crises and disasters is essential to managing an efficient response (Littlefield & Quenette, 2007). This could be an intriguing joint research project, combining emergency management and communication.

Demography is only a shallow expression of identity, but even this is missing in the literature about emergency managers. From the one study I could find, the Weaver et al. (2014) study, it was apparent that, at least in the U.S.A., the profession is male-centric, with more than 80 percent of emergency managers identifying as male. Women made up 20 percent. Ethnicity was essentially monocultural in emergency management with 94 percent of respondents indicating they were of European ancestry (Weaver et al., 2014). There is no analogous research in New Zealand or Australia; I would find it interesting to explore a similar survey in other countries outside the U.S.A. Examining demography of emergency managers in various countries may assist in understanding what inspires some to enter the emergency management profession.

Another intersection between emergency management and communication research could be to explore how relevant our current messages about preparedness. I discussed this in Chapter 2: Bridging the Literature, about the history of current preparedness messages. These messages: storing food, water and emergency supplies for three days or more, have been relatively static since the 1940s (Preston et al., 2011). In the Q-Files, the messages largely referred to natural hazards but at the end of each booklet there were some emergency preparedness messages. Given the shift towards resilience within the emergency management sector, solely focusing on the immediate three days in communication campaigns, focusing only on after an emergency appears, to me, to be of limited value. Perhaps one issue for publics is that preparedness messages do not reflect their own understanding of what they require to respond to and recover from emergencies.

Narrowing the scope of future research, I suggest what may be useful is the development of communication strategies that increase resilience, both individually and as communities of locality. Combining resilience research with communication theory may be a useful research approach. Before this study, I was involved in research that attempted to analyse communication documents in the Hawkes' Bay region in New Zealand, with messages that may assist in building resilience (Becker et al., 2012). The concept was interesting but in hindsight my own participation lacked rigorous analysis, due to my novice research skills in 2012. Given the research in this thesis and my previous research, I question whether emergency managers are providing useful preparedness information and advice for their communities. Revisiting the development of communication strategies for increasing community resilience may be a useful pathway for future research.

Slightly tangentially, I see value in deeper philosophical investigation into emergency management as an academic discipline. I found few books and journal articles which addressed the philosophies of emergency management and its disciplinary boundaries. However, these discussions are far from mature and wider cross-disciplinary may be useful to determine both philosophical frameworks and disciplinary focus. At the moment, it appears the discipline is still in search of its identity; philosophical discussions may provide further pathways.

A potential area that includes philosophy, communication and emergency management is to include critical discourse analysis using Lacan's four positions – specifically the dynamic of the Master and University discourse but also could include the Hysteric and the Analyst (Clarke, 2015; Dahlberg & Phelan, 2011; Lacan, 1998). I wanted to explore Lacanian theory but while it would have added another dimension to this thesis, it would have also been a major distraction from the theories I wanted to explore, specifically those addressing scientism, actor-network theory from Latour (2005), combined with persuasion and propaganda. However, I believe research to extend Lacan's theories into this area would likely add new insights and dimensions into this space.

Extreme preparedness: Preppers

One of the more interesting future pathways of research is about “hyper-prepared” people or “preppers”. In the U.S.A., there is a growing group of people who “hyper-prepare”, far beyond most advice provided by emergency managers. In New Zealand, Becker (2012) explored that perceptions of over-prepared people were considered “over the top” or “nutters” (abnormal). Further, Becker (2012) indicated that over preparedness was a negative social norm. These preppers have been the subject of television shows, exploring their methods of hyper-preparedness (Kabel & Chmidling, 2014). Some preppers are motivated by religious doctrine while others are concerned with existential risk (Foster, 2014b). I became captivated by the topic of ‘preppers’. Overall, I perceive that emergency managers did not have a positive impression of this group, despite the idea that here was a group of people with elevated levels of individual and community resilience. There is research about the actions and beliefs of ‘preppers’ (Foster, 2014a, 2014b). However, I would like to extend this to explore the perceptions and beliefs emergency managers have about ‘preppers’ and vice versa, as well as how these groups communicate with each other.

How prepared are “experts”?

Some theories, specifically mental models for risk communication, encourage publics to think as experts (Atman et al., 1994; Bostrom et al., 1994). However, does expert knowledge relate to more preparedness? I could find little research indicating how prepared experts are in their daily lives and households. It could be an intriguing study to explore what experts think about preparedness personally and how their expert knowledge translates to various activities in their daily lives. A study of “expert” attitudes versus action may lead to further insights into the knowledge and behaviour gap.

Natural Hazards: Scientists as responders

The Canterbury Earthquake response provided new evidence for a different kind of scientist: science responders. My experience during the Christchurch Earthquake Response and, at GeoNet, highlighted that scientists at GNS Science occupied intriguing communication roles that are more traditionally held by emergency managers. The media and various publics included the scientists in the emergency response and discussions about integration appear to be ongoing (Beaven, Wilson, Johnston, Johnston, & Smith, 2016). Specifically, I am intrigued with how crisis communication will continue to involve scientists, as well as how our scientists will respond to roles that they were neither trained for nor expected to fill in their careers. Further study on the role of scientists in response, what training they may require and their duties may be an intriguing further pathway for research. Developing communication guidelines, training, and other support measures for scientists, based on communication research and practitioner experience, may be useful as both a practical and research objective.

Operational Earthquake Forecasting and Early Earthquake Warnings

Science communication about earthquakes continues to be a complex endeavour. One recent development is Operational Earthquake Forecasts. Operational earthquake forecasting (OEF) “is the dissemination of authoritative information about these time-dependent probabilities to help communities prepare for potentially destructive earthquakes” (Jordan, Marzocchi, Michael, & Gerstenberger, 2014, p. 955). These probabilities have numerous uses and strong ethical imperatives in their communication. The International Commission on Earthquake Forecasting for Civil Protection (ICEF) has developed “The Transparency Principle”, which counsels that scientific information about future earthquake activity should not be withheld from the public. OEF has been used in New Zealand in the last five years and has been

operationalised within communication initiatives during the Canterbury Earthquake Sequence and the Cook Strait/Lake Grasmere earthquakes (Becker, Potter, Wein, Hudson-Doyle, & Ratliff, 2015).

OEF presents a variety of communication challenges. Not only is OEF most likely to be communicated during times of crisis but it is also used to communicate. This amalgam of disaster and risk communication is unique in seismology, as seismologists previously focused on reporting earthquakes rather than forecasts. On top of this complexity of combining risk and disaster communication, best-practice often differs based on publics' needs, rather than a standardised "one-size-fits-all" approach. Further research on the communication of earthquake forecasts could be an intriguing combination of communication, emergency management and natural hazard perspectives.

Persuasion and Science

In 2014, I co-facilitated a session called *Science, the Media and Disasters* with the Royal Society of New Zealand's Science Media Centre. Attendees were largely natural hazard scientists, with a few communicators, policy makers, and students. I asked participants before the workshop about what kinds of topics they wanted to explore in the session. I developed a survey, using SurveyMonkey, to ask the group questions:

“Do you think scientists should be persuasive or use persuasive techniques to communicate their science?”

Forty-seven (out of 49) participants responded, with roughly half agreeing and half disagreeing with the statement. Comments I received ranged from full support to absolute distaste and revulsion for persuasion. I have not yet published the survey data or my interpretations from the workshop but I think the discussions in the comments indicated, to me, an area for further study to explore how scientists perceive persuasion. Understanding how scientists perceive persuasion may provide insights into challenges and opportunities for communicators. Persuasion and science have been explored (Latour, 2000; Zammito, 2004), but the challenges of preparedness and natural hazard communication are unique and require further exploration.

Updating readability tests

Readability tests have provided another means for triangulating my findings in this thesis. The high readability tests of the Q-Files indicated that much of what we had provided was

only useful for the people who wrote these. However, readability tests may be far too general to be useful and, given the last readability test was developed in the 1970s, these types of analyses could be updated (Meade & Smith, 1991).

One issue is that current readability tests are too general to be useful for specific types of communication (Schrivver, 2000). Further research could develop a readability test specific to natural hazard communication, which accounts for channels, publics and other inputs, to assist communicators in this and other related fields, like science communication. While computer-assisted readability analysis should not be solely relied on to determine cogency, it could be useful to help practitioners with valuable reflections on their communication.

Communication research: new approaches to preparedness campaigns

In the last months of my thesis, I began to explore Latour's actor-network theory (ANT) (Latour, 2005). I think one very useful component of ANT is how networks and relationships influence behaviour among individual members of that network. Useful research could investigate behaviour change campaigns and emergency preparedness. The reason I developed an interest in ANT was an attempt to consider unconventional approaches to creating behaviour change.

Appealing to individual motivators and self-preservation appears to have little influence on many publics, despite the many years of supporting these kinds of campaigns. Even the communication of impacts, instead of hazards, seems to lack persuasion because some people may not think something bad will happen to them, as explored by Zimbardo (1969). McClure et al. (1999) supports Zimbardo's (1969) "not me" concept or that people largely trust their own levels of resilience to cope (Toh et al., 2014). Other publics may consider the issue is so complex and daunting, that preparedness seems futile (Becker et al., 2013).

I suggest a very different approach is worth exploring, focusing away from individual or household survival, to communal or network approval of actors within that network, as suggested by parts of ANT. I envisaged a concept that I loosely titled the "Heroes, Helpers and Healers" campaign. This campaign would be based not on attempting to connect with self-preservation but rather examining how we want to be seen by others around us, using three mythical archetypes explored by Jung (1959). These archetypes, as part of the campaign, would explore how the actor wants to interact and be perceived by their social

networks, hence the addition of components of actor-network theory (Latour, 2005). Pre-testing and post-testing such a campaign could be an avenue for pragmatic future research.

By focusing on social networks, several issues may be addressed. One may be fatalism. Instead of exhorting people to think something negative may happen to them, a shift is made to explaining something that may happen to fragile people around them. This may encourage people to be empowered and would also increase positive outcome expectancy; that preparing can create positive outcomes, rather than perceiving the hazard to be so sizeable that nothing can be done. I realise that using philosophical and sociological theory, like ANT, would require a major shift in thinking about preparedness communication campaigns within emergency management traditions which have predominately been influenced by individualistic behaviours approaches to date. I think it may be useful to cease working against human behaviour and explore social constructivist avenues.

Further, I would like to explore aspects of power, authority and control and how this relates to communication strategies. Gobbledygook and jargon are artifices of power and control (Flesch, 1945). Exploring why ‘experts’ and emergency managers attempt to control publics through opaque communication would be an intriguing pathway of research, particularly as it relates to power and authority.

Supporting future insider researchers: insider research is tough

I have some insight as to how insiders can be better supported by their research community and how they can support themselves. As highlighted in previous chapters, this was a very personal thesis journey for me. I had to be careful to determine the differences between what was self-indulgent and what was reflective. While that can be said of most theses, this work involved placing myself within the research to understand and reflect the systems, processes and cultural groups I had played a role in the development of the researched artefacts (the Q-Files). When I started this thesis journey, I wanted to understand why people “just did not listen to us”. At some point, at about year two, I shifted and thought: what is wrong with us that we were ineffectual in communicating with our publics? I slowly peeled back the layers of belief about expertise and authority until I came to understand that scientism was likely the prevailing belief system that I was operating under and that it was a barrier to having an effective relationship with our publics. Our attempt at communication was not about building and supporting relationships as much as it was about enforcing our beliefs on publics. We

used fear, threats and dogmatic, inflexible, exclusive language to communicate. I reflect that the group I worked with were only effective in communicating with people like ourselves.

Reflecting on this journey, I was extremely fortunate throughout this research. I had a primary supervisor who had worked with first-person, narrative theses previously. One transformative moment for me was when my primary supervisor suggested I take a different path than the one I had set out for myself. Originally, I had written my confirmation report and supporting documents in the more traditional “scientific” way. But, from the beginning, it felt unnatural. And, eventually, with support and direction, I found my way while balancing the requirements of clarity required for academic prose. It was a challenge; I found few examples of reflective first person theses in my disciplines, except for a few in communication research and one in social psychology. Natural hazards and emergency management have no contemporary examples, that I could find, of first person, narrative theses from an insider. I mention contemporary theses in emergency management because the first emergency management Ph.D. thesis, written by Samuel Prince, was about his personal experiences, reflections and observations during the Halifax Disaster in 1917 (Prince, 1920). However, when I reviewed Prince’s thesis, he did not include personal pronouns, instead opting for an observational, third-person narrative. I do not critique Prince’s work because it lacked his voice; this work was a valuable first step in emergency management scholarship. I mention Prince’s thesis to reflect on how alone I have been in this process.

Without many other qualitative interpretative insider researcher theses from emergency management or natural hazards to follow, I did sometimes feel lost in the process, not always knowing what I was achieving. But had I not been encouraged to use narrative techniques and my perspective, I would have ended up in a very different place than I have now. Because I could not remove myself from the terrible events in Christchurch, instead, the narrative approach allowed me to embrace my experience. It challenged my perspectives and allowed me to recognise belief systems like scientism.

Insider researchers have other important insights to share, different from what is digested by non-insider researchers. Instead of denying emotions or biases or perspectives, I was encouraged to embrace them. I argue that my thesis is valuable not for the “data” I uncovered but for the perspectives I explored. This is the space where insiders can be encouraged to share their narratives and histories, to provide further perspectives. I understand why insiders may not want to; it is difficult to expose the sensitive underbelly of a profession. I have

considered this and I do worry how people in my sector and community of practice will receive my research. This thesis, with its inclusion of my voice and perspectives, may be dismissed as not being ‘scientific’ or empirical. For a sector which appears to value the empirical ‘certainty’ of science, I am aware that this work may be either controversial or ignored completely. I have felt like a trailblazer but have also struggled with legitimacy among my peers.

I am not suggesting that more conventional methods of research do not have value. I cannot advocate the approach of a narrative thesis for many other people, except other insiders like myself. The structure and approach of this thesis worked for me because it allowed me to break out of previously held conventions, a necessary and uncomfortable process. I suggest practitioner-researchers consider that they are a product of a specific discipline and question this training. Narrative, first person explorations can provide a shift in perspective for those researchers seeking more ‘certainty’ or confirmation of their own beliefs.

I advocate for more insider researchers to find their voices and explore their perspectives. Their stories are valuable and can inform all of us to consider thinking about research and our sectors in new ways.

Final Thoughts

In this thesis, I explored the process of an “insider” perspective, reflecting on communication artefacts created to inform and prepare members of the community in Canterbury about earthquakes. Through a thorough analysis process, including reflections from members of my community of practice, I determined that these communication artefacts (the Q-files) would likely have failed to achieve important shifts in perspectives required for behavioural change. This is corroborated by low preparedness levels in the community when actual disaster did strike. My findings have not always been comforting. However, anything less than transparency would have been a lost opportunity.

To be clear, this process has not made me “anti-science” but rather I have a greater understanding of science’s benefits and limitations. I appreciate now that my research, for all its personal narrative and first person pronouns, is also a form of science. Further, I suggest, from the best-practice principles in the communication literature, what may have been more successful is not the “science is the only perspective” but rather, “here is what some scientists suggest AND” approach to create a more inclusive and compelling narrative. I am not suggesting that we exclude science, rather that we include science as part of the wider

community narrative to approach the earthquake preparedness in the emergency management profession. Going forward, I encourage researchers and practitioners to develop more inclusive, transparent and participatory communication strategies. Development of reflective practices would also be extremely useful in future.

Through this journey, I documented my first role in Canterbury: that as the public education and public information coordinator for the Canterbury CDEM Group. I did not explore my Public Information Management Second-In-Command role in the 22 February Response or as the Public Information Manager for the Valentine's Day Earthquake (M5.7) for GeoNet in 2016. The reason I did not explore these roles is because of the emotional work required of me to properly research these experiences; these were too raw and close. Working before, during and hopefully, at the end of the devastating sequence has not been without its costs. This insider perspective of a decade of work on Canterbury and associated destructive earthquakes has been both a gratifying and taxing process. I consider being part of the sequence of events in Canterbury to be a privilege but also a terrible responsibility; an experience that I will carry for the rest of my life.

Through this research, I can perhaps inspire other people in my previous position to be critical and more thoughtful of their work, to improve our conversations about earthquakes. Further, I aspire that the gaps addressed in this thesis will create greater connections and that these could be built by greatly expanding who is included in the conversation about preparedness for natural hazards.

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Appendices

Appendix 1: The Best-Practice Matrix

Appendix 2: Canterbury Public Education and Public Information Strategy 2009

Appendix 3: Literature review table

Appendix 4: Social media from September 2010

Appendix 5: Survey questions from survey monkey

Appendix 6: Ethics Documents

Appendix 7: The Q-Files

Appendix 1: The Best-Practice Matrix

Appendix 1: Best-Practice Matrix

Sub-Theme	Best practice	Poor Practice	Supporting quotes	References
Source: spokesperson subtheme: powerful	Influential power base comes from: impersonal reward, expert/information, legitimate equity/reciprocity, referent, personal reward, legitimate position and legitimate dependence (Raven et al., 1998).	Authoritative voice without providing either information, reward, legitimacy by expert (Macnamara, 2012).	Influential power base comes from: impersonal reward, expert/information, legitimate equity/reciprocity, referent, personal reward, legitimate position and legitimate dependence. Communicative sources who are seen as credible, trustworthy, attractive, likeable, similar, familiar, and powerful are more likely than those who are not to effect behaviour change, all things being equal (Jost & Hardin, 2011).	(Jost & Hardin, 2011; Macnamara, 2012; Raven et al., 1998)
Source: spokesperson subtheme: multi-agency	Fire, police and ambulance rated high in trust; all are included in campaigns.	Isolated communication efforts; not including a multi-agency perspective.	“Successful campaigns often involve multiple-organisations playing different roles in the multifaceted goals of the campaign effort) (Coppola & Maloney, 2009, p. 11)	(Coppola & Maloney, 2009; Eriksen & Gill, 2010; McCaffrey et al., 2013; McComas, 2003)
Source: spokesperson subtheme: personal stories	Different people, typically not associated with a government agency, share their stories of disaster.	No personal experiences. Personal experiences but not of people whom the audience will relate to as familiar or as similar to them.	“storytellers (such as the local media, community organisations and neighbours) should be the first and most critical step in helping residents prepare for various natural disasters” (Y. C. Kim & Kang, 2010, p. 484).	(Bainbridge & Galloway, 2010; Y. C. Kim & Kang, 2010)
Source: spokespeople	Positive relationships between spokespersons and publics.	Acrimony between publics and spokespersons.	“If the relationship between the spokesperson and public is perceived to be friendly and helpful, the participants more likely will respond positively and follow the instructions for dealing with the crisis. Conversely if the relationship has a hostile, dominant, disruptive tone,	(S. Moore, 2004; T.L. Sellnow et al., 2009b; Webster, Jardine, Cash, & McMullen,

Appendix 1: Best-Practice Matrix

		No human spokespeople identified. One reason that emergency managers may struggle with this role is that communication, whether campaign development, implementation and even performing as a key spokesperson during an emergency, is largely absent as a recommended skill set within training programmes for emergency managers in favour of leadership, critical thinking, authority, organisation and navigating organisations (Nicolopoulos &	the less likely the participants will respond as instructed.” (T.L. Sellnow et al., 2009b)	2010)

Appendix 1: Best-Practice Matrix

			Hansen, 2009).		
Source: spokesperson subtheme: likeable/attractive	although the message content may be the most important determinant of persuasion under some circumstances, in other circumstances such noncontact manipulations as source reliability, attractiveness and so forth may be even MORE important. (Petty, Goldman, & Cacioppo, 1981)		Only code when best practice.	Communicative sources who are seen as credible, trustworthy, attractive, likeable, similar, familiar, and powerful are more likely than those who are not to effect behaviour change, all things being equal. (Jost & Hardin, 2011) Members of the target audience may be more likely to identify with and hence adopt, the opinions of attractive sources compared to unattractive sources. (E. J. Wilson & Sherrell, 1993, p. 102)	(Jost & Hardin, 2001; McGuire et al., 1985, Wilson & Sherrell, 1993).
Source: Trust	Trust must be between both the publics and the source for persuasive discourse to occur.		The source acts in an untrustworthy way. “There is some evidence that, if a distrusted source provides information that appears to promote its own vested interest, the information will influence people’s attitudes in the opposite direction to that	“Trustworthiness is named as a fourth aspect as trust or possibly credibility is important in persuasive discourse.” (Burkart, 2004, p. 460) “A local population is more likely to bounce back from a crisis such as a natural disaster or terrorist attack if it has access to trusted information.” (P. Longstaff & S.-U. Yang, 2008, p. 14) “Trust is engendered when people believe that decision-makers share their sense of values and have confidence in their past performance.” (Luth et al., 2013, p. 7) Trust: is required in scientific experts and authorities and confidence in protective measures. (Wachinger et al., 2013)	(Burkart, 2004; Frewer, 2004; L. Gray et al., 2012; Höppner et al., 2012; Luth et al., 2013; Wachinger et al., 2013)

