Niho taniwha: Communicating tsunami risk

A site-specific case study for Tūranganui-a-Kiwa

Harmony Repia 2018

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To my daughter, thank you for your love and patience.

Whakapapa

Ko wai au
I te taha o toku papa

Ko Titirangi te Maunga
Ko Uawanui-a-Ruamatua te Awa
Ko Horouta te Waka
Ko Te Aitanga-a-Hauiti te Marae
Ko Ruakapanga te Whare
Ko Ngati Porou te Iwi

Ko Harmony Repia toku ingoa.

Figure. 1
Uawa

Acknowledgements

Specials thanks to my supervisors Jo Bailey
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immense support. I will value the knowledge
you have shared with me for the rest of
my design practise. I would also like to
acknowledge my *whanau* and friends who
encouraged me every step along the way.
And lastly thank you to all of the participants
who shared your knowledge and expertise
with me, aroha nui.

Terms that are *italicised* are explained in
the Glossary section of this exegesis on
page 89.

Abstract

For some people living in Tūranganui-a-Kiwa, tsunami are recognised as a natural hazard that could threaten the entire East Cape region at any time. However for most, an ethnographic study of local residents reveals high levels of complacency within the Gisborne urban community when it comes to being aware and prepared for tsunami risk.

A recent study by Dhellemmes, Leonard & Johnston (2016) was conducted along the East Coast of the North Island of Aotearoa to explore the changes of tsunami awareness and preparedness between 2003–2015. Results from this study revealed coastal communities including *Tūranga* had low levels of tsunami awareness and high expectations of receiving a formal warning before evacuation (Dhellemmes, et al. 2016).

As a result *Geological and Nuclear Sciences (GNS)* with the *Joint Centre for Disaster Research (JCDR)* have identified that the population needs to respond with urgency to natural warning signs (one being an earthquake) rather than assuming an official warning will come through formal Civil Defence channels. There is also a need to raise tsunami awareness by understanding what influences tsunami preparedness in communities.

The *tangata whenua* of Tūranganui-a-Kiwa hold various bodies of knowledge that can contribute to our society and future risk management . Māori oral traditions are often mapped to the *whenua* and anchored in our genealogies, which as King, Goff & Skipper (2007) explain enables the transfer of knowledge down through the generations. The method of acknowledging the contextual location of *Tūranga* is crucial in understanding the community's need to raise tsunami awareness for their own *iwi*, *hapū* and *whanau*.

This process proposes that by allowing the community to share responsibility for their response to an unfolding crisis, it opens up new opportunities to raise awareness. This design-led research explores how Human-Centred-Design (HCD) methodology underpinned by *Mātauranga Māori* principles can contribute new ways of designing novel tsunami communications for Tūranganui-a-Kiwa. This project intends to create a site-specific work based on an extensive community-based design process.
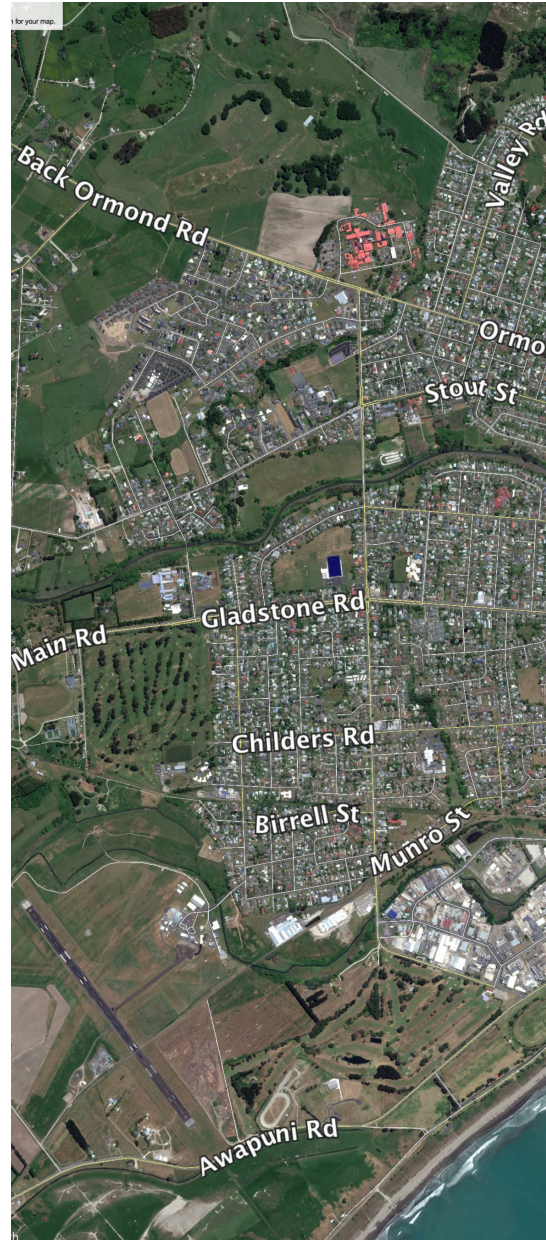

Figure. 2
Tūranga

Figure. 3 (Top)
Tūranga Waikane beach

Figure. 4 (Bottom)
Tūranganui river

Introduction

A joint venture

In 2017, scholars from the *Joint Centre for Disaster Research (JCDR)* and *Geological and Nuclear Sciences (GNS)* identified that the public do not sufficiently understand tsunami risk. In particular, there is little awareness regarding the three different types of tsunami; *local, regional* and *distant* and that each type requires a differing response and warning communication method. For example the shake is the warning for a *local* tsunami and immediate action should be taken to get to higher ground. In response to these findings, JCDR and GNS set up a research project where a Master of Design student and a Master of Communication student could both explore new communications of tsunami risk and warning systems for Aotearoa. This is the Masters of Design response to that project.

I was drawn to this research because of my own experiences with tsunami warnings. Over the years Turanganui-a-Kiwa has experienced multiple tsunami warnings that have been triggered by *local* and *distant* earthquakes. An example of this was the Kaikoura 2016 earthquake that triggered a tsunami warning for the East Cape. While the community of *Tūranga* live with the awareness of our vulnerability to tsunami, often we expect the warnings sent by Civil Defence and the media will provide us with enough information and notice to protect our *whanau*, *hapū* and *iwi*. Therefore I have a huge appreciation for systems that communicate warnings across Aotearoa. I was selected as the Master of Design candidate to carry out this research and embraced the opportunity to focus on my own community, *Tūranga*, which is a part of the wider region Tūranganui-a-Kiwa, a place I consider my *tūrangawaewae*.

Cultural context

Tūranganui-a-Kiwa is the original place name for the Gisborne area, otherwise known as Poverty Bay. There are different explanations of how Tūranganui-a-Kiwa derived its name, but according to Tūpara (2005) one account refers to Kiwa, an ancestor from the Tākitimu waka, who waited for the arrival of the Horouta. The arrival took so long that Kiwa named the final landing place the "long waiting place of Kiwa" or "the standing place of Kiwa". The four main *iwi* that occupy this area are Te Aitanga-a-Māhaki, Rongowhakaata, Ngai Tāmanuhiri and my own *iwi* Te Aitanga-a-Hauiti. It is important to understand the specificness of this *whenua* because the *tangata whenua* who live here hold various bodies of knowledge that could inform a risk management strategy and design response pertinent to the local context, thereby contributing to our society a solution more likely to resonate with the community. The method of acknowledging the contextual location of *Tūranga* is crucial in understanding the community's needs to raise tsunami awareness for their own *iwi*, *hapū* and *whanau*. Research into the nature of our *whenua*, particularly the *Hikurangi Subduction Zone*, strongly indicates the severity in which a tsunami may affect *Tūranga*, and the importance of understanding and preparing for this potential event.

Research aims

King, Goff & Skipper (2007) suggest that by allowing the community to share responsibility for their response to an unfolding crisis, it opens up new opportunities to raise awareness. I see huge potential to bring together government entities, JCDR and GNS with the community of *Tūranga* into a meaningful and collectively-oriented project. My research aims to uncover this potential, and perhaps also offer approaches and working methods for other researchers in the future. I am interested in exploring traditional *Mātauranga Māori*

and Māori values to improve natural hazard communications for *Tūranga*. This project aims to respond to the research question:

How can Mātauranga Māori produce a meaningful and relevant narrative to enhance community conversations that raise awareness of tsunami risk and inform new tsunami communications for Tūranganui-a-Kiwa?

In order to unpack this question, this thesis has been broken down into four key components that informed the project's scope, methods and context. The design-led research will explore:

Section 1.0 Risk communications in Aotearoa to develop an understanding of current communication methods.

Section 2.0 Human-Centred Design methodology and the process of *co-design* that was used to build empathy with my community and reveal the underlying problems affecting tsunami awareness and preparedness in Tūranga.

Section 3.0 A Māori cultural base that underpins the project's key values, and principles that have informed the decisions made through the design process.

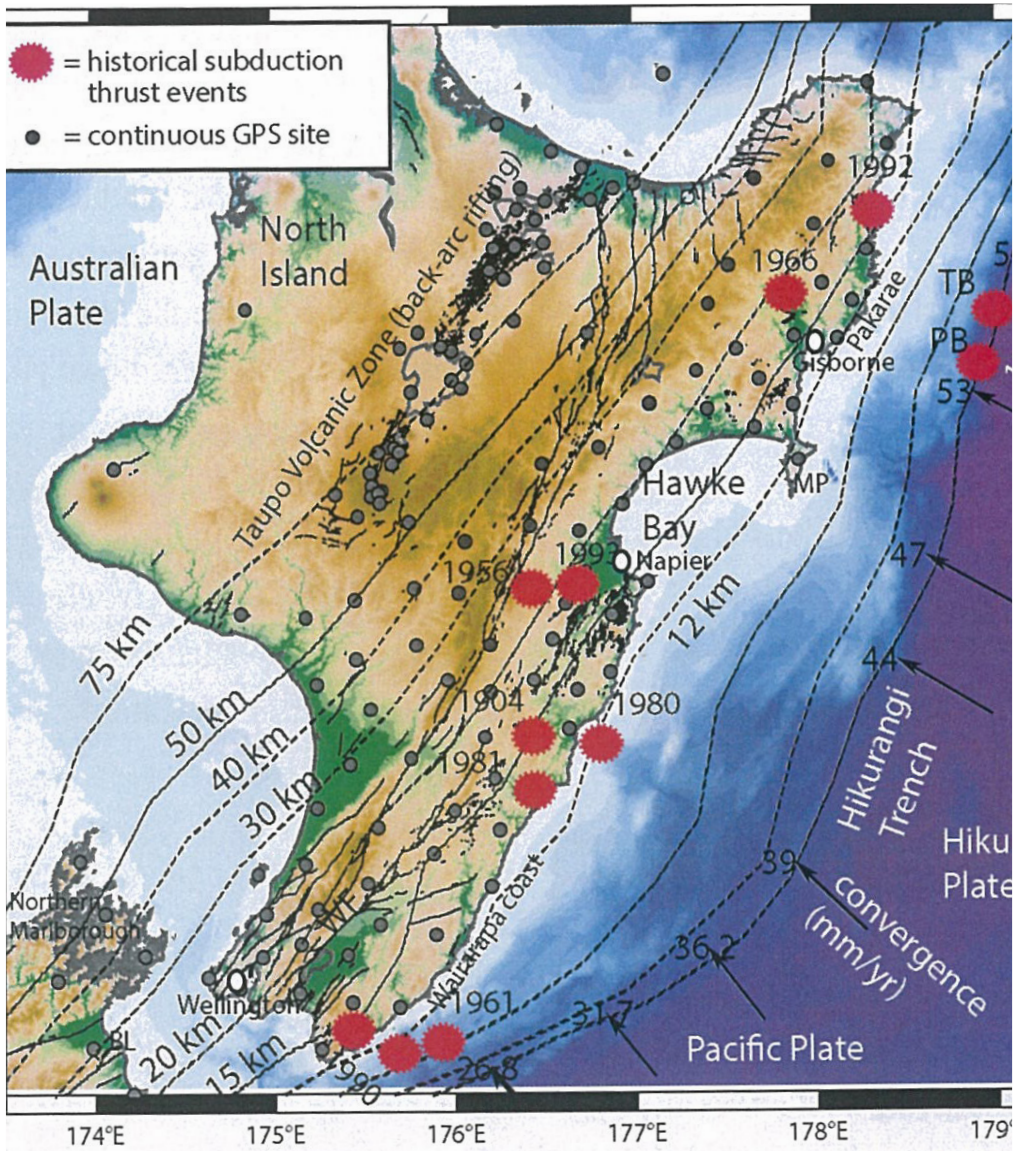Section 4.0 The design process and the final design outcome.

Figure. 5
Wallace, L,. (2014). Tectonic setting of the
Hikurangi Subduction Zone

Risk communication

What is risk communication?

Risk communication is the intersecting point where practical management, policy making and social communication meet (Boholm, 2008). The aim of risk communication is:

"To inform and educate the public about risk and risk management" (Boholm, 2008).

Such communication is used to build knowledge and awareness around specific risks in order to influence attitudes and behaviours of the public that inform decision making required within emergency situations.

Traditionally risk communication was perceived to be a distinction between the expert and the public, scientific data versus social values and people who make decisions as opposed to those affected by them (Boholm, 2008). Experts in this scenario are the regulators, and scientific experts who assess the risk of disaster

using scientific methods of analysis and then communicate the risk directly to the public (Boholm, 2008). But the problem with this approach is the disconnect between how the public interpret and analyse risk information which forms their own perceptions about any identified risks around them. This in turn contributes to their decision making and behaviour. Slovic (p. 5-8, 1986) describes four key problems that affect public risk perceptions:

1. People's perceptions of risk are often inaccurate

2. Risk information may frighten and frustrate the public

3. Strong views are hard to modify

4. Naive views are easily manipulated through presentation

Together these risk perceptions highlight the need to shift away from a technocratic approach to a collaborative learning

approach by interacting with the public (Boholm, 2008). Ortwin Renn (2006) as cited by Kellens, Terpstra, & De Maeyer (2013) discusses that risk communication has evolved to focus on enhancing conversations between experts and the public to develop a shared understanding and response toward risk. This strategic shift can be applied to a diverse range of risk management activities during large scale natural events that may affect human settlements. Therefore, this unified approach has become a crucial lens to explore how risk communication can inform risk management in Aotearoa.

