

Moving Through Strangeness: Using Virtual Reality as an Interactive
Immersive Environment to Inhabit Pūrākau from te ao Māori.

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How can I use Virtual Reality as an Interactive Immersive Environment to Inhabit Pūrākau from te ao Māori, drawing on both traditional oral storytelling with whakapapa knowledge and other retellings.

Abstract

The phrase “Putting the Noble Savage to bed,”¹ came from Timothy Russell’s talk at Play by Play 2021 and inspired me to embrace my Māoritanga and te ao Māori in the development of interactive immersive environments. To “put the noble savage to bed” is to change the way Māori characters (and other Polynesian identities) are represented in games. While it is not the sole focus of this research, it was a driving force in beginning it. This study attempts to determine the effectiveness of virtual reality (VR) as a medium of storytelling and visualizing pūrākau (stories/myths/legends). Shifting the traditional story from an oral tradition to an immersive and interactive narrative experience, it considers how evocative the game’s perspectives are and what that does to the player experience. The research focuses on environmental storytelling and wayfinding to see its influence on and navigation through a VR space. The pūrākau used here is the story of Hatupatu and Kurungaituku. This pūrākau centres around the meeting and conflict of Hatupatu, an ancestor of mine who hailed from Te Arawa, and Kurungaituku, a half-bird half-woman ogress. To do this, the Iterative Design Process (IDP) merges with Pūrākau (as a methodology), combining the two, we playtest fundamental elements, and thus, resulting in an artefact.

¹ Timothy Russell, “Putting the Noble Savage to Bed,” (Presented at Play by Play, Te Papa, Wellington, April 23, 2021).

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed: 

Date: 18/8/2022

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Introduction

Mā te huruhuru ka rere te manu – Adorn the bird with feathers so that it may soar.

In an academic sense, this whakataukī represents giving ngā ākonga (students) the tools and knowledge to prosper. It is the cyclic notion of learning, sharing, and passing down knowledge that is important in order for us to flourish. For me, it symbolizes the countless feathers I made to actually adorn the main character of my chosen pūrākau (story), Kurungaituku, the birdwoman. By literally adorning her with feathers of onioni (clay), I do so hope she soars!

This research investigates the relationships that centers te ao Māori in the visualization of an interactive virtual reality experience guided by Kaupapa Māori research. Drawing from my pūrākau and whakapapa, I have responded to the telling and retelling of the story of Hatupatu and Kurungaituku. In the weaving together of pūrākau as a methodology² and the Iterative Design Process³ we discover that our journey takes us right into the ngākau (heart) of Kaupapa Māori (conceptualization of Māori knowledge⁴). Let us *hīkoi te whenua* (walk the land⁵) and enjoy ngā tukanga me ngā haerenga (processes and journeys) we encounter along the way. With this we have a base for our korowai (cloak; virtual reality experience⁶), and now it is time puhi (to adorn it with feathers; encompass it with te ao Māori⁷). The final result shall be a kākahu kura (cape of red feathers⁸) to envelope us in this space.

2 Jenny Lee-Morgan, 'Māori Cultural Regeneration: Pūrākau as Pedagogy' (Auckland, New Zealand, The University of Auckland, 2005): 7, http://www.rangahau.co.nz/assets/lee_J/purakau%20as%20pedagogy.pdf

3 Tracy Fullerton, *Game Design Workshop: A Playcentric Approach to Creating Innovative Games*, Fourth Edition (CRC Press, 2018); Colleen Macklin and John Sharp, *Games, Design and Play: A Detailed Approach to Iterative Game Design* (Addison-Wesley Professional, 2016); Katie Salen Tekinbaş and Eric Zimmerman, *Rules of Play: Game Design Fundamentals* (MIT Press, 2004).

4 Tuakana Mate Nepe, 'Te Toi Huarewa Tīpuna: Kaupapa Māori, an Educational Intervention System' (Thesis, The University of Auckland, 1991), 17, <https://researchspace.auckland.ac.nz/handle/2292/3066>.

5 The idea of walking and receiving and imparting knowledge.

6 The korowai has become a metaphor for a VR experience as both are donned or are a wraparound of a form, discussed further in the Literature Review.

7 We have our VR experience, now it is time to immerse ourselves into the cultural paradigm.

8 Is what Kurungaituku owns or has created that is one of her many taonga (precious (items)).

Literature Review

In beginning this research, I orientated myself around games as effective teaching tools and a Western approach to te ao Māori and strangeness. Upon reflection, in my use of the word and the concept of 'strangeness' I attempted to describe an otherworldly (liminal) space. By repositioning the research, shifting substantially into te ao Māori, it has become more responsive and whānau-lead. Through this, the concept of strangeness has morphed to encompass movement between realities,⁹ shifting perspectives, and the queerness and fluidity in these spaces. I recognise that I was searching for a term that made sense in a Western context; it alienated this idea, turning it into the 'Noble Savage.'¹⁰ The change addresses the othering¹¹ of te ao Māori through a Western lens and places it directly in the ngākau (heart) of this research. This reclamation set into motion a return to a state of wholeheartedness and whakamana (empowerment), propelling a journey of healing and flow.¹²

This literature review is separated into two parts. The first will focus on key game design contexts used within this research. The second will delve into te ao Māori.

Literature Review – Game:

Virtual Reality (VR)

Transported into a space, it is dark and quiet. The crashing of waves creeps closer to you until that, and the whistle of the wind, are all you hear. There is some light now, small speckles like flecks on a black backdrop. Soon the moon may show its face, but that is enough for now. You take off the headset.

What is VR? Virtual reality is a tool to experience a space almost holistically. These experiences are immersive 360-degree simulations of the real or alternate worlds using a head-mounted display (HMD). As a part of a virtual reality kit, motion controllers are used alongside the HMD for interaction and sensory (haptic) feedback. External optical tracking sensors (trackers) are now optional as there is a shift to more portable headsets such as the *Meta Quest 2*¹³ (*Quest 2*; formerly *Oculus Quest 2*).

Why VR? Firstly, 'Immersion.' VR allows you to enter spaces you usually may not. For example, a body of lava, it is not advisable to walk into lava. However, by (digitally) recreating this lava pool, the physical damage-to-self is mitigated, but you are still able to experience what the space is like. This will be further talked about in the literature review (see Immersion). Next is 'Presence.' Presence, according to Jason Jerald, is "a sense

9 Virtual reality versus the real-world.

10 'Definition of Noble Savage,' in *Merriam-Webster.com*, n.d., <https://www.merriam-webster.com/dictionary/noble+savage>. A mythic conception of people belonging to non-European cultures as having an innate natural simplicity and virtue uncorrupted by European civilization. First known use in 1670.

11 To view or treat (a person/group of people) as intrinsically different from and alien to oneself.

12 Described as "being in the zone"- is a mental state in which a person performing some activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of the activity.

13 "Meta Quest 2," n.d., <https://store.facebook.com/nz/quest/products/quest-2/>.

of 'being there' inside a space, even when physically located in a different location."¹⁴ The key difference is that immersion is "about the characteristics of technology, where presence is an internal psychological and physiological state of the user."¹⁵ So, instead of registering what (technology) makes the experience, the player approaches what it represents. In a sense, presence is what makes it *feel* real, while immersion is the tool to bring it to life. The last point of discussion is Illusion. What we perceive is what we can define as our reality. However, this can be extremely subjective. So, if we are suspended (not literally) in a space where what we know and what we do not exist, what is real? To an extent we innately know that the 'fleshy tentacle thing' moving towards us at speed is not real, but we still flinch. Illusion is an instance of being deceived or a perception the represents what is perceived in a way different from the way it is in reality. It is when presence is induced by the technology-driven immersion.¹⁶ While it is not virtual reality, a great example of all three elements working together is a scene from *Thor: Ragnarok*.¹⁷ Thor seemingly hallucinates his introduction to Sakaar (junkyard planet he is on), he is completely surrounded by the space and can hear a voice speaking to him. As he supposedly moves through literal space, the speed increases, and he 'passes through' planets. It slows for a drawn-out minute until the voice says, "You will meet the Grandmaster in 5 seconds. Prepare yourself. Prepare yourself." Lights flash and walls curve in on themselves as the pace picks up, Thor screams, and the simulation ends. He is actually in front of the Grandmaster and his guards.

The Hardware.