Appendix 1: Best-Practice Matrix

		being promoted in the first place” (Frewer, 2004, p. 393) No prior work to establish the trustworthiness of the source with the intended audience prior to using in the booklet.		
MESSAGES	Best practice	Poor Practice	Supporting quotes	References
Message: locality	Successful risk communication requires in-depth local understanding of conditions to effectively encourage behaviour changes.	Generalised messages that do not include local context and not immediate.	“If the threat is immediate and local, people will be in tune with the information. But, if the absence of location specificity and time pressure inherent in a hazard awareness program provides little need for those at risk to obtain immediate answers, so they are likely to forego active information seeking in favour of passive monitoring of the situation.” (Lindell & Perry, 2012, p. 624)	(Covello, 2003; Cutter et al., 2010; Lindell & Perry, 2012; Marsh & Buckle, 2001; Paton, 2003)
Message: science information	Science explained simply, without jargon, and not so much it is overwhelming to the publics, jointed by positive outcome expectancy messages.	Science can be seen as complex and access can be difficult to different audiences	“Science can be seen as complex and access can be difficult to different audiences OR highly technical terms are used making it out of reach for some people. ” (T.L. Sellnow et al., 2009b, p. 149)	(Riesch, 2014; Sellnow et al., 2008; P. B. Thompson, 2012)

Appendix 1: Best-Practice Matrix

Message: jargon	Information provided without the use of technical language or concepts inaccessible to the publics.	Technical language more appropriate for internal or key stakeholder publics.	“Use clear, non-technical language appropriate to the target audience.” (Covello, 2003, p. 7)	(McComas, 2003, 2006; Dennis S Milet, S. Nathe, P. Gori, M. Greene, & E. Lemersal, 2004; Timothy L Sellnow, Robert R Ulmer, Matthew W Seeger, & Robert S Littlefield, 2009)
Message: fear message	Messages should contain both negative consequences and positive outcomes when preparedness action is undertaken.	No positive outcomes communicated; fatalistic messages.	“We recognise that for hazards, such as earthquakes, that cannot be prevented and only predicted with difficulty, it is understandable that many people will adopt a fatalistic attitude that such events are beyond their control.” (McClure et al., 1999, p. 384) Fear-based messaging campaigns carry risks, specifically when strong emotion is communicated; sometimes that negative emotion can be shifted towards the source, rather than at the risk itself (Turner & Underhill, 2012)	(McClure, Walkey & Allen, 1999; Turner & Underhill, 2012)
Message: acronym	No acronyms used.	Acronyms used.	‘Use clear, non-technical language appropriate to the target audience.’ (Covello, 2003, p. 7)	(Covello, 2003; McComas, 2006)
Message: outcome expectancy	Outcome expectancy: perceptions of whether personal actions will reduce a problem	Only threatening or negative messages without any positive outcome expectancy messages.	Demonstrating the reality of avoidable losses and how people can have some control over these interactions increases outcome expectancy. (Paton & Johnston, 2006, p. 119)	(McClure et al., 2001; Paton, 2003; Paton & Johnston, 2001; Paton & Johnston, 2006)

Appendix 1: Best-Practice Matrix

		Fatalistic messaging.		
Message: mitigation/ Policy and Planning	Positively framed, expressing that risk mitigation efforts can change the outcome of a disaster.	Negatively framed, a lack of communication deconstructs risk governance.	”assessment uncertainty is an important factor in deciding how to act, i.e. whether to reduce risk (through risk mitigation action) or reduce uncertainty (through focused research activity)” (Frewer, 2004, p. 395). Infusing risk communication into policy decisions, meet risk perceptions needs by remaining and accessible to the public, collaborate and coordinate about risk with credible information sources. (Burby, 2001, 2003; Christoplos, Mitchell, & Liljelund, 2001; Frewer, 2004; I. W. R. Martin, 2008; Mulilis, 1998; Newport & Jawahar, 2003)	(Burby, 2001, 2003; Christoplos, Mitchell, & Liljelund, 2001; Frewer, 2004; I. W. R. Martin, 2008; Mulilis, 1998; Newport & Jawahar, 2003)
Message: Definitions (combined in last coding with jargon).	Definitions alone do not persuade. Lay people do not compare events strictly in terms of actuarial risks.(Plough & Krimsky, 1987)	Communicating the risks and educating the public into thinking about the problem the way the experts do. Public perception must be brought into conformity with scientific rationality. (e.g. start with the same definitions)	“Explanation, predication and control” is not the bottom in of our business; “understanding” and “intertextuality” fail to comprehend our discourse; not even “human emancipation” reflects our practical intent quite without distortion. As a practical discipline, our essential purpose is to cultivate communicative praxis, or practical art, through critical study. All of our work does, or should, pursue that purpose” (Craig, 1989, 97-98).	(Craig, 1989; Plough & Krimsky, 1987)
Message: propaganda	“Name calling, glittering generality, the plain-folks approach, card stacking, the bandwagon, transfer,	Focuses on what the organisation activities rather than the use for	“Propaganda is not education because it strives for closed mind rather than the open mind. The propagandist merely wishes you to think as he does. The educator is more modest; he is so delighted if you think at all that he is willing to let you do so in your own way.” (E. D. Martin,	(John W Handmer & Penning-Rowsell, 1990; B. B. Johnson, 1999; Nielsen &

Appendix 1: Best-Practice Matrix

	testimonial.” (Rogers, 2007, p. 77)	the publics; authoritarian, “top down”.	1932, p. 32)	Lidstone, 1998; R. W. Rogers, 2007)
Message: message frequency/length	Shortened messages to lessen the chance of distraction. Seven or less elements, consistent and redundant.	Lengthy messages are more prone to being dismissed due to distraction.	Strive for brevity (Covello, 2003, p.7). “to serve both consistency and redundancy, it is best to keep the number of elements seven or less.” (Saaty & Ozdemir, 2003, p. 356)	(Covello, 2003; Petty & Wegener, 1999)
Message: guilt messages	guilt campaigns link parental responsibility to preparedness with moderate success (but only when not too extreme)	Positive message reinforcement rather than guilt messages.	‘Whereas the high intensity appeal elicited the highest level of anticipated guilt and risk perception, it also created the highest level of anger at the source of the message. It also did not increase behavioural intention significantly’	(Lennis G Echterling & M Wylie, 1999; Mulilis & Lippa, 1990; Peters et al., 2013; Silberbauer, 2003)
Message: Entertainment	Humour, celebrity, entertainment.	Coded as Jargon or acronym.	“Humour should be given far greater salience and relevance than it has been accorded in previous risk research in order to investigate further how emotions and affect work in relation to risk.” (Parkhill, Henwood, Pidgeon, & Simmons, 2011, p. 326). Entertainment media that contain persuasive messages can reduce these forms of resistance through greater involvement with the narrative (58). This involvement facilitates the development of message-consistent beliefs, especially in audiences otherwise predisposed to disagree with the message (Eveland & Cooper, 2013).	(Eveland & Cooper, 2013; Parkhill et al., 2011)
Message: ideal	Culturally sensitive, dialogue encouraging, personal address, localised,	No attempt at dialogue, personal address, localised	Interviewees across the board noted that it was important for people to understand the rationale behind recommendations in emergency situations – NOT JUST GET DIRECTIVES. Emergency officials need	(Macaulay & Logie, 1996; R. J. Marshall et al., 2007; T.L.

Appendix 1: Best-Practice Matrix

	rationale plus simple steps plus benefit to them for their lives, connected to community.	messages, etc.	to understand cultural and religious differences and to begin now to establish trust by working and planning together (R. J. Marshall et al., 2007).	Sellnow et al., 2009a)
Message: counterarguments	Counterarguments and alternate theories are acknowledged, discussed and addressed, rather than avoidance.	Alternate theories and counterarguments are ignored.	“As predicted, the immunizing superiority of the double over the single defence was found only when the subsequent attack involved the same counterarguments; against novel counterarguments the single defences was an effective as the double.” (McGuire, 1961, p. 332)	(McGuire, 1961a; Papageorgis & McGuire, 1961)
CHANNELS	Best practice	Poor Practice	Supporting quotes	References
Channel: maps	Maps and imagery should be used to assist with risk communication. The general notion of why there should be a mutual influence between text and picture processing is grounded in the fact that text and pictures fulfil complementary functions during multimedia learning, which together contribute to the construction of a comprehensive mental model. P. 49 (Eitel et al., 2013)	No graphics or imagery.	“Maps, newspapers and radio ranked the highest which as far as trustworthiness” (McCaffrey et al., 2013, p. 10) Each user constructs their own individual knowledge from interpreting the different symbols, colours, and expressions on the map (Bertin, 1983; MacEachren, 2004)	(Bertin, 1983; Eitel et al., 2013; MacEachren, 2004; Marsh & Buckle, 2001; McCaffrey et al., 2013; K. Smith et al., 2000)
Channel: online	Further information is	No online	‘most Americans are searching the Internet for health [sic] and preparedness related information,1 and because online information can	(Friedman et al., 2008; S. Moore,

Appendix 1: Best-Practice Matrix

presence	available online.	presence	be accessed and updated more rapidly than print media (Friedman et al., 2008, p. 440).	2004; Sellnow et al., 2008; Tanner et al., 2009)
Channel: face to face	Invitations are issued to come in and talk to people face to face, to phone for a chat, to attend a community meeting or face to face briefing, etc.	No opportunities for face to face mentioned	There is no denying that exposure to information about working with carcinogenic substances through outside media, resulting in interpersonal communication about the campaign subject must have had a clear impact. (I. P. Moonen, G. A. van der Rijt, K. F. van Koppen, & J. W. van der Gulden, 1995) “Face-to face communication leads to more interpersonal influence than CMC only for participants with high trait private self-awareness.” (Moonen et al., 1995, p.371)	(I. P. Moonen et al., 1995; Raven et al., 1998)
Channel: printed material	Printed material is necessary	No printed material	“one must disseminate a written brochure to the public” (Mileti, Fitzpatrick, & Farhar, 1992, p. 38)	(Mileti et al., 1992)
Channel: social media	Frequent engagement regarding using this channel.	No social media engagement or presence.	“Determine social media engagement as part of the risk and crisis management policies and approaches.” (Veil et al., 2011, p. 119)	(Briones et al., 2011; Tierney et al., 2006; Veil et al., 2011)
Publics	Best practice	Poor Practice	Supporting quotes	References
Publics: two-way communication	Two-way symmetrical communication.	One-way communication from the Source to the Publics without a feedback loop.	“One meeting, where instead of technical experts reading from their podiums and citizens read testimony but no time for interaction, this other meeting included time for interaction. This greater openness and responsiveness to citizens’ concern, and played a role in increased credibility the government agencies enjoyed following the meeting” (A.E. Crowley & Hoyer, 1994, p. 1267). Two-way and symmetrical communication. Two-way, symmetrical public relations uses research, listening, and dialogue to manage conflict and to cultivate relationships with both internal and external strategic publics more than one-way and asymmetrical communication.	(A. E. Crowley & Hoyer, 1994; Grunig, 1992, 2009; Grunig & White, 2008)

Appendix 1: Best-Practice Matrix

Publics: resilient community	Resilience is a part of social identity and personal identity.	Lack of acknowledgement of resilience in a community	“Resilient persona for a community contributes to the social resilience of towns in the wake of adverse events.”(Madsen & O'Mullan, 2013, p. 68) “One should construct pre-hurricane preparedness messages that focus on community-level damage” (Y. C. Kim & Kang, 2010, p. 484).	(Becker, 2012; D. M. Johnston et al., 2013; Y. C. Kim & Kang, 2010; Madsen & O'Mullan, 2013; Sinclair et al., 2013)
Publics: involvement in planning regarding response	Involving the “public” early once a risk is identified	No involvement with publics	The public are more likely to take appropriate action and accept the recommendations if they have been involved in the decision-making process, and the quality of relationship between authorities and the community has a direct effect on the uptake of risk messages, and trust in the message providers (L. Gray et al., 2012, p. 2)	(Earle & Cvetkovich, 1997; Eriksen et al., 2011) (Eriksen et al., 2011), (Mileti & Darlington, 1997; G. A. Tobin, 1999).
Publics: diverse publics	Diverse publics require diverse channels and messages	Using the same messages and channels for everyone.	“it is no longer appropriate to rely on hunches and institutions regarding the details of message formulation. Once a message has been drafted, it should be tested on a sample audience to see whether it has the intended (or unintended) effects” (B. B. Johnson, 1999, p. 334).	(D. Crowley & Heyer, 2011; Eriksen et al., 2011; Höppner et al., 2012; McCaffrey et al., 2013; Paton, Bajek, et al., 2010; T.L. Sellnow et al., 2009b; Wilensky, 2011)

Appendix 1: Best-Practice Matrix

			(Statistics New Zealand, 2006) “The linguistic reproduction of the superiority of Pakeha, constructed by individuals and the media, alludes again to Foucault’s state racism (Foucault, 2006), in which interleaved racism works on many levels to maintain a specific societal structure. The discourse of superiority also legitimises subtle but powerful marginalisation by individuals working within structures” (Pack et al., 2015)	
Publics: society	Society is addressed in risk communication	Society is ignored; only personalised messages are communicated	Fiske’s elementary forms of sociality are discussed as is risk management judgements; sociality is defined as elementary ways in which people relate to one another socially. These elementary forms of sociality are culture-free and innate, available to all persons in all contexts at all times; to be used, however, they must be implemented within specifics cultures (Earle & Cvetkovich, 1997, p. 63)	(Aven, Renn, & Rosa, 2011; Earle & Cvetkovich, 1997; Renn, 2010; R. Shaw & Goda, 2004)
SETTING	Best practice	Poor Practice	Supporting quotes	References
Setting: location/time	Location and timing in which messages are received considered and addressed.	Content is static with no acknowledgement of timing and location of publics when information is received.	Timing is an important factor in persuasion; the retention decays after a period of time and this weakens resolve of the listener (or immunity to ideas) (McGuire, 1962).	(McGuire, 1962)

References in Thesis Reference Section.

Appendix 2: Canterbury Public Education and Public Information (PEPI) Strategy 2009 – 2012

Public Education Public Information Strategy 2008-20 11 for Canterbury CDEM Group

1. Vision
2. Introduction
3. Outcomes
4. Background
5. CDEM Group Plan Objectives
6. Outputs
7. Monitoring and Evaluation

1. Vision

To provide excellence in Public Education and Public Information to achieve a resilient Canterbury.

2. Introduction

This strategy has been prepared for the Canterbury Civil Defence Emergency Management Group's Public Education and Public Information (PEPI) Committee.

The focus of the Canterbury CDEM PEPI Strategy 2008 to 2010 will be to transition from the more traditional hazard and preparedness education model to one which aims to enhance community resilience to all hazards. Traditional public education is a combination of marketing (print, radio and television advertisements) and public relations (news stories, events).

Community resilience is a holistic approach to enabling communities to be aware of, plan and prepare for, respond to and recover from all hazards. Examples of community resilience include working with community groups, households and schools. The tools are face-to-face meetings, courses, and risk identification and mitigation through community consensus.

Ideally, community resilience would be a discussion with communities regarding their risks and what they can do to mitigate that risk.

The inclusion of community resilience work is an addition to the current work programme of public education. Community resilience work will complement and enhance current public education programmes.

3. Outcomes

The definition of a resilient community from The Canterbury CDEM Group Plan 2005-2010 is:

- ☐ the community recognises the need to invest time and resources in creating and maintaining a resilient Group area;
- ☐ the risks to the community are well understood;

Appendix 2: Canterbury Public Education and Public Information (PEPI) Strategy 2009 - 2012

- ☐ there is a strong community spirit and communities work together to ensure their safety; everyone accepts responsibility for reducing risks to acceptable levels;
- ☐ decisions about how best to manage risks are made in a way that contributes to the overall sustainable development of communities;
- ☐ CDEM planning is integrated with everyday decision-making;
- ☐ Businesses have well-rehearsed business continuity plans that safeguard their people, the services they provide and business income;
- ☐ *These outcomes are directly related to Public Education work streams.*

AND:

- ☐ people know what to do *and* help each other in the event of an emergency;
- ☐ the response to and recovery from an emergency is fast, well-coordinated and effective;
- ☐ the critical role that CDEM plays in assuring community safety and prosperity is recognised.

These outcomes are related to the Public Information Management (PIM) work stream.

Public Education and Public Information programmes and activities are critical to the realisation of this vision.

4. Background

The PEPI Committee established in 2003, has worked on coordinating public education programmes, such as Disaster Awareness Week, Earth's Fury and the Pandemic Survival Roadshow. Public information training and exercises developed with input from the PEPI Committee have strengthened regional emergency public information coordination capacity.

National CDEM Strategy (from the National PEP Strategy 2006-2015)

The strategic goals of the National CDEM Strategy were developed to enable an effective response to hazards, and are supported by the National Public Education Strategy and Programme.

The PEPI goals of the National CDEM Strategy are to:

- ☐ increase community awareness. understanding and participation in civil defence emergency management
- ☐ reduce the risks from hazards to New Zealand
- ☐ enhance New Zealand's capability to manage emergencies enhance New Zealand's capability to recover from disasters.

Community Resilience

Results from recent research projects, focused on community resilience in New Zealand and internationally, and experience gained from actual large-scale emergencies, have contributed

to a review of the Canterbury PEPI strategy. This research has demonstrated the value of community resilience-building and the limitations of awareness programmes on their own.

This strategy will focus on three key groups: geographical communities, schools and business throughout Canterbury.

5. CDEM Group Plan Objectives

The Public Education-related objectives of the Canterbury CDEM Group are to:

- ☐ Identify and understand the hazards that our communities face Educate our communities in preparation for emergencies
- ☐ Encourage our communities and emergency response agencies to be prepared for emergencies
- ☐ Reduce the impact of emergencies

The Group's Emergency Public Information Management related objectives are to:

- ☐ Respond effectively to emergency events through cooperation and coordination
- ☐ Inform our communities during emergencies

In addition to the above objectives, the CDEM Group Plan (2005-2010) includes a series of goals.

The goals with significant Public Education and Public Information components are to:

- ☐ Enhance community resilience and capacity.
- ☐ Further develop response agency partnerships
- ☐ Enhance collective emergency response and recovery capabilities

6. Outputs - Key outputs over the next three years will include:

Public Education

- ☐ Coordinated public education campaigns and resources.
- ☐ Facilitating the development of Public Education and Public Information capabilities in smaller member authorities - encouraging or introducing joint approaches where capacity is limited.
- ☐ Strategic engagement with national Public Education initiatives, to gain maximum local benefit with minimal local investment.
- ☐ Timely, flexible and innovative use of emergencies and related events elsewhere in New Zealand and internationally as a catalyst for resilience-building Public Education initiatives within Canterbury.

Public Information Management

- ☐ Collaborative commitment to Public Information Management aspects of responses to all significant emergencies.
- ☐ Development and maintenance of the Group's (all-agency and member authority) PIM capabilities.

Appendix 2: Canterbury Public Education and Public Information (PEPI) Strategy 2009 - 2012

- ☐ Coordination of PIM with Group members and partner organisations during all emergencies that require a significant coordinated response.
- ☐ Enhanced professional development for Group Emergency Coordination Centre, member authority and partner PIM managers and team members.

7. Monitoring and Evaluation

There are currently three evaluation programmes: the biennial market research (as reported in the Environment Canterbury Annual Plan), the GNS community resilience study and the national Public Education survey.