Risk communication in Aotearoa

The *Ministry for Civil Defence and Emergency Management (MCDEM)* has a risk management framework for dealing with natural hazards in New Zealand. This approach is described as the '4Rs' (New Zealand & Department of Internal Affairs, 2008) see Figure 6:

- **Reduction:** The first stage aims to reduce the likelihood and potential impact of a disaster occurring.

- **Readiness:** The second stage encourages people to undertake activities to prepare for a disaster e.g. having a survival kit or emergency plan.

- **Response:** The third stage refers to actions taken immediately before, during or after an emergency event to work with people who have been affected.

- **Recover:** The final stage refers to a coordinated effort between government, emergency organisations and communities to rebuild and work together from the immediate event.

Risk communication plays an essential role across all four stages within risk management . The stage of the crisis event is relative to the response and should influence which choice of communication should be used.

In Aotearoa, there are multiple information sources and channels being used to communicate risk for the public. For example tsunami education can consist of evacuation maps, tsunami 'safer for schools' programmes, annual exercises, brochures, information boards and national advertising. Brenkert-Smith, Dickinson, Champ, & Flores, (2013) explain that it is important to integrate expert knowledge sources with informal social interactions, which can be seen through communicating emergency updates from *MCDEM* or local authorities via mass media and informal communications such as hearing about a neighbour's actions through social media. A great example of this is how *Te Tairāwhiti* Civil Defence uses social media to post updates about natural hazards that in turn provide a platform for the community to share, discuss and engage with crisis information. The importance of doing this recognises that local sources of information like one-to-one interactions are valued more because they offer a personalised experience as opposed to
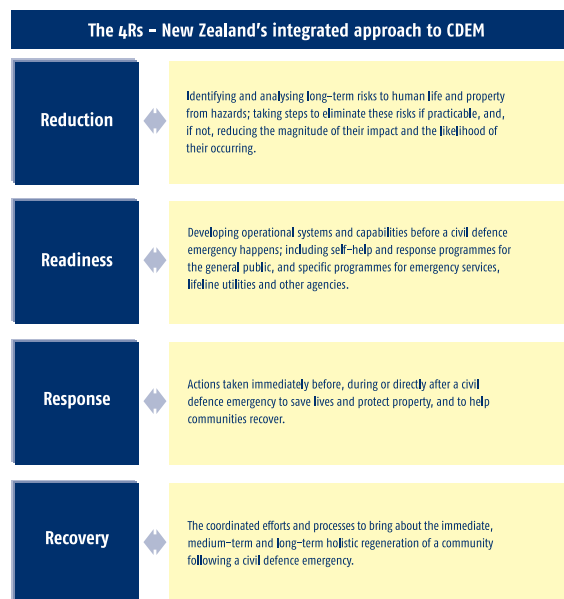
The 4Rs – New Zealand's integrated approach to CDEM

Reduction — Identifying and analysing long–term risks to human life and property from hazards; taking steps to eliminate these risks if practicable, and, if not, reducing the magnitude of their impact and the likelihood of their occurring.

Readiness — Developing operational systems and capabilities before a civil defence emergency happens; including self–help and response programmes for the general public, and specific programmes for emergency services, lifeline utilities and other agencies.

Response — Actions taken immediately before, during or directly after a civil defence emergency to save lives and protect property, and to help communities recover.

Recovery — The coordinated efforts and processes to bring about the immediate, medium–term and long–term holistic regeneration of a community following a civil defence emergency.

Figure. 6
(New Zealand & Department of Internal Affairs, 2008). The '4Rs' — New Zealand's integrated approach to *CDEM*.

mass media sources (Brenkert-Smith et al., 2012). Each communication channel employs different levels of information and messages which are determined by factors including understanding audiences, availability of power, time and resources (Sheehan, 2015).

In this project, I propose to test the process of integrating risk communication focussed on the exchange of information between experts and the public that responds to the '4Rs' risk management approach. Because each communication channel employs different levels of risk information relating back to the '4Rs' management approach there are multiple factors that determine what those communication should consist of. This project aims to unpack these understandings by using a Human-Centred Design methodology underlined with principles of *Mātauranga Māori.*

Figure. 7
Quake Core conference
2017
Wairakei, New Zealand

Conference connecting experts across the natural hazards fields with an emphasis on earthquakes. By attending this conference I built a larger appreciation for the science involved in natural hazards research especially in relation to tsunami.

Figure. 8

Nga Aho wānanga
2017
Omaka Marae

The Nga aho wānanga brought together a range of different Māori artists to *co-design* with *whanau* for *whanau* at Omaka Marae. This was the moment I realised I wanted to *co-design* with my community *Tūranga*.

Human-Centred Design

What is Human-Centred Design?

Human-Centred Design is a unique approach to problem solving and is grounded in understanding the needs and insights of the people that the designer is designing for. Empathising with people can help to reveal the underlying problems affecting their communities or the situation that an individual may inhabit. This provides the opportunity for designers exercising a Human-Centred approach to drive creative thinking and offer innovative proposals relative to the situation being considered. The core value of Human-Centred Design recognises that;

"The people who face those problems everyday are the ones who hold the key to the answer" — (IDEO, 2015)

IDEO (2015) recommend that by focussing on what a designer may learn from individuals and asking them the right questions will enable them, to more likely arrive at a suitable proposal together. Human-Centred Design is not a one size fits all process, nor is it perfectly linear

Each project brings different perspectives, context and knowledge that in turn navigates its own contours and character. IDEO call this process 'diverging and converging' which is a very similar concept to Design Council's (n.d.) 'Double Diamond' design process model.

Methodology

The 'Double Diamond' model is the method I used to inform my design process (see Figure 9). However as mentioned above the process was not straightforward and at times challenged my decision making (see Figure 10). In Figure 10 I mapped my own process alongside the 'Double Diamond' method and highlighted areas of reflection where my design process changed its course. My decisions were influenced by the need to better understand my audience by taking the time to build relationships and connections with them.
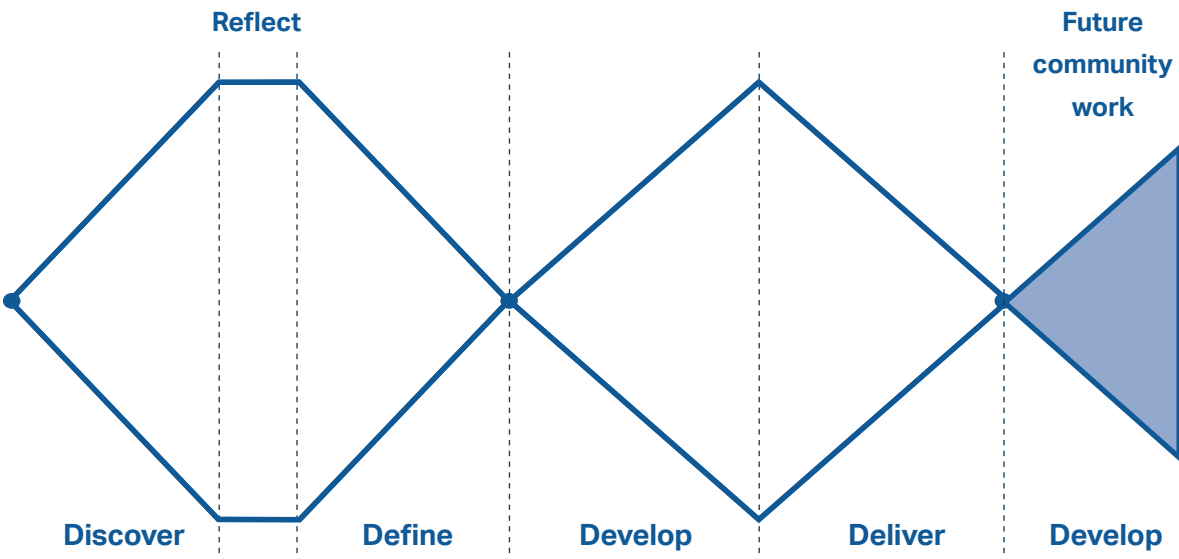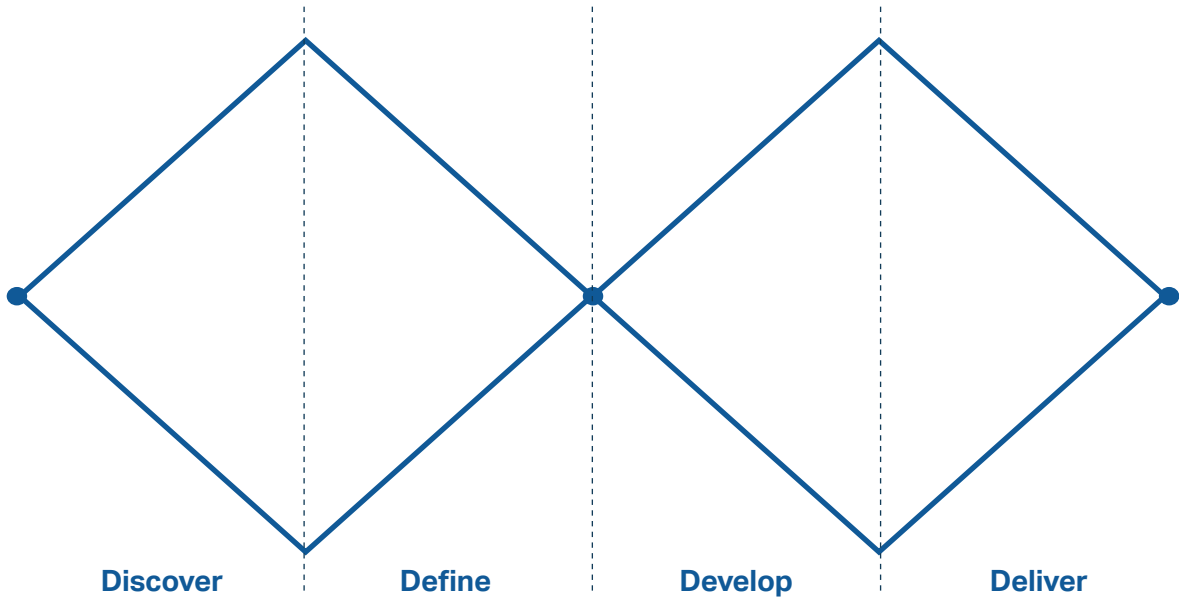
Discover   **Define**   **Develop**   **Deliver**

Reflect   **Future community work**

Discover   **Define**   **Develop**   **Deliver**   **Develop**

Figure. 9 (Top)
Design Council
'Double diamond'

Figure. 10 (Bottom)
Harmony's design process

This methodology has kept me grounded in believing that what I have heard and observed from my own people will guide me to arrive at solutions that meet my community's needs.

The model has four phases, Discover, Define, Develop and Deliver. The model shows how the design process diverges where thinking and possibilities are broad to converging and focussing on distinct objects (Design Council's, n.d.). Below is a breakdown of these four phases.

- **Discover:** The first part of the model is a period of discovery that encourages designers to look at the world from a new perspective, seek information and gather insights. The exploration involves empathising with people and can utilise both qualitative and quantitative research methods. Gathering data and insights builds a rich bank of knowledge that will inform the rest of the design process.

- **Define:** During this phase the model converges, synthesising all of the possible opportunities and design ideas generated in the discovery phase. The aim is to filter through the mass of ideas by analysing them into a reduced set of problem statements, *personas* and pain-points that frames the design challenge.

- **Develop:** One of the qualities that sets Human-Centred Designers apart is the belief that there will always be more ideas. Develop is the phase where designers have the opportunity to think big, prototype and test. This is often a generative process of discarding bad ideas and nurturing the gems to refine a solution for the people you are designing for.

- **Deliver:** In this phase the design concept is finalised and sent out into the world. This is an important time to consider capturing feedback. This is also an important time to feed back lessons learnt with the people you are designing for.

Figure. 11
Quake Core
conference: Huka Falls
2017
Wairakei, New Zealand

In this moment I felt a huge appreciation for the power of water. The weight of this moment can be understood through a indigenous lens.

Māori kaupapa approach

Indigenous knowledge

This research embraces a shift from Western traditional knowledge frameworks towards an Indigenous knowledge approach, as it became clear to me that Māori values, customs and indigenous perspectives must inform the basis of research that involves indigenous peoples. Indigenous peoples share a long standing connection to their lands, community and natural environment that is maintained through an understanding of practices of belonging, knowledge and responsibility (Wilson, 2008). 'Indigenous' describes a collective who share an understanding of the underlying natural knowledge structures that inform fundamental values and practices, and, who share recent histories of subjection to imperial and colonial enterprises and their ongoing impacts including marginalisation of indigenous knowledge systems (Puke, K. personal communication, March 6, 2018). The work of Cordero (as cited in Wilson, 2008) explains that Western knowledge is separated into distinct categories such as science, art and religion. Within these bodies, disciplines are disconnected again from each other and privileged for this specificity, individualised authorship and stratified within distinctly western values.

Indigenous knowledge springs out of the integration of those areas and maintains inter-relationships that reflect a holistic understanding of the world. Pihama, Southey, & Tiakiwai (2015, pp.6-16) give an example from their own cultural knowledge base that indicates science and culture are not separated. Pihama et al, (2015, pp.6-16) describes that the navigational expertise of *tupuna* Māori who travelled across the Pacific Ocean highlights a strong understanding of water related sciences like ocean swells, tides and sea movements. Māori have generated different names for these phenomena that tells people about the myriad characteristics, shapes and nature of an energy that can uphold life but also bring destruction (Royal, 2006).