For the artefact I am using the Oculus Quest 2. This VR kit is sold as its own console as it can run games independently, meaning there is no need for a computer or console (*Xbox*¹⁸ or *PlayStation*¹⁹). It can be tethered to a computer or connected over shared Wi-Fi with the Oculus Air Link²⁰ app. My aim is to have the artefact (and VR kit) independent of a computer, but if it must be tethered due to limitations or restriction²¹ then there is no issue. It simply makes for a better player experience to be cable-free.

User Experience (UX) and the Player Experience

User experience, or player experience, refers to the feel of a game and its user interface (UI). Game feel, according to Steve Swink²², is built from three things: real-time control, simulated space, and polish. Paraphrasing from Swink's definitions: Real-time control is an almost instantaneous process of information and action between participants.²³ In regard to game systems, however, it requires a simulated space to be perceived. A simulated space is a virtual space that simulates physical interactions that are actively perceived by the player,²⁴ it is (most times) a digital recreation of the physical world. If you were to walk into a table, you will not pass through it. 'Polish' refers to any artificial

14 Jason Jerald, *The VR Book: Human-Centered Design for Virtual Reality*, First edition., ACM Books, #8 (M&C, Morgan & Claypool, 2016), 82.

15 Ibid.

16 Ibid., 83.

17 *Thor: Ragnarok*, directed by Taika Waititi, (Marvel, 2017).

18 "Xbox Consoles | Xbox," *Xbox.Com*, accessed August 15, 2022, <https://www.xbox.com/en-NZ/consoles>.

19 "PS4 Pro," *PlayStation*, accessed August 15, 2022, <https://www.playstation.com/en-nz/ps4/ps4-pro/>.

20 "Introducing Oculus Air Link" n.d., <https://www.oculus.com/blog/introducing-oculus-air-link-a-wireless-way-to-play-pc-vr-games-on-oculus-quest-2-plus-infinite-office-updates-support-for-120-hz-on-quest-2-and-more/>.

21 Such as an inability to download/host the app on a computer on a server (like that of university computers) or simple lack of time.

22 Steve Swink, *Game Feel: A Game Designer's Guide to Virtual Sensation*, first edition (Amsterdam; Boston: CRC Press, 2008), 21.

23 Ibid.

24 Ibid., 23.

enhancements without changing the underlying simulation. If the aforementioned controls and spaces are like a cake, things like audio cues and ambient sounds or music could possibly be the 'icing on the cake.' The 'cherry on top' potentially being a day and night cycle, and any 'sprinkles' as a fully interactive environment.

In my project, there will be dual sets of each of these tools, though almost completely opposing. With the first character encountered (as a playable character), Kurungaituku, you will not have much control over her. You can control her head movement and rotation to look at and focus on things, but you remain a spectator. The second character, Hatupatu, you have complete control over – *you are him*. The limitations are things like free movement (the ability to move anywhere desired within the level), due to the project scope he can only follow a predetermined path. In developing the project further, I would like to add free movement to enable exploring.

The simulated spaces are placed within forests. Geographically, it is an extremely far distance the characters cover so these spaces have been restricted, starting in different locations chronologically versus the 'real-time equivalent' (where both characters are located at the same time). You watch Kurungaituku in a viewing of the past but are in the present as Hatupatu. Our Kurungaituku begins around her dwelling and there is a quick and powerful shift in atmosphere before she leaves this space. With our Hatupatu, he is in danger and running from this energy and entity.

Polish, in this regard, is harder to define as both characters are constantly moving. Added features include the form of the sounds of a fantail singing in the forest or a taonga puoro (Māori musical instrument²⁵) softly played in the background. Further development would include a day and night cycle and fully interactive experience.

When a game feels satisfying, it will be due to the player-centric design methodologies where mechanics (actions that players use to interact with the game world), aesthetics, etc. cater to the players. Standard player-centric design relies heavily on playtesting and player feedback, here however, I will replace it with a self-reflective version,²⁶ where I carry out the playtesting. In this regard, it is similar to an offshoot of the player-centric process; a designer-centric model. This is where the game is intended for one person, the designer who made it.²⁷

Immersion

Immersion (absorbing involvement) is the act of immersing, or state of being immersed (in something). Within a game design context, it is the engagement with a game in its entirety, mechanics, aesthetics, narrative, etc. Virtual reality can take this a step further than most standard video games. In his book, *Virtual Art: From Illusion to Immersion*, Grau explores VR's association with immersion, how the words themselves can contradict, and how images can impact the "perception of mage space and

²⁵ Brian Flintoff, "Māori Musical Instruments – Taonga Puoro," Web page, *Te Ara - the Encyclopedia of New Zealand*, last modified October 22, 2014, accessed July 30, 2022, <https://teara.govt.nz/en/maori-musical-instruments-taonga-puoro/page-2>.

²⁶ Tracy Fullerton, *Game Design Workshop: A Playcentric Approach to Creating Innovative Games*, Fourth Edition (CRC Press, 2018).

²⁷ asylumrunner, 'Player-Centric vs. Designer-Centric Game Design,' +4 *Blog of Arcane Secrets* (blog), 20 November 2013, <https://blogofarcanesecrets.wordpress.com/2013/11/19/player-centric-vs-designer-centric-game-design/>.

reality.”²⁸ It speaks of appeal in the sense that immersion can make use of the senses holistically versus only one sense; sight. In this, the sense-holistic nature of immersion uses the sensorium.²⁹ The sensorium are the faculties of an organism’s perception, a ‘seat of sensation’ where it experiences and interprets the environments within which it lives. The use proprioception (self-movement and body position) and interoception (the sense of the body’s internal state) to recreate the physical world in the digital then becomes the experience. The player experience inside VR then, is enveloped by copious amounts of information. Representing this are the audio-visual elements of the story that will allow the player to be immersed in the pūrākau (story).

Alongside the sensorium, agency and in-world interactions aid in complete immersion within a narrative context. By providing the player with agency (action producing a particular effect or providing options) we can create consequences. Interactivity is reliant on player input, but divided into four concepts by Zimmerman in *Narrative, Interactivity, Play and Games: Four Concepts in Need of Discipline*.³⁰

Play

As a noun, play is the act of experiencing a game, but as a verb, play is any activity that goes beyond the requirements of the moment.³¹ Taken from the glossary of *Games, Design, and Play*, the authors Macklin and Sharp define play in a simplified game context. Similarly, Salen Tekinbaş and Zimmerman in *Rules of Play* describe play as “free movement within a more rigid structure.”³² Another definition can be the “exercise or activity for amusement or recreation.”³³ All of these combined encapsulate what play means for me. More than anything, play to me, is the act of experiencing a moment. There is always some way to incorporate ‘fun’³⁴ and play, though it is very subjective.

In both books the authors combine categories and kinds of play to address critical but different points. *Games, Design, and Play* characterizes the different play experiences a player can encounter. The two that influence this research are ‘Experience-based Play’ and ‘Expressive Play.’ ‘Experience-based Play’ is self-explanatory ‘Expressive Play’ expresses a feeling or concept,³⁵ much like the artistic expression found in music, film, visual arts, etc. It can be the designer’s intention to express something, or the player could derive meaning from it.

Rules of Play has a combination of three categories that makes up play: gameplay, ludic activity, and being playful. ³⁶ Gameplay is the “formalized, focused interaction that occurs when players rules of a game in order to play it.” Board games are a notable

28 Oliver Grau, *Virtual Art: From Illusion to Immersion*, Leonardo (Series) (Cambridge, Mass.). (MIT Press, 2003).

29 ‘Sensorium’, in Wikipedia, 18 May 2022, <https://en.wikipedia.org/w/index.php?title=Sensorium&oldid=1088495968>.

30 Eric Zimmerman, “Narrative, Interactivity, Play and Games: Four Concepts in Need of Discipline,” in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (MIT Press, 2004), 154–64.

31 Colleen Macklin and John Sharp, *Games, Design and Play: A Detailed Approach to Iterative Game Design* (Addison-Wesley Professional, 2016).

32 Katie Salen Tekinbaş and Eric Zimmerman, *Rules of Play: Game Design Fundamentals* (MIT Press, 2004).

33 ‘Definition of Play,’ in [www.dictionary.com](https://www.dictionary.com/browse/play), accessed 10 August 2022, <https://www.dictionary.com/browse/play>.

34 Raph Koster, *Theory of Fun for Game Design*, second edition (Sebastopol, CA: O’Reilly Media, 2013), 116. In *Theory of Fun*, fun “is the act of mastering a problem mentally.” The author, Raph Koster, also defines it as “the feedback the brain gives us when we are absorbing patterns for learning purposes.”