Appendix 3: Literature Review Table (sample)

Appendix 3: Literature Review Table (sample)

Appendix 3: Literature Review Table (sample)

Article/Book Title	Author's name/Significance	Issue	Argument	Critique of Argument/Gaps in research	Terms defined (new terms? Critique on current terminology?)	Analysis	So what? (How does this apply to my research question and which one)	Conflicts in academic research? Other useful material?	Score (one being not useful, five being a foundation document)	Entered in End Note?	Key terms
Public Health Emergency Preparedness and Response communication with Health Care Providers: A literature review	Debra Revere, Kailey Nelson, Hanne Thiede, Jeffry Duchin, Andy Stergachis and Janet Basement. This was a multi-authored paper from University of Washington! Excellent!	Investigation of the systems and tools used by public health to generate health emergency and response (PHEPR) communications to HCPs and to identify specific characteristics of message delivery mechanisms and formats that may be associated with effective PHEPR Communication.	The authors found that detailed descriptions of PHEPR messaging from public health to HCPs are scarce in literature and, even when available are rarely evaluated in any systemic fashion.	The authors acknowledged that it was a very U.S. centric study and that because many articles were behind a pay wall, these were not analysed. Good on the authors for being so honest but really?	Public Health Emergency and Response (PHEPR). Health Care Providers (HCP).	With the multiple channels, it has made the job of communicators harder not easier to alert “overload”, confusion due to differing federal, state and local guidelines. Also, there was only one study that investigated the effectiveness of various message delivery systems (email, fax and SMS) ...and this showed some confusion.	It's a good example at public health, probably the largest contributor to risk communication, still does not robustly enough evaluate its' programme. See V. Johnson re this article.	No.	3.5	(Revere et al., 2011)	Emergency preparedness and response
Motivating Emergency Preparedness Behaviours: The Differential Effects of Guilt Appeals and Anticipating	Monique Mitchell Turner is an associate professor in the Department of Prevention and Community Health at George Washington University and Jill Cornelius Underhill is at Marshall	Previous preparedness efforts by the Red Cross and FEMA has failed to increase a change in people's preparedness within the US. Currently, existing	Guilt is studied as component of compliance gaining, which have consistently found that guilty feelings lead to increases in compliance, typically	The “pro-social” domain however has shown no evidence of a non-monotonic relationship (an inverse U) between level of guilt in the appeal of feelings of guilt and other outcomes as attitude change. With marketing or advertising appeals, there is an inherent conflict of interest in these types of	Guilt: closely related to the concept of remorse (Strickland, 2001) is an emotional experience that occurs when individuals become aware (whether	The methods used here messages via PSA given to heads of household to protect their families and get prepared. there were 229 participants drawn from a	This paper is great in that it examines one type of persuasive emotional appeal: guilt. I need to examine fear campaigns and positive outcome	No.	5. This is a really important paper. And it was short, well-written and excellent methodology.	(Turner & Underhill, 2012)	Guilt campaigns, persuasion, emergency preparedness, emotions, source, message receiver.

Appendix 3: Literature Review Table (sample)

Guilty Feelings	university, Department of Communication Studies).	emergency preparedness messages and public service announcements have employed informative and largely emotionally neutral messages; these campaigns inform audiences of actions but does not employ strategies known to impel people to action (546). The use of guilt is examined in the paper as a source of compelling persuasion techniques.	operationalized as helping behaviour (547). The Pinto and Priest study (1991) Pinto AND Priest study (199) examined the effect of low, moderate and high guilt appeal on purchase intentions. They posited a curvilinear effect of the intensity of guilt messages on the amount of guilt people experience: As the intensity of the guilt communicated in the appeals increased, guilty feelings would increase until a threshold point at which point felt guilt would begin to decrease (547). Another Pinto study with Worobetz (1992) showed that moderate	messages, which ultimately seek to sell a product or service.	justified or not) that they have violated a moral standard and are responsible for that violation (547).	random sample. One series of messages were informative, the other one was messages design to illicit guilt at low, medium and high frequencies. High guilt messages elicited negative consequences including anger towards the source...Guilt appeals can cause mixed emotions in message receivers. Behaviour was not significantly changed due to guilt campaigns, however anticipating guilty feelings was associated with positive persuasive outcomes, including higher levels of perceived importance to the of emergency preparedness, increased risk perceptions and increased behavioural	campaigns (McClure) further.			

Appendix 3: Literature Review Table (sample)

			guilt levels was the most effective.				intentions to take steps to prepare for an emergency. (556)					

Appendix 4: Social media from 04 September 2010



Canterbury CDEMGroup
@CanterburyEM



Following

Canterbury earthquake update 2 from Canterbury ECC:
<http://ecan.govt.nz/news-and-notices/news/Pages/earthquake-0710-040910.aspx>

RETWEETS

2



6:39 AM - 4 Sep 2010

 2



Canterbury CDEMGroup
@CanterburyEM



Following

<http://ecan.govt.nz/news-and-notices/news/pages/earthquake-1600-040910.aspx.aspx>
Update from the Canterbury CDEM Group

7:43 PM - 4 Sep 2010

 1

Appendix 5: SurveyMonkey Survey from Member Checks

Appendix 5: SurveyMonkey Survey from Member Checks

Member Checks - SMcBride PhD Thesis

About this Study - Information Sheet

Lessons from the Canterbury Earthquake Sequence: Member Checks Survey

This research is a part of a PhD research project at Massey University, in partnership with GNS Science and USGS. The topic of the PhD research looks at public education and communication about earthquakes before the Canterbury Earthquake Sequence. It will take approximately 20 - 30 minutes to complete this survey.

Your involvement

You were specifically chosen to be involved in the member checking process due to your connection or expertise regarding this research. "Member checking" is an important part of the research validation process, especially when the research relates to a specific community. It allows the researcher to explore whether their interpretations are consistent with or different from the perceptions of other people, thus enriching the data pool and identifying further concepts not explored in the initial part of the research. Members invited to comment on this research are people who were involved with the Public Education and Public Information Committee in Canterbury from 2000-2008, and several external practitioners working in New Zealand in public education during that time.

In this member checking process, the survey contains a summary of the researcher's key findings from a detailed analysis of the Q-Files. You will be asked to agree, disagree and/or comment and reflect on the findings by providing your perspective on these findings. Your responses will be used in the research only in aggregated, anonymised form, and individuals will not be identifiable. You have been provided with copies of the Q-Files

here: <https://www.dropbox.com/sh/mc1nnodywyayeiy/AADL94XW60pCXQZuBC921CiBa?dl=0>

It is recommended that you review these documents prior to participating in this survey. If you require access to the documents via email, please email sara.mcbride@gmail.com.

The researcher applied a critical analysis to the booklets, meaning the findings are examining a personal perspective on "lessons learned". The research used an interpretive insider perspective, meaning it does not claim that the findings are in any way universal or representative of all possible perspectives, but situates them very clearly as the researcher's individual interpretations. This is a valued and widely used research methodology in the humanities and social sciences. This research is not a negative reflection on any one individual or on the group as a whole who were involved with writing the booklets but rather a discussion on ways for improvement in future. It is important to note that the findings presented here are not the only findings in the research but rather the ones which relate directly to your community of practice.

(Cont...)

Member Checks - SMcBride PhD Thesis

Member Checkers and Your Rights

About Member Checks

Member checks are part of the process to determine validity of findings by the researcher (S. McBride). Disagreements in findings are just as important as agreements for this research and if you disagree with a specific finding, please communicate this using the survey. Your views are crucial to the overall success of this research and your honesty is appreciated.

Note: People were specifically chosen to be involved in the survey. Do not forward this survey or related documentation on to others, as these are preliminary findings.

About your rights

All participation is anonymous and voluntary. You will not be identified at any time during this study. You are under no obligation to accept this invitation to participate. If you decide to participate, you have the right to:

-
- decline to answer any particular question
- withdraw from the study by stopping participation in this survey
- ask any questions about the study at any time during provide information on the understanding that your name will not be used unless you give permission to the researcher
- be given access to a summary of the findings when the research is concluded.

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 13/44. If you have any concerns about the conduct of the research, please contact Dr. Nathan Matthews, Chair, Massey University Human Ethics Committee: Southern B, telephone +64-6-350-5799 x 80877 or email humanethicssouthb@massey.ac.nz.

If you have any questions, you can contact the researcher on sara.mcbride@gmail.com or the Primary Supervisor, Associate Professor Elspeth Tilley at e.tilley@massey.ac.nz.

Thank you,
Sara
K. McBride

Member Checks - SMcBride PhD Thesis

Participant Consent

1. PARTICIPANT CONSENT

I have read the information provided and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree/do not agree (select one function) to participate in this study under the conditions set out in the Information Sheet.

☐ I agree to participate in this study under the conditions set out in Information Sheet

☐ I do not agree to participate in this study under the conditions set out in Information Sheet

Member Checks - SMcBride PhD Thesis

Demographics

2. Were you involved in the Public Education Public Information Committee in Canterbury at any time from 2000 - 2009?

Yes

No

If yes, please specify what your role was on the committee:

3. How would you identify yourself professionally?

Professional Communicator (Public Relations/Media Management/Marketing) Scientist

Science Communicator Project

Manager Administrator

Hazard Analyst Policy

Analyst

Emergency Manager

Other (please specify)

4. Were you involved in writing, editing, project managing or in some other way, in the creation of the Q- Files?

Yes

No

If yes, please specify how you were involved

5. If yes, when?

Member Checks - SMcBride PhD Thesis

Jargon/Technospeak

For this page, please indicate if you agree or disagree, and place any comments below.

6. Readability tests performed on the documents indicate that some of these were written at a second year university level. Only 20 percent of Cantabrians (N.Z. Census, 2006) reached this level of education. These means potentially 80 percent of the population could have been excluded from easily accessing the information in the booklets due to its difficult reading level. Future preparedness campaigns would benefit from pre-testing readability and aiming for more widely accessible language levels.

Agree

Disagree

Other (please specify)

7. In addition to jargon and difficult readability, the booklets contained some acronyms that were not explained to the reader. Some examples include organisational names like NIWA, GNS Science, and USGS were not given relevant context for the reader in some, but not all, the booklets. This use of acronyms contributed to the exclusive language of these booklets. Future preparedness communication should avoid using acronyms.

Agree

Disagree

Other (please specify)

8. The Q-Files contained jargon and lengthy scientific explanations. This may have alienated readers not coming from scientific backgrounds and should be minimised in future preparedness communication.

☐ Agree

☐ Disagree

Comments:

Member Checks - SMcBride PhD Thesis

Exclusive narrative

For this page, please indicate if you agree or disagree, and place any comments below.

9. No other narratives, including those of Māori, were presented in the booklets. This is despite the presence of Māori in Canterbury for more than 1,000 years. There was no acknowledgement of the Māori oral histories regarding earthquakes in Canterbury (in Christchurch and Banks Peninsula) even though these stories exist. This exclusion of other perspectives may have contributed to different groups not engaging with the booklets.

Agree

Disagree

Other (please specify)

10. Why do you think these exclusions occurred? In future, what additional steps or processes have you used in other work that you would recommend?

11. The booklets contained predominately scientifically acceptable information.

Agree

Disagree

Other (please specify)

Member Checks - SMcBride PhD Thesis

Fatalism

For this page, please indicate if you agree or disagree, and place any comments below.

12. The booklets contained predominately scientific information with less emphasis on messages about how to prepare for emergencies. This may have alienated people with other perspectives.

Agree

Disagree

Other (please specify)

13. In the later editions (2007-2009), one page at the back of each booklet provided preparedness and mitigation advice, but did not specifically explain why each action should be taken (e.g. with respect to how it would mitigate the hazard), or how it related to personal circumstances. The booklets should have contained more positive messaging regarding preparedness actions to engage readers more effectively.

Agree

Disagree

Other (please specify)

Member Checks - SMcBride PhD Thesis

Threat/Fear appeals

For this page, please indicate if you agree or disagree, and place any comments below.

14. The first editions of Q Files (2000-2002) and some of the second editions (2007-2008) contain fear inducing or threatening language for some readers. The use of threat or fear inducing messaging can, based on research, alienate or even anger audiences. How would you recommend addressing this in future?

☐

Agree

☐

Disagree

Other (please specify)

Member Checks - SMcBride PhD Thesis

Requiring people to think like experts

For this page, please indicate if you agree or disagree, and place any comments below.

15. There were many examples of providing definitions in the booklets. For example, in the 2001 edition of "Defining Moments in Nature": Risk is the combined effect of the probability that an event will occur and the damage it might do.

In the 2008 edition: Risk is the combination of the likelihood of an event occurring and the potential consequences of that event.

Do you think providing definitions is necessary for influencing people to prepare for earthquakes?

☐ Agree

☐ Disagree

Other (please specify)

16. Is there value in providing definitions of risk, natural hazards, natural events and disasters in these kind of documents? And, if so, what would that be?

Member Checks - SMcBride PhD Thesis

Echo Chambers

Information regarding echo chambers and how we can break these.

17. The preliminary findings are that these booklets were written for people who were engineers, scientists, planners, or emergency managers by engineers, scientists, planners, or emergency managers. This is sometimes described as the “echo chamber” effect, where people associate and communicate with like- minded people only, often excluding other narratives, ideas, concepts or beliefs that are contrary to their own.

☐ Agree

☐ Disagree

Other (please specify)

18. If you agree that an "echo chamber" was created, how would you recommend "breaking the echo chamber" in future for other groups?

Member Checks - SMcBride PhD Thesis

Barriers to successful public education/communication campaigns

These questions provide suggested themes for answers, based on your perspective and experience. However, please use the comment box for any other themes, ideas or concerns that you think further address the question.

19. On reflection, what do you think were some of the barriers to communicating effectively about earthquakes prior to the Canterbury Sequence:

☐

Lack of time

☐

No or little political will Budgetary

☐

constraints

☐

No or little support from management in your organisation

☐

No or little direction from the Ministry of Civil Defence and Emergency Management

☐

No or little direction from the Canterbury CDEM Group

☐

Lack of scientific support or information from GNS Science

☐

Personal conflicts with members in PEPI

☐

Few people in Canterbury believed an earthquake could happen in their lifetime

☐

Shortcomings in skillsets from professional communicators

Other (please specify)

375

Appendix 5: SurveyMonkey Survey from Member Checks

20. Canterbury's emergency preparedness levels are dropping, from 32 percent (2012) to 22 percent (2014) (Colmar Brunton, 2014). What do you see are the barriers now to earthquake preparedness campaigns?

☐ Lack of scientific support or information from GNS Science or other agencies

☐ No or little direction from the Canterbury CDEM Group

☐ No or little direction or support from the Ministry of Civil Defence and
Emergency Management

☐ Budgetary constraints

☐ Lack of support from the research community No or little political will

☐ No or little support from the management of your organisation

☐ Too much work post-earthquake to focus on public education/communication

Other (please specify)

21. When you reflect on your experience working on public education/public communication campaigns, with the retrospective knowledge you have now, what do you wish you had known then that you know now?

Member Checks - SMcBride PhD Thesis

Thank you.

I appreciate the time and effort you put in to filling out this survey. Your insights are extremely valuable to this study.

I can provide you with a short summary of the member check results, after the research has been completed, on request. Results will be published in the thesis *The Canterbury Tales: Learnings from the Canterbury Earthquake Sequence* to inform better public communication campaigns.

22. Please leave any last comments here:

Appendix 7: Ethics Documents



MASSEY UNIVERSITY
TE KŪNENGA KI PŪREHUROA

9 July 2013

Sara McBride
1 Fairway Avenue
LOWER HUTT

Dear Sara

Re: HEC: Southern B Application – 13/44
The Canterbury Tales: Learnings from the Canterbury Earthquake sequence in New Zealand to inform public education design for other lower seismic hazard zones

Thank you for your letter dated 5 July 2013.

On behalf of the Massey University Human Ethics Committee: Southern B I am pleased to advise you that the ethics of your application are now approved. Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

Dr Nathan Matthews, Chair
Massey University Human Ethics Committee: Southern B

cc Dr Elspeth Tilley
School of Communication, Journalism
& Marketing
WELLINGTON

Prof Malcolm Wright, HoS
School of Communication, Journalism
& Marketing
WELLINGTON

Massey University Human Ethics Committee
Accredited by the Health Research Council
Research Ethics Office

Massey University, Private Bag 11222, Palmerston North 4640, New Zealand T 06 832 1573 040 310 1573 F 06 832 1522
E humanethics@massey.ac.nz info.ethics@massey.ac.nz pte@massey.ac.nz www.massey.ac.nz



Lessons from the Canterbury Earthquake Sequence:

Public education research and document data analysis

INFORMATION SHEET

Introduction

As part of a PhD project at Massey University and in partnership with the United States Geological Survey (USGS) and the Crown Research Institute for Geological and Nuclear Sciences (G.N.S. Science), I am conducting a study about public education in emergencies and earthquake information to identify:

- (a) What public education materials on seismic risk were available to members of the public before the Canterbury earthquake sequence;
- (b) What materials were effective to communicate the risk and what werenot;
- (c) What were common beliefs regarding seismic risk before the earthquakes; and
- (d) Were residents adequately informed and prepared for earthquakes?

The analysis will begin in July 2013. The findings from the study will be used to develop guidance on how to create a more effective public education programme regarding earthquake. To carry out this research, documents, surveys, research and reports may be requested by the researcher for analysis. The researcher may also request your assistance, as a subject matter expert, to discuss the findings to better inform this project and to assist with data collection, if required. You will be part of a small group of subject matter experts to assist in determining the validity of the thematic findings of this research project. This is to ensure the project is robust and thorough.

This is part of a PhD project at Massey University. Funding for this project has been provided through the Natural Hazards Research Platform via GNS Science, with co-funding from the USGS.

Project Procedures

All data will be collected, used and stored in compliance with the Massey University Code of Ethical Conduct.

Participant's Rights

You are under no obligation to participate in this research. If you decide to participate, you have the right to:

- ☐ decline to answer any particular question;
- ☐ withdraw from the study at any time before the results are sent for publication;
- ☐ ask any questions about the study at any time during participation;
- ☐ provide information on the understanding that your name will not be used unless you give permission to the researcher;
- ☐ be given access to a summary of the project findings when it is concluded. Once available, project findings will be published on the Massey University School of Communication, Journalism & Marketing website at: <http://communication.massey.ac.nz/>

Project Contacts

For further information about the project, please contact: Sara K. McBride, GNS Science, P.O. Box 30386, Avalon, Lower Hutt New Zealand, 5010

Ph: +64-21-269-0312. Email: s.mcbride@gns.cri.nz or sara.mcbride@gmail.com

Dr. Elspeth Tilley, Massey University, Phone: +64-4-801-5799,
Extension: 62543

E-mail: E.Tilley@massey.ac.nz

P.O. BOX 756, Wellington, New Zealand 6041

Dr. David Johnston, GNS Science and Massey University,

Box 30386, Avalon, Lower Hutt Ph: 04 570 1444,

Email: david.johnston@gns.cri.nz

Project Evaluation and Ethical Approval

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern B, Application 13/44. If you have any concerns about the conduct of the research, please contact Dr. Nathan Matthews, Chair, Massey University Human Ethics Committee: Southern B, telephone +64-6-350-5799 x 80877 or email humanethicssouthb@massey.ac.nz.

USE OF DATA

GNS Science and U.S.G.S. have the right to use the aggregate data, which does not identify individuals, to improve the safety of all communities.

Defining moments in nature

Natural events, natural disasters, natural hazards, risk
what's the difference?



What's in a Name?

Natural events, natural disasters, natural hazards and risk are terms that can be confusing. This is not surprising, after all they are closely linked. However, if we are to work together to get the best results for Canterbury's communities, then we need to make sure we are all talking the same language.

The Key Terms Defined

Natural events

- extremes of natural processes that can be classified into two groups,
 - climatological (for example, strong winds, snow, rain and wildfires)
 - geophysical (for example, earthquakes, tsunamis, landslides and volcanic eruptions)

Natural disasters

- the actual impact of extreme natural events on human use of an area (for example, when part of a city or farmland is flooded and there is damage, loss and disruption)

Natural hazards

- the actual or potential interaction between extreme natural events and human activities

Risk

- the combined effect of the probability that an event will occur and the damage it might do

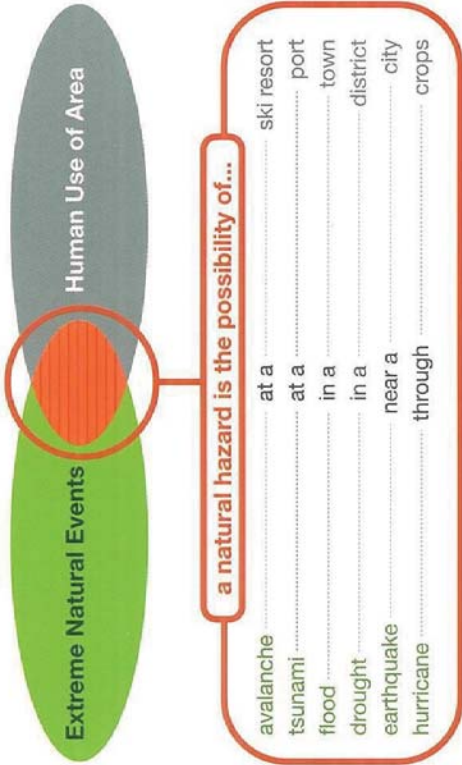
"When I use a word," Humpty Dumpty said in a rather scornful tone, "it means just what I choose it to mean, – neither more nor less."

Lewis Carroll "Through the Looking Glass"

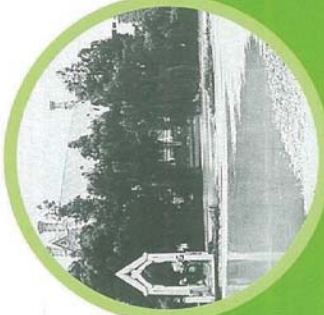
Defining Moments in Nature
– Original 2000 edition

What makes a Natural Hazard?