This energy with all of its forms, moods and expressions is known as *Tangaroa*. Through narrativised knowledge *Tangaroa*, the *kaitiaki* of the ocean is considered an *atua*. *Atua* have personality, a spiritual self, and a genealogical network, where aspects are employed for describing relationships, situations and events in order to transmit knowledge in memorable ways. These stories assist in passing on information to tasks at hand, such as fishing, navigation and seasonal planning. Within a wider underlying understanding, these are narratives that bind, link, inter-relate to both the land (the underlying sea beds, continental shelves), all marine life, bird life, to the environment and wider again into the cosmos. Therefore an indigenous paradigm comes from the fundamental belief that knowledge is relational (Wilson, 2008).

"It's collective, it's a group, it's a community. And I think that's the basis for rationality. That is, it's built upon the interconnections, and interrelationships, and that binds the group… But it's more than human relationships. And maybe the basis of that relationship among indigenous people is the land. It's our relationship to the land. There's a spiritual connection to the land. So it's all of those things". — (Wilson, 2008, p. 80)

Thinking through research as relational entails understanding not only some of these interrelationships, but how research questions are formed, planned and carried out. This requires protocols that ensure the research meets the requirements relevant to indigenous peoples. This is not an extensive review of an Indigenous knowledge approach but it has set some principles to explore how Māori Indigenous knowledge can inform a cultural base when conducting Indigenous research.

Mātauranga Māori

The notion of being connected through *wairua* and *mauri* to the land is crucial to this research. As I described in my Cultural Context section, the method of acknowledging the contextual location of my *tūrangawaewae* affirms my identity and *whakapapa* to *Tūranga*. Therefore *whakapapa* is one of the core principles that underpins the cultural base of this research. Wilson (2008) writes about the importance of relationships and why it is fundamental to an understanding of an indigenous framework. In *Mātauranga Māori* this is referred to as *whakapapa*;

"Identity is also inextricably bound to *whanau* and whenua relationships, to the marae and the value system and language which holds these things together".
— Pihama et al, (2015, p. 49)

In this research *whakapapa* extends to the responsibility of communities, *kaitiakitanga,* manaakitanga, whanaungatanga and wairuatanga to tino rangatiratanga where the people are able to exercise their ongoing responsibilities to their people and environment. In terms of people having meaningful participation, ownership and control of their own disaster management, how does the community gain that involvement to a culturally and socially relevant level? They gain it through education and understanding through knowledge sharing within the relevant forms and modes.

My research that began on the premise of relationality, revealed that this would occur most effectively through their own local narratives, the use of Te Reo and acknowledging the diversity of perspectives within *whanau*, *iwi* and *hapū*. This method considers ethical considerations such as the process of forming clear relationships with people. Pihama et al, (2015, pp.47-53) makes the point that simply being Māori does not grant you access to be an insider in terms of a researcher. In my community, my

engagement was very much dependant on my relationships and connections through my Ngāti Porou *whakapapa.* Even this kinship requires strengthening, ongoing engagement in the forming of healthy and strong relationships with Māori in my community beyond the scope of this project.

Figure. 12
Nga Aho wānanga
2017
Omaka Marae

Whakawhanuangatanga, Manaakitanga — Connecting through
sharing stories and showing respect and support for each other
as a group which became an integral part of this design process.
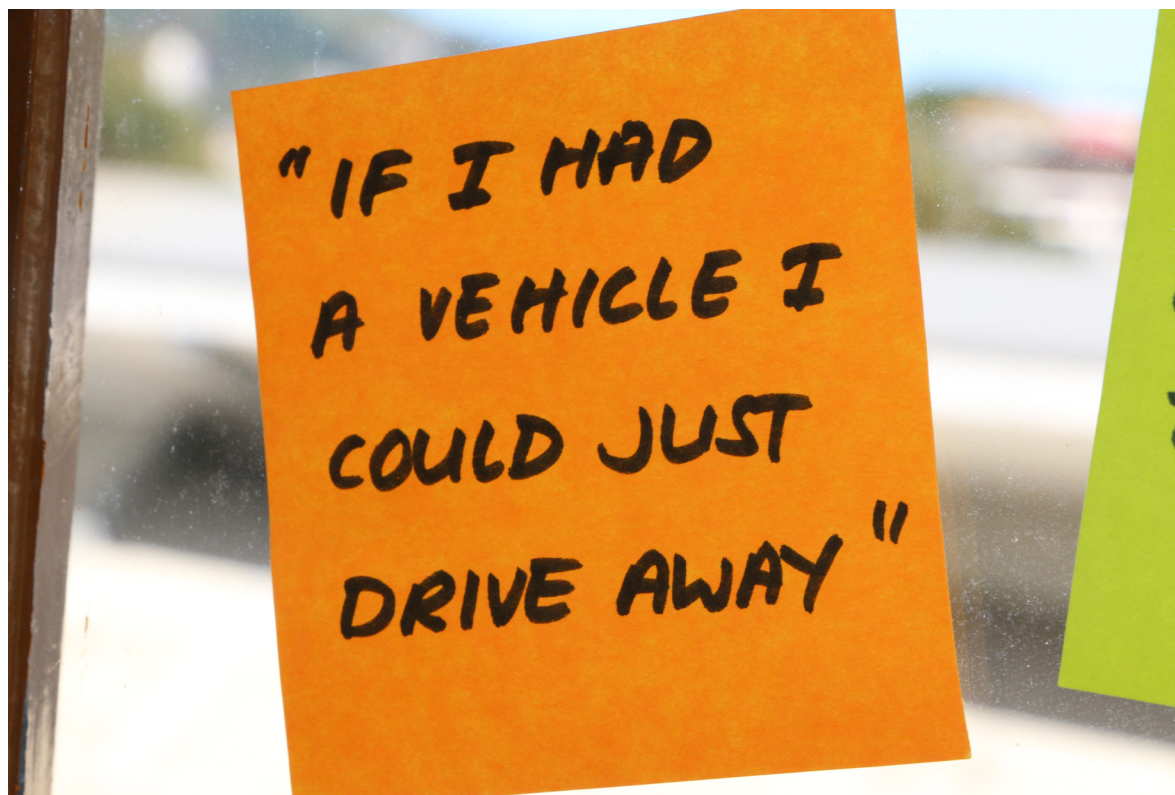
Figure. 13
Semi_structured interviews
Interview analysis
2017
Tūranga

Design process

Discover

Regardless of my previous experience within different design processes in the past, from the start I realised I had much to discover. I needed to discover and collect as much information and data about tsunami risk as possible. This sparked an investigation of how tsunami risk affects my community in Tūranganui-a-Kiwa. My Discover phase can be broken down into three main parts:

- Understanding the Hikurangi Plate Boundary

- *Mātauranga Māori* perspectives: Understanding tsunami risk

- Examination of data collected in the 2015 Preparedness survey

Understanding the Hikurangi Plate Boundary

My research began with an invitation to attend a *hui* with coastal communities on the East Cape with a group of scientists, emergency managers and experts from Niwa, GNS, JCDR and East Coast Lab. The group delivered a presentation that described a range of initiatives to better understand hazards posed by the *Hikurangi Subduction Zone*. Some activities include seafloor pressure monitoring, offshore drilling, seismic surveys and others. At this point I had a low understanding of the risk posed by the subduction fault, so this was an excellent opportunity for me to learn through listening, observing and participating in the activities and conversations demonstrated in the presentations. This was where I learnt that Tūranganui-a-Kiwa is home to the shallowest slow earthquakes in the world. This makes the East Coast of the North Island highly susceptible to tsunami risk. "Slow slip" events are also known as 'silent earthquakes' — fault movements that are not felt as they occur over a long period of time e.g. days, weeks, months see Figure 5 (L, Wallace, personal communication, June 22, 2017).

The *Hikurangi Subduction Zone* is the name for the active condition of the Pacific Plate, as it is thrust beneath the North Island of New Zealand by the Australian Plate'). Currently these two plates are locked, leading to the building up of elastic energy which will eventually be released in future large subduction earthquakes (Wallace, L. personal communication, June 22, 2017). These subduction earthquakes are similar to the ones that caused the Indian Ocean tsunami in the in 2004 and the 2011 tsunami in Japan.

Because of the close proximity of *Tūranga* to the Hikurangi trench, the risk of a major earthquake could result in a "*Local source*" tsunami which could hit the shores of the East Coast within minutes (Dhellemmes, et al. 2016). Research into the nature of our *whenua* indicates that *Tūranga* is highly exposed to tsunami. It is crucial to this research that my community understand this hazard and that it is communicated in ways that are relevant and meaningful.

Mātauranga Māori perspectives:

As I discussed in my Indigenous Knowledge section, narratives are used to explain the interconnections and interrelationships indigenous peoples have with the land. For Māori, ancient narratives in the form of *pūrakau* can be used to examine tsunami. King, & Goff (2010) talk about written records that tell of destructive waves caused by *taniwha* that endanger the lives of people in coastal communities. Although *taniwha* in these stories appear to be hostile, McFadgen (2007) considers them to be neutral and only aggressive when described in *pūrakau* involving events that kill people or cause damage. King & Goff (2010) talk about *taniwha* being governed to the laws of tapu. *Taniwha* were usually associated with areas of risk and were recorded to give an explanation to natural hazards like a rapid in a river. These *pūrakau* function as a warning or place to avoid.

The experiences contained within these stories fascinated me so much, that I

began to look into the history of my own *iwi* in search of *pūrakau* that communicated tsunami risk. In my search I came across the well known narrative 'Te tai o Ruatapu'. This *pūrakau* talks about how Ruatapu sent great waves to destroy his half brother Paikea after being shamed by his father Uenuku (Taumaunu, 2001). However, as much as I enjoyed researching this *pūrakau* in academic texts, I felt the need to talk to local people to acknowledge their specific perspectives relevant to their *iwi*'s understanding of the narrative. I sought to connect with local experts about 'Te Tai o Ruatapu' using my own *whakapapa* connections but found that, because I was still in the discovery stage of my research, I hadn't laid a strong enough foundation to start building relationships with locals.

This may highlight the notion that just because I am Māori and *whakapapa* back to *Tūranga* does not mean I will be immediately accepted to research *iwi pūrakau*, nor at the right level to understand the process of collecting indigenous narratives. As a result I decided to stay open to the idea of *pūrakau* but steered towards understanding new narratives that could be developed by a community to understand tsunami risk.

2015 Preparedness survey

It was important in the Discover phase to understand how my community perceives tsunami risk and risk management in *Tūranga*. In the Tsunami Awareness and Preparedness report 2015 (Dhellemmes, Leonard & Johnston, 2016) the survey revealed coastal communities on the East Coast of Aotearoa, including *Tūranga*, had low levels of tsunami awareness and high expectations of receiving a formal warning before evacuation. Quantitative and qualitative data from the Tsunami Awareness and Preparedness Report (2015) survey highlighted that even

Table 18   **Q10.** How does the respondent expect to be warned that a tsunami is coming within an hour? (Several options possible).

Community / Type of warning	Akitio	Castlepoint	Eastbourne	Haumoana	Lyall Bay	Riversdale	Seatoun	Te Awanga	Wainui	Westshore	TOTAL
n	4	11	166	120	100	14	128	99	86	146	874
By feeling an earthquake (%)	25.0	45.5	63.9	48.3	59.0	57.1	61.7	49.5	55.8	37.0	53.4
Warning sirens (%)	100	81.8	83.7	78.3	65.0	85.7	63.3	76.8	31.4	91.1	73.3
Loud speaker announcements (%)	25.0	36.4	32.5	73.3	47.0	50.0	37.5	65.7	25.6	35.6	44.3
Flashing lights (%)	25.0	18.2	4.8	15.8	11.0	14.3	3.1	18.2	7.0	8.2	9.5
Radio and TV announcements (%)	75.0	54.6	78.9	72.5	73.0	50.0	74.2	64.7	76.7	80.1	74.2
Via text message (%)	0	27.3	17.5	16.7	33.0	21.4	31.3	16.2	20.9	19.9	21.8
Via smartphone application (%)	0	0	12.1	6.7	24.0	7.1	18.0	5.1	5.8	10.3	11.5
Door-to-door visit by emergency services or civil defence staff (%)	75.0	63.6	17.5	32.5	21.0	42.9	13.3	37.4	43.0	30.1	27.4
Word of mouth (%)	50.0	54.6	32.5	27.5	30.0	28.6	39.1	32.3	37.2	30.1	32.8
Don't know (%)	0	0	2.4	1.7	2.0	0	3.9	1.0	1.2	0.7	1.8
Other* (%)	0	0	0.6	3.3	5.0	14.3	2.3	6.1	5.8	2.7	3.4
I do not expect to receive any kind of warning (%)	0	0	1.2	1.7	1.0	0	0.8	4.0	3.5	1.4	1.7

Figure. 14
Tsunami Awareness and Preparedness Survey report (2015) (Dhellemmes, et al. 2016).

Define

though residents understood they lived in a coastal community prone to tsunami risk, they were not necessarily prepared for a tsunami situation (Dhellemmes, et al. 2016).

I decided to look at the survey results, in particular the data collected from Wainui, a suburb in *Tūranga.* In table 18 (see Figure 14) it is clear that a good number of residents expect an earthquake to warn them of a *local* tsunami, however there is still a large proportion of residents who rely on a mixture of communication methods like radio and TV announcements, word of mouth and warning sirens. I found this part of the survey interesting as it echoes back to risk communication and the different methods and messages used to alert people of an impending danger. The next step of my design process should engage with community residents to uncover their needs and gain insights to address the problem whilst understanding what communication method works best for them.

From the information and data collected in the previous section, the Define phase aims to synthesise those learnings to define how tsunami risk is understood in my community, *Tūranga.* I decided to use *kanohi ki te kanohi* semi-structured interviews as my method of approach to collect qualitative data that might be compared and contrasted against the quantitative data found in the Tsunami Awareness and Preparedness report (2015) (Dhellemmes, et al. 2016). Gray (2014) explains interviewing to be a skill of building rapport with interviewees while being objective by observing and listening in order to keep control of the interviews. Building rapport with my interview participants reflects back on the principle of *whakapapa* that underpins this research. Whakapapa connections were used to find potential interview participants. Ethical considerations were made to ensure my participants felt respected and trusted through the choice of interview location, the types of questions asked, the recording

and collecting of information and consent of using information in my research.