35 Macklin & Sharp, *Games, Design and Play*, 139.

36 Salen Tekinbaş & Zimmerman, *Rules of Play*, 307. All of the following definitions are found on page 307.

example of this as most deviance from the rules can halt the game.³⁷ Ludic activity is the “non-game behaviours in which participants are “playing” such as two tussling animals. Game play is a subset of ludic activities.” Finally, being playful is the “state of being in a playful state of mind, such as when a spirit of play is injected into some other action. This category includes both gameplay and ludic activity.” While all three have their place within this research, gameplay is the most influential as potential limitations within VR can emerge. By placing certain restrictions on the project, I can utilize the time saved by improving what is there.

Storytelling in Games

There are many ways to tell a story, it can be through a series of images, literature, film, oral recounts. Three distinctive approaches within this research are through environmental storytelling, camera work, and perspective. Camera work and perspective tend to go hand-in-hand (as the camera positions the viewer or is the perspective) but I have separated them to show the different points of storytelling each can do.

In Fern Griffith’s blog she describes environmental storytelling as “exist[ing] in the space between the scripted story and the story created by gameplay.”³⁸ In this space resides audio, level design, and visual clues (visual storytelling³⁹), and a subset of all three, wayfinding. Audio storytelling is the narration or voice over, it is the music, and it is the ambience that fills and defines the spaces. Narration and voice over are not commonly associated with games, but when combining with pūrākau it is a nod to the oral storytelling traditions within te ao Māori. There is a wonderful use of this in *Thor: Love and Thunder*⁴⁰ when director Taika Waititi’s character Korg tells the tales of the characters in the film; mainly Thor. Music, both diegetic and non, can embody the atmosphere of a space. The evocative nature of it compels players to feel and experience whatever their character is going through and harness the emotion of a situation, immersing the player in the pūrākau. Ambient sounds such of the trees, birds, insects, etc as well as the sound of logging trucks passing by will be incorporated to juxtapose the potential time of the story (any time between 1300 - 1500). These are the sounds I usually hear when I am on my marae in Putāruru or the track of Hine Hopu (or Hongi) in Rotoiti, as both are on or intersected by main roads.

Ernest Adams describes level design, in his book *Fundamentals of Game Design*, as “the process of constructing the experience that the game offers directly to the player, using the components provided by the game designer.”⁴¹ The ‘level’ of a game is similar to that of a storey or floor of a building in that, most of the time, no two levels are the same. A common example is a ‘boss level’, where the player is pitted against a challenging opponent or task (or both). In simple terms, level design is about the characters, challenges, actions, game world, core mechanics, and potential storyline⁴²

37 Modifications (mods) and additional rules added on top of or instead of do not apply to this

38 Fern Griffiths, ‘Environmental Storytelling – How to use a Games Level Design to Tell a Story’, *Fable & Fern* (blog), 30 May 2020, <https://fable-and-fern.com/2020/05/30/environmental-storytelling-how-to-use-a-games-environment-to-tell-a-story/>.

39 The concept of “show don’t tell.”

40 *Thor: Love and Thunder*, directed by Taika Waititi (Marvel, 2022).

41 Ernest Adams, *Fundamentals of Game Design* (New Riders, 2013), 63. Note that level designers are not game designers, but game designers can be level designers.

42 Ibid.

It is, in essence, worldbuilding. *The Elder Scrolls V: Skyrim*⁴³ (*Skyrim*) by Bethesda, is my preferred example of this as the world around you has such a story to tell even without the storyline prompts. *Skyrim* is atmospheric and immersive as it pulls you into the quests and fall in love with the cities, (non-playable characters,⁴⁴ and wilderness).

To finish off environmental storytelling are visual cues and wayfinding. Firstly, visual cues are the use of coordinated placement,⁴⁵ consistent color (the use of the same color for all marked objects for their function. For example, red is used to mark all interactable objects in the game *Mirror's Edge*⁴⁶), identifiable iconography, and responsiveness and indication.⁴⁷ Not all games have all of these, in fact, a great deal of the time a game will feature perhaps one or two of these cues. Recent role-playing games (RPGs) tend to use a combination of responsiveness or indication with identifiable iconography. This can be seen in *Skyrim* or *Assassin's Creed: Origins*⁴⁸ in the form of clothing or banners depicting opposing sides in a conflict. The response is brought on by entering 'enemy territory' and their (potential) immediate awareness of the player and combat-readiness in engaging with said player. Now, while wayfinding is very similar to- and comprised of similar tools to- visual cues, it also includes the use of audio and more movement.⁴⁹ Wayfinding is how people find their way around an environment. It makes use of all previously mentioned storytelling tools to help guide the player within the underlying narrative; and all without the loss of player agency! Though the story being told is linear, wayfinding will still encourage the player to interact with the environment, thus engrossing them further into the pūrākau.

Camera work within game design is similar to film in that it focuses on the main subject/object in a frame. The major difference falls under control of the camera- in games you have the ability to control the camera. Rudolf Kremers states as much in his book *Level Design: Concept, Theory, and Practice*: "A major difference between film and video games lies in the fact that while a film audience has no influence what so ever on what is displayed on screen, games allow for a huge range of freedom in this regard."⁵⁰ Times when the player no longer has control of the camera are cutscenes or involuntary camera movement (to focus on an end goal or subject). This can be harnessed to showcase a scene⁵¹ where the player controls the head movements of a character through an HMD. So, while the player swings their head side-to-side the character's head too would do this. A question posed by Kremers is "what information do we want to convey to the player?"⁵² There are multiple ways a designer can answer this question, and, truly, it is up to the designer. One potential response could be in the use of light (and dark). Utilizing light within a level can drastically change the ambience and atmosphere of a space; where it is a warm and vibrant light you find life, where you

43 Bethesda Game Studios. *The Elder Scrolls V: Skyrim Special Edition*. Bethesda Softworks. PlayStation 4 Pro. 2016.

44 Not playable/non-playable characters (NPCs) are characters in-game that serve the purpose of telling stories and gossip or giving out quests for the player to complete. Once they have served their purpose the player is still able to interact with them though the responses may just repeat. Most times their dialogue will have changed depending on the completion of a quest or the consequence(s) of them.

45 The literal placement of a marker that makes sense visually and story-wise.

46 DICE. *Mirror's Edge*. Electronic Arts, EA Mobile. Xbox 360. 2008.

47 Adam Henry, 'Visual Cues in Level Design', *Game Developer* (blog), 13 July 2015, <https://www.gamedeveloper.com/design/visual-cues-in-level-design>.

48 Ubisoft Montreal. *Assassin's Creed: Origins*. Ubisoft. PlayStation 4. 2017.

49 Than to that of the responsiveness seen in *Skyrim* and *Assassin's Creed: Origins*.

50 Rudolf Kremers, *Level Design: Concept, Theory, and Practice* (CRC Press, 2009), 200.

51 Another name for level.

52 Rudolf Kremers, *Level Design*, (CRC Press, 2009), 204

feel the cold dense light (or lack thereof) you will likely find death. An example of what could take the shape of an environment where the scene quickly distorts is spriteliness and vigor associated with the living, and the dull ache of those lost to us.

This moves us into the last storytelling element, perspective, which usually resides within camera work. There will be two perspectives the player will experience- first person and third person. Third person, is where the player sees the character (usually from behind as they control the character)⁵³ it will set up the establishing shot.⁵⁴ They would then see the character, that will mimic the player's head movements. After this, however, the player will see the character exit the scene on multiple occasions⁵⁵.

53 Control is not limited to just seeing behind the character, usually there is a way to circle the character, them being the primary focus, and see all details.

54 As similarly used within film.

55 The character's movement from one side of the camera to the other, repeatedly. Once the character has left there is no focus or embodiment for the player for an incremental moment. And then, the jarring encounter of displacement that accompanies the evolution from existing to being.

Literature Review - Te Ao Māori:

Whakapapa / Whānau Knowledge

When I was a child, I had the opportunity and privilege of joining a wānanga (tribal learning – important traditional, philosophical, etc. knowledge) with my whānau. It was a small wānanga consisting of me and five of my girl-cousins at my aunty and uncle's house. My uncle, Te Hau Hohepa (Uncle Hau), led us in this space. We were asked to use masculine names for the duration of the wānanga. After hearing the names my cousins chose- Freddy, Adam, George, to name a few- I quickly chose the name Michael. This decision was in part because I had two uncles named Michael, but mainly because of Michael Jackson. While we learned the karakia whakamutunga (ending prayer) in both spoken form and sung to the tune of a guitar, I was Michael. This wānanga covered the span of a two-week school break. We learned the karakia, tī rākau⁵⁶ (stick games), and whai⁵⁷ (string games).