Assets + People + Natural Occurrences = Natural Hazards



When an extreme natural event interacts with human occupation and use of an area then the outcome may range from a nuisance to a catastrophe. This outcome is a cost to the community. The cost of natural hazard damage includes damage to life, property and the environment.



Waimakariri River Flood, 1868

Flooding near the Canterbury Provincial Council Buildings. The Waimakariri River overflowed near Halkett and entered old channels and flowed through Avonhead and Fendalton to the Avon River.

1875

1900

Defining Moments in Nature
– Original 2000 edition

Managing Natural Hazards

It's a risky business

Before steps are taken to reduce a natural hazard – that is, the potential impact of natural events, the likelihood of a particular event occurring needs to be known.

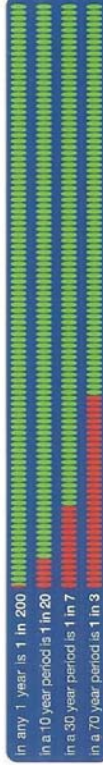
The chance of a natural event occurring is defined in the same way as any other infrequent but recurring event. The chance of an earthquake can be estimated by counting how many earthquakes of a certain size have occurred over a given period of time. For example, if there have been eight earthquakes of a certain size in the last 150 years, then an earthquake of that size has occurred every 18.7 years on average. The chance of another earthquake this size in any one year is 1 in 18.7 (approximately 1 in 20).

A flood in the Ashburton River with a flow of 1,960 cubic metres per second is described as a "1 in 200 year flood". This means a flood this size or larger is likely to occur about once every 200 years. This does not mean that if a "200 year flood" occurs, it will not reoccur for another 200 years. In fact, there is a 0.5% chance it will be equalled or exceeded in any year.

Time will tell

With time the probability of experiencing a natural event changes.

For example, the chance of a "1 in 200 year" flood occurring...



Cheviot Earthquake, 1901

"A terrible earthquake this morning [15 November 1901] at a quarter to eight. There is a mass of ruins at Cheviot... shook a traction engine over, and a man out of his coffin."
(Diary entry, Harry Richard Willis)

1900

1925

1950

Defining Moments in Nature
– Original 2000 edition

Mitigating the hazard

Mitigation means moderating or reducing a natural hazard, that is the effects a natural event could have. There are three main ways to mitigate natural hazards:

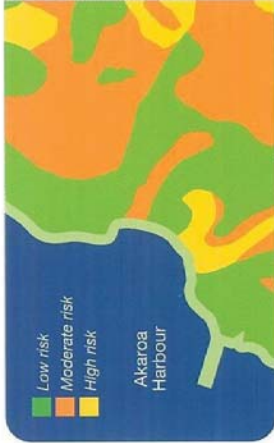
1 Modify the natural event (for example retaining walls, stopbanks and sea walls)

Stopbanks prevent flooding, up to a design level. Their appeal lies in their direct and specific results. Stopbanks cannot be built high enough to protect against all floods. The consequences of their overtopping and failure during a major flood may be severe.



2 Modify proneness to damage (for example avoiding places where an event is likely to occur or strengthening buildings)

Slope stability hazard maps can help make decisions on where development should take place and on other land use issues. Hazard maps are a useful and effective way to present technical hazard information to planners, emergency management officers and engineers.



Kaikoura Flood, 1923

"It went through again next day and it reached 19 inches higher than any previous flood level. There was 3 foot of water at Flowers store while it was up to the door handle on the Dairy Company's office." (Marlborough Catchment Board notes)

1925

1950

1975



Engineering design and detailing will reduce damage to the James Hight Library complex at the University of Canterbury. To prevent the buildings swaying and smashing against each other during an earthquake, the buildings have been connected with special seismically articulated pins. The photograph shows an articulated pin in the floor. This means the buildings will move in sympathy with each other, rather than bang into each other in a large earthquake.

③ Minimise the consequences of disaster (for example emergency management planning)

Response plans provide a decision-making framework and assist organisations to respond effectively to natural hazard events, and enable prompt recovery of essential community facilities and services. Important features of a response plan include a list of people with designated emergency response roles, and key initial actions and procedures needed to obtain essential resources.



Mitigation methods ① and ② work by cancelling or reducing at least one of the two factors that interact to create a natural hazard. Take away one of those factors and you take away the hazard.

Mitigation method ③ deals with natural disasters that occur when a hazard becomes a reality.



Arthur's Pass Earthquake, 1929

A magnitude 7 earthquake felt over all of New Zealand except Northland. Numerous large landslides occurred in a narrow belt 40 kilometres long by four kilometres wide along the Kakapo fault.

1925

1950

1975

9

Defining Moments in Nature
– Original 2000 edition

Risk

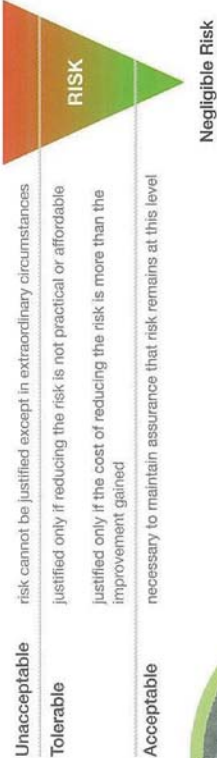


Understanding risk is important for two reasons. First, knowing the risk factors helps identify ways of reducing risk. Second, being able to calculate a value for risk helps with setting priorities.

To assess risk we need to know the probability of an event occurring, and its consequences.

The risk to an office building in a magnitude 7.0 earthquake can be found by multiplying the probability of the earthquake by the damage it would cause. The predicted consequences might be that the building will collapse. If the building was occupied the consequences could also include death and injury.

The probability of such an earthquake is low, but because the consequences could be severe, the risk would be assessed as high. For a similar building that seldom contains people the risk would be much lower.



High winds in Canterbury, 1975

The peak wind speed in the August 1975 storm was 193 kilometres per hour. About \$13 million damage occurred to exotic forests and 12,600 insurance claims were made for damage to structures.



Defining Moments in Nature
– Original 2000 edition

So how do we reduce (mitigate) these risks?

No way has yet been found to modify earthquakes, but mitigation methods **2** and **3** (explained on page 4 & 5) can still be considered.

Modifying buildings to resist collapse can reduce risk and developing plans to evacuate and rescue any people who may be in the buildings could further reduce the risk.

The best laid plans

Despite everybody's best intentions it is difficult to completely mitigate natural hazards and residual risk is always a factor. Residual risk is the risk of a natural event having an impact on people and property despite having a level of protection in place.

There is always a risk that in spite of existing stopbanks, and other flood mitigation structures, flood waters will not be contained. Stopbanks can be breached or overtopped by flood events larger than they have been designed for. Land use controls and higher floor levels are effective ways to reduce residual risk.



Houses with raised foundations, Heathcote River.



South Canterbury Flood, 1986
Large areas of South Canterbury were flooded in March 1986. Along the Waihao River, 13 kilometres of stopbanks failed and about 20km² of farmland flooded.

2000

2025

Defining Moments in Nature
– Original 2000 edition

Natural Hazards Management in Practice

Some Canterbury examples

Blandswood, Peel Forest, South Canterbury

The lower part of Blandswood is exposed to flash floods from Kowhai Stream. Environment Canterbury, in consultation with the Blandswood community, has put a series of flood warning initiatives in place including flood warning signs and notices.



Waikuku Beach Settlement, Ashley River

Sand fences have been built to reduce the flood risk to the beach settlement. The fences trap wind-blown sand and help raise the level of the beach. The beach level has increased generally between 0.4 and 0.8 metres, and in places up to 1.2 metres.



Canterbury Drought, 1987/88

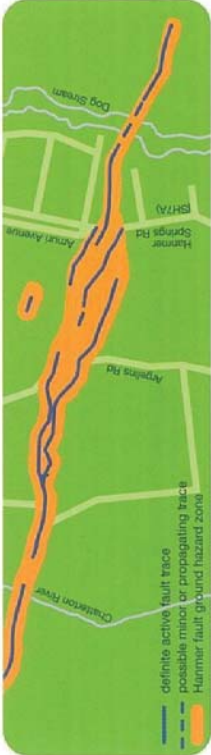
There is, on average, one significant drought every six years in Canterbury. The impacts of severe drought are generally widespread and costs to the region are often difficult to separate from costs to New Zealand.



Defining Moments in Nature
– Original 2000 edition

Hanmer Springs, North Canterbury

An earthquake fault hazard map shows where detailed geological investigations are required. This information is used to ensure that new structures are located and designed appropriately.



Timaru District Engineering Lifelines Project

Natural hazards have been assessed for the Timaru district. These hazards include extreme meteorological events (wind, snow, lightning and rainfall), earthquakes (ground shaking, liquefaction, active faulting and slope instability), tsunami and storm surge flooding. The owners and operators of the engineering lifelines and emergency services are using this information to assess the vulnerability of their lifelines or services and to make them more robust. Engineering lifelines include water supply, sewer, drainage, telecommunications, electricity supply and distribution, broadcasting and transport networks.



Canterbury Snowfall, 1992

The August 1992 snowfall of about 25cm was the second largest to have affected Christchurch after the 1945 snowfall of 28cm. This snowfall has a recurrence interval of about 50 to 100 years.

2000

2025

Defining Moments in Nature
– Original 2000 edition

Emergency Management Exercises

Environment Canterbury promotes community preparedness for disasters. This can reduce damage, disruption and suffering. Exercises improve community preparedness and test the operational capability of emergency management organisations, the interaction and co-ordination between emergency services, and the effectiveness of response plans.



Environment Canterbury's Role

A major function of Environment Canterbury is to reduce the impact natural events have on communities. This includes investigations and monitoring, planning, emergency management, warning and protection, and advice and education.

Canterbury has always experienced extreme natural events, some localised and some widespread. As we occupy and develop the region these events will sometimes cause disasters.

The likelihood of being directly affected by an extreme natural event is low, but the impact if it happens can be severe. Not only on life, property and economic activity, but in the emotional scars that often remain long after material damage has been repaired.

Environment Canterbury and other agencies, and individuals are constantly trying to minimise risk. However, the only promise any of these efforts bring is of less frequent natural disasters and less impact when one does occur.

"Few headlines are so alarming, perplexing, and personal in their implications as those concerning safety. Frightening stories jolt our early morning complacency so frequently that we wonder whether things can really be that bad. We hardly know which cries of "Wolf!" to respond to; but we dare not forget that even in the fairy tale, the wolf really did come."

W.W. Lawrance "Of Acceptable Risk"

Defining Moments in Nature
– Original 2000 edition

Environment Canterbury

58 Kilmore Street
PO Box 345
Christchurch
New Zealand
Telephone: (03) 365 3828
Fax: (03) 365 3194
Email: peter.kingsbury@ecan.govt.nz

75 Church Street
PO Box 550
Timaru
Telephone: (03) 688 9069
Fax: (03) 688 9067

Customer Services
Telephone: 0800 EC INFO (0800 324 636)

Website: www.ecan.govt.nz



**Environment
Canterbury**
Your regional council

Environment Canterbury Regional Council

Living on a floodplain



Everything is connected



What you can do

Make sure you know about:

- how floods could happen in your area
 - rivers
 - small streams
 - local runoff
 - coastal (seawater) flooding
- local flood protection measures
 - are there stopbanks?
 - what flow can they contain?
 - requirements for the height of floors in new buildings
- how often it could flood at your house
- evacuation plans for your area
 - where is the nearest safe high ground?
 - could your evacuation route be cut off by floodwaters?
- flood warning procedures
 - visit www.ecan.govt.nz
 - the Civil Defence page in the back of the local phonebook.

Check your house insurance policy with your insurance company
Think about where you store your photos, valuables and important documents.

Much of Canterbury is prone to flooding

Disastrous floods have struck many areas in Canterbury at some time over the past 100 years.

Flood protection measures, such as stopbanks, help prevent flooding.

In extreme floods, floodwaters will overtop stopbanks and serious flooding may result.

Stopbanks can be eroded in more modest floods, causing breaches and flooding onto adjacent land.

If floodwaters enter an average-sized house, the costs of water damage may be around \$100,000.



What are the chances of a flood affecting my house?

If you live on a floodplain, the chance of a major flood in any given year is about 1 in 50.

This means that over the next 50 years, there will almost definitely be a major flood.

For example, over the next ten years, the chances of that flood happening are about one in five, and over the next 30 years, the chances are about one in two.

In comparison...

The chance of your house being damaged by a fire in any given year is about 1 in 400.

Therefore, a house on a floodplain is about eight times more likely to be flooded than be damaged by fire!



During floods

During floods Environment Canterbury provides information on rainfall, rivers and flooding via:

- the River Report info line – 0900 74837
- our website – www.ecan.govt.nz
- local radio stations
- your local Civil Defence and emergency services.



What Environment Canterbury can do for you

We can provide you site-specific information on:

- historic flooding (river or coastal)
- potential sources of flooding
- expected flood frequency
- flood depths
- floor heights for new buildings
- flood protection.

Environment Canterbury offices

Kaikoura District
Kaikoura Office
P. 03 319 5781
F. 03 319 5809

South of the Rakaka River
Timaru Office
P. 03 687 7800
F. 03 687 7808

North of the Rakaka River
Christchurch Office
P. 03 365 3828
F. 03 365 3194

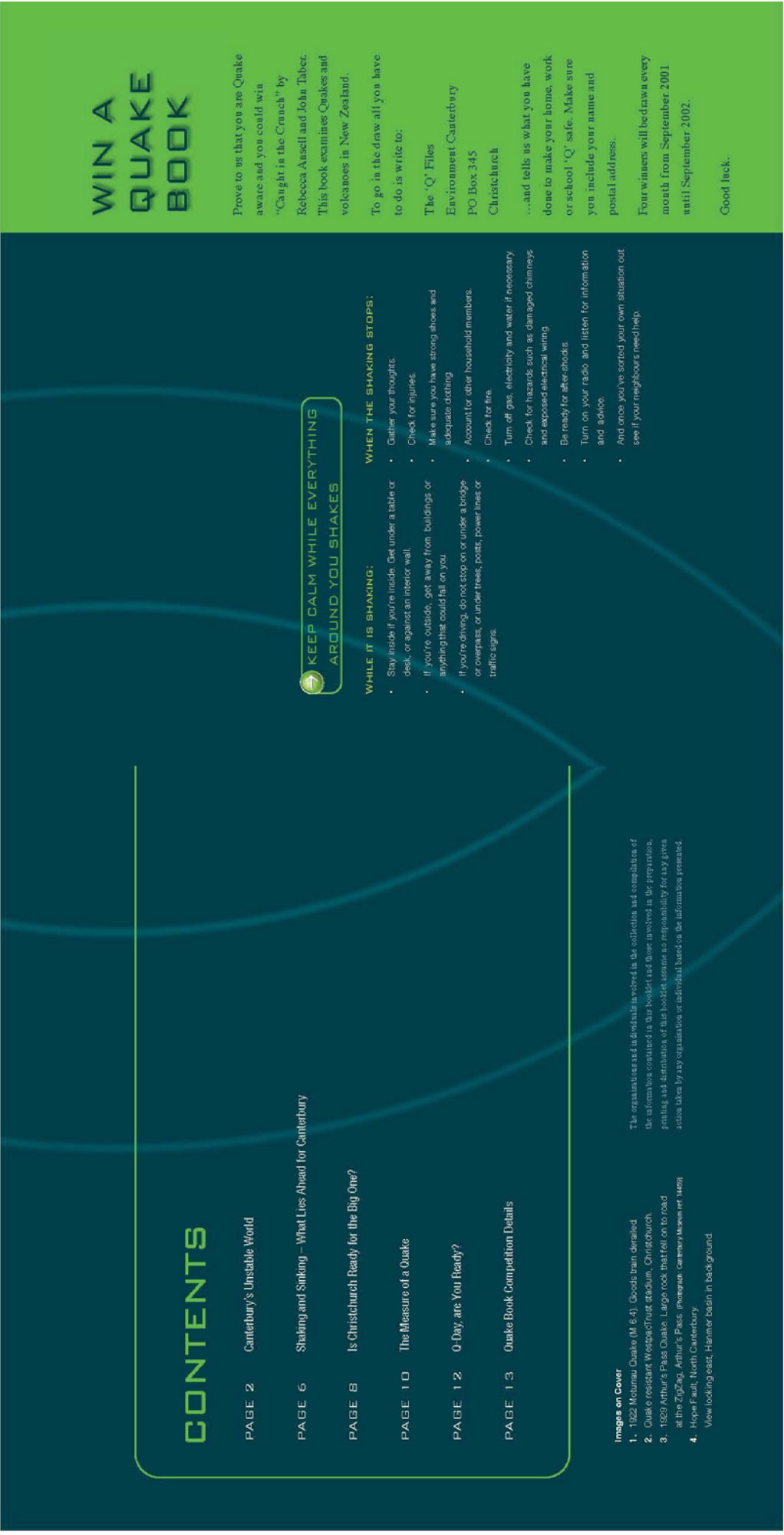
Environment Canterbury Regional Council

Everything is connected
Promoting quality of life through
balanced resource management.
www.ecan.govt.nz

Living on a
Flood Plain,
2009 (not a
Q-Files
booklet but
related
hazards
booklet.



Exposing Canterbury’s Shaky Future, 2000 (original edition)



Exposing Canterbury's Shaky Future, 2000 (original edition)

turn to right

STRENGTH-ENERGY
RICHTER SCALE
MAGNITUDE RATING

000,000,000 million ergs released
or up to the amount of energy it takes to
move one gram of steel one centimetre in
one second

as equivalent event

turn to left

INTENSITY-DAMAGE
MODIFIED MERCALLI SCALE
MM RATING

physical results

THE Q FILES

'Q' DAY – ARE YOU READY?

It is only a matter of time before a large Quake rocks Canterbury. It could happen today, tomorrow or in 10 years or more, but it will happen. Here are some simple precautions to help reduce damage and disruption.

GET READY NOW OR PAY LATER

CORRIDORS

- post-exercises for children, adults and dogs
- keep objects lying out of corridors and stairways
- use heavy-duty wedges

APPLIANCES

- water appliances (washing machines, computers, etc.) should be turned off
- use sturdy poles for Black to secure pots, fences, trees and other ornaments

ORNAMENTS

- use sturdy poles for Black to secure pots, fences, trees and other ornaments

FOUNDATIONS

- check that foundations are supported for floor of your house is properly secured to the foundations
- anchor poles can make a big difference
- ensure contact professional

SOLID FUEL STOVES

- fire standing and good fuel delivery and heaters must be secured to the floor

CHIMNEYS

- make sure your chimney is set off to the side of your house with metal bands

SLOPES, BANKS, WALLS

- make regular checks for cracks and distortion, especially on stone walls
- plan ground cover on unstable slopes or built a retaining wall

HEADERS/TANKS

- make sure you have a good head of water to make sure you get enough water into the storage tank

HOT WATER CYLINDERS

- strength supports the wall

FOR MORE INFORMATION VISIT

www.qcd.govt.nz

OR CALL EQC ON 0800 652 333

THE Q FILES

THE HIDDEN DANGER

There is a hidden threat inside the Earth. However it is real, and it is dangerous. This threat is so great, so powerful that it is almost impossible to understand. When it comes the results could be devastating – and it will come. It is only a matter of time.

Quakes.

The 'Q' Files unearthing Canterbury's hidden threat...

Can you spot the Alpine Fault? (Don't worry)



THE Q FILES

CANTERBURY'S UNSTABLE WORLD

THE EARTH MOVES

A TICKING BOMB BENEATH THE SURFACE

Our world is built on massive slabs of rock that move slowly across the Earth's surface. The energy stored by these rigid plates moving against each other is enormous. When the stress becomes too great they break and the Earth Quakes. The energy is released along weak zones called faults. These faults can rupture abruptly and violently during a Quake. Directly beneath New Zealand two giant plates, the Australian and the Pacific, collide. These forces in the Earth's crust make New Zealand a highly active Quake zone. The situation is made even more extreme for Canterbury because of the Alpine Fault. This fault is the 'you and I' boundary of the Australian and Pacific Plates. Name's giant forces are a constant threat.

THE FUTURE IS DEVASTATINGLY CLEAR

The Alpine Fault, by shaping the past, guarantees the future. In 1450, 1650 and 1771 it produced magnitude 8 Quakes. Using this information Quake scientists estimate there is a 65% chance that there will be a magnitude 8 Quake on the Alpine Fault over the next 50 years. This rupture will have a major and possibly devastating impact on Canterbury. Canterbury's future is definitely shaky.