Target audience

The target audience for this research originally included all of *Te Tairāwhiti* but through conversations with *Te Tairāwhiti* Civil Defence, I found that smaller communities along the East Coast were seen as exemplars for self policing themselves in relation to preparing for tsunami (Stuart, P. personal communication, 2017). Rural communities are exposed to natural disasters more often than the urban communities because of their distance from central amenities. This means rural communities need to be prepared for events like road closures, flooding or being cut off from power due to severe storms, that had required them to take extra steps for being prepared for such events. As opposed to the urban *Tūranga* community, people living in urban

areas are heavily reliant on help to come from emergency services rather than preparing for an event on their own. This can be heard in the information collected in the interviews where one participant described:

"When we had the power cut, it was three days without power and it was crazy in town. The line up for Pak'N'Save was ridiculous, everyone was trying to get money out from the ATM because they weren't prepared — The petrol stations were all full coming into town, it was just crazy, you could see just how ill-prepared Gisborne was."
— Rāwiri Participant 2017

For this reason I chose to narrow the scope of my research to those people living in the urban community so that I could emphasise learning about the different levels of awareness and preparedness. In order to do this I sent out a survey through my own *whakapapa* channels, social media, email and with the

help of *Te Tairāwhiti* Civil Defence. The survey was titled 'Local Hazards in your Local Area' as to not prompt tsunami as the initial discussion. The survey was used to collect an overarching view of my community's perspectives on natural hazards and was used to compile a list of participants for my semi-structured interviews. By using this method of selection I ensured a range of different variables like levels of awareness and preparedness, demographics, geographic locations and ethnicity was included in my interview range.

Survey questions;

The survey consisted of three natural hazard questions;

- How much do you know about Natural Hazards that might occur in your local area?

- How important is it for you to know about Natural Hazards in your local area?

- How prepared are you if a Natural Hazard in your local area was to occur?

From the survey results see Figures (15, 16 & 17) a clear trend suggested that people felt a varied amount of knowledge and preparedness regarding natural hazards in their local area with need or interest to know more. From these results I selected 12 participants to interview with me in *Tūranga*.

How important is it for you to know about Natural Hazards in your local area?
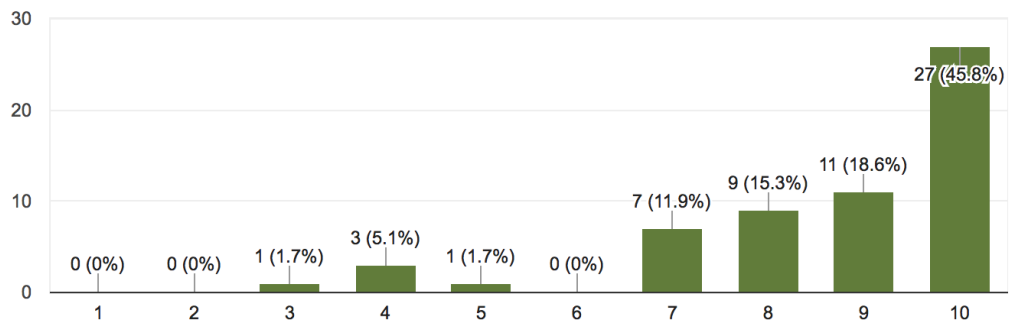
59 responses

How much do you know about Natural Hazards that might occur in your local area?
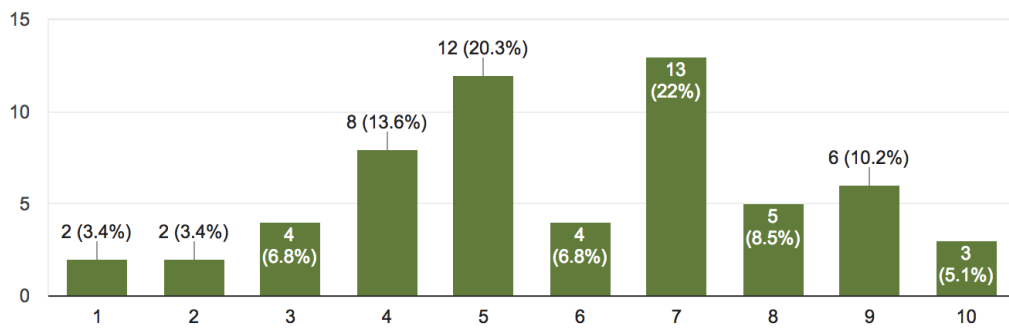
59 responses

Figure. 15 (Top)
Questions one: Natural Hazards
in your local area survey
2017
Tūranga

Figure. 16 (Bottom)
Questions: two: Natural Hazards in
your local area survey
2017
Tūranga

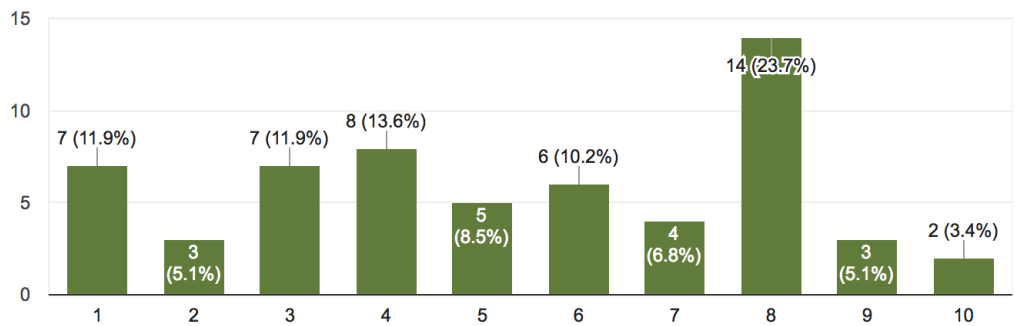How prepared are you if a Natural Hazard in your local area was to occur?

59 responses

Figure. 17 (Top)
Questions three: Natural Hazards in your local area survey
2017
Tūranga

Semi-structured interviews

I planned my semi-structured interviews to be 60-90 minutes long and I held them at an outdoor café close to one of *Tūranga*'s well known beaches see Figure 19. I felt the location of my interviews was important when it came to providing a space that was comfortable and familiar for my interviewees but also had relevant meaning to my interview questions. The common themes that came out of the interviews were things like:

- Low understanding between the three different types of tsunami

- Confusion between how strong a earthquake needs to be before evacuating for tsunami

- Strong emphasis on waiting for a formal warning before evacuating — mostly from Ngati Porou Radio station, *Te Tairāwhiti CDEM*, or the 'siren'.

- National messaging like the 'Long,
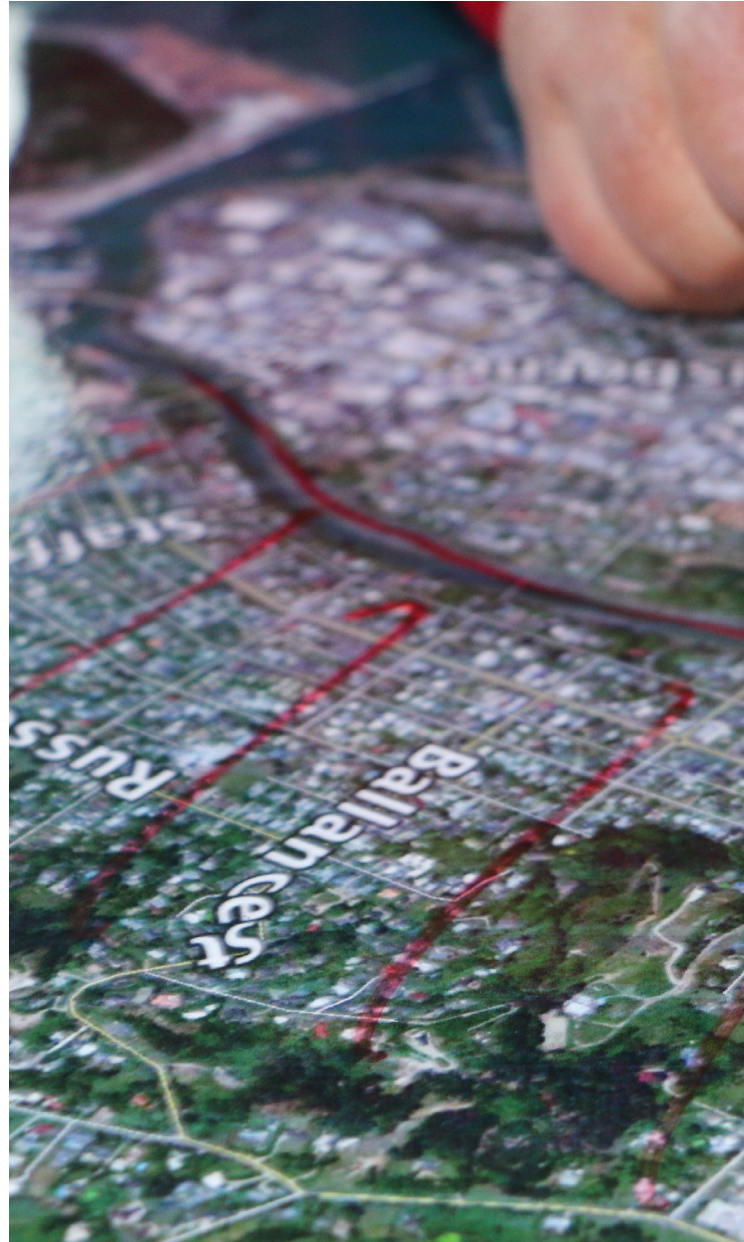
Figure. 18
Semi_structured nterviews:
2017
Tūranga

Figure. 19 (Top)
Semi-structured nterviews:
Interview location
2017
Tūranga

Figure. 20 (Bottom)
Semi-structured nterviews: Interview
drawing map with whiteboard marker
2017
Tūranga

strong, get gone' campaign did not resonate with respondents because it lacked context to *Tūranga*. When presented with images of the campaign, participants wanted to know more about the effects tsunami could have on their own region and what they needed to do to prepare. They were more interested in local knowledge as opposed to general messages on the TV. Local narratives could provide them with their own way of understanding tsunami risk that felt more meaningful to them.

- Local narratives provide a great way of understanding natural hazards to this specific community, land and place.

- There is lack of complacency to react to tsunami warnings because of past warnings that have issued false reports.

These key themes marry up with the data collected in the Tsunami Awareness and Preparedness report 2015 (Dhellemmes, et al. 2016). A strong emphasis on the contextual location of *Tūranga* and the relationship people build with the *whenua* became evident in the following statements from these interviews:

"In their oral histories tsunami has hit here and they have done something about it to save their people. The community used to live on the coast but they moved inland because of a tsunami. These are the stories that the old people tell. So we've got history within memory and when you've got that you have to listen to those stories and think about what do we need to do?" — Ashleigh, Interview participant, 2017

"We live in a coastal community. Obviously the possibility of tsunami feels more real" — Gina, Interview participant, 2017
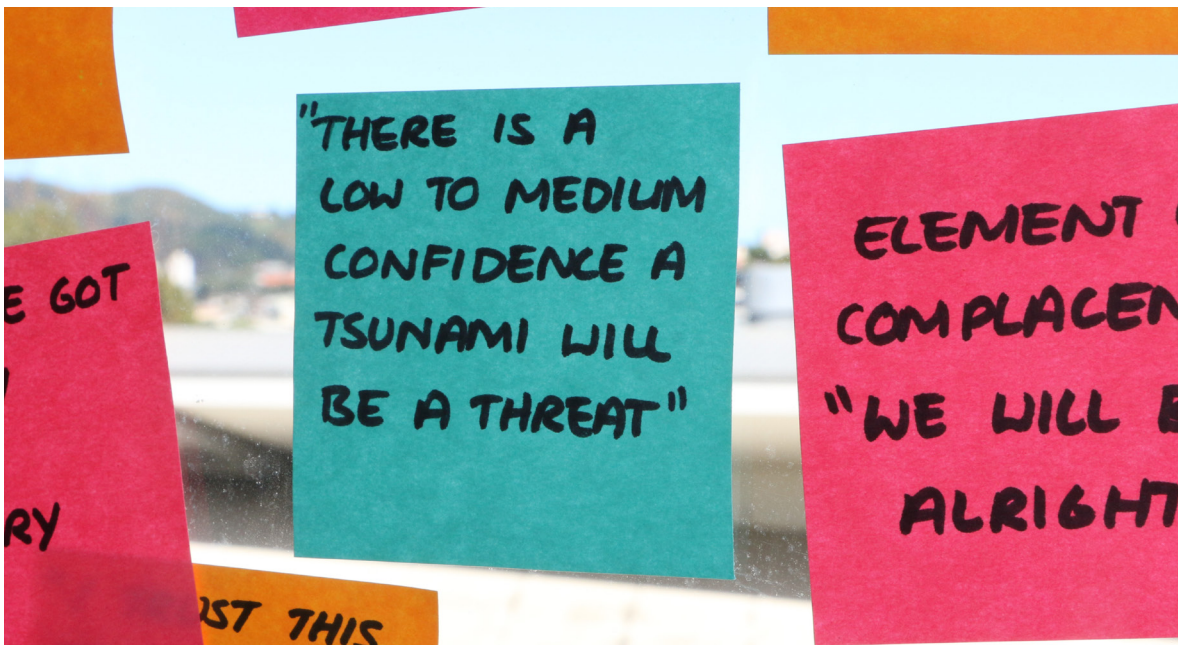
Figure. 21 (Top)
Semi-structured nterviews:
Interview analysis
2017
Tūranga