Reflecting on this I see such fluidity in being⁵⁸, a pivotal moment in becoming who I am today. It brings into the spotlight liminal spaces and queerness. Liminal spaces are usually thought of as transitional periods, happening all throughout the phases of life⁵⁹. Queerness in this instance is the temporary embodiment of a different state of being. So, in our taking of (temporary) new names for two weeks, created a new piece of us. Compared to my cousins, this seems to have been much more monumental to me as I entered the queer space from a different angle later in life.

In the style of the return of wānanga, Uncle Hau returns to guide me once more, this time for knowledge of the pūrākau of Hatupatu and Kurungaituku. In order to respect whanaungatanga, tikanga, whenua, and whakapapa, I have taken up Ethics to provide a cultural safety net. Ethics is touched on in Methodology as it became a method to help cultivate and nurture this research and my growth. It was through this that another privilege I have was realized; I have a whakapapa, whenua, and whānau connection to this pūrākau. I believe, that this pūrākau chose me as much as I chose it.

Pūrākau

“Thus, this tiny spark has become the centre. Let us meet here at the centre. The centre of all that is known, all that will be. We will create a world here from a few words, we will make a place where we will be comfortable.” – Whiti Hereaka⁶⁰

Hereaka's quote is at the heart of my engagement with pūrākau. 'The center,' for me, has

56 Ross Calman, 'Traditional Māori Games – Ngā Tākaro - Stick Games, String Games, Poi and Haka', *Te Ara - the Encyclopedia of New Zealand* (Ministry for Culture and Heritage Te Manatū Taonga, 5 September 2013), <https://teara.govt.nz/en/traditional-maori-games-nga-takaro/page-5>.

57 Ibid.

58 The state of being or existing as nothing but myself.

59 Theodora Blanchfield, 'The Impact of Liminal Space on Your Mental Health,' *verywellmind.com*, 20 October 2021, <https://www.verywellmind.com/the-impact-of-liminal-space-on-your-mental-health-5204371>.

60 Whiti Hereaka, "Prologue," in *Pūrākau: Māori Myths Retold by Māori Authors*, ed. Witi Ihimaera and Whiti Hereaka (New Zealand: Penguin Random House New Zealand Limited, 2019.), 15-22.

been the story of Kurungaituku and Hatupatu. This has allowed me to move through different dimensions, not just the various retellings, but also in exploring my wairua⁶¹ (spirit or soul) and appreciating the process.

The word *Pūrākau* holds many meanings; as Dr Jenny Lee states: “It is not coincidental that the word *pūrākau* literally refers to the roots or the base (pū) of the tree (rākau), rather it is significant that ‘story telling’ derives its meaning in Māori language from words that relate to the trees and bush, since the imagery of trees often reflect our cultural understandings of social relationships, our inter-connectedness with each other and the natural environment.”⁶² It is the preserved ancestral knowledge⁶³ told to new generations, and it is a worldview that shapes how we care for our environment and what is tapu (sacred).

Māori storytelling provides clear passages in the cosmography for creative stages. The story of how the world is created, is a vital part of this research, aligning the creation process with the design stages, from Te Kore, to Te Pō and into Te Ao Mārama. In the beginning, there is only Te Kore⁶⁴ (The Nothing), a vast emptiness that turns to Te Pō⁶⁵ (The Endless Night), the concept of the universe, was created. Inside this, Papatūānuku (the Earth Mother, Papa) and Ranginui (the Sky Father, Rangi) grew. From Te Pō, Papa and Rangi bore children, ngā Atua (gods) of forests, animals, and weather. In their separation, at the hands of their son, Tāne (atua of forests and birds), Te Whaiao⁶⁶ (The Dawnlight) comes forth; thus, light is brought to the world. This leads us to the present world, Te Ao Mārama⁶⁷ (The World of Light).

Thus, in te ao Māori was the “tiny spark that became the centre.”⁶⁸

The design of the interactive immersive environment unfolds along the same lines as the creation story. It will be an interactive opening sequence of sorts and will appear before any form of title screen or main menu. You will be paddling a small waka taua (war canoe) through the event of the creation story⁶⁹ until you come upon the rock of Hatupatu. I will try to weave in some oral story telling elements to acknowledge that tradition, explained by Jane McRae: “Māori oral tradition is the richly informative, poetic record of ngā kōrero tuku iho or the words that were remembered and handed down by voice over generations.”⁷⁰

61 As a form of soul searching after pulling back from te ao Māori due to personal circumstances.

62 Jenny Lee-Morgan, ‘Māori Cultural Regeneration: Pūrākau as Pedagogy’ (Auckland, New Zealand, The University of Auckland, 2005): 7, http://www.rangahau.co.nz/assets/lee_J/purakau%20as%20pedagogy.pdf

63 Ibid., 2

64 Te Kore is the universe before it's conception or the 'big bang', and it is a realm of potential.

65 Te Pō is the perpetual night, it has several stages and moments of movement as it shifts from the realm of potential into one of 'becoming' or 'being.' This realm is one filled with no light. It is in the final stage of Te Pō (Te Pō-tahuri-mai-ki-taiao, “the night of turning towards the revealed world) that we see the start of the separation of Rangi and Papa.

66 Te Whaiao also known as daylight or the world of light, it is commonly associated and used interchangeably with Te Ao Mārama. It is the time in which the world is bathed in light at the separation of Rangi and Papa. This then shifts into Te Ao Mārama.

67 Te Ao Mārama is also the world of light, where life is first created and is the current world we reside in.

68 Whiti Hereaka, “Prologue,” 17.

69 My interpretation/visualization of it the creation story.

70 Jane McRae, *Māori Oral Tradition: He Kōrero No Te Ao Tawhito*, First Edition, (Auckland, New Zealand: Auckland University Press, 2017), 1, <http://ebookcentral.proquest.com/lib/aut/detail.action?docID=4825619>.

Whakataukī

Picking up on the whakataukī in my introduction, I have illustrated its cyclic pattern; to learn, to share, to pass down. It is a form of legacy, because, if nothing else, that is what we leave behind. It could be the feather we see left on the ground after a bird has taken flight. It is these feathers that connect and enrich the pūrākau and the whakataukī. From the poetic nuance⁷¹ of a feather to literally creating a lot of them, it serves as the messenger between worlds⁷² (spiritual and physical⁷³) and holds the mana (prestige and spiritual power) within this project. This then lends itself to the wraparound of virtual reality as a korowai or kākahu kura; you can then become the leader of your space.⁷⁴

The Story of Hatupatu and Kurungaituku

As if the story were a feather falling to my lap, it found its way to me, settled, and became everything.

The Pūrākau of Hatupatu and Kurungaituku was briefly touched upon in childhood however I had a patchy understanding of this story of my tīpuna Hatupatu, hailing from Te Arawa, and Kurungaituku, a half-bird half-woman forest dwelling being. There are many retellings of this pūrākau but all comprise of three main events: the meeting, the chase, and the rock.

Drawing from the pūrākau there are two definitive ways this story has been told. The *History of Aotearoa New Zealand Podcast* (HANZ Podcast) by Thomas Rillstone (episodes 56⁷⁵ and 57⁷⁶) is a direct retelling of the life of Hatupatu (in two parts) from that of *Te Arawa: A History of the Arawa People*.⁷⁷ Focusing solely on the part with Kurungaituku, this version sees her as a demonic entity. She wants to eat Hatupatu but meets her end via the sulphur pools of Whakarewarewa (forest and geothermal area near Rotorua). However, in *Kurungaituku*⁷⁸ and *Kurungaituku, the Guardian of the Forest*⁷⁹ we see the birdwoman as benevolent, wishing only to help Hatupatu, but he ultimately betrays her.

There is another retelling, released after the collection of all influence chosen, *Kurungaituku*⁸⁰ by Whiti Hereaka. The version depicts both Hatupatu and Kurungaituku as neutral beings, purely just existing before, during, and after their worlds colliding. Following the same ending as *Te Arawa*, Hatupatu returns home and Kurungaituku dies at the hand of a geothermal pool in Whakarewarewa. The subtle difference is how

71 In te ao Māori birds are held in high regard as they are children of Tāne and messengers between realms. Each bird has special qualities, so different feathered korowai will be imbued with different and special meanings.