Exposing Canterbury's Shaky Future, 2000 (original edition)

399

SIGNIFICANT CANTERBURY QUAKES

There were eight Quakes between 1840 and 1929 that caused significant building or contents damage in Christchurch. Since then nature has allowed Canterbury an uneasy reprieve. There were also significant Quakes in 1994 and 1995 however they produced relatively short duration shaking in Christchurch, resulting in only minor damage. Accordingly current residents, at their peril, have become complacent, not understanding or appreciating the danger.

This fence (which was once straight) across the Hope Fault was displaced by 2.6m during the 1868 North Canterbury Quake.



(MM = Modified Mercalli Intensity Scale, refer to page 10)

4. JUNE 1869

4 JUNE 1005
THE CHRISTCHURCH QUAKE

RATING magnitude 5, MM VII at epicentre
DAMAGE widespread chimney destruction, stone
building damage

REPORTS "The house was violently shaken to the core destruction of chimneys, crockery and chimney ornaments."

31 AUGUST 1870

RATING magnitude 5.5, MM VI in Christchurch, Banks Peninsula and as far south as Rakara

DAMAGE household contents, chimneys, minor structural damage, rock falls

REMARKS "Thesea jumped and boiled"

5 DECEMBER 1991

3 DECEMBER 1981
THE CASTLE HILL QUAKE

PLATING magnitude 6, MM VI in Oxford and
MM V in Christchurch

DAMAGE Christchurch Cathedral spire damaged, broken windows, household contents, chimneys, Avon river stopped flowing

31 AUGUST 1988

01 AUGUST 1 0000
THE NORTH CANTERBURY QUAKE

RATING magnitude 7-7.3, MM IX in the epicentral area, MM VII in Christchurch

DAMAGE surface rupture of Hope Fault, severe damage to slopes and buildings, landslides, liquefaction. Christchurch Cathedral damaged.

15 NOVEMBER 1991

THE CHEVIOT QUAKE

RATING magnitude 6.9, MM IX in Chevol, MM VI in Christchurch

DAMAGE widespread contents damaged, cracks to stone work, broken windows, damaged chimneys and Christchurch Cathedral spire, widely reported liquefaction

REPORTS "The time was about quarter to eight, and suddenly without the slightest warning all hell was let loose.... there is a mass of ruins at Chevrolat."

25 DECEMBER 1999

23 DECEMBER 1994
THE MOTUNAU QUAKE

RATING magnitude 6.4, MM VII Mcunau, MM VI in Christchurch and MM V in Ashburton

DAMAGE: extensive damage in North Canterbury
 crockery and household items broken in
 Christchurch, liquefaction on beaches
 and river flats

QUAKE RESISTANT

The design of major buildings in Canterbury must take into account the likelihood of Quakes in the region. Although it is almost impossible to make buildings Quake proof, it is possible to make them Quake resistant.

Information on Quake resistant building design, supplied by Holmes Consulting Group – structural and civil engineers.

ENVIRONMENT CANTERBURY IN THE HAZARD ZONE

Environment Canterbury is aware of the Quake risk, and is carrying out studies to better understand the Quake hazard. Canterbury is vulnerable to damage from a number of natural events, not just Quakes. These include flooding, drought, landslides, coastal erosion, and tsunami. The Resource Management Act (1991) and other legislation requires Environment Canterbury to plan to avoid or lessen the effects of these events.



THE WE-STRACTRUST STADIUM seats 8200 people and has been specifically designed with Oudes in mind. The stadium building is made up of seven separated structures. This means that during a Quake each structure is able to move independently from each other, rather than tear each section apart. The roof is securely attached to one of the concrete structures and rests on large sliding bearings on the other structures.

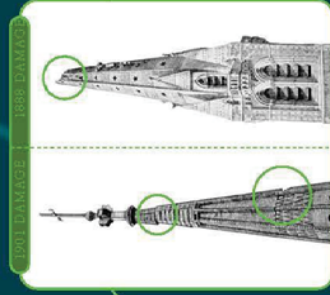


Four buildings from the **JAMES HIGHT LIBRARY COMPLEX** at the University of Canterbury in a quake these buildings could have swayed and smashed against each other. To prevent this, the buildings have been connected with special seismically articulated pins. The photograph above shows an articulated pin in the floor. This means the buildings will move with respect to each other, rather than being into each other in a large quake.

↑ 'Q' EXPERTS

PETER KINGSBURY, ENVIRONMENT CANTEBURY

CHRIS GORDON, LEWIS AND BARROW LTD -
CONSULTANT ENGINEERS



The **CHRISTCHURCH CATHEDRAL** has been damaged by Quakes on three separate occasions. The most notable was the 1988 North Canterbury Quake, magnitude 7.3. This Quake caused a partial collapse of the spire. At present the Cathedral is undergoing a strengthening programme (started in 1990 and to be completed in 2002) which has included significant cross-bracing and strengthening to the roof of the side aisles. Two new concrete-archer walls (walls that give lateral support) have been constructed in the transept area and another two concrete shear walls have been constructed between the west wall

THE ARTHUR'S PASS QUAKE

FLATING magnitude 7, M41 VIII near Arthur's Pass and
1.0.9.1.0 in. Cheltenham.

JUNE 1929

THE BULLER QU

RATING magnitude 7.8 (mod)

New V-VI across Canterbury

DAMAGE damage to roads, bridges, buildings and other

structures, and pure, earnings

100

18 JUNE 1994
Agriculture, Forest, and Wildlife

ARTHUR S. PASS WUANE

RATING magnitude 6.7, MM III-VI in Christchurch

DAMAGE major ellipse, slumping and cracking of Arthur's

Pass/City road and damage to buildings and contents in

100

24 NOVEMBER

THE CASS QUAKE

RATING magnitude 6.3

DAMAGE some damage reported at Arthur's Pass. Cause

and Mount White Station



McGilligan's butcher shop in Chovioz was severely damaged during the 1901 Cheviot Quake which measured magnitude 6.9. These photographs show the front and back of the shop.
(photographs: Canterbury Museum, ref. 1754)



PAGE 5

SHAKING AND SINKING
WHAT LIES AHEAD FOR GANTERBURY

 WAVES OF DESTRUCTION

In a Quake the ground will shake. A Quake releases energy which travels at, and below, the Earth's surface as seismic waves. These waves cause ground shaking.

A Quake generates three main types of seismic waves. The first waves to arrive are the P waves, which are often heard rather than felt, hitting a house with a bang or a boom. They generate forward and back movement as the Earth compresses and expands. They are followed by the bigger and more destructive S waves, which shake the ground from side to side, causing structures to vibrate dangerously. Shallow Quake's also generate surface (L) waves. These waves are the last to arrive but cause the most severe shaking.


CANTERBURY LIQUEFIED

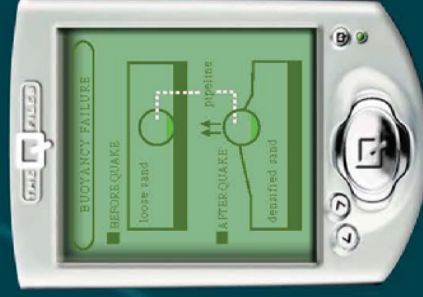
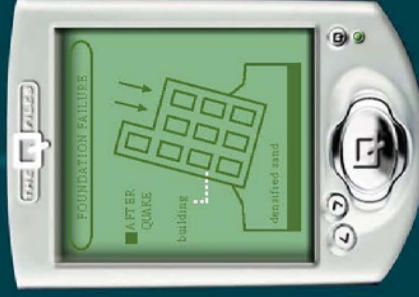
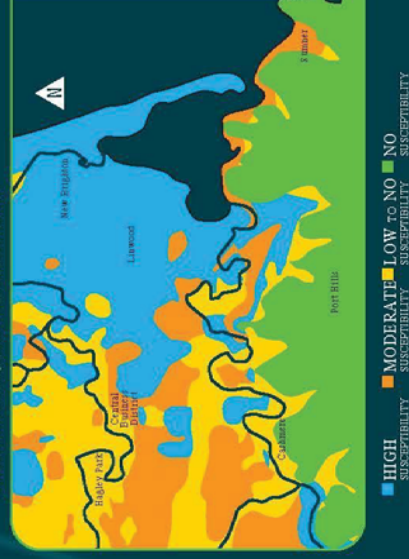
During a big Quake some local areas in Canterbury may experience ground *liquefaction*.

Liquefaction occurs when a Quake's seismic waves pass through water saturated soil. The waves shake the soil particles apart. With the soil particles no longer in contact with each other water fills the gaps. The soil and water are now loosely mixed together causing near surface ground layers to become more like a liquid than a solid.

When soil becomes liquefied buildings can sink and tilt to dangerous angles, while underground tanks and pipes can rise and float to the surface.

THAT SINKING FEELING

The soils below Christchurch determine what will happen when the Quake hits. This map shows the areas susceptible to liquefaction. Information like this is used by Environment Canterbury and other organisations to make decisions on land use planning, development and Quake mitigation work.



THE SOLID FACTS ON CHRISTCHURCH LIQUEFACTION

WHAT IS LIQUEFACTION?

Liquefaction is a process where the soil particles lose contact with each other and the soil becomes a fluid. This happens when the soil is shaken by an earthquake. The water in the soil is pushed into the spaces between the soil particles, and the soil particles are forced apart. This causes the soil to lose its strength and become a fluid. This is called liquefaction.

HOW DOES LIQUEFACTION HAPPEN?

When the ground is shaken by an earthquake, the soil particles are forced apart. This causes the soil to lose its strength and become a fluid. This is called liquefaction.

WHAT ARE THE EFFECTS OF LIQUEFACTION?

Liquefaction can cause buildings to tilt, sink, or even collapse. It can also cause the ground to rise or fall, and it can cause the ground to become very soft. This can be dangerous for people and property.

HOW CAN WE PREVENT LIQUEFACTION?

There are several ways to prevent liquefaction. One way is to use deep foundations for buildings. Another way is to use soil reinforcement. A third way is to use ground anchors. These methods can help to prevent buildings from tilting or sinking during an earthquake.

DOES LIQUEFACTION HAPPEN IN ALL EARTHQUAKES?

No. Some ground shaking is required for liquefaction to occur. The size of the earthquake and the depth of the focus are important factors. Liquefaction is more likely to occur in areas with loose, saturated soil.

MODIFIED MAGNITUDE INTENSITY SCALE

This scale is used to measure the intensity of an earthquake. It ranges from 1 to 10. A magnitude 1 earthquake is very small, while a magnitude 10 earthquake is very large.

LOW GROUNDWATER TABLE LIQUEFACTION POTENTIAL HAZARD MAP

This map shows the areas of Christchurch that are at risk of liquefaction. The map is color-coded to show different levels of hazard. Red indicates a high hazard, while yellow indicates a moderate hazard. Green indicates a low hazard.

HOW DID WE ASSESS THE CHANCE OF LIQUEFACTION HAPPENING?

We used a variety of methods to assess the chance of liquefaction happening. We looked at the geology of the area, the depth of the groundwater, and the intensity of the earthquake shaking. We also used computer models to simulate the effects of liquefaction.

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REMARKABLE FAILURES IN THE EARTH

There have been many famous failures of buildings and infrastructure due to liquefaction. One of the most famous is the failure of the Tacoma Narrows Bridge in 1940. Another famous failure is the failure of the Great East Japan Earthquake in 2011.

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Earthquakes (Canterbury's Shaky Future) 2008 edition.

EARTHQUAKES



THE Q FILES

→ WHAT CAUSES EARTHQUAKES?

→ HOW DO EARTHQUAKES AFFECT CANTERBURY?

→ ARE YOU REALLY PREPARED FOR AN EARTHQUAKE?

**CANTERBURY**
Civil Defence Emergency
Management Group

**Environment
Canterbury**
Your regional council

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Future) 2008 edition.

CONTENTS

PAGE 2

What causes earthquakes?

Page 2

Measuring earthquakes

Page 4

Canterbury’s active faults

Page 6

The Alpine Fault

Page 7

Earthquake hazards

Page 10

Canterbury’s shaky history

Page 12

Managing earthquake risk

Page 13

Are you really prepared?

Images on front cover — from left to right

1. Goods train derailed in the 1922 Motunau earthquake.

2. Earthquake resistant Westpac Trust Stadium, Christchurch.
Source: Holmes Consulting Group

3. Rock fall at Arthur’s Pass in the 1929 Arthur’s Pass earthquake.
Source: Canterbury Museum ref. 74429

4. Looking east along the Hope Fault towards the Hammer Basin, North Canterbury.

The organisations and individuals involved in the collection and compilation of the information contained in this booklet and those involved in its design, printing and distribution, assume no responsibility for any action taken, or decision made, by an organisation or individual, in reliance on the information presented.

Earthquakes (Canterbury's Shaky Future) 2008 edition.



EXPOSING CANTERBURY'S SHAKY FUTURE

Earthquakes are caused by the sudden release of slowly built-up strain along a fault (fracture) in the earth's crust. They can be generated on land or off-shore.

New Zealand experiences many earthquakes because it is located across the boundary of two tectonic plates. Ten to fifteen thousand earthquakes are recorded each year in and around New Zealand, but only about 150 of these are felt. The last 60 years have been relatively quiet with only two on-shore earthquakes greater than magnitude 7.

The Q Files dig up the facts about Canterbury's earthquake threat and what you can do to be prepared. A damaging earthquake could occur at anytime...



PAGE 1

→

WHAT CAUSES EARTHQUAKES?

The constantly-moving tectonic plates that make up the earth's crust do not move past each other easily, and stress builds up on and near the boundaries where these plates meet. This stress is occasionally released along planes of weakness, or faults, in the earth's crust. The sudden fault 'rupture' releases a lot of energy, which radiates out from the fault as seismic waves and is felt as an earthquake.

New Zealand lies across the boundary of the Australian and Pacific tectonic plates. To the east of the North Island, the two plates move towards each other, meeting in a collisional boundary called a subduction zone, where the Pacific Plate slides, or subducts, beneath the Australian Plate. To the south of the South Island, the Australian Plate subducts beneath the Pacific Plate. In between, from Marlborough to Fiordland, the two plates try to slide past each other. The movement of the plates is not exactly parallel to the plate boundary, so the edge of the plates have been deformed and pushed up, creating the Southern Alps.



Above: New Zealand's plate boundary location.

MEASURING EARTHQUAKES

Earthquakes are measured in two different ways: magnitude and intensity.

Earthquake magnitude is a measure of the energy released by an earthquake, or its 'size'. The magnitude of an earthquake is determined by measuring the height of seismic waves recorded at several seismograph stations at different locations. Because earthquakes vary a lot in size, earthquake magnitude scales are logarithmic. For an increase of one step in magnitude, the energy

released increases about 32 times. So magnitude 7 is 32 times bigger than magnitude 6, and a magnitude 8 earthquake releases one million times more energy than a magnitude 4 earthquake.

Earthquake intensity, on the other hand, describes how much ground shaking occurred, or how 'strong' the earthquake was, at a particular location. Seismic waves attenuate (weaken) as they travel away from the earthquake source, so an earthquake generally feels less intense the further away from the source

Earthquakes (Canterbury’s Shaky Future) 2008 edition.

you are. The intensity of earthquake shaking at a particular location depends on the magnitude of the earthquake (how much energy was released at the source), and how deep and how far away it was. Local topography, geology and soils also influence shaking intensity. For example seismic waves are often amplified in soft sediments, or can be focused along ridgelines.

There are a number of intensity scales, but in New Zealand intensity is measured using the Modified Mercalli (MM) intensity scale. This is a descriptive scale from 1 to 12 based on how people feel an earthquake, the damage to buildings and their contents, and how the physical environment responds.

- THE MODIFIED MERCALLI INTENSITY SCALE

 - 1. Not felt.
 - 2. Felt by persons at rest or on upper floors of buildings.
 - 3. Felt indoors, like a small truck passing; hanging objects swing slightly.
 - 4. Felt indoors by many, like a heavy truck passing; hanging objects swing, windows rattle.
 - 5. Felt outdoors, sleepers awakened, small objects and pictures move.
 - 6. Felt by all, crockery breaks, furniture moves, weak plaster cracks.
 - 7. Difficult to stand, noticed by car drivers, furniture breaks, weak chimneys break at roof line, and plaster, loose bricks and tiles fall.
 - 8. Driving is difficult, ordinary masonry is damaged, chimneys and towers fall, some liquefaction.
 - 9. General panic, poor masonry destroyed, ordinary masonry and foundations damaged, liquefaction and landslides.
 - 10. Most masonry structures destroyed. Some well-built wooden structures and bridges destroyed. Dams and embankments damaged, large landslides.
 - 11. Few buildings left standing.
 - 12. Damage nearly total.



Above: The general pattern of Modified Mercalli shaking intensity during the magnitude 7.0-7.3, 1898 North Canterbury earthquake on the Hope Fault. Shaking intensity generally decreases away from the source of an earthquake, but can be influenced by local topography, geology and soil.



Above: Seismographs measure ground shaking and record it onto a drum. They provide important information which is used to locate, measure and study earthquakes.

Source: Wikipedia

Earthquakes (Canterbury's Shaky Future) 2008 edition.

CANTERBURY'S ACTIVE FAULTS

Faults are planes of weakness in the earth's crust, so they are the most likely areas to move (rupture), creating an earthquake, when stress develops in the crust. Active faults are faults that have ruptured in the past and are likely to rupture again in future.

There are many active faults in and near Canterbury, both on land and offshore. Generally, only large fault ruptures, generating earthquakes of more than magnitude 6.5, will break through to the ground surface, leaving a visible line or scarp along the ground known as a fault trace. There are many mapped fault traces in Canterbury, particularly in the Southern Alps and foothills.

Many faults, however, are entirely underground and are difficult to detect. Sometimes underground faulting produces folding or warping of the ground surface above. There are several of these folds or warps in the gravels of the Canterbury Plains, indicating faults in the bedrock underneath. Often though, these underground faults remain undetected until an earthquake occurs on them.



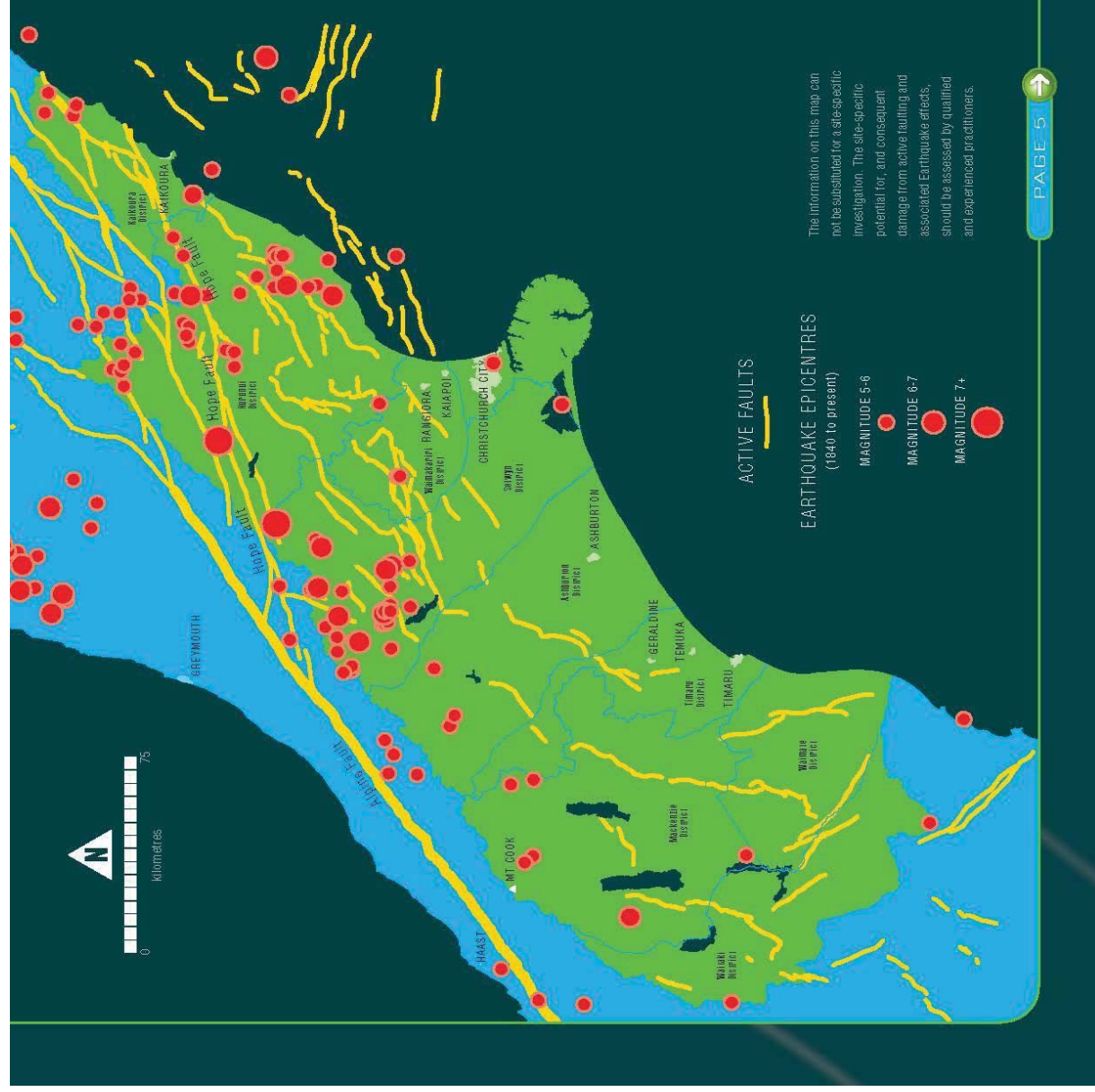
Above: Digging a trench across the Ashley Fault scarp near Rangiora. Trenching reveals where layers of sediment have been offset by movement on the fault during earthquakes. Organic material within the sediment can be dated to help determine when earthquakes have occurred.