Figure. 22 (Bottom)
Semi-structured nterviews:
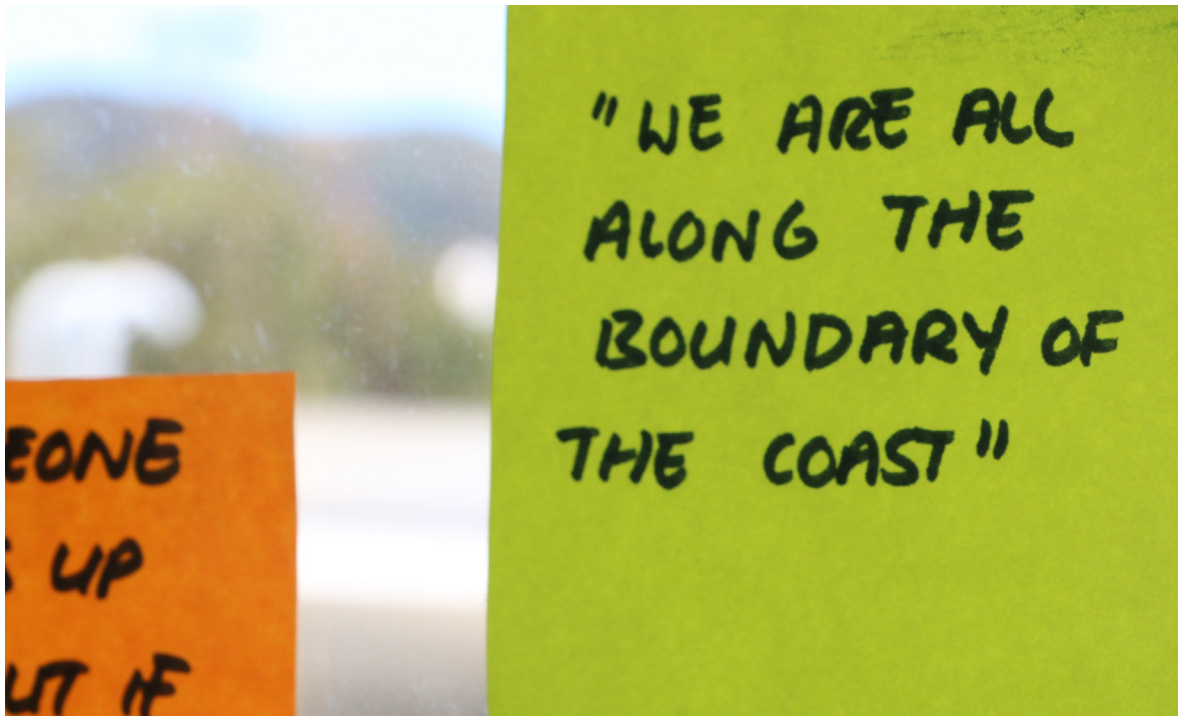Interview analysis
2017
Tūranga

Figure. 23 (Top)
Semi-structured nterviews:
Interview analysis
2017
Tūranga

Post it notes capture the thoughts of my community in *Tūranga* about Natural Hazards in their local area.

Personas and problem statements

One way of analysing the information collected during my interviews was to create 'personas'. *Personas* are used to identify user types and acknowledges that every person has different needs, experiences and behaviours (Open Design kit, n.d). I used *personas* to present an overview of the different people living in *Tūranga* and what their needs and insights are toward tsunami risk in their community. By understanding these differences the *personas* helped me to identify with the people I am designing for, and also revealed key problem statements for each. From the 12 interviews conducted, three *personas* were created to represent the *Tūranga* community overall.

Reflecting on the Define phase, I have identified my key target audience and learnt about their needs and insights for communicating tsunami risk in their community. The *personas* provide a rich understanding of the people I am designing for which informed the process of developing ideas for tsunami communications contextual to Tūranganui-a-Kiwa.
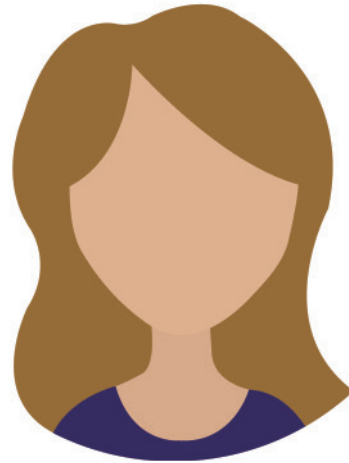

Gina

Gina needs a way to feel empowered that she is making the right decisions for her family. But surprisingly, the connections that she keeps with her friends does not expose her the information that she needs.

Needs and insights:

- Equip me with practical tools to share/discuss with my friends and family

- Build a relationship with me through my work or *hapū/iwi*

- Tell me what I need to do and where to go in a natural disaster
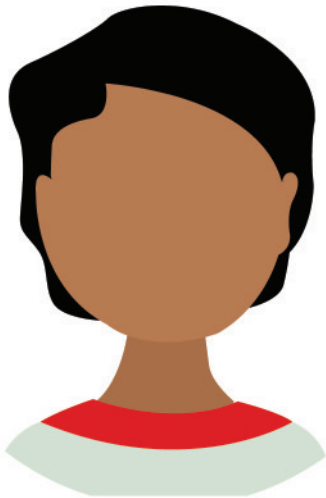
Rāwiri

Rāwiri needs a way to feel enlightened about preparing for a natural disaster but unfortunately the exposure that he's had with tsunami awareness fails to relate to him personally which leaves him feeling disengaged.

Needs and insights

- Visualise for me scenarios of how to evacuate and where to go

- Interact with me in person through community events or school

- Share with me new innovative ways of being prepared step by step via a digital platform

Ashleigh

Ashleigh needs a way to participate in tsunami education that is fun for her and her family as well as connecting her to people alike. But what puzzles her is that no one in her community wants to share their experiences and she worries if people know what to do.

Needs and insights

- Educate me and my children about natural disaster information in a fun interactive environment

- Connect me with people in my community who are interested in natural hazard preparedness

- Explain/Involve me in how you are going to help people in my community prepare and plan.

Develop

The Develop phase in my research looks to explore a range of ideas to suit my community's needs identified in the Define phase. One way of doing this was to *co-design* with the community to come up with new ideas for tsunami communication for their own community. I decided to do this through a workshop where I encouraged people to share their stories and experiences by mapping them to their local environments. I printed a series of posters and story cards that encouraged participants to draw, write and talk about tsunami and earthquakes in their community.

Exercise 1: Participatory asset mapping

Participatory asset mapping is a combination of participatory mapping (community members identifying their own people, places and experiences based on their community onto a map) with asset mapping (identifying community assets like behaviour, knowledge and skills that support resources for individuals and collective groups in a community (Janice,

Figure. 24
Participatory workshop
2017
Tūranga

Figure. 25 (Top)
Participatory workshop :Assets maps
2017
Tūranga

Figure. 26 (Bottom)
Participatory workshop :Assets maps
2017
Tūranga

Burns, Dagmar & Silvia, 2012). Together these terms create participatory asset mapping which was an activity I used to map a scenario of a tsunami risk situation with members of my community in *Tūranga*.

The centre circle see Figures 25 and 26 is where the participant places themselves and as the circles radiate outwards they begin to place the most important things they consider in their lives to the less likely experiences they have within the community. I gave my participants the task of completing their own individual asset maps by identifying on the map their important locations, people and places that could inform their decision making regarding a tsunami risk situation. From those individual maps the participants were asked to share their assets maps in a group of four people to discuss how they would respond to a tsunami event. The conversations between the workshop participants were enlightening to this

research. The dialogue consisted of their own personal experiences and how they planned to prepare for such an event. I then asked the participants to transfer their own individual asset maps on to one large map see Figures 27 and 28. This created an immense amount of discussions between participants that visualised areas of importance in their community but also *whanau* structures in regards to how they needed to plan for a tsunami emergency.

Figure. 27 (Top)
Participatory workshop: Coloured
dots signify different assets
2017
Tūranga

Figure. 28 (Bottom)
Participatory workshop: Placing coloured dots to
match the asset maps made in last exercise
2017
Tūranga

Exercise 2: Sharing stories

In the second exercise I invited the community to share their experiences with earthquakes and tsunami warnings using story cards see Figure 29. The story cards were separated into four groups using a colour coding system: Blue = Tsunami, Green = Earthquakes, Red = Time, Yellow = Response (see Figure 31). The colour system was used as a way to break down the information collected during the sharing process but also in the analysis phase where I could step back and see the coloured trends.

The purpose of this exercise was to share people's responses to earthquakes and tsunami and whether or not they were aware of the idea that a *local* tsunami could be triggered by an earthquake and that the response time could be less than 20 -15 minutes for evacuation. Everyone was encouraged to share their stories and put their cards onto a map of *Tūranga* see Figure 32.

The map acted as a canvas for contextualising my participants stories.

I found this approach enriched the experience as people moved through the different maps to locate and generate conversation about their suburb or local areas in their community.

This provided the opportunity for the entire workshop group to reflect on the main themes highlighted in their stories. One of those themes underlined the behaviour of waiting for a formal warning in a tsunami event before evacuating for safety. I used this theme to transition into the final exercise which involved building their own forms of tsunami communications.
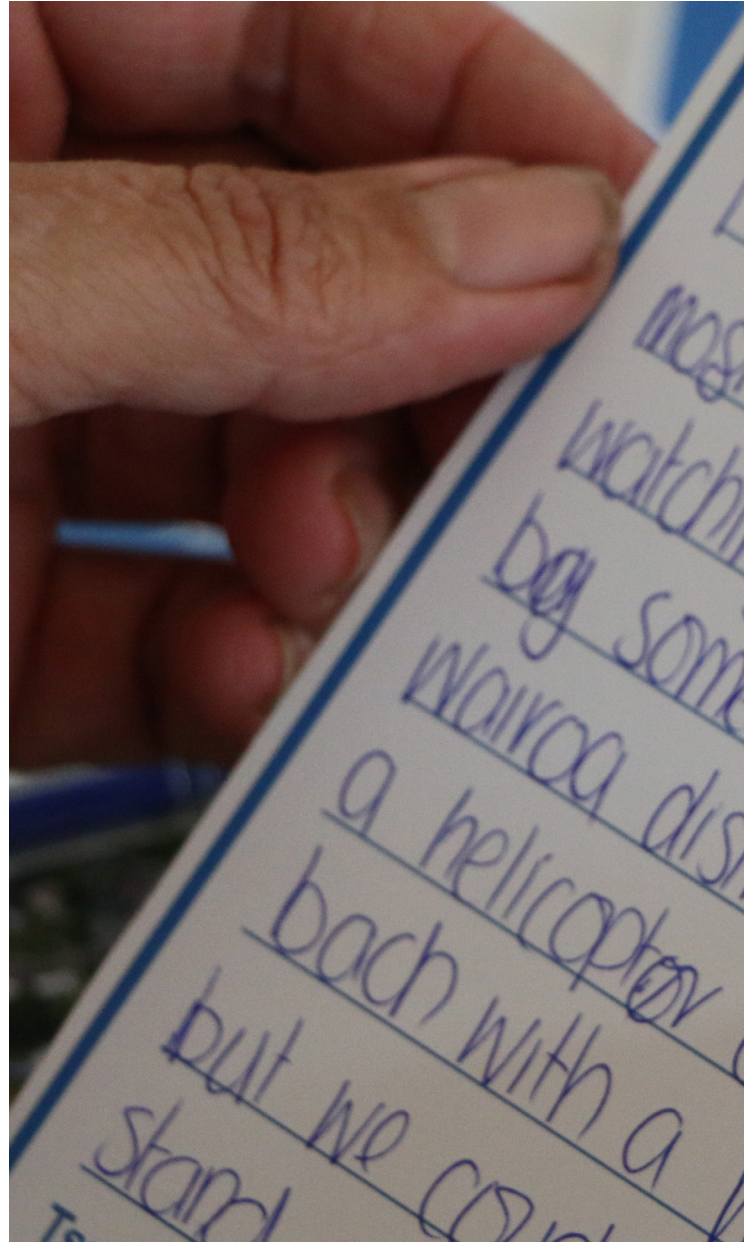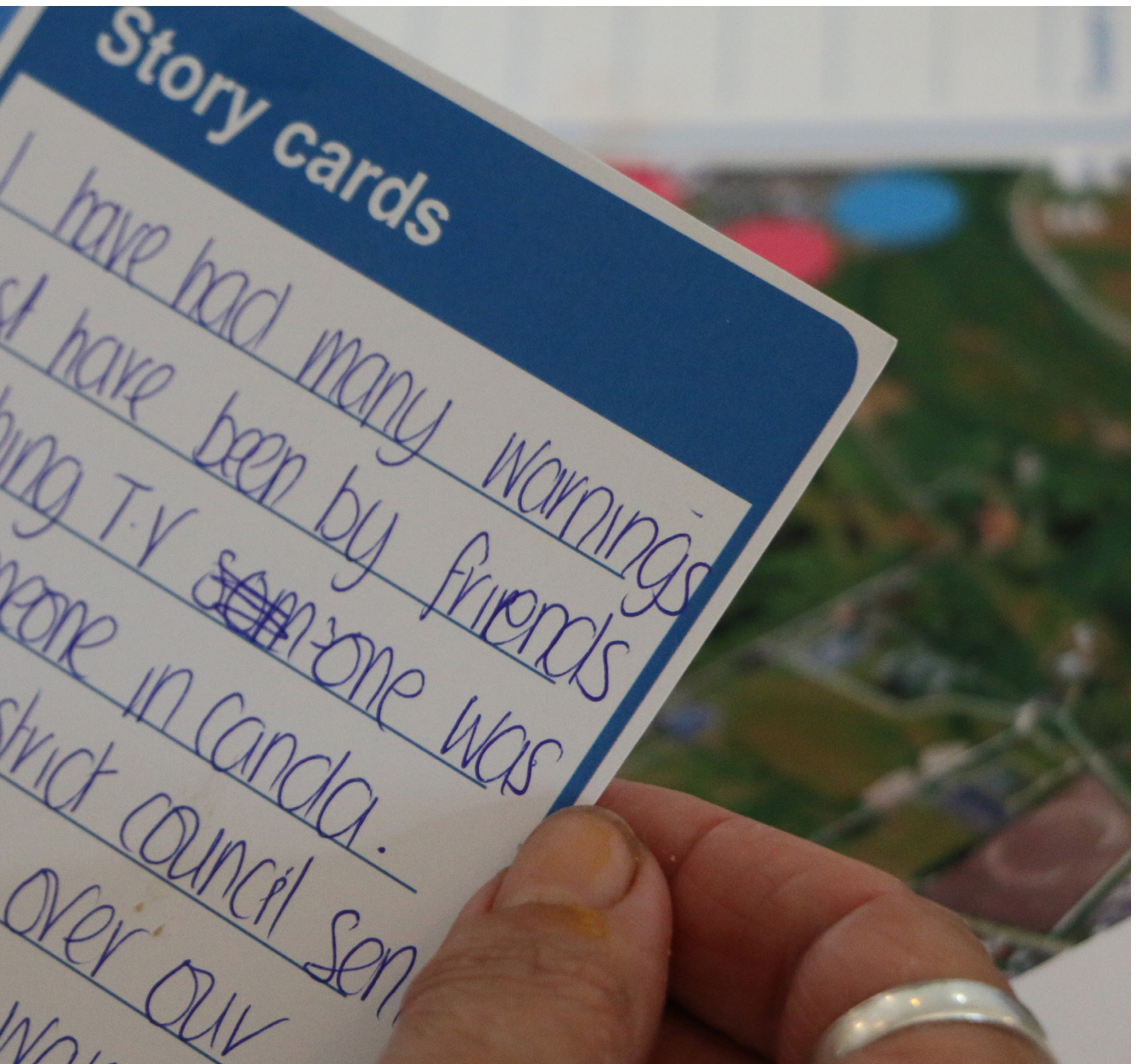
Figure. 29
Participatory workshop: Story cards
2017
Tūranga