72 Museum of New Zealand Te Papa Tongarewa. "Feathers | Collections Online," n.d. <https://collections.tepapa.govt.nz/topic/3625>.

73 In this case, it is the messenger between the physical world and virtual reality.

74 Korowai made of red feathers, usually from a Kākā, symbolize leadership or chiefly status. So to don one you would then become the leader of your mana, wairua and mauri (vital essences/the essential quality and vitality of a being or entity).

75 Thomas Rillstone, '56 – Hatupatu', *History of Aotearoa New Zealand Podcast*, accessed 2 August 2021, <https://historyaotearoa.com/2021/01/31/56-hatupatu/>

76 Thomas Rillstone, '57 – Hatupatu Part Rua', *History of Aotearoa New Zealand Podcast*, accessed 2 August 2021, <https://historyaotearoa.com/2021/02/15/57-hatupatu-part-rua/>

77 Donald Murray Stafford, *Te Arawa: A History of the Arawa People*, 4th Enhanced (Oratia, 2016).

78 Ngāhuia Te Awēkotuku, "Kurungaituku," in *Pūrākau: Māori Myths Retold by Māori Writers*, ed. Witi Ihimaera and Whiti Hereaka, (New Zealand: Penguin Random House New Zealand Limited, 2019), 247-57.

79 Huirama Te Hiko and Nigel Te Hiko, *Kurungaituku the Guardian of the Forest*, 2017, <https://raukawa.org.nz/rct/wp-content/uploads/sites/2/2017/07/2-Kurungaituku-the-Guardian-of-the-forest.pdf>

80 Whiti Hereaka, *Kurungaituku* (Wellington, New Zealand: HUIA, 2021).

Kurangaituku still feels everything that happens to her corporeal form but exists outside of it. This is the end of an on-going notion that Kurangaituku exists but does not, and that her form alters depending on the thoughts from other creatures. While it will not be used to influence my own interpretation, it will guide the aesthetic choices for Kurungaituku (appearance) and the environment.

In response to the previously mentioned, I have crafted my own interpretation of this pūrākau. Similar in many ways to *Kurangaituku*,⁸¹ it takes a neutral stance. It showcases both characters as 'good' and 'evil,' or 'human.' Shifting into VR presents some storytelling challenges as it is a large story, and some retellings are even larger, filled with extra context and drama.⁸² As such, I have had to select and scope for a smaller section of the pūrākau. What will be seen is what I feel holds the pivotal point⁸³ of the pūrākau- the chase and the lead up to it:

Standing in front of her cave, Kurungaituku watches her friends and family, all little reptiles, birds, kurī (Māori dogs), and insects. In that moment things are vibrant, but this moment has passed, and Kurungaituku sees the carnage courtesy of Hatupatu. The sole survivor, a miromiro (white-breasted Tomtit) is the unfortunate harbinger of this message. Incensed by the massacre, Kurungaituku turns in a storm of rage in search of Hatupatu. The crunching of leaves under heavy feet and the hefty flap of her powerful wings signals the start of the chase.

As Hatupatu, you run – on tired legs. You barely manage to sleep in fear of *her* catching you, you hear things. In the snap of a twig under your feet and every howl of the wind, you hear her. *Kurangaituku*. So, you run. You feel your beating heart slow, as does time, when you hear her land not too far off, but could sprint. You find yourself running again, dodging the ever appearing after image of her. *Was she truly there?* You do not wish to find out, and so, when you come upon a rock, one that could fit a person, you open it and close it just as fast. Then you hear her screech and scratch and tear at the rock, but she cannot get to you.

81 Whiti Hereaka, *Kurangaituku* (Wellington, New Zealand: HUIA, 2021).

82 Used in a positive sense, it is engaging when a form of conflict is started. It can be akin to being unable to take your eyes off a burning car wreck.

83 The most action-packed part of the story that can engage and immerse the player into the story at enough of a level that they would be interested in future developments.

Linking VR and te ao Māori

The Adornment of VR Like That of a Korowai

At a basic level, virtual reality experiences enable the player to inhabit different environments, identities, and spaces. The predominate discourse around VR has been Western, which begs the question: *How does one represent these stories or histories?* As Deidre Brown says in *Theorizing Digital Cultural Heritage*:

“AR and VR are most effective as cultural heritage devices when they replicate objects, events, and scenes that are difficult or impossible to realize or access, as simulation for the sake of repetition offers no value and incites little interest. Digitized replicants of unique objects are likely to appeal to a general audience; however, VR’s greatest contribution will be in the replication of objects for remote study, curatorial work, conservation, and repatriation.”⁸⁴

By replicating the real world (via 3D scanning/asset creation, recording audio, etc.) and placing it into a digital or virtual world, we can create spaces that could not exist. An example of this is my interpretation of Kurungaituku, she has the figure of a human woman, but has a beak, eyes, leg shape, wings, and feathering of a Kārearea (New Zealand Bush Falcon). In our current world, we have not seen her; in a VR space, however, she could potentially be found in her whare (dwelling or house).⁸⁵

Shifting from the environment we consider the apparatus of VR and what it does? *Could it be linked to a korowai?* A korowai embodies: “both spatial and temporal connectivity, revealing aspects of liminality which engage the past within the present, subsequently acting as the corporeal conduits...”⁸⁶ In VR, you place the headset upon your head and enter a virtual world that allows you to take on a new identity, concept, or perspective. A korowai is a mantle of mana, it symbolises leadership and connects to the spiritual and physical realms⁸⁷ and liminality. Virtual reality is the immersion (absorbing involvement) in a virtual space with presence (a sense of “being there”) and illusion (perception that represents what is perceived in a way different from the way it is in reality). Here the adornment of virtual reality, is likened to the korowai. Wrapped around you it has the ability to project a new identity, define a space, by taking on the mantel.

84 Deidre Brown, “Te Ahua Hiko: Digital Cultural Heritage and Indigenous Objects, People, and Environments,” in *Theorizing Digital Cultural Heritage: A Critical Discourse*, ed. Fiona Cameron and Sarah Kenderdine, Media in Transition (Cambridge, MA, USA: MIT Press, 2007), 82.

85 Not limited to a house structure but can be anything where someone lives or defines as their kāinga (home).

86 Vincent Malcolm-Buchanan, Ngāhuia Te Awēkotuku, and Linda Waimarie Nikora, “Cloaked in Life and Death: Korowai, Kaitiaki and Tangihanga” 1, no. 1, *MAI Journal 2012: Volume 1 Issue 1* (April 27, 2012), 6. This meaning, I believe, takes place more so in a tangi (funeral) environment than the standard day.

87 Through once being a part of a bird, a messenger between realms/worlds.

Fluidity of the Spaces

Within virtual reality and te ao Māori we have fluidity; it is in the way we move through these spaces that we incorporate it. In te ao Māori, it is a mātauranga process to move through different dimensions. As discussed in the literature review,⁸⁸ I became 'Michael,' and for two weeks 'Michael' was a part of te ao Māori. Beyond that were processes and transitional spaces that formed who I am today. In VR, the player usually becomes the character,⁸⁹ and in that, embodies how they would think or act. To this then, Kurungaituku is a liminal space, and through her this research has taken place. We watch her, we run from her, but it is because of her that we are here.⁹⁰

88 See Whakapapa and Whānau Knowledge

89 This is not always the case as not all VR experiences are games, so there is no character to become.

90 Both literally in the story as she takes Hatupatu to her whare, but also in the way of the pūrākau being chosen.

Methods and Methodology

The intertwining of pūrākau (as a methodology) and the Iterative Design Process (IDP) situates itself in the ngākau of Kaupapa Māori. In addressing the methodology, then, under three headings: Kaupapa Māori, IDP, and Playtesting; I discuss the interwoven tikanga thread⁹¹ within each section. Ethics has also interlaced through all three.

Kaupapa Māori

Like a plait, that which was to the side, connected, is pulled to the center.

Kaupapa Māori is the overarching framework of this methodology. As established by Tuakana Nepe “Kaupapa Māori knowledge is the systematic organisation of beliefs, experiences, understandings and interpretations of the interactions of Māori people upon Māori people, and Māori people upon their world.”⁹² A simplification of this could be that it is “a conceptualization of Māori knowledge.”⁹³ Linda Tuhiwai Smith furthers this with:

“The concept of kaupapa implies a way of framing and structuring how we think about those ideas and practices... It is a way of abstracting that knowledge, reflecting on it, engaging with it, taking it for granted sometimes, making assumptions based upon it, and at times critically engaging in the way it has been and is being constructed.”⁹⁴

It is a process, and like in life, it is about the journey not the destination. In actively pursuing this, I began to appreciate this process and the tension that rose within; the maintaining of mana.⁹⁵ It is uplifted and guided by whanaungatanga (kinship or sense of whānau connection) through the process of ethics and reconnection with my whānau, especially Uncle Hau. It is also through *Hīkoi te whenua* (“walk the land,” the concept of walking and talking as a form of knowledge seeking and sharing) and whakapapa connection that Kaupapa Māori could take shape.