Source: University of Canterbury



Above: Land on either side of a fault may move in different ways depending on whether the crust is being pulled, pushed or twisted. Most faults in Canterbury are reverse or strike-slip faults, or a combination of the two.

Earthquakes (Canterbury's Shaky Future) 2008 edition.



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THE ALPINE FAULT



Above: The central South Island, with the west coast at the top of the picture and the east coast and Banks Peninsula in the bottom. The Alpine Fault marks the sharp western edge of the Southern Alps through the image.



Left: The most probable Modified Mercalli ground shaking intensities for a magnitude 8 earthquake on the Alpine Fault. This size earthquake is the largest earthquake likely to occur on faults in or close to the Canterbury region.

The Alpine Fault marks the boundary between the Australian and Pacific Plates and forms the western edge of the Southern Alps. The Alpine Fault has not moved since European settlement but geologists believe it is capable of producing magnitude 7.9-8.2 earthquakes. Evidence suggests that the last earthquake on the fault, involving fault rupture along almost 400km of the fault, occurred in 1717. Previous earthquakes have been dated at around 1430 and 1625.

Estimates of how likely a future Alpine Fault earthquake is vary but most scientists agree that, given the current rate of stress accumulating along the fault, a large earthquake is almost certain within the next 100 years.

The next Alpine Fault earthquake will cause major damage across the South Island. Transport routes will be impassable as bridges are damaged and landslides block roads and railway lines. Water and electricity supplies, communications and food supply networks will be disrupted. If the earthquake occurs in summer, many people will be isolated in tourist locations. It is likely we will need international assistance, and many aftershocks will affect the response and recovery.

The effects of an Alpine Fault earthquake will continue for many years. Landslides in the Southern Alps will supply large volumes of sediment into rivers, which will slowly work its way down valleys and onto plains and coastal areas. This is likely to cause rivers to change course and flood land, particularly on the West Coast with its steep river catchments and high rainfall.

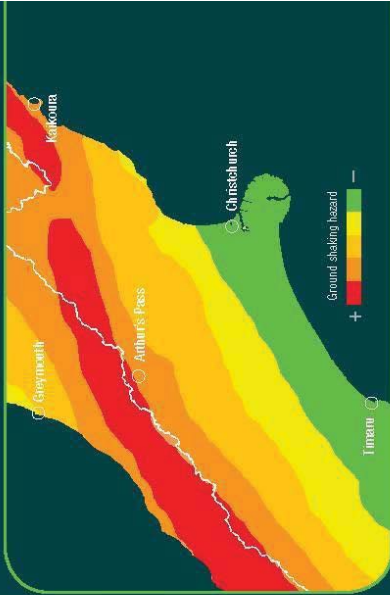
EARTHQUAKE HAZARDS

The energy released during an earthquake creates both local and widespread effects, including ground shaking, surface fault rupture, liquefaction, landslides and tsunamis.

GROUND SHAKING

Most of the damage during an earthquake is caused by ground shaking as seismic waves pass through the earth. The amount of damage depends on how large the earthquake is, how long it lasts and the frequency of the earthquake waves it produces. Large waves put significant stress on man-made structures and, the longer the shaking lasts, the more likely the structures are to sustain serious or permanent damage. Different frequencies of shaking affect buildings differently. In general, low frequency waves affect taller buildings, while high frequency waves affect shorter buildings. Buildings and other structures can be located and constructed in ways to reduce the likelihood of damage and injury from ground shaking.

Aftershocks will occur after a large earthquake as the land adjusts to the displacement that has occurred. These smaller earthquakes can continue for weeks, months or even years after the earthquake.



Above: This map shows the relative ground shaking hazard across the central South Island (the white line is the Canterbury region boundary). The redder the area, the more likely it is to experience strong ground shaking. This is based on the location of known active faults as well as historical earthquakes.



Above: Earthquakes generated on faults in the earth's crust can cause ground shaking, fault rupture at the ground surface, ground deformation, liquefaction, landslides and tsunamis.



Above: An earthquake generates different types of seismic waves. The first waves to arrive at a location are the fastest travelling P or 'primary' waves. P waves generate forward and back movement as the Earth compresses and expands and are often heard rather than felt, hitting a building with a 'bang' or a 'boom'. They are followed by the larger and more destructive S or 'secondary' waves, which shake the ground from side to side, causing structures to vibrate. Shallow earthquakes also generate Love waves, which are the slowest waves but cause the most severe shaking.

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EARTHQUAKE HAZARDS

(CONTINUED)

FAULT RUPTURE

If an earthquake on a fault is big and shallow enough, generally greater than magnitude 6.5 and less than 40km deep, the displacement on the fault can travel all the way to the ground surface and offset land across the fault, both horizontally and vertically. The two most active faults in New Zealand – the Alpine Fault to the west of Canterbury and the Hope Fault in North Canterbury – move on average every few hundred years, creating large earthquakes and many metres of permanent offset of the ground across the fault. Other faults in Canterbury, further from the plate boundary, may only move every few thousand or tens of thousands of years, with less than a metre of displacement.

Fault rupture at the ground surface will cut underground services, such as water pipes, that cross the fault and can severely damage or destroy structures built across the fault. The fault rupture hazard is confined to a relatively narrow strip along the fault and, because fault rupture tends generally to occur repeatedly in the same place, the areas where it is likely to happen in future can be mapped, and development within those areas can be avoided or minimised.

LIQUEFACTION

Liquefaction occurs when saturated soil is strongly shaken and behaves more like a liquid than a solid. Liquefaction can cause ejection of sand and water onto the ground surface (often called 'sand boils'), ground settlement and lateral spreading where unsupported land, such as riverbanks, move sideways. Damage from liquefaction includes floatation of buried structures like pipes and storage tanks, and tilting or sinking of buildings as the soil loses its strength and ability to support structures.

Liquefaction is most likely in areas where there is saturated, loose sandy and silty soils, or poorly constructed man-made fill, less than 10 to 15 metres below the ground surface. These kinds of sediments occur in parts of coastal areas between Amberley and Lake Ellesmere, and around Timaru. Areas that are most susceptible to liquefaction can be identified and important buildings and infrastructure can be located elsewhere, or the soil can be treated to reduce the potential for liquefaction.



Above: When the ground shakes during an earthquake, soil particles are rearranged and the soil compacts and decreases in volume, causing water to be ejected.



Left: The Edgecumbe Fault ruptured to the ground surface during the 1937 Edgecumbe earthquake, causing up to 2 metres of permanent displacement of the ground.

Source: GNS Science

TSUNAMIS

Tsunamis can be generated by earthquakes, either by fault rupture on the sea floor, or by landslides into or under the sea. The most likely source for a significant tsunami for most of the Canterbury coast is a large earthquake off the coast of South America. In the Kaikoura area, the biggest tsunami threat is from a tsunami generated close to shore that could reach the coast in minutes. *The Q Files* – *Tsunamis* gives more information on tsunamis and how you can be prepared.



Above: Fifty-five million cubic metres of rock fell from Felling Mountain on the Main Divide during the 1920 Arthur's Pass earthquake and travelled 4.5km down the Otahake River.

Source: GNS Science

The Q Files – *Liquefaction* and *The Q Files* – *The Solid Facts on Christchurch Liquefaction* give more detailed information on liquefaction, its impacts and ways the likelihood of liquefaction can be reduced.



Left: To reduce the potential of damage from liquefaction, a network of stone columns was placed beneath the Paul Kelly Motor Company Stand at AMI Stadium. The stone columns are 600mm in diameter, 8–10m in length and about 1.5m apart. Covering an area of 12,500m², the stone columns improve the strength and stiffness of the soil and provide a path for water to escape should liquefaction occur.

Source: AMI Stadium Ltd.

LANDSLIDES

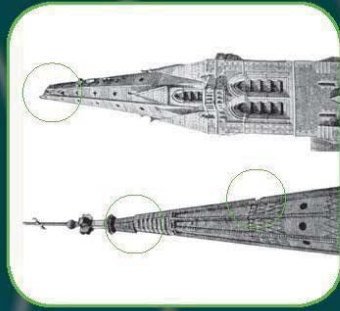
In New Zealand, landslides are second only to building collapse as a cause of death during earthquakes, having claimed 16 lives in the 1929 Buller earthquake and three in the 1968 Hangahua earthquake. Large earthquakes can cause widespread landsliding, particularly in the steep and highly-fractured Southern Alps.

Landslides in steep valleys and gorges can form dams, which block rivers and create lakes. These dams can be dangerous because they can break suddenly, releasing floodwater down the river. Most landslide dams fail within a few days or weeks, usually during a fresh or flood in the river, but some dams remain for years.

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CANTERBURY'S SHAKY HISTORY

It is 80 years since Canterbury experienced a large, damaging earthquake. However, in the 70 years between 1860 and 1930, eight earthquakes caused significant building or contents damage in Canterbury.



Above: The Christ Church Cathedral has been damaged by earthquakes on three separate occasions. The most notable was the 1868 North Canterbury earthquake, which caused the partial collapse of the spire. A four-year strengthening programme, completed in 2002, included significant cross-bracing and strengthening to the roof of the side aisles. Four concrete shear walls (walls that give lateral support) were constructed in the transept area and against the west wall.

**04 JUNE 1868
NEW BRIGHTON**
DESCRIPTION Magnitude 5, epicentre around New Brighton, MM intensity 7-8 at New Brighton, intensity decreased rapidly away from Christchurch.
DAMAGE Widespread chimney destruction, damage to stone buildings.
REPORTS "The house was violently shaken to the sore destruction of chimneys, crockery and chimney ornaments."

**31 AUGUST 1870
LAKE ELLESMERE**
DESCRIPTION Magnitude 5.5, epicentre in the vicinity of Lake Ellesmere, MM intensity 6 in Christchurch, Lake Ellesmere and as far south as Rakaa, felt in Oamaru, Greymouth and Dunedin.
DAMAGE Most damage in Christchurch and Lyttelton - household contents broken, chimneys destroyed, minor structural damage, rock falls.

**5 DECEMBER 1881
CASTLE HILL**
DESCRIPTION Magnitude 6.2-6.3, MM intensity 7-8 at epicentre, MM intensity 6 in Oxford and MM intensity 6-7 in Christchurch.
DAMAGE Christ Church Cathedral spire damaged, broken windows, household contents, chimney damage, Aeon Pier stopped flowing.
REPORTS Gedstone Pier at Lyttelton "twisted like a snake".

**1 SEPTEMBER 1888
NORTH CANTERBURY**
DESCRIPTION Magnitude 7-7.3, MM intensity 9 at epicentre, MM intensity 5-7 in Christchurch, felt from Taranaki to Southland, surface rupture of the Hope Fault.
DAMAGE Landslides and severe damage to buildings in the Amuri area, damage to Christ Church Cathedral spire, contents damaged.

**16 NOVEMBER 1901
CHEVIOT**
DESCRIPTION Magnitude 6.5-7, epicentre near Parnassus, MM intensity 9 in Cheviot, MM intensity 6 in Christchurch, felt from New Plymouth to Dunedin.
DAMAGE Widespread damage to contents, cracks to stone work, broken windows, damaged chimneys and damage to Christ Church Cathedral spire, liquefaction and lateral spreading reported along the Pegasus Bay coast, particularly in Kaiapoi.

REPORTS "A terrible earthquake this morning at a quarter to eight. There is a mess of ruins at Cheviot...shook a traction engine over and a man out of his coffin."

Source: Dairy entry, Harry Richard Mills, 16 November 1901

Earthquakes (Canterbury's Shaky Future) 2008 edition.



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MANAGING EARTHQUAKE RISK

REDUCING EARTHQUAKE RISK

Most deaths from earthquakes occur when buildings collapse. New Zealand is a world leader in earthquake engineering – we have resilient houses and high standards for buildings and other structures such as dams. The Building Code, updated in 2004, aims to minimise structural damage, prevent collapse and protect life. However, there are still a significant number of older concrete and unreinforced masonry buildings in Canterbury which have not yet been strengthened.

Ground shaking during a large earthquake is unavoidable but we can identify and manage the type of development in areas where soft sediments may liquefy or faults may offset land at the ground surface. For example, some district plans restrict or place conditions on developing high-rise or important community buildings, such as hospitals, in areas of liquefaction potential, while still allowing lower-risk residential development.

RESPONDING TO AND RECOVERING FROM EARTHQUAKES

While emergency services will do their best to respond, a large coordinated response will be required from the Canterbury Civil Defence Emergency Management (CDEM) Group in a big earthquake. The Group comprises all local authorities in the region, along with Police, Fire and St John Ambulance, and the Canterbury and South Canterbury District Health Boards. We may need help from other regions, or even international organisations.

In New Zealand, the Earthquake Commission provides insurance against earthquake damage, up to a certain limit, for residential buildings and contents that are covered by fire insurance.

Pre-event recovery planning – Identifying in advance the land-use planning decisions that will need to be made after a disaster – is particularly important for earthquakes, but has received little attention in the past. One of the challenges is weighing up the need for communities to get back to normal as soon as possible, with the opportunity for more considered planning, making more resilient communities in future.

ARE YOU REALLY PREPARED?

The danger you face in an earthquake comes mainly from falling items and collapsing structures such as buildings. You need to be aware of these hazards to help you get through.

BEFORE AN EARTHQUAKE

- Develop a Household Emergency Plan and prepare emergency survival supplies so that you can cope with being on your own for at least three days.
- Check your household insurance policy.
- Seek qualified advice to make sure your house is secured to its foundations. Also check that any renovations comply with the Building Code.
- Secure heavy items of furniture to the floor or wall.

For more information on how to 'quake-safe' your home, go to www.eq-lq.org.nz



DURING AN EARTHQUAKE

- If you are inside a building, stay in the building but move to a safe place (under a table, next to an interior wall, but move no more than a few steps).
- If you are outside, move no more than a few steps, then drop, cover and hold.
- If you are driving, pull over and stop.
- If you are at the beach or near the coast, drop, cover and hold, then move to higher ground immediately in case a tsunami follows the earthquake.

AFTER AN EARTHQUAKE

- Stay calm and check for any injuries.
- Check on people around you and, if you can, help those who need it.
- Check for fire and turn off gas, electricity and water if safe to do so.
- If you are in a damaged building, try to get outside and find a safe, open place – and if possible take with you strong shoes and adequate clothing.
- Listen to the radio for information.
- Be ready for aftershocks.
- Note and photograph property damage for insurance purposes.

MORE INFORMATION ABOUT EARTHQUAKES

The following websites have lots of information on earthquakes, or ask at your local library for earthquake resources:

- Environment Canterbury: www.ecan.govt.nz/naturalhazards
- Institute of Geological and Nuclear Sciences (GNS Science): www.gns.cri.nz
- GeoNet: www.geonet.org.nz
- Earthquake Commission: www.epc.govt.nz www.eq-lq.govt.nz
- QuakeTrackers: www.quaketrackers.org.nz
- Ministry of Civil Defence & Emergency Management: www.civildefence.govt.nz www.getthru.govt.nz
- Te Ara: The Encyclopaedia of New Zealand: www.teara.govt.nz

For more information on earthquake hazard management in your local area, contact your city or district council.

Earthquakes (Canterbury’s Shaky
Future) 2008 edition.



Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.



Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

CONTENTS	
PAGE 2	What causes a tsunami?
PAGE 4	What damage can a tsunami do?
PAGE 5	Boxing Day 2004: The Indian Ocean tsunami
PAGE 6	New Zealand's tsunami sources
PAGE 7	Canterbury in the path of the wave
PAGE 9	Kaikoura's threat
PAGE 10	Warning New Zealand
PAGE 11	Warning Canterbury
PAGE 12	Tsunamis: the facts
PAGE 13	What you can do to be safe

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

TSUNAMIS

Tsunamis are waves caused by underwater earthquakes, volcanic eruptions and landslides. They can be generated close to shore or thousands of kilometres away.

In the open ocean, tsunami waves travel up to 900 kilometres per hour and may be less than half a metre high. But when the waves reach the shore they slow down and become higher – sometimes many metres high. These waves can be very destructive, sweeping away almost everything in their path.

The Q Files go deep into the ocean to uncover the facts about tsunamis and find out what you can do to be prepared...



Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

WHAT CAUSES A TSUNAMI?

Tsunamis are most frequently caused by underwater earthquakes, but may also be generated by volcanic eruptions and landslides, both underwater and into the water.

The tsunamis that threaten coastal settlements in and around the Pacific Ocean are almost always generated by earthquakes. The Pacific Ocean basin regularly experiences large earthquakes so tsunamis occur more often here than other parts of the world. Tsunamis have affected Canterbury in the past and will do again in the future.

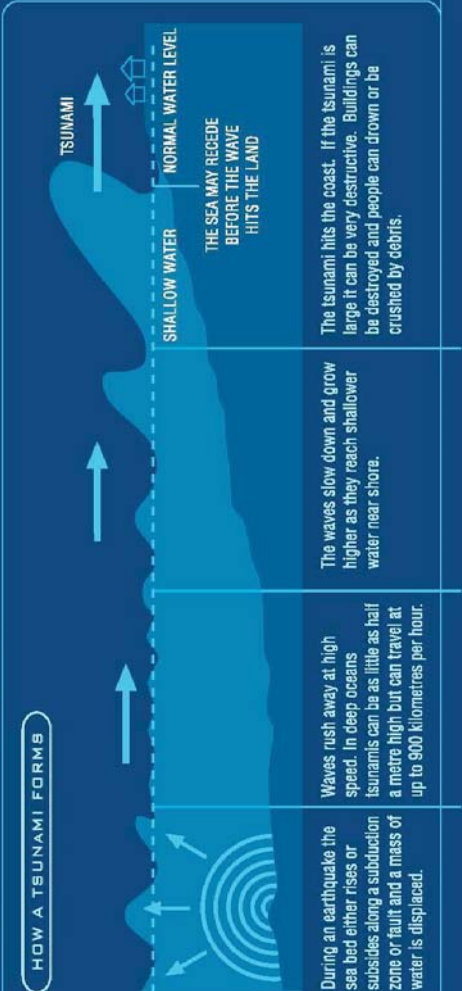
HOW EARTHQUAKES CAUSE TSUNAMIS

Not all earthquakes cause tsunamis. To create a tsunami the earthquake must occur under the sea bed and create substantial vertical movement of the sea bed. When this happens a great volume of sea water is displaced upwards. Tsunami waves are created by this water attempting to regain its place.

Earthquakes that cause tsunamis often occur at subduction zones. Subduction zones are where two of the tectonic plates that make up the earth's crust move towards each other, and one plate slides under the other. The pressure that builds up where the plates meet is occasionally released in very large earthquakes, which often cause displacement of the sea bed. The 2004 Indian Ocean tsunami was caused by an earthquake along the Sumatran subduction zone where the Australian Plate is forced under the Eurasian Plate.

There are many subduction zones around the edge of the Pacific Ocean, including the Hikurangi and Kermadec troughs to the east of New Zealand where the Pacific Plate is being pushed under the Australian Plate.

Tsunamis can also be created by earthquakes on faults in the earth's crust near subduction zones.



Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

HOW TSUNAMI WAVES BEHAVE

The initial height of a tsunami wave is usually small, often less than half a metre. In the open ocean the wave has the space to spread over vast areas, becoming long, low and fast. Because of this, tsunamis are difficult to detect in the open ocean – they are not easily felt aboard ships, nor seen from the air. Because the waves move so efficiently they lose little of the initial energy generated by the earthquake.