Story cards

I have had many warnings
I have been by friends
~~ing~~ T.V ~~som~~ one was
one in canda.
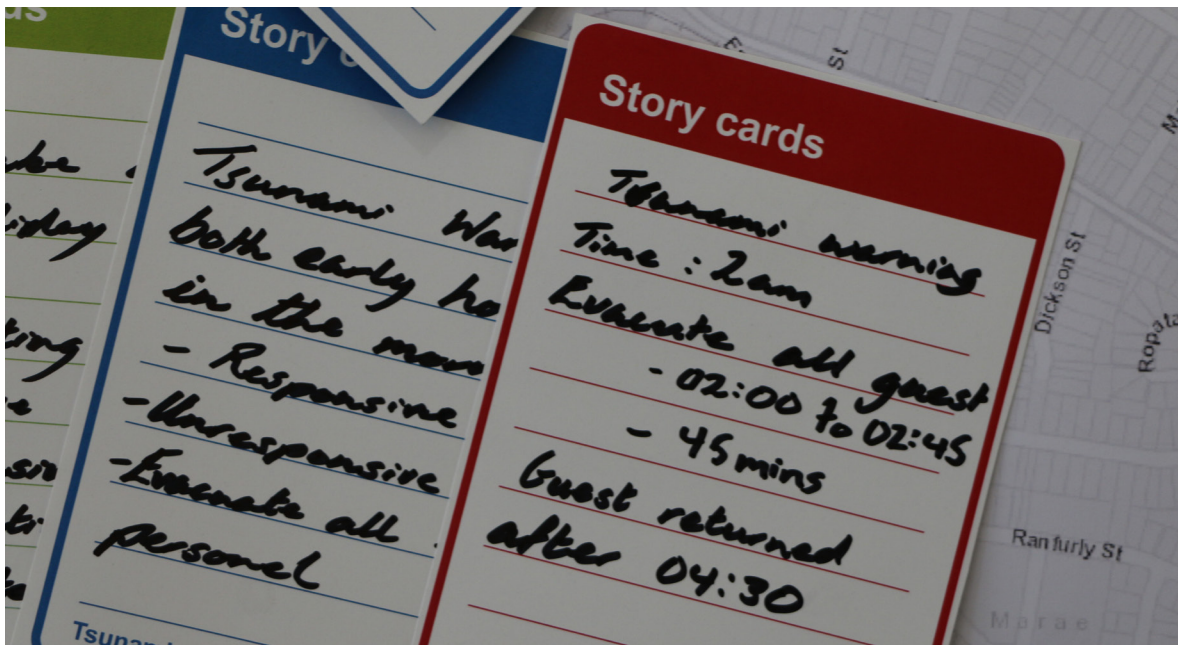strict council sen
over our

Figure. 30 (Top)
Participatory workshop: Participant's
story about tsunami.
2017
Tūranga

Figure. 31 (Bottom)
Participatory workshop:
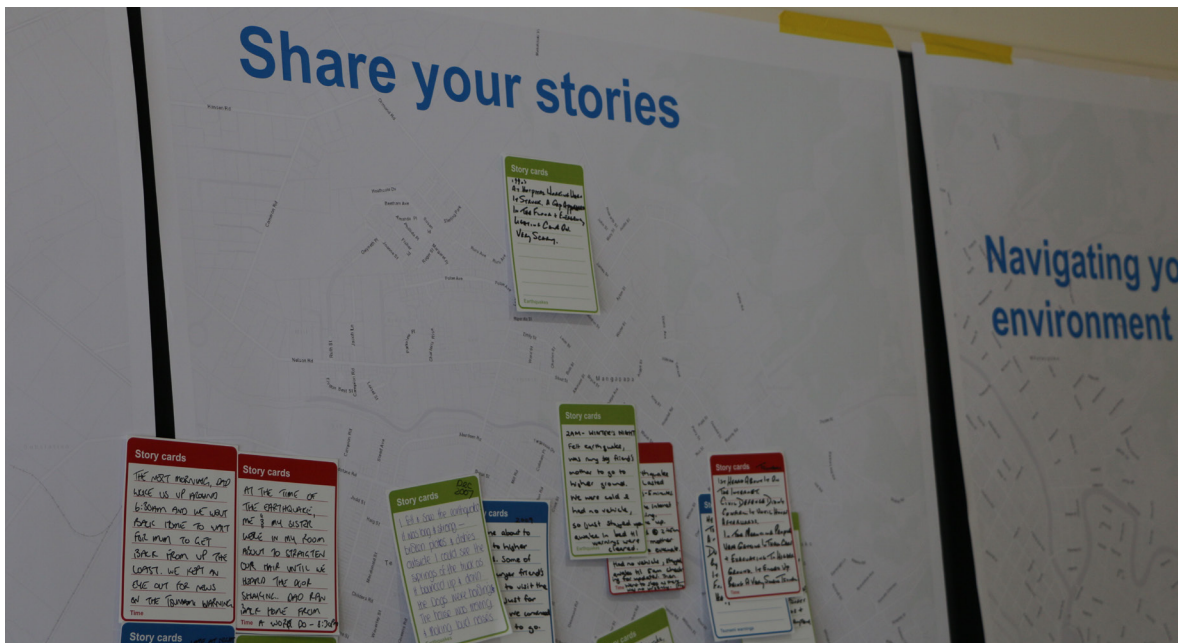Different types of story cards
2017
Tūranga

Figure. 32 (Top)
Participatory workshop: Mapping story cards to
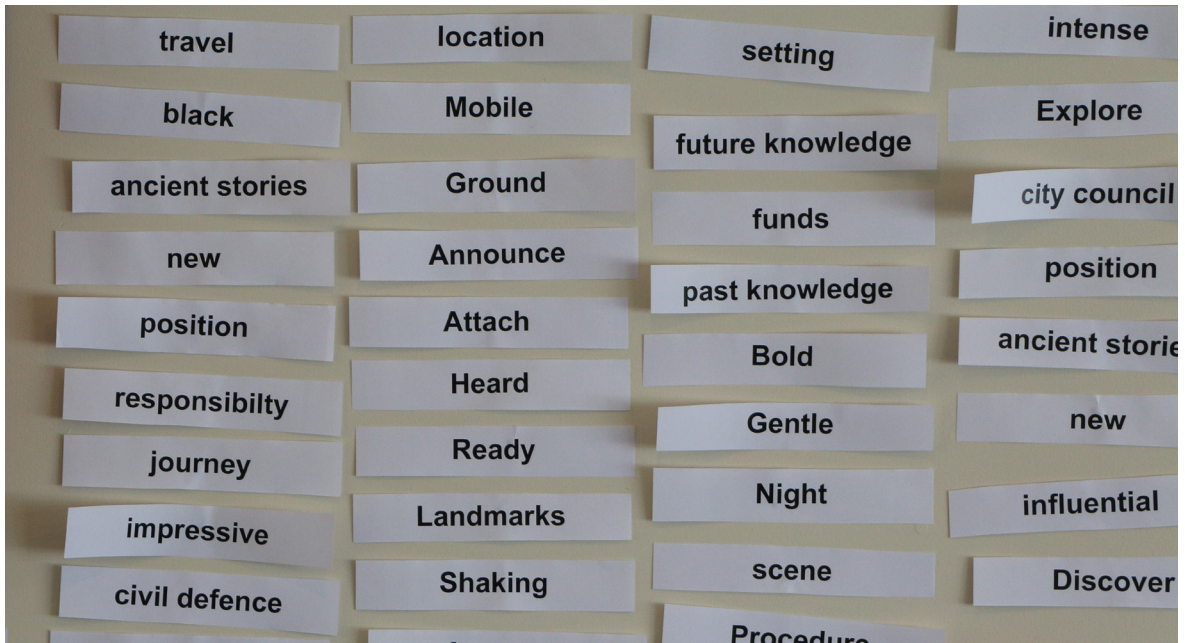large maps of *Tūranga* on the walls
2017
Tūranga

Figure. 33 (Top)
Participatory workshop: Word
prompts
2017
Tūranga

Figure. 34 (Bottom)
Participatory workshop: Building narratives
2017
Tūranga

Exercise 3: Building narratives

The last exercise used boxes, words, papers and pens to build new tsunami communications for *Tūranga*. When I conducted my interviews I learnt that having practical tools like the laminated map and coloured pens enabled conversations to flow freely without the need for directing the conversation at me. This led me to think about new ways of collecting information in preparation for my participatory workshop. I reflected back on my research in the Discover phase and utilised the idea of core drilling briefly mentioned in my 'Discover; Understanding the Hikurangi Plate boundary' section. The scientific method of drilling into the earth to collect data about *paleotsunami* can also reflect my principle of *whakapapa*, I see the layers of the earth collected in drilling as the *whakapapa* of previous tsunami in *Tūranga*.

Therefore the idea of creating layers of information to build narratives of place gave reasoning behind utilising the method of building structures out of cardboard boxes and using tangible methods of making to form the basis of this workshop.

Participants were split into groups of four and asked to build new tsunami communications for *Tūranga*. The process of making tsunami communication structures took 40 minutes and consisted of each group, using pre-made words to prompt conversations about design, science, tsunami and local knowledge combined with boxes to build levels. It was fascinating to watch each group discuss, negotiate and input ideas toward building their own tsunami communication structures. Each structure was unique and specific to the group that made them.

As the facilitator I encouraged the teams to utilise the data collected in the previous exercises to drive the rationale behind their designs. At the end of the exercise each

team reflected back to the group their own ideas. These are the main concepts that were captured in their tsunami communication structures.

- **Team One:** Different stages of responding to a tsunami event representative in the different levels of the structure. Confusion > Organised > Connected (see Figure 35).

- **Team Two:** Navigation by sounding an alert and showing directions plus community engagement through schools and acknowledging local knowledge (see Figure 36).

- **Team Three:** Communicating information by using the structures to talk to one another. The use of colour is important to identify which area of risk you are in e.g. safe or danger zones (see Figure 37).

- **Team Four:** Educational structure with science information. Use light as a beacon and the idea of sound connected to the cracking of *Rūaumoko* was discussed (See Figure 38).

Collaborating with my community through the method of *co-design* enabled this research to develop meaningful new narratives that are relevant to my community. More importantly the outcome of this workshop enhanced community conversations about raising tsunami risk in *Tūranga* and generated new ideas for tsunami communication in Tūranganui-a-Kiwa.
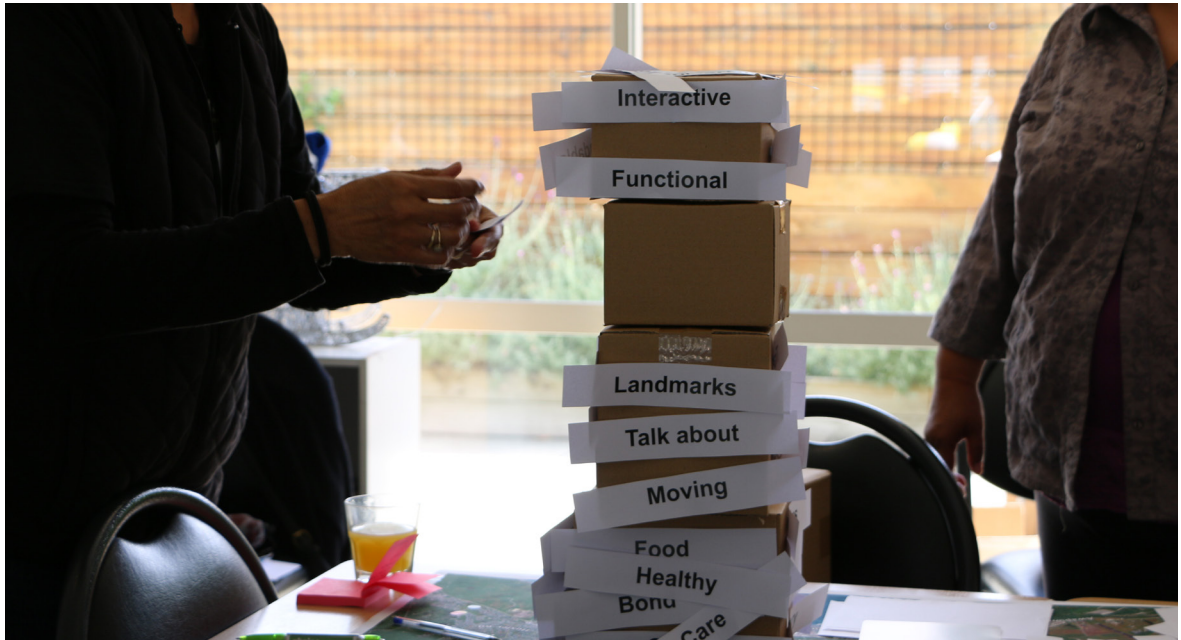
Figure. 35 (Top)
Participatory workshop:
Team one
2017
Tūranga