Through the initial use of the creation story (see Pūrākau), I have focused on pūrākau in the sense of the gathering, processing, understanding, and implementing of Kaupapa Māori. Much like this pūrākau, it starts with Te Kore, there is nothing. But then, an idea appears; this is Te Pō. And in Te Pō, this idea churns, stretches, shrinks, and multiplies.⁹⁶ With ideas flowing, it carries us over to Te Whaiao, to the light. Implementation takes its place as the end but creates a new beginning too. In te ao Māori the cyclic nature becoming, returning, and changing are understood in pūrākau.

91 The guidelines or rules found within each heading that are shared between them.

92 Tuakana Mate Nepe, ‘Te Toi Huarewa Tipuna: Kaupapa Māori, an Educational Intervention System’ (Thesis, The University of Auckland, 1991), 15, <https://researchspace.auckland.ac.nz/handle/2292/3066>.

93 Ibid., 17.

94 Linda Tuhiwai Smith, “Kaupapa Māori Research” in *Reclaiming Indigenous Voice and Vision*, ed. Marie Battiste (UBC Press, 2000), 231.

95 Mana is a supernatural force in a person, place or object, it is also known as prestige, authority, influence, and spiritual power. It can give a person the authority to lead, organize and regulate communal expeditions and activities. A person’s mana can increase or decrease with successes or lack thereof.

96 It is the processing and understanding.

Iterative Design Process (IDP)

The Iterative Design Process⁹⁷ is a system of receiving, evaluating, refinement (of an initial idea), and incrementally evolving it; this too is cyclic.

Now the next strand of the plait crosses over to the center.

What makes up the IDP is the conceptualization⁹⁸ (creation of ideas and form of initial visualization), prototyping⁹⁹ (simplest possible execution of a design concept¹⁰⁰), playtesting,¹⁰¹ and evaluating.¹⁰² Weaving this too into the creation story, conceptualization starts in Te Kore but shifts into Te Pō. From there the prototyping glides us down to Te Whaiao. And in the light of Te Ao Mārama, playtesting finds what does not work. Standard playtesting uses other people (players) to experience, play, and attempt to 'break'¹⁰³ the game. For my research I have chosen to self-test. This ensures that the project functions well and prevents any potential risks such as VR Sickness. It is similar to Motion Sickness but can emerge from virtual lag (delay between action and reaction) and latency (time taken for data moving between its source and destination). Evaluation has been merged with playtesting as interaction with the space can generate prompts for refinement or implementation. Due to all of this, Playtesting will be discussed separately to the rest of the Iterative Design Process; it is a lot to cover so it deserves its own section.

Conceptualization is situated in the creation of concepts, and it is the process of generation. Within this research it has been used to ideate and formalize a visual interpretation of environments, characters, objects, etc. This is in the form of storyboards, concept sketches, and informal drawings. Here "*He aha te kaupapa o ngā kura me te onioni me te korowai?*" (What is the plan/purpose for the feathers, clay, and the korowai?) can be asked and answered.

The use of *prototyping* takes the concepts generated in the conceptualization phase and places them into a different medium. For example, it can be the move from 2D sketches on paper to 3D assets inside a virtual environment created within Unreal Engine¹⁰⁴ or sculpting a physical model. I have used this alongside the rapid creation of feathers in clay, a 'feather factory,' and it is grounded in the material culture of whakapapa, whenua, and pūrākau.¹⁰⁵ Most initial prototypes begin with a 'grey box' level¹⁰⁶ and slowly through iterations gain the necessary visual details. These do not contain permanent fixtures and are very experimental.

97 Tracy Fullerton, *Game Design Workshop* (CRC Press, 2018); Colleen Macklin and John Sharp, *Games, Design and Play* (Addison-Wesley Professional, 2016); Katie Salen Tekinbaş and Eric Zimmerman, *Rules of Play* (MIT Press, 2004).

98 Yohanna Egiri and Enoch Wuritka, 'Conceptualizing Concepts: A New Approach to Industrial Design,' 20 September 2016, <https://doi.org/10.13140/RG.2.2.23092.45443>.

99 Jesse Schell, *The Art of Game Design: A Book of Lenses*, Third Edition (Milton, UNITED KINGDOM: CRC Press LLC, 2019), 148, <http://ebookcentral.proquest.com/lib/aut/detail.action?docID=5842983>.

100 Will Wright, 'Will Wright's 3 Tips for Successful Prototyping in Video Games', MasterClass, 8 June 2021, <https://www.masterclass.com/articles/will-wrights-tips-for-successful-prototyping-in-video-games>

101 Tracy Fullerton, *Game Design Workshop*, (CRC Press, 2018), 435.

102 Macklin and Sharp, *Games, Design and Play*, (Addison-Wesley Professional, 2016), 206.

103 Find all the potholes and weaknesses in the game and exploit them to see what they can receive from the game.

104 'Unreal Engine,' Unreal Engine, n.d., <https://www.unrealengine.com/en-US>.

105 Feathers are found in the story used, as such they are connected to me through whakapapa and pūrākau directly. And because clay is of the land, it is connected to whenua.

106 A level that focuses on mechanics and interaction with the virtual environment rather than aesthetics, using placeholder boxes in place of the visuals.

Playtesting

As the name suggests, playtesting is the testing of gameplay and in using self-testing it ensures that any initial problems can be addressed and dealt with. In the case of VR, it is vital to test for VR Sickness¹⁰⁷ so that there is no discomfort in the eventuality of others playing it. However, when you design something, you can overlook potential problems as oversight, what feels comfortable to me may not be for you. With this in mind, it is important to test and observe with 'fresh eyes' each time. Evaluation was placed under playtesting as in self-testing *you* are the observer and there will be personal insights on what you have created.

At the time of writing this, there has only been one playtest completed. This prototype was inside Unreal Engine 4 and tested in the virtual reality viewport on the *Quest 2*.¹⁰⁸ Minor adjustments have been made for this prototype (replacement of assets and altering of lighting), but observations made were useful. In moving forward, the prototype shall include more assets, 3D scanned into the digital world and tested in the space. Kurungaituku will be scanned, animated, and move through the level as you watch her. As a result, rapid prototyping¹⁰⁹ may be introduced in order to promptly create, test, and implement changes.

Ethics

Another strand crosses over and the cycle may now start again until the end.

I sought ethics approval to formally engage with my Uncle Hau and the kōrero he offered around Kurungaituku and Hatupatu. I did not grow up with these stories but through ethics I was able to access them within the scope of this research and in aiding the VR process, especially in terms of aesthetics in comparison to the real world,¹¹⁰ I was able to re-establish this connection. In relation to Kaupapa Māori research it enabled me to visit and capture the potential sites and nests of Kurungaituku and Hatupatu with Uncle Hau and create 360-degree pictures with a GoPro Max¹¹¹. With the IDP and playtesting, ethics brought into question whether I should find testers (with family and friends), and while it was on the table it was reconsidered in the rescoping of the project. The process of undertaking ethics solidified what could and would not happen and cemented concepts and prototypes for further research.

107 As explained in IDP

108 See Critical Commentary

109 Starloop Studios, 'Rapid Game Prototyping: Why It Is Important in Game Development?', *Starloop Studios* (blog), 8 December 2020, <https://starloopstudios.com/rapid-game-prototyping-why-is-it-important-in-game-development/>.

110 I opted not to go for hyperrealistic or photorealistic, there is too much detail it would take too long to recreate.

111 'GoPro | World's Most Versatile Cameras | Shop Now & Save,' accessed 26 February 2022, <https://gopro.com/en/us/>.

Critical Commentary

This research looked to scan potential assets into a digital form to recreate the natural space in a prototype virtual environment. It would potentially be photorealistic within VR but 'more authentic.'¹¹² It became imperative to get reference and lived experience in physical locations to base the virtual environment on.