As a tsunami wave leaves the deep water of the open ocean and comes into shallower coastal waters it undergoes a rapid change. The shallower water makes the wave slow down. But the wave still has a large amount of energy so the wave grows in height to make up for slowing down.

Like earthquakes, tsunamis vary in size depending on the initial size of the wave and the distance it travels before it reaches the shore. Many tsunamis that hit New Zealand are small and don't cause any damage. For example, the 2004 Indian Ocean tsunami reached Canterbury but by the time it got here it was less than 1 metre high.

Occasionally, however, a large tsunami will travel across the ocean and may be 3 to 4 metres high when it hits New Zealand, enough to cause significant damage, especially at high tide. And very occasionally an extremely large tsunami, over 10 metres high, will hit a part of New Zealand's coastline. These very large tsunamis are usually generated close to our shore.

Coastal geography influences tsunami waves as they approach the shore. Reefs, bays and the slope of the beach or cliffs all affect the height, speed and shape of the waves that reach shore. Inlets and rivers can allow tsunamis to travel further inland, and tsunamis can set up oscillations, called seiches, within harbours or enclosed bays.

A tsunami is not a single wave. A tsunami usually consists of successive waves, or surges of water, and the return of these waves to the sea. Sometimes the first wave to hit the shore is not the largest and later waves may be bigger. Sometimes the trough of the first tsunami wave arrives at shore before the crest, and the sea recedes rapidly before coming in again. The intervals between waves can also vary from a few minutes to more than an hour.



Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

WHAT DAMAGE CAN A TSUNAMI DO?

Tsunamis cause damage in four main ways:

- ① Swiftly flowing water, which can rush inland as a torrent or wall of water (sometimes called a bore), can damage boats, coastal property and infrastructure and can injure or kill people. A tsunami exerts great pressure on walls and buildings – up to 3,000 kilograms per square metre, far more than earthquake reinforcements are designed to withstand. The backwash from a receding tsunami wave can do as much damage as the incoming wave and can drag people and debris out to sea. The interaction of a receding wave and an incoming wave can create strong swirling currents.
- ② Debris picked up by waves add to a tsunami's potential destructiveness. Many tsunami casualties are caused, not by drowning, but by the impact of debris carried in the water. Debris also increases damage to buildings and infrastructure.
- ③ Hazardous substances can spill or leak, which can contaminate land or water, or start fires. Contamination can also result from broken or flooded sewerage infrastructure.
- ④ Ponding of sea water on land may cause salt water contamination. This can cause medium to long term damage to soils and crops, buildings, electronics and fittings.



SEICHES

Tsunamis can cause seiches (pronounced "sayshes") in partially enclosed water bodies such as inlets or harbours. A seiche is an oscillation of the water within the water body, like water sloshing in a bucket if it is tipped back and forward. A seiche may be set up in a harbour, depending on the time between tsunami waves and the shape of the inlet or harbour. This seiching, or sloshing, of water can last for several days.

Seiches are not always caused by tsunamis. They can also be generated by wind, atmospheric pressure changes and seismic waves from earthquakes, and can occur in lakes and reservoirs. Small seiches are often seen in swimming pools after earthquakes, but large seiches, up to several metres high, can occur in large lakes.



Debris in a lagoon in Thailand after the 2004 Indian Ocean tsunami.
Source: United Nations Disaster Assessment and Coordination

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.



Damage caused by the 2004 Indian Ocean tsunami. Sources: United Nations Disaster Assessment and Coordination

BOXING DAY 2004: THE INDIAN OCEAN TSUNAMI

The Indian Ocean tsunami was caused by a magnitude 9.3 earthquake on the subduction zone off the western coast of Sumatra, Indonesia, on 26 December 2004. During the earthquake a 1,200 km long section of the subduction zone buckled, causing a large area of sea bed to rise suddenly. Hundreds of cubic kilometres of sea water were displaced upwards, creating a tsunami that spread across the Indian Ocean. The tsunami swept kilometres inland in some low lying coastal areas, destroying everything in its path. Damage was widespread and over 220,000 people were killed in 12 countries.

A combination of factors contributed to the damage and deaths. Many countries in and around the Indian Ocean have settlements in low-lying coastal areas that are particularly vulnerable to tsunamis. Also, the Indian Ocean had no early warning systems designed to detect tsunamis. Even if such a system had been in place the tsunami was generated so close to the Indonesian coast that many people in the first-hit areas would have had little or no warning, except for the earthquake itself.

The Indian Ocean tsunami has had a significant effect on New Zealand's awareness of the potential damage that can be created by a large tsunami.

Displaced fuel storage tank Kreung Raya – 2004 Indian Ocean tsunami. Source: United Nations Environment Programme



WHAT HAS NEW ZEALAND LEARNED FROM THE DISASTER?

In February 2005 a team of New Zealand scientists, engineers and emergency management professionals travelled to Thailand to assess the damage from the Indian Ocean tsunami. Key lessons they brought back to New Zealand included:

- Existing estimates of the likely damage from a tsunami striking the New Zealand coast were too conservative.
- A similar sized tsunami to the Indian Ocean tsunami could be generated by a magnitude 7 or greater earthquake within 200 km of the New Zealand coast. This size offshore earthquake can occur as often as once a year.
- Planning requirements for low lying coastal populations are critical. A similar sized tsunami hitting a populated coastal area of New Zealand now is likely to be devastating.
- Green belts, dunes, mangroves and dense coastal trees can significantly reduce the impact of a tsunami.
- Serious injuries can overload medical facilities after a tsunami, which can cause an unexpectedly high death rate.

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

NEW ZEALAND'S TSUNAMI SOURCES

Tsunamis are categorised into three groups – distant, regional and local source – defined by the time the waves take to travel from their source to the New Zealand coast.

Distant Source tsunamis are generated more than 3 hours' travel time from New Zealand. Distant source tsunamis that are large enough to cause damage in New Zealand originate from earthquakes on subduction zones around the rim of the Pacific Ocean, particularly those along the coast of South America. This subduction zone can produce very large earthquakes (greater than magnitude 9) and is one of the most frequent tsunami sources in the Pacific Ocean. Tsunamis generated along this coast can be directed towards New Zealand by both the orientation of the plate boundary and the shape of the sea bed between South America and New Zealand. The three largest distant source tsunamis to hit New Zealand within written history – in 1868, 1877 and 1960 – have all come from this area. The areas most likely to be affected by distant source tsunamis are the east coast of the North Island, the Canterbury coast and the Chatham Islands. Distant source tsunami waves are unlikely to be greater than 5 metres high at the New Zealand coast.

Regional Source tsunamis are generated 1-3 hours' travel time from New Zealand. Regional sources include earthquakes and volcanoes in tectonically active areas to the north and east of New Zealand. The area most at risk from regional source tsunamis is the northeastern coast of the North Island. Regional source tsunamis are generally considered less likely than distant and local source tsunamis.

Local Source tsunamis are generated less than 1 hour's travel time from the nearest New Zealand coast. The most likely local tsunami sources include an earthquake on one of the many active faults offshore of New Zealand or the Hikurangi subduction zone east of the North Island, or a submarine landslide. Thirteen local source tsunamis have been recorded since 1840 in New Zealand, all generated by offshore earthquakes. Local source tsunami waves can be over 10 metres high at the coast, and there is usually little, if any, warning time. However, their impact, particularly if they are generated by an underwater landslide, is usually quite localised. The areas most likely to be affected by local source tsunamis are the east coast from East Cape to Kalkoura, and Fiordland.



Time taken for tsunami to travel to New Zealand from around the Pacific Ocean. Source: Institute of Geological and Nuclear Sciences

NEW ZEALAND'S TSUNAMI SOURCES



Tsunami sources and their relative likelihood of affecting New Zealand. Source: Institute of Geological and Nuclear Sciences

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

CANTERBURY IN THE PATH OF THE WAVE

Canterbury is exposed to both distant and local source tsunamis. Since 1840 nine tsunamis have been recorded in Canterbury.

The entire Canterbury coast is exposed to distant source tsunamis, especially those generated off the South American coast. Banks Peninsula is particularly vulnerable to these types of tsunamis because the long narrow harbours and bays channel and increase the height of the tsunami waves. Another, less likely, source for the Canterbury coast is an earthquake along the Hikurangi subduction zone off the east coast of the North Island. As well as distant source tsunamis, the Kaikoura coast in particular is also exposed to local source tsunamis.

The largest tsunamis to hit the Canterbury coast since 1840 have all been distant source tsunamis from South America.

On 16 August 1868 a tsunami struck the Canterbury coast after travelling 15 hours from southern Peru. Waves up to 3 metres above sea level at the time were recorded in Lyttelton Harbour and Timaru. Wharves in Lyttelton Harbour were damaged, houses were damaged in Akaroa and Little Akaloa Bay and farmland was inundated. One person was killed on the Chatham Islands, where the tsunami waves were up to 7 metres above high tide, New Zealand's only recorded tsunami death.



Water from the 1960 tsunami cascades into the dry dock at Lyttelton Harbour.
Source: Christchurch Star

In May 1960 another tsunami, this time generated by a magnitude 9.5 earthquake off the coast of southern Chile, travelled across the entire Pacific Ocean, causing damage in many places including Hawaii, Japan and New Zealand. The tsunami arrived in Canterbury in the early hours of Tuesday 24 May, coinciding with low tide. Even so, damage around Banks Peninsula was widespread as sea level rose between 3 and 5 metres above the sea level at the time. Sea level fluctuations continued during the night and into the next day. In Timaru the tsunami waves were reported to be around 1 metre above the sea level at the time, flooding the Caroline Bay carpark.

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.



Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

KAIKOURA'S THREAT

The Kaikoura coast is in the zone where the Australian and Pacific tectonic plates meet, creating active faults and deep canyons offshore.

Research by NIWA³ shows that an earthquake on the Kekerengu Bank Fault, 35 km off the north Kaikoura coast, poses the largest local tsunami hazard to coastal areas north of the Kaikoura Peninsula, particularly around Kekerengu and the Clarence River mouth.

A different local source exists for the area south of the Peninsula between Oaro and South Bay – an underwater landslide into the Kaikoura Canyon. The head of the canyon is only 1 km offshore at Goose Bay and the sea bed drops away very quickly to over 2000 metres deep. Research shows that sediment from the North Canterbury rivers is accumulating at the head of the canyon. This sediment could slide down into the canyon creating a very large, but localised tsunami.

There would be very little warning of a tsunami generated by an underwater landslide into the Kaikoura Canyon. The first tsunami wave would reach Goose Bay less than 1 minute after the landslide



The rugged coast south of Kaikoura. In the background, carries State Highway 1 and the South Island main trunk rail line.
Source: PhotoNewZealand/Dennis Bourman

and could be over 10 metres high. Waves over 5 metres high would reach Oaro and South Bay after about 6 minutes. As well as possible deaths, injuries and damage to buildings, a tsunami along this coast would also damage State Highway 1, the main trunk rail line, and the communications and power infrastructure that runs along the coast.

There is no written record of this type of tsunami happening in the last 170 years, but studies of sediment in the canyon indicate that underwater landslides have happened before, maybe every few hundred years.

A Kaikoura Canyon landslide is most likely to be triggered by a strong earthquake, on the nearby Hope Fault for example. The likelihood of a strong earthquake happening and creating a tsunami along the Kaikoura coast in any one year is very small – less than 1 in 200 – but the consequences could be disastrous. If you are in a low lying area along the Kaikoura coast and feel a strong earthquake, move to higher ground or as far inland as you can immediately. Do not wait to see if there is a tsunami or wait to be evacuated.



The sea bed off the Kaikoura coast drops away quickly to over 2000 metres deep in the Kaikoura Canyon, marking the boundary between the Australian and Pacific tectonic plates.

3. Walters, et al. 2004, Kaikoura District engineering lifelines project: tsunami hazard assessment (Part 1b). Report prepared for Environment Canterbury by the National Institute of Water and Atmospheric Research, Christchurch, Environment Canterbury report U04/11.

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

WARNING NEW ZEALAND



PACIFIC TSUNAMI WARNING CENTER

New Zealand receives warnings of distant source tsunamis from the Pacific Tsunami Warning Center (PTWC) in Hawaii. The PTWC, established in 1949, continuously monitors earthquake activity and sea levels in the Pacific region using data from participating nations, including New Zealand.

The PTWC issues a "tsunami warning/watch bulletin" when an earthquake greater than magnitude 7.5 is detected within or near the Pacific Ocean basin. If the earthquake appears to be large enough to cause a tsunami and is located in an area where tsunami generation is possible the PTWC will check sea level data from automatic tide stations near the earthquake for evidence of a tsunami. If the sea level data indicates that a tsunami has been generated a Pacific-wide tsunami warning is issued. If tide stations indicate a negligible or no tsunami then the tsunami warning/watch bulletin is cancelled.

PTWC tsunami warning/watch bulletins and warnings are sent to the Ministry of Civil Defence & Emergency Management in New Zealand. Warnings are then passed to regional Civil Defence

Emergency Management groups, local authorities and the Police, who coordinate evacuations in their regions if necessary. PTWC warnings do not include forecasted wave heights – each nation is responsible for evaluating the likely impacts of a tsunami in their area.

PTWC tsunami bulletins are available to the public on the PTWC website (www.pfhn.noaa.gov/ptwc) and anyone can freely subscribe to receive bulletins by email (but these are not real time warnings like the ones sent to the Ministry of Civil Defence & Emergency Management).

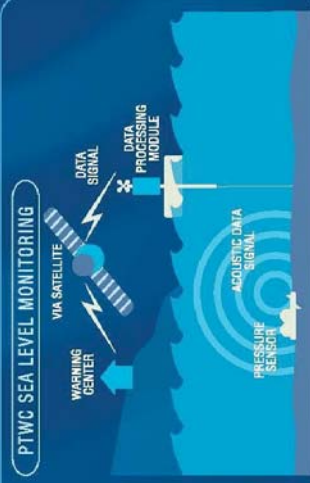


LOCAL SOURCE TSUNAMIS

The time between a local source tsunami being generated and it hitting the shore can be as short as a few minutes. New Zealand does not have a local warning system for local source tsunamis. Some other countries around the Pacific, such as Japan, Australia and the United States, have near shore tsunami detection systems that can give some minutes warning of a local source tsunami. These systems are extremely expensive and are unlikely to be economic for New Zealand.

Because of the time taken to analyse data and confirm, or otherwise, a tsunami, the PTWC cannot be relied on to warn of local source tsunamis in New Zealand.

In general the only warning people in New Zealand have of a local source tsunami is a strong earthquake or the ocean behaving unusually. If you feel or see either of these, go to higher ground immediately, or as far inland as you can.



Source: US National Oceanic and Atmospheric Administration

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

WARNING CANTERBURY

The Ministry of Civil Defence & Emergency Management pass any confirmed distant source tsunami warnings from the Pacific Tsunami Warning Center on to the Canterbury Civil Defence Emergency Management (CDEM) Group. The Canterbury CDEM Group comprises Environment Canterbury, the region's city and district councils, and the emergency services.

Each local authority, as well as the Police, have local contingency plans for evacuating people from areas likely to be affected by a distant source tsunami. There can be up to 15 hours warning of a distant source tsunami before it reaches New Zealand. People should always have their getaway kits containing

important documents and personal items ready in case of an evacuation – for any emergency, not just a tsunami.

Warning signs in low lying coastal areas can also help educate people about the tsunami hazard, especially from local source tsunamis where there may be little warning time. Internationally recognised tsunami warning signs are used in many places around the world and in some places in the North Island. Local authorities in Canterbury are waiting for the results of a national tsunami warning project before deciding whether to use warning signs here.

TSUNAMI EVACUATION PROCEDURES FOR CANTERBURY

The emergency services and the Canterbury CDEM Group are currently reviewing evacuation procedures for their local areas. Current local warning and evacuation arrangement for distant source tsunamis are:

Local authority	Police or Council vehicles with PA/sirens	Local radio stations	Sirens ⁴	Telephone trees	Door knocking	Coordination of public warnings
Ashburton District Council	•	•	•	•		
Christchurch City Council	•	•		•	•	
Hurunui District Council	•	•	•			
Kaikoura District Council	•	•	•			
Selwyn District Council		•		•	•	
Timaru District Council		•	•			
Waimakariri District Council		•	•			
Waimate District Council		•		•	•	
Group Emergency Management Office at Environment Canterbury		•				•

For local source tsunamis the only warning may be a strong earthquake or the sea behaving in an unusual way. In this case it is up to people in low lying coastal areas to evacuate themselves to higher ground, or as far inland as possible.

4. Sirens are generally Fire Service sirens at river mouth communities.

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

TSUNAMIS: THE FACTS

- Tsunamis that strike New Zealand are almost always caused by earthquakes. These earthquakes can occur far away or near to shore.
- Most tsunamis that hit New Zealand are less than 1 metre high, but occasionally they can be more than 10 metres high and can move several kilometres inland.
- Tsunamis consist of a series of waves. The first wave may not necessarily be the largest wave, and the time between waves can vary. The danger from a tsunami can last several hours after the arrival of the first wave.
- Tsunami waves are not like normal waves – they do not usually curl and break. They may arrive as a “wall” of water, or appear like a rapidly rising and falling tide.
- Sometimes sea water may withdraw, leaving the sea bed exposed, before the first tsunami wave hits.



Examples of tsunami warning signs used overseas.

- Large tsunamis are very destructive, having not only the force of tonnes of water behind them, but also carrying debris.
- Tsunamis are powerful enough to travel around corners, so can also be dangerous on coasts facing away from the source of the tsunami.
- Any low lying coastal area can be affected by tsunamis.
- Tsunamis can travel inland up rivers and streams.
- Tsunamis can move faster than a person can run.



Source: Christchurch Star

The sea at Redcliffs in Christchurch during the 1960 tsunami. These photos were taken 3 minutes apart.

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.

WHAT YOU CAN DO TO BE SAFE

Be aware of the facts about tsunamis – it could save your life. Share this knowledge with your family and friends – it could save their lives.

- If you are at the beach or near the sea and feel a strong earthquake move immediately to higher ground or as far inland from the coast as you can. Do not wait for a tsunami warning – you may only have a few minutes to get to safety.
- If you are at the beach or near the sea and see the water withdraw from the coast, or rise in an unusual way, move immediately to higher ground or as far inland from the coast as you can.
- If you suspect a tsunami stay away from rivers and streams leading to the sea.
- Stay away from the shore even if you think the tsunami is over – there can be up to several hours between waves.
- Follow Civil Defence or emergency services' instructions if a tsunami warning is issued.
- Have your getaway kit with important documents and personal items ready (this is important for any emergency, not just a tsunami!).
- Do not try to surf a tsunami! It is not like a regular wave.



Remains of the cottage at Turihaua Point near Gisborne after the 1947 tsunami.
Source: N. Tunnell/He

WHERE CAN YOU GET MORE INFORMATION ABOUT TSUNAMIS?

Tsunamis are one of the most powerful natural forces on Earth. They are fascinating, awe-inspiring, and have the potential to be devastating. The following websites have lots of information on tsunamis, or ask at your local library for tsunami resources.

- Institute of Geological and Nuclear Sciences (GNS Science): www.gns.cri.nz
- National Institute of Water and Atmospheric Research (NIWA): www.niwa.science.co.nz
- Ministry of Civil Defence & Emergency Management: www.civildefence.govt.nz
- Te Ara: The Encyclopedia of New Zealand: www.teara.govt.nz
- Pacific Tsunami Warning Center: www.ptwc.noaa.gov/ptwc
- International Tsunami Information Centre: www.tsunamiwave.info
- UNESCO/Intergovernmental Oceanographic Commission (IOC): www.ioc.unesco.org
- United States National Oceanic and Atmospheric Administration (NOAA): www.noaa.gov

For more information on tsunami hazard management in your local area, contact your city or district council.

Tsunamis booklet, 2008. Note: no tsunami booklet was developed during the first editions in 2000 – 2001.



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CONTENTS

PAGE 2

Canterbury's hazardscape

PAGE 4

What's in a word?

PAGE 6

Risk

PAGE 7

Managing risk

PAGE 9

Managing Canterbury's risk – some examples

PAGE 12

Environment Canterbury's role

PAGE 13

Are you ready?

Images on front cover — from left to right

1. Flooding in Pleasant Point, 1986.

2. Damage from the Cheviot earthquake, 1901.

3. Power poles brought down by the weight of snow, June 2008.

Source: Electricity Ashburton

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437

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DEFINING MOMENTS IN NATURE

Straddling a tectonic plate boundary, on floodplains between high mountains and the coast, Canterbury is vulnerable to many natural hazards. Floods, earthquakes, snow, high winds, tsunamis, landslides, erosion and droughts have affected us in the past, and will continue to affect us in the future.