Figure. 36 (Bottom)
Participatory workshop:
Team one
2017
Tūranga

Figure. 37 (Top)
Participatory workshop:
Team three
2017
Tūranga

Figure. 38 (Bottom)
Participatory workshop:
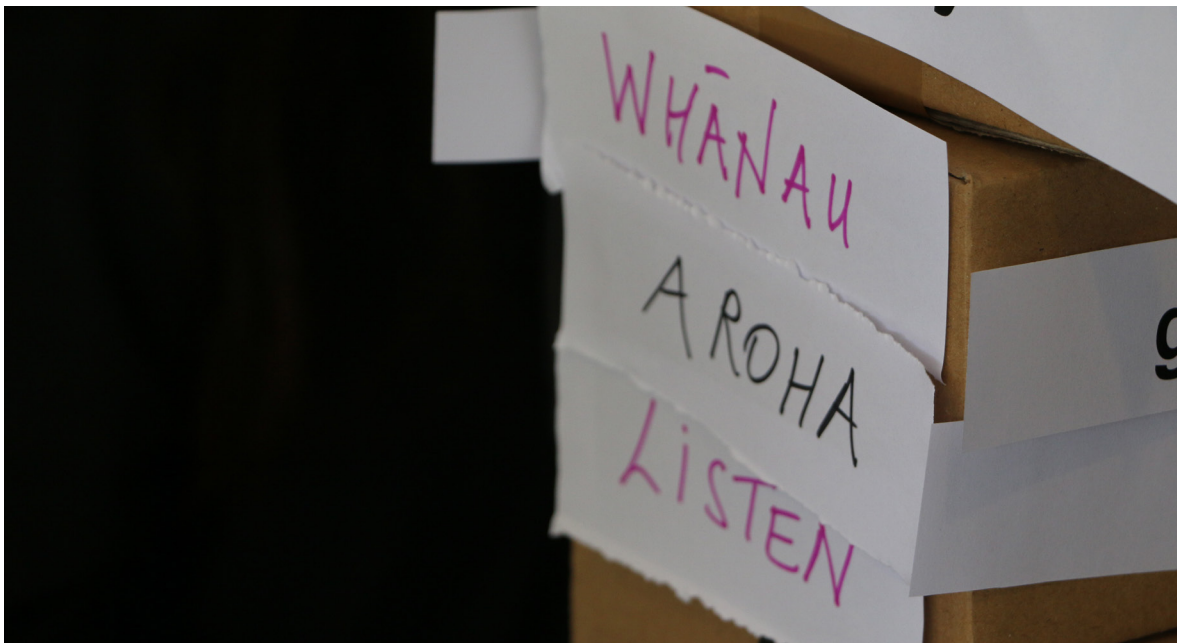Team four
2017
Tūranga

Figure. 39 (Top)
Participatory workshop: Placing where the structures should go on the map
2017
Tūranga

Fig.40 (Bottom)
Participatory workshop: Important principles to consider in the design
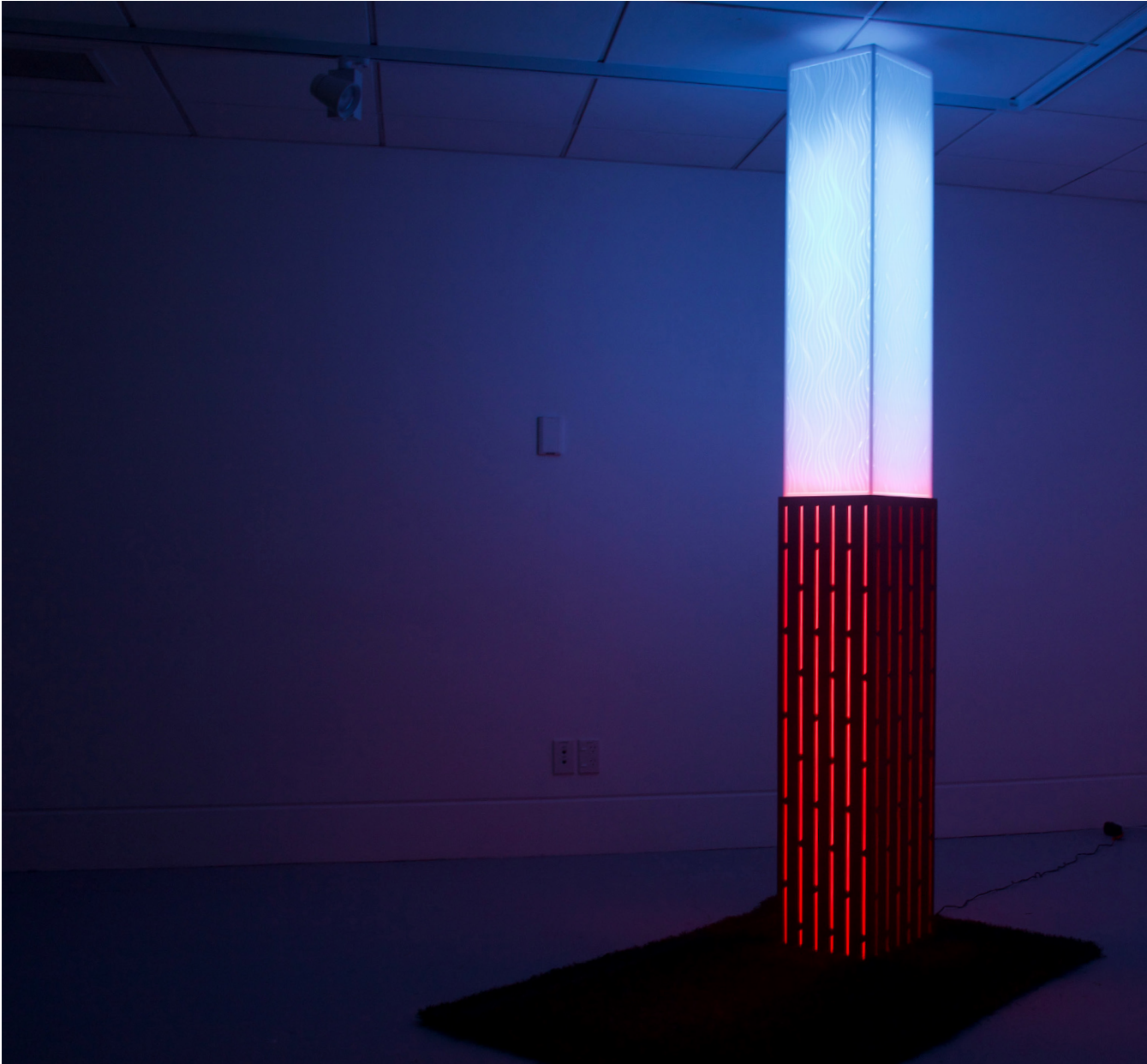2017
Tūranga

Figure. 41
Pouwhenua: Light
installation
2017

Deliver

The final stage of the design process is Delivery where the final design output can emerge in response to everything I have learned in my research. During the Development phase I talked about the idea of understanding the *whakapapa* of the *whenua*. One way that this can be understood is using the scientific method of drilling for *paleotsunami* samples. The core used to drill for these samples is an elongated shape that made me think of other forms within *Mātauranga Māori* that could give meaning to this understanding. This led me to explore *pouwhenua*.

Pouwhenua

Pouwhenua resonated with me because it can reflect a boundary marker or land post symbolising areas or territory in the *whenua*. Automatically I thought of safe and unsafe zones for tsunami risk and reflected back on the materials created

in the development workshop exercises. Participants in the workshop wanted to utilise local knowledge, beacons of light and *atua* in their structures to communicate tsunami risk. The participants in my workshop continued to talk about the importance of the *whenua* in *Tūranga* and they mentioned *kaitiakitanga* as a principle for investigating tsunami communication. This can be seen in their ideas to illuminate structures with light (beacons) that navigate you to safety just like a *kaitiaki* would or an *atua*. I believe my participants connection to the land and their own *whakapapa* and understanding of *kaitiakitanga* are embedded in the structures they created. Therefore I used local knowledge, beacons of light and *atua* as the conceptual drive to design my own *pouwhenua* prototype. As a result the concept of this design heavily reflects back on my design process and acknowledges indigenous knowledge perspectives.

Mātauranga Māori

The continental shelf is *Papatūanuku*, *Rūaumoko*, *atua* of earthquakes is within her and *Tangaroa* is the *kaitiaki* of the ocean. These *atua* are reflected in the narrative of my *pouwhenua* that recognise earthquakes are the warning for tsunami.

Papatūanuku is represented in the pressure plate that turns the *pouwhenua* on (see Figure 41. Papa's relationship with the earth moving may refer to the *Hikurangi Subduction Zone* where the two plates are currently locked. When the energy and pressure is built up over time the release of that energy may be seen in large subduction earthquakes that could trigger a *local* tsunami for *Tūranga*. *Rūaumoko* is represented in the shelf that sits at the bottom half of the *pouwhenua* and is adorned with the pattern 'niho *taniwha*' see Figure 42.

In my initial research I came across *pūrakau* that tell of *taniwha* being a metaphorical understanding of tsunami risk in coastal communities. This led me to decide to use the notch pattern/'niho *taniwha*' (see Figure 42) as a way of embedding this Mātauranga into the *pouwhenua*. The upper half of the pou is *Tangaroa's* domain where I have used a wave pattern (see Figure 45) to signify the water carving into the land as a tsunami might do.
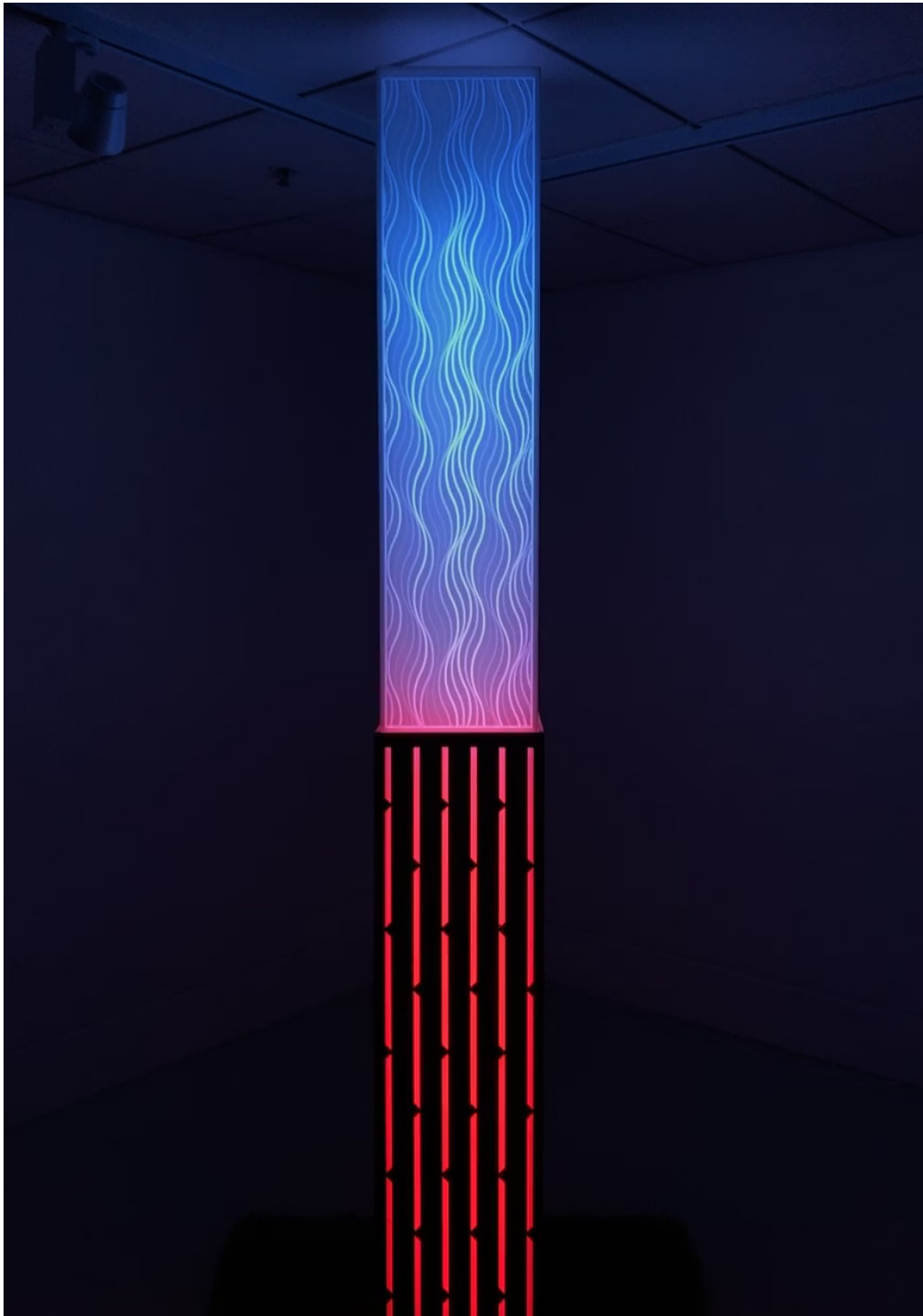
Figure. 42
Pouwhenua: Relationship between *Rūaumoko* and *Tangaroa*, see
niho *taniwha* pattern.
2017

Figure. 43
Pouwhenua: Rūaumoko's domain
2017

The *mauri* of the *pouwhenua* is represented in the light that is activated when a person triggers the pressure plate. The energy released from a person standing on the pressure plate simulates how the *pouwhenua* may be triggered by seismic forces in a real event. It becomes a metaphor for understanding the relationship between an earthquake and tsunami or *Rūaumoko* - red light and *Tangaroa* - blue light. The energy of *Rūaumoko* lights up the bottom half of the pou see Figure 43. While an animation of blue light see Figures 44 and 45, cycle through three times indicating that a tsunami wave can inundate and recede multiple times. Instead of using icons that represent earthquakes and tsunami I have explored the idea of textures lattice = earthquake and wavy lines = tsunami.

Digital pouwhenua

This research shifts away from the design of a traditional *pouwhenua* by adding a digital element of light and interactivity. *Tangata whenua* can interact and visualise the energy and *mauri* of our *atua*, which brings a new meaning to the narratives embed in *pouwhenua*. The aim of the design is to entice people to interact with the narrative of the pou, to raise awareness and enhance conversation around tsunami risk. This *pouwhenua* is a passive communication reminder that is specifically connected to the *whenua* of Tūranganui-a-Kiwa. The behaviour the *pouwhenua* inhibits a response to the earthquake as a warning for tsunami. At the moment the *pouwhenua* comments on the narratives of cultural memory that are embedded in the *whenua*.

Figure. 44
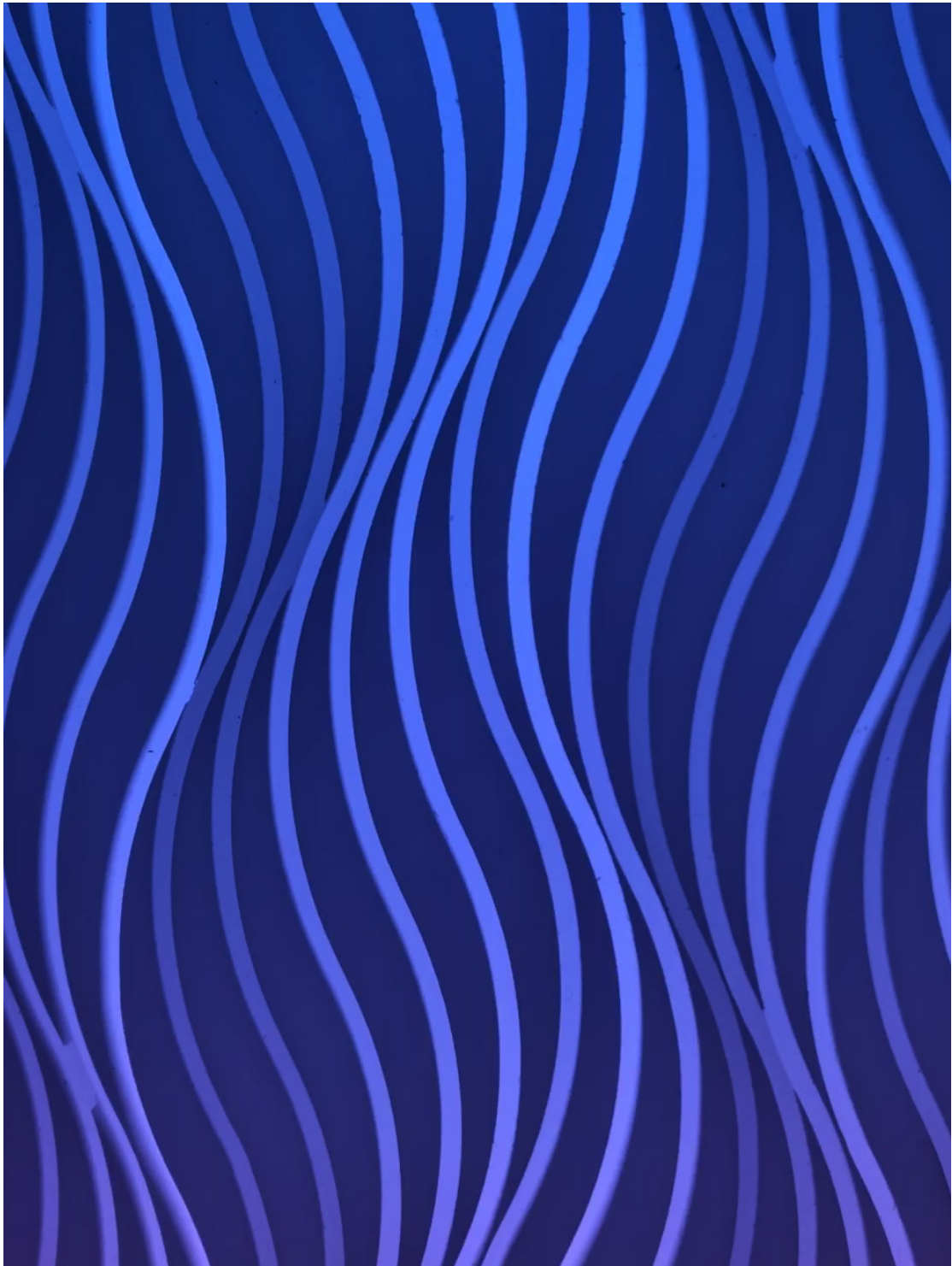*Pouwhenua*: Transition of light from the earthquake to
tsunami.
2017

Figure. 45
Pouwhenua: *Tangaroa's* domain
2017

Figure. 46
Pouwhenua: Light
installation
2017

Figure. 47
Pouwhenua: Light
installation
2017

Conclusion

This design-led research explored new approaches and working methods for designing tsunami communication warning systems in Tūranganui-a-Kiwa. In the beginning I explained my appreciation for warning systems across Aotearoa because of my recent experiences with tsunami warnings in *Tūranga*. This motivated me to embrace this Masters of Design opportunity to focus on designing for my own community as a case study. This project aimed to respond to the research question:

How can Mātauranga Māori produce a meaningful and relevant narrative to enhance community conversations that raise awareness of tsunami risk and inform new tsunami communications for Tūranganui-a-Kiwa?

In section one, I outlined risk communication as the lens for examining tsunami communications across Aotearoa.

I learned that risk communication has evolved to focus on enhancing conversations between technical experts and the general public with the purpose of communicating and managing risk in ways that are easy to understand. Because Aotearoa has multiple communications methods that inform the public of tsunami risk Brenkert-Smith et al., (2012), discussed the need to integrate expert knowledge sources (mass media communications) with informal social interactions (conversations with your neighbour). The importance of doing so recognises that local sources of information resonate better with the public because they are personalised unlike mass media communications (Brenkert-Smith et al., 2012). This was brought to light in my semi-structured interviews where

some participants revealed that they had not seen the 'Long strong, get gone' campaign.

"Nah, haven't heard of it — Long in that time for me is 10mins. I would evaluate how long it goes on for but 10mins is the time to do something" — Rāwiri interview participant

Therefore the process of embedding the knowledge that, as the situation will unfold quickly in a localised tsunami event where the earthquake is the warning, my *pouwhenua* design works towards integrating risk communication focussed on the exchange of information between experts and the public that responds to the '4R's risk management approach (New Zealand & Department of Internal Affairs, 2008);

Hence, the people of my community and perhaps any, should be the central source of knowledge when it comes to designing

new tsunami communication warning systems for *Tūranga* and beyond.

My approach to recognising the local knowledge of *Tūranga* is examined in my method of using Human-centred design as a way of empathising and collaborating with my community. I identified that the 'Double Diamond' method provided a good basis for my design enquiry, however my process adapted from the original model to suit my community's needs. I learned that as a design researcher, time is crucial to building relationships and *whakapapa* connections within a community. Reflecting back on the design process, it was important for me to build relationships with not just my own community, *Tūranga*, but with GNS, JCDR, *Te Tairāwhiti CDEM* and all other government agencies that informed this project. Human-centred design methodology kept me grounded. It helped me believe that what I have heard and observed from my own people could guide me to arrive at solutions that meet my communities needs and address their safety.

Section three responded to my design process by acknowledging an Indigenous knowledge approach to research. The research shifted away from traditional Western perspectives to embrace indigenous perspectives, values, customs and principles. The work of Cordero (as cited in Wilson, 2010) explained one difference between these two paradigms is the separation of knowledge in a Western framework as opposed to the integration of knowledge in an Indigenous framework. This became relevant in my project when I researched into Mātauranga Māori, and found that *pūrakau* was used to describe tsunami in the form of *taniwha* (King & Goff, 2010). This indigenous approach of understanding tsunami as a phenomena links back to narrativised knowledge about the underlying seabed, continental shelves and earthquakes that trigger tsunami. I understood this in the form of *atua* which is why I represented *Papatūanuku* as the continental shelf, Rūaumoko *atua* of earthquakes and *Tangaroa* the *atua* of the ocean in my final *pouwhenua* design.

Section four reflects on the design process which involved building relationships through my own *whakapapa* connections, which is integral to an indigenous framework. *Whakapapa* was used to underpin the decisions and thoughts I made along this research journey ensuring that the data and narratives collected in the semi-structured interviews and workshop were acknowledged and respected. Mechanisms like interviews, workshop and *hui* throughout this research enabled a way of telling the story of my community and their need to integrate local knowledge into risk and risk management for *Tūranga*. Section four highlights an indigenous understanding of my own cultural value that underpins a risk management approach through a system of communication and collaboration with my community.

As a result this design-led research proposed the idea of designing a *pouwhenua* that integrates Mātauranga

Māori, local knowledge and science related to tsunami communication warning systems. A narrative was built through an indigenous understanding of phenomena that tells people about the different forms, shapes and nature of an energy and expressions that can be seen in an Māori understanding of *atua* (Royal, 2006). The *atua* represented in the final *pouwhenua* describe the relationship between *Papatūanuku*, *Rūaumoko* and *Tangaroa* or an earthquake triggering a tsunami and that the shake is the warning to evacuate. By embedding a narrative that responds to traditional knowledge of place may transmit knowledge in memorable ways and enhance community conversations that raise awareness of tsunami risk and inform new tsunami communications for Tūranganui-a-Kiwa.

Speculation

Catalysing communities

How can government and emergency management agencies come together with local communities to design with and for that community in mind? This design-led research could act as an example of a new approach and working method to bring together government entities, JCDR and GNS with indigenous communities into a meaningful and collectively-oriented project.

I believe the *pouwhenua* could be used as a tool for conversation that opens up a dialogue between experts and the public.

Glossary

Atua
Māori trace their ancestry from atua in their whakapapa and they are regarded as ancestors with influence over particular domains. ("Atua - Māori Dictionary," n.d.)

CDEM
Civil Defence and Emergency Management.

Co-design
Collaboration between designer and the public

GNS
Geological and Nuclear Sciences (GNS Science). See here

Distant source tsunami
Generated from a long way away, such as from across the Pacific in Chile. In this case, we will have more than three hours warning time for New Zealand. See here

Hapū
Kinship group, clan, tribe, subtribe - section of a large kinship group and the primary political unit in traditional Māori society. ("Hapū- Māori Dictionary," n.d.)

Hikurangi Subduction Zone
Pacific Plate is being thrust under the Australian plate

Hui
Meeting or get together.

Iwi
Tribal group - often refers to a large group of people descended from a common ancestor and associated with a distinct territory. ("Iwi - Māori Dictionary," n.d.)

JCDR
Joint Centre for Disaster Research at Massey University. See here

Local source tsunami
Generated very close to New Zealand. This type of tsunami is very dangerous because we may only have a few minutes warning. See here

Kaitiaki
Guardian, caregiver

Kaitiakitanga
Guardianship, stewardship, ("Kaitiakitanga - Māori Dictionary," n.d.)

Kanohi ki te kanohi
Face to face

Mātauranga Māori
Māori knowledge

Mauri
Life force

MCDEM
Ministry of Civil Defence and Emergency Management. See here

Paleotsunami
Tsunami occurring prior to historical record (McFadgen, 2007).

Papatūanuku
Earth, Earth mother and wife of Rangi-nui - all living things originate from them.

Persona
Personas are used to identify user types and acknowledges that every person has different needs, experiences and behaviours (Open Design kit, n.d).

Pouwhenua
Boundary marker, land marker post, land symbol of support - post placed prominently in the ground to mark possession of an area or jurisdiction over it or Long weapon. ("Pouwhenua - Māori Dictionary," n.d.)

Pūrakau
Māori ancient stories

Regional source tsunami
Generated between one and three hours travel time away from their destination. See here

Rūaumoko
Atua of earthquakes

Tangaroa
Atua of the ocean

Tangata whenua
People of the land

Taniwha
Water spirit, monster, dangerous water creature, powerful creature. Regarded as guardians by the people who live in their territory, but may also have a malign influence on human beings. ("Taniwha - Māori Dictionary," n.d.)

Te Tairāwhiti
East Coast (of the North Island)

Tūrangawaewae
Standing place belonging through kinship and whakapapa. ("Tūrangawaewae- Māori Dictionary," n.d.)

Tupuna
Māori ancestor

Wairua
I have used the terms wairua rather than 'spiritual' as the term spiritual does not adequately cover these terms. If I were to employ an Indigenous research paradigm to this term 'spiritual' then I am made aware that the western understanding of 'spiritual' is entwined in the western knowledge stratification that privileges religion and religious studies which is held separately to the lesser research category of 'spirituality'. I would then need to articulate a Māori understanding. In general it is the understanding that ultimate reality of any person is both equally tangible and intangible (Marsden, 2003)

Whakapapa
Genealogy, genealogical table, lineage, descent ("Whakapapa - Māori Dictionary," n.d.)

Whenua
Land

Whanau
Extended family, family group. ("Whanau- Māori Dictionary," n.d.)

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Appendix a — Ethics approval

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA

UNIVERSITY OF NEW ZEALAND

Date: 08 August 2017

Dear Harmony Repia

Re: Ethics Notification - **4000018261** - **Communication design: Tsunami warning systems**

Thank you for your notification which you have assessed as Low Risk.

Your project has been recorded in our system which is reported in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

If situations subsequently occur which cause you to reconsider your ethical analysis, please contact a Research Ethics Administrator.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:
"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director - Ethics, telephone 06 3569099 ext 86015, email humanethics@massey.ac.nz. "

Please note, if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to complete the application form again, answering "yes" to the publication question to provide more information for one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

Dr Brian Finch
Chair, Human Ethics Chairs' Committee and Director (Research Ethics)