Gathering

To start the process of data collection (of photo, video, audio, etc.), I visited the rock of Hatupatu. This initial visit was with close friends and at the start of my reconnection with te ao Māori.¹¹³ The rock had a scattering of what potentially was koha (gifts or offerings); yet had candy shoved into holes and cracks within the rock. This can be seen in Figure 1. While here, I was able to scan the rock with an iPhone¹¹⁴ camera and the app Polycam¹¹⁵ as seen below (Figure 2¹¹⁶).

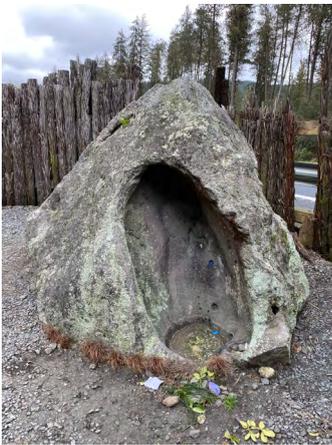


Figure 1: Picture taken of the rock of Hatupatu, is reminiscent of a shark fin.

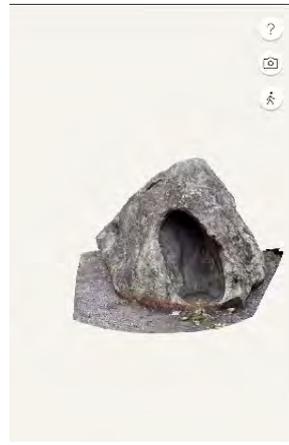


Figure 2: Screen recording of a turntable of the rock on Polycam (on phone), initial 3D scan.

The research trip was interrupted, and physical access was limited, leading to a second trip. Revisiting the rock, I took the time to touch it, feel its warmth, and connect with it. Establishing a physical connection with the rock felt important. Here I was able to retake the 3D scan here, the rock is tidier, but a piece had broken off the top. Here I was able to retake the 3D scan here, the rock is tidier, but a piece had broken off the top.

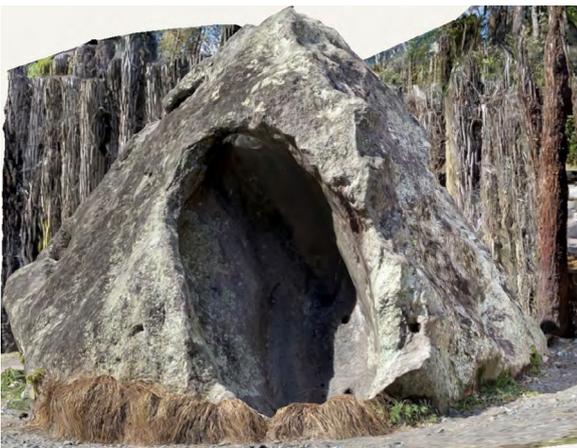


Figure 3: Hatupatu rock, front view of the rock.

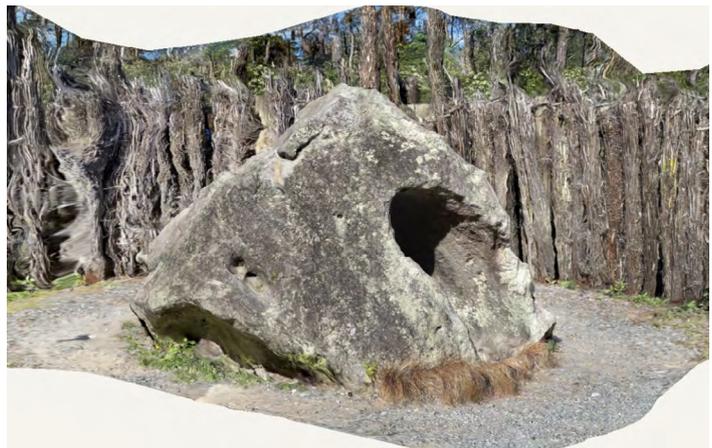


Figure 4: Hatupatu rock, side view.

The research trip was interrupted, and physical access was limited, leading to a second

¹¹² To make the space feel like the real world.

¹¹³ To be expanded on further ahead.

¹¹⁴ 'iPhone,' Apple (New Zealand), n.d., <https://www.apple.com/nz/iphone/>.

¹¹⁵ 'Polycam - LiDAR & 3D Scanner', App Store, n.d., <https://apps.apple.com/us/app/polycam-lidar-3d-scanner/id1532482376>.

¹¹⁶ In the chance the video does not work it can be found in the exegesis documents, otherwise see [here](#).

trip. Revisiting the rock, I took the time to touch it, feel its warmth, and connect with it. Establishing a physical connection with the rock felt important. Here I was able to retake the 3D scan here, the rock is tidier, but a piece had broken off the top. After Hatupatu rock, we ventured over to Te Puia¹¹⁷ in Whakarewarewa.¹¹⁸



Figure 5: Static Image, Whakarewarewa waterfalls sounds.



Figure 6: Scrub and brush from Whakarewarewa.



Figure 7: Te Puia geothermal pool.

By comparing landscapes¹¹⁹ we gain an idea of an environment that would host both Kurungaituku and Hatupatu.



Figure 8: Fantail sitting on a branch.



Figure 9: Video of the same fantail in a different part of the forest.

Expanding on areas, a third trip was made, to capture the track of Hinehopu (or Hongi), a track between Rotoiti and Rotoehu. This space I explored with my father and uncle Hau. Here I was privileged in my encounters with ngā pīwakawaka (fantails) as they curiously twittered and hopped from branch to branch.¹²⁰

¹¹⁷ "Te Puia," n.d., https://www.tepuia.com/?gclid=Cj0KCQjw3eeXBhD7ARIsAHjssr8XR_5JCvfJAGhIppaanjCD0tm14GBrT6horxFFonjyZr_ItVq_XXwaAr97EALw_wcB.

¹¹⁸ If the video does not work, refer to exegesis documents or see [here](#).

¹¹⁹ Of Whakarewarewa and Ātiamuri (an area between Rotorua and Taupō)

¹²⁰ If the video does not work, refer to exegesis documents or see [here](#).



Figure 10: Panorama of the Track of Hine Hopu or Hongi.

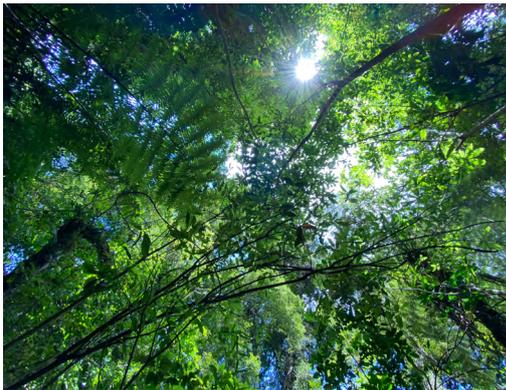


Figure 11: Canopy of the track, multiple different trees.

This small encounter was a *tohu* (sign) and affirmed the direction of my project and placed more importance on feathers.¹²¹

Conceptualization

The process of conceptualization started in choosing a waka. This vessel is what carries you across a vast ocean to the start of the actual VR experience. Traditionally, waka hourua (double-hulled canoe) were the open sea-faring craft and Waka taua (war canoe) were for warriors. For a single player, both are unsuitable as they require multiple people. Ultimately, the waka taua was chosen as aesthetically and conceptually it could be moved by one.

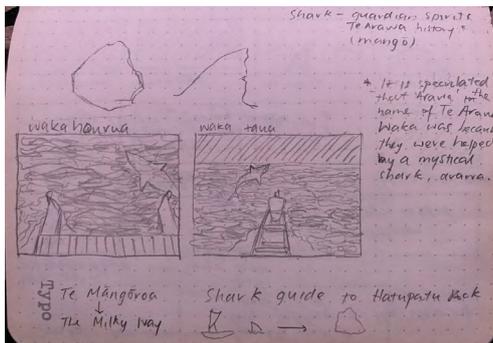


Figure 12: Waka sketches comparison.

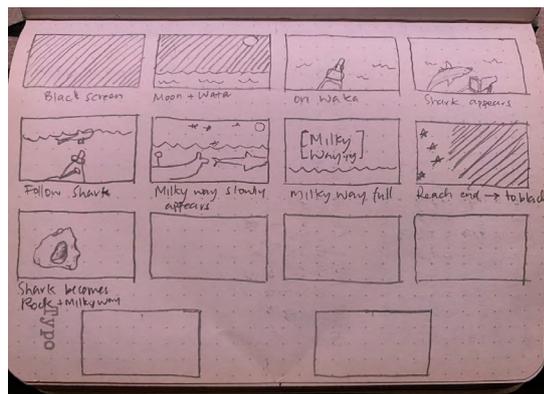


Figure 13: Initial storyboarding.

I used storyboards of the sequence for the interactive opening, to identify key parts used from the pūrākau. An added feature is a shark, Arawa, who is said to have guided Te Arawa to Aotearoa. In Figure 14, the storyboards show the movement from the dark phase to the light. You are guided by Arawa to the rock of Hatupatu.

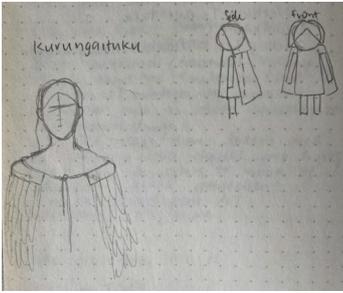


Figure 14: Kurungaituku initial mock up.

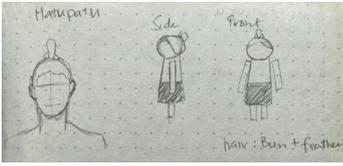


Figure 15: Hatupatu mock up.



Figure 16: 3D Low Poly Kurungaituku.



Figure 17: 3D Low Poly Hatupatu.

Prototyping

The prototyping of the characters and objects started in Low Poly (forms that have less shapes and appear 'blocky') provides our start (Figures 17 & 18).

Exploring WildShape¹²² tested the landscape of Ātiamuri as there are hills and a river.

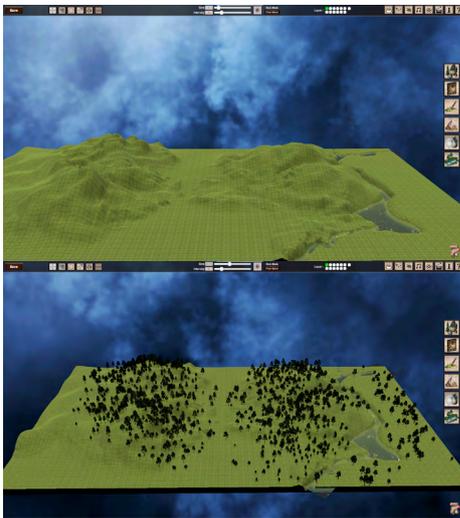


Figure 18: (Above) Treeless digital recreation of Ātiamuri.

Figure 19: (Below) With trees, digital recreation of Ātiamuri.

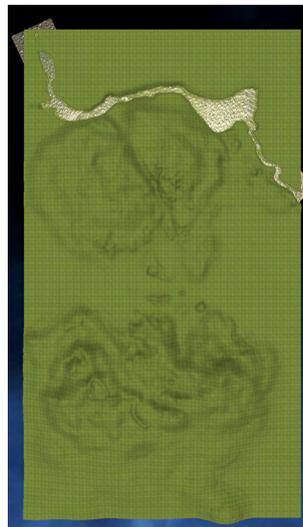


Figure 20: Bird-eye view of Ātiamuri.



Figure 21: Bird-eye view of Ātiamuri with trees.

As the project is still under construction at this time of writing, evaluation lies in the observation of the one and only VR prototype. It was a way to start the environment for the interactive opening. Initially I attempted to use a sky sphere of the Milky Way, this did not work so I edited the default sky sphere to being a night-time and starry.¹²³



Figure 22: Water material and starry sky with unknown light source, done in Unreal Engine 4.27.

¹²² "Wildshape: Map Creation and VTT," n.d., <https://wildshapevtt.com/>.

¹²³ Unfortunately, it can only have either the stars or the moon in the sky at one time. A sky is still a sky, it requires extra processing to incorporate the moon

The original water system had a problem where inside VR the water would flicker in a chessboard-like pattern, so it was replaced by animated 'water materials.' My intention is to have Arawa visible in the 'water materials' available and to address light source.¹²⁴

Originally, Kurungaituku appears as a spectre, potentially made of particles or simply just shadow. From this she has evolved and shifted from the ephemeral to corporeal through the use of clay.



Figure 23: Initial redraw of Kurungaituku.



Figure 24: Half body sketches plus leg study.



Figure 25: First image in clay.



Figure 26: Hair started.



Figure 27: Back of head plus feathers.

Using clay meant having the tactility of actually sculpting something and it was the physicality of taking her from 2D to 3D by my hand the propelled her making. Redrawing Kurungaituku fleshed out her likeness in the way that I interpret her to be (see Figures 23-4).



Figure 28: Eye-feathers and full head, front view.



Figure 29: Full head, side view.



Figure 30: Full hair, back view.



Figure 31: Bird-eye view.

However, this started what I call the *feather factory*, the processing plant of her feathers, made by hand. This process has been time-consuming and slowed down the progress in her making tenfold. Detail was necessary, the smaller the feathers got. There was no structured process to her partial creation (as she remains incomplete at this time).



Figure 32: Raptor-like feet.



Figure 33: Full body shot, front.



Figure 34: Full body shot, 3/4 view.



Figure 35: Lit from below, front.



Figure 36: Current version, front.

Figure 37: Current version, left.

Figure 38: Current version, right.

Figure 39: Current version, back.

Another physical artefact created and finished is the whare of Kurungaituku. The cave I have made is a hollow that leads deeper into the potential rocks, cliffs, or hills it is situated in. Unlike Kurungaituku herself, the cave follows a linear process of crafting a base from cardboard, sticking it together (combining), then placing clay upon the cardboard. The process can be seen through Figures 41 to 58.



Figure 40: Base foundation of the cave.



Figure 41: Cardboard as wall structure.



Figure 42: Almost complete base.



Figure 43: Quarter clay covered cave.



Figure 44: Mostly covered.



Figure 45: 90% covered cardboard.



Figure 46: Finished clay base, high light.



Figure 47: Finished clay base, shadows.



Figure 48: Finished base, front, shadow overhang.



Figure 49: Finished base, front lit.



Figure 50: Base primed with painted floor.



Figure 51: Base coat brown.



Figure 52: Additional color plus color removal.



Figure 53: Plant adornment, ti tree plus cotton embroidery thread.



Figure 54: Final shoot, cool lighting, high shine.



Figure 55: Experimental shot, low angle, shadows.



Figure 56: Experimental shot, natural light, angled.



Figure 57: Final shoot, cool lighting plus saturation.

Reflection

Through using the pūrākau of Kurungaituku and Hatupatu I re-established bonds and aroha with whānau, whenua, and whakapapa. Personal circumstances prohibited me from connecting with them all, and this could be seen in the initial undertaking of this research. In reclaiming my mana, I was able to heal and grow, as a result this research is centred deeply around te ao Māori. The realization and awareness of the whakamana (power and empowerment) I obtained propelled the research into that healing space, opening up to constant states of flow.

This shift was established in the transference of whakataukī. The movement into *He huruhuru ka rere te manu* connected everything into a single artefact, a feather. With its many uses and forms, feathers enveloped this research, taking the shapes of korowai, fantails, and Kurungaituku. In the sculpting of Kurungaituku I was initially drawn to the flexibility of moulding clay into being. So, as I was working with the clay, I was actually working with and connected to the whenua. It is an embodiment of my relationship with the story and my connection to the whenua and pūrākau itself.

Ka mua ka muri – Looking back to move forward situates the guidance received from my uncle Hau both past and present. Without him this research would not have such sturdy foundations.

Conclusion

This research was inspired by “Putting the Noble Savage to Bed”¹²⁵ by Timothy Russell and presented some challenges for me. As the research developed finding te ao Māori views to inform the direction became a central concern. At the core is representation. By embodying mātauranga Māori and Kaupapa Māori within the visualization of Kurungaituku and her feathers I have arrived at a destination.

At this time, the project still has not been fully realized. However, working out the process has been vital in considering the tensions that sit within my project around maintaining mana and incorporating mauri. Through this research I made the following discoveries: virtual reality is a korowai of identity projection by taking on the mantel, the fluidity of liminal spaces calls to mātauranga Māori through dimension shifting, and the cyclic natures of Kaupapa Māori and the Iterative Design Process create a framework that gathers, processes, understands, and implements te ao Māori. From this blueprint I feel confident that I have a framework that automatically weaves together tikanga Māori and the practicalities of VR experiences.

Upon further study this research seeks to define the queerness of the spaces between virtual reality and te ao Māori, and in facilitating ethics, gaining the playtesters and extra pūrākau contexts. The project intends pursue expanding interaction within the virtual environment, elongating