The effects of these hazards can be significant, not only on life, property and business, but also in the emotional scars that often remain long after material damage has been repaired.

Our actions, and where we choose to live, work and play, determine these impacts.

The Q Files reveal our risky situation and how we can make ourselves less vulnerable...



1865

1870

1875

1880

Canterbury floods, 1868

Heavy rain in February 1868 caused widespread flooding throughout Canterbury. "The damage to property was enormous, and when the flood abated a desolate picture met the eye - houses levelled to the ground, crops silted over and buried, fences washed away..." - *P. M. Burdon*. In Christchurch, the Waimakariri River overflowed into old channels near Hakitt and flowed through Avonhead and Fendalton to the Avon River.

PAGE 1



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CANTERBURY'S HAZARDSCAPE



FLOODS



Floods are the most common and, for many areas, the most significant natural hazard in Canterbury. Many settlements are built on floodplains, including Christchurch. Northwesterly rainfall in the Southern Alps can cause large alpine rivers like the Waimakariri, Rakaia and Rangitata to flood. Rivers rising in the foothills and on the plains can flood, often quickly, during rain from the south or east. Today, monitoring, warning systems and structural works like stopbanks mean that floods in Canterbury claim few lives but they still regularly cause millions of dollars of damage to buildings, infrastructure and agriculture.



EARTHQUAKES



Canterbury lies in a zone of active land deformation along the boundary between the Australian and Pacific tectonic plates. Several large earthquakes caused deaths, injuries and damage to buildings and infrastructure in the early years of European settlement. In contrast, the last 80 years have been unusually quiet with no earthquakes larger than magnitude 7 in the region. However, it is likely that we will experience a large, damaging earthquake within the next 100 years. You can find out more about Canterbury's earthquake hazard in *The Q-Files: Earthquakes*.



TSUNAMIS



Source: Christchurch Star

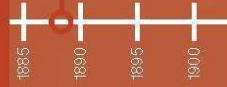
The entire Canterbury coast is exposed to distant source tsunamis, particularly those generated off the coast of South America. Banks Peninsula is particularly vulnerable because the long narrow harbours and bays channel and amplify tsunami waves. The North Canterbury coast, especially around Kaikoura, is also exposed to local source tsunamis generated by offshore faults or undersea landslides. To find out more information on tsunamis along the Canterbury coast, check out *The Q-Files: Tsunamis*.



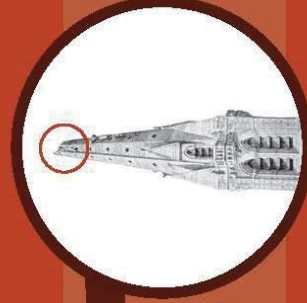
DROUGHTS



In the rain shadow of the Southern Alps and commonly experiencing dry northwesterly winds, Canterbury is particularly susceptible to drought – over the last 100 years there has been a significant drought at least once per decade. Climate change is likely to increase this susceptibility.



North Canterbury earthquake, 1891
This magnitude 7.73 earthquake occurred in the early hours of 1 September, damaging buildings and contents throughout North Canterbury and Buller. Land was displaced up to 2.6 metres across the fault through Glynn Wye Station, and liquefaction produced large pits and sandblows. In Christchurch, the top of the Cathedral spire collapsed.



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LANDSLIDES

Landslides are common in the fractured rock of the Southern Alps. They are usually triggered by strong earthquakes but can

also happen with no obvious trigger. The steep volcanic rock slopes and faces of Banks Peninsula are also susceptible to rock falls and there are many landslides in the overlying, thick wind-blown silty soil, which are often triggered by rainfall. Activities on slopes, such as clearing vegetation and constructing roads and buildings, can increase the likelihood of landslides.



SNOW AND WIND

While snowfalls are common in the Southern Alps and foothills during winter, heavy snowfalls on the plains and downlands are uncommon. Major

snowstorms, which damaged buildings and power infrastructure and seriously disrupted transport and communications, have happened in 1945, 1967, 1973, 1992, 1996 and 2006. High winds are also a hazard for Canterbury, the most severe being



Source: Waimea District Council.

COASTAL EROSION AND FLOODING

Most of the Canterbury coast is undergoing long-term erosion, the only exceptions being the rocky shoreline of Banks

Peninsula, Kaitorete Spit, southern Pegasus Bay and the Kalkoura coastline. Many low-lying coastal areas, particularly at river mouths and along the South Canterbury coast, are vulnerable to seawater inundation during coastal storms. In many places, people have significantly altered natural coastal processes, and some development has happened in areas where the coast is eroding or land may be flooded.



the northwesterly 'downslope winds' that blow across the Southern Alps and over the plains. These can damage forestry, crops and buildings, and disrupt infrastructure.



Chexiwo earthquake, 1901



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WHAT'S IN A WORD?

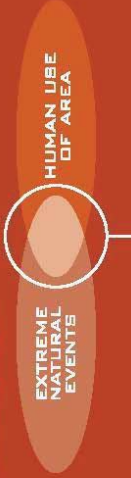
→ **NATURAL EVENTS**

'Natural events', 'natural hazards', 'natural disasters' and 'risk' are a few of the terms used in natural hazard management and they can be confusing. However, we need to make sure we are all talking the same language so that we can work together to get the best results for Canterbury's communities.

→ **NATURAL HAZARDS AND NATURAL DISASTERS**

A natural process, or extreme natural event, becomes a hazard when we choose to live, work or play in an area where it has the potential to affect us.

The effects of a natural process or event can range from being a nuisance to a catastrophe. We often use the term 'disaster' when the effects overwhelm the ability of a community to respond – a situation that can include deaths and injuries, extensive damage to property, infrastructure or the environment, and disruption to normal day-to-day life.



A NATURAL HAZARD IS THE POSSIBILITY OF...

an avalanche at a ski resort
a tsunami at a port
a flood in a town
a drought in a farming district
an earthquake near a city
a wind storm through crops



Arthur's Pass earthquake, 1929
This magnitude 7 earthquake was felt across New Zealand and triggered many large landslides in the Southern Alps between Arthur's Pass and Lake Sumner, including the Falling Mountain rock avalanche. This large rock in this photograph fell onto and blocked the road in Oira Gorge.



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WHAT ARE THE CHANCES

We often 'measure' hazards by describing the likelihood, or probability, that an event will occur.

The likelihood of a certain size event happening can be estimated by counting how many events of that size have occurred over a given period of time. For example, there have been 20 earthquakes bigger than magnitude 7 in or near New Zealand in the last 170 years. So, on average, a magnitude 7 or bigger earthquake has happened approximately every 8.5 years. The chance of another magnitude 7 or bigger earthquake happening in any one year is 1 in 8.5, or a 12% chance. However, large earthquakes are not evenly spaced and often occur in clusters.

There are different ways of describing probability. A flood in the Ashburton River with a flow of 1,960 cubic metres per second can be described as a 1 in 200 year flood. This means a flood of this size or larger is likely to occur on average about once every 200 years. But it does not mean that if a 1 in 200 year flood occurs, that it will not occur again for another 200 years.

There is a 1 in 200 or 0.5% chance there will be a flood of 1,960 cubic metres per second, or larger, in any one year. This way of expressing probability as a percentage chance each year is

called Annual Exceedance Probability (AEP) and is often used instead of return period because it gives a better indication of how likely something is in any year.



We only have a short written record of natural events in New Zealand – about 170 years. Because large events are infrequent, our written records and experiences sometimes do not give a good indication of the sorts of things that could happen in the future. We can, however, use the data we do hold or evidence of large events in the geological record to predict the likelihood of something happening in the future.

Human activities can change the likelihood of some natural hazards occurring. Cutting into slopes to create roads and building platforms can increase the likelihood of landslides. Removing vegetation from river catchments and urbanisation can increase the likelihood of heavy rain creating a large flood.



In December 1956 a hailstorm, with hail stones up to 5cm in diameter, damaged forestry plantations and crops along a narrow, 100km long belt from Mt Somers to Loburn. Windows were broken, iron roofs dented, and many trees in plantations and shelter belts died in the months following the storm.

Source: New Zealand Journal of Forestry

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RISK

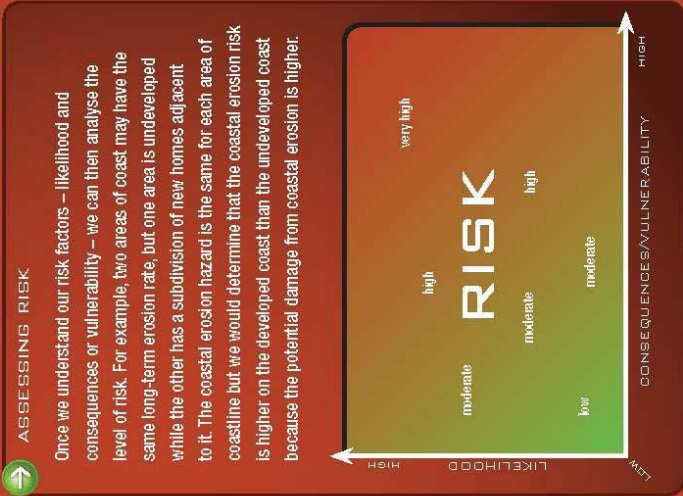
Risk is the combination of the likelihood of an event occurring and the potential consequences of that event.

RISK = LIKELIHOOD X POTENTIAL CONSEQUENCES/VULNERABILITY

Understanding risk is important for two reasons.

Firstly, by understanding the factors that contribute to risk (i.e. the likelihood of something happening and a community's vulnerability to it), we can develop ways to reduce risk. Secondly, by determining risk, we can compare levels of risk across different types of hazards and set priorities for reducing that risk.

While in many cases we cannot influence the likelihood of natural events occurring, we can often avoid or reduce the potential consequences. We make ourselves more vulnerable to natural hazards by choosing to live, work and play in areas where natural events are likely to occur.



MANAGING RISK

Managing risk in New Zealand involves activities across the '4Rs': risk reduction, readiness, response and recovery.

RISK REDUCTION

After identifying and analysing risks, risk reduction involves taking steps to eliminate or reduce risk by reducing an event's likelihood or potential effects. This includes measures that reduce vulnerability to hazards such as land-use planning, building design and construction, minimum floor levels, and planting or retaining vegetation. It also includes measures that modify the natural event, such as structural measures like stopbanks or seawalls.

Structural measures can be expensive to maintain and can sometimes affect the natural environment or transfer flooding or erosion problems to adjacent areas. Sometimes, structural measures such as stopbanks can actually increase risk by encouraging development behind them and increasing the potential damage if the stopbank is overtopped by a flood larger than it is designed to contain. Although stopbanks are necessary in some areas to reduce risk to existing settlements, risk reduction now focuses more on avoiding intensive development in high hazard areas, using those areas for other activities such as agriculture or recreation, which are likely to be more sustainable in the long-term.

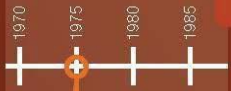
RESIDUAL RISK

Risk from natural hazards cannot be completely eliminated. Despite constructing strong and flexible buildings, wherever you are in Canterbury you may still be affected by a strong earthquake. Also a stopbank may be overtopped by a flood larger than what it was designed to hold back. Taking steps to reduce risk costs – not just in dollars to build stopbanks or strengthen buildings, but also in lost development opportunities. These costs need to be weighed up against the level of risk.

Residual risk is the level of risk that remains after we have implemented risk reduction measures. Ideally, the level of residual risk is low enough to be acceptable to the community.



A northwesterly windstorm hit Canterbury in August 1975, with a peak wind speed of 198km/hr recorded in Kaikoura. The winds caused millions of dollars worth of damage to forest plantations and 12,600 insurance claims were made for damage to structures.



Canterbury windstorm, 1975

PAGE 7

444

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→ READINESS

Readiness involves preparing and developing systems to cope with and minimise the effects of a natural hazard event. This includes being prepared at home and at work by having adequate emergency supplies, as well as communities and organisations having systems like evacuation plans, warning systems and response plans in place.

→ RESPONSE AND RECOVERY

Response is the action taken immediately before, during or directly after a natural hazard event to save lives and property, and to help communities recover. Response involves the whole community but is usually coordinated by emergency services, local government and health organisations.

Recovery is the phase of community regeneration after the immediate response to a natural hazard event and can take many months or even years. Hopefully, following recovery, a community will be much more resilient to future natural events than it was before. This may include taking steps such as relocating people away from flood-prone areas after a flood, rather than simply rebuilding in the same place and still being vulnerable.



Emergency management teams in South Canterbury after the 2006 snow storm.



South Canterbury flood, 1986
Large areas of South Canterbury flooded in March 1986, including Temuka, the Levels Plain from Pleasant Point to the coast, and areas adjacent to the Panora and Waitao rivers. Two thousand people were evacuated and one person died. Damage to property, roads, bridges and river engineering works, and loss of crops and livestock were estimated at \$60million (1986 dollars).

1985

1990

1995

2000

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MANAGING CANTERBURY'S RISK – SOME EXAMPLES

REDUCING FLASH FLOOD RISK –
BLANDSWOOD, SOUTH CANTERBURY

The lower part of Blandswood has been affected by at least four flash floods from Kowhai Stream in the last 250 years. In 1975, four lives were lost when some baches were washed away, and evidence suggests that the previous floods could have been even larger. Environment Canterbury, in consultation with the local community, has put a series of flood warning initiatives in place, including flood warning signs and notices.

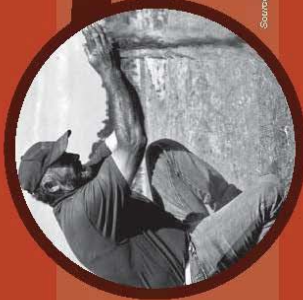


REDUCING FLOOD RISK –
LYELL CREEK, KAIKOURA

Kaikoura has flooded more than a dozen times in the last 150 years. The last major flood in 1993 caused \$10million worth of damage and prompted a floodplain management strategy. One measure to come from this strategy was the 400 metre-long Lyell Creek floodwall, which was completed in 2006. The floodwall is designed not only to keep floodwaters out of Kaikoura, but also to be opened to allow water entering the town from the State Highway 1 bridge to pass back into the river quickly. The award-winning works included planting the creek banks and constructing bridges, a walkway and an amphitheatre for the community to use.



Source: SquareCircle



The 1988-1989 drought cost Canterbury several tens of millions of dollars in lost productivity. In addition to the drought, thousands of tonnes of dry topsoil was blown away by strong north-westerly winds.



Source: The Press

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REDUCING FAULT RUPTURE RISK
- HAMMER SPRINGS

The active Hammer Fault runs through Hammer Springs township in Hurunui District. The fault is thought to be relatively active, moving at least once every 2000 years, generating a large earthquake and displacing the ground across the fault by up to one metre. The location of the fault is included in the Hurunui District Plan and geotechnical investigations are required within 20m of the fault, so that new buildings are located and designed to reduce the effects of displacement of land across the fault.



— definite active fault trace
- - - possible minor or propagating trace
■ Hammer fault ground hazard zone



TSUNAMI READINESS -
COASTAL CHRISTCHURCH

Christchurch City Council has developed a plan to evacuate residents from coastal parts of Christchurch if a tsunami warning is received from the Pacific Tsunami Warning Center in Hawaii. The Council distributed a brochure to residents in 2007 which shows areas that will be evacuated if a warning is received, along with recommended evacuation routes and advice on where to go, what to take, what to do with pets and which radio stations to listen to. The brochure gives background information on Christchurch's tsunami risk and detailed advice on what people can do to reduce their own risk.



Source: Christchurch City Council



Canterbury snowstorm, 1992
The August 1992 snowfall was one of the largest recorded in Christchurch, with around 25cm falling in the city, damaging buildings and disrupting transport. The snowstorm killed over one million livestock in Canterbury and the economic impact was estimated at between \$50million and \$100million.

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➔

READINESS – EMERGENCY
MANAGEMENT EXERCISES

The Canterbury Civil Defence Emergency Management Group holds regular emergency management exercises, which are a practical, efficient and cost-effective way to prepare. Exercises improve community preparedness and test the operational capability of emergency management organisations, the interaction and coordination between emergency services, and the effectiveness of response plans and procedures. The usefulness of exercises relies on accurate and up-to-date hazard and risk information.



➔

ASSET MANAGEMENT
PLANS – ORION

Earthquake, tsunami, flood, snow, and wind hazard information has been used to develop risk reduction and readiness measures within Orion's asset management plans. These measures aim to reduce disruption to electricity supply in an emergency. Equipment spares are stored in a secure location and an emergency contractor is engaged to respond to emergency events. Infrastructure is checked regularly to make sure it is robust and bunding has been installed at some sites to reduce the possibility of an oil spill. Bridges that carry Orion cables have had their approaches checked for liquefaction potential and have been reinforced if necessary.



Source: Orion New Zealand Ltd



Kaikoura flood, 1993

On 23 December 1993, the Kowhai River changed its course and flowed through Kaikoura township and into Lyell Creek. Thirty-five houses and 44 businesses were flooded, and damage was estimated at \$10million.

1990

1995

2000

2005

➔

PAGE 11

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ENVIRONMENT CANTERBURY'S ROLE

Environment Canterbury, along with city and district councils in the region, is responsible for helping reduce the potential effects of natural events in Canterbury. This includes identifying hazards and risks as part of broader environmental management, thus helping work towards a sustainable and resilient community.

Our work spans risk reduction, readiness, response and recovery, and includes hazard investigations and monitoring, planning and regulation, river engineering, flood warning, emergency management, and providing advice and education.

Environment Canterbury is also a member of the Canterbury Civil Defence Emergency Management (CDEM) Group, a partnership of local councils, emergency services, district health boards and other emergency response organisations in Canterbury. The members of the CDEM Group work together to identify and analyse hazards and risks in Canterbury, and to plan how to reduce risk, be ready for, respond to and recover from hazard events.



WHERE CAN YOU GET MORE INFORMATION ABOUT NATURAL HAZARDS?

- Environment Canterbury:
www.ecan.govt.nz/naturalhazards or your city or district council
- Canterbury Civil Defence Emergency Management Group:
www.cdemcanterbury.govt.nz
- Ministry of Civil Defence and Emergency Management:
www.civildefence.govt.nz
- Institute of Geological and Nuclear Sciences (GNS Science):
www.gns.cri.nz
- National Institute of Water and Atmospheric Science (NIWA):
www.niwa.co.nz
- MeService Learning Centre:
www.melservice.co.nz
- Te Ara: The Encyclopedia of New Zealand:
www.teara.govt.nz



South Canterbury flood, 1994
On 19 March 1994, 178mm of rain fell in 24 hours on the town of Fairlie. The bridge over the Ophi River was destroyed and the river swept through a timber business on the river bank taking tractors, trucks, timber and sawmilling buildings with it.



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ARE YOU READY?

Everyone has a part to play in managing natural hazard risk. Emergency services, local government and other organisations do their bit to reduce risk and be ready – are you doing yours?

Being prepared means reducing the impact of an event, in addition to coping with it as well as we possibly can when it does happen. Household emergency plans and emergency survival supplies help make communities self-sufficient in an event. Remember, in a disaster, many people will need help and the emergency services will not be able to get to everyone immediately. You need to be able to look after your family and neighbours without help.

HOUSEHOLD EMERGENCY PLAN

Discuss ways to get in touch with other family members during an emergency (bearing in mind communications may be limited).

- ◆ Arrange for people to collect children from school and provide the school with a list of these people.
- ◆ Establish a meeting place in case you cannot stay in your house or if family members are separated.
- ◆ Allocate tasks for those at home when a disaster occurs, like turning off power and water, and checking on neighbours.
- ◆ Do a first aid course.
- ◆ Locate your nearest civil defence centre.

EMERGENCY SURVIVAL SUPPLIES

- Locate your nearest civil defence centre.

ocate your nearest civil defence centre.

- Locate your nearest civil defence centre.

ocate your nearest civil defence centre.



Canterbury snowstorm, 2006

Source: *Times Herald*

PAGE 13

↑ following items are useful to have easily accessible at home:

- ◆ water – at least 10 litres per person, more is better
- ◆ food – at least three days' supply
- ◆ alternative cooking source and utensils – BBQ or gas cooker, can opener, knives
- ◆ warm, water proof clothing and sturdy shoes
- ◆ emergency blankets
- ◆ important family documents
- ◆ first aid kit, medications, baby supplies
- ◆ soap, wet wipes, toilet paper
- ◆ torch with spare batteries
- ◆ radio with spare batteries



Defining Moments in Nature (2008 edition).

Environment Canterbury
58 Kilmore Street
P O Box 345
Christchurch
New Zealand

Telephone: (03) 365 3828
Fax: (03) 365 3194
Website: www.ecan.govt.nz

Canterbury Civil Defence
Emergency Management Group
www.cdem-canterbury.govt.nz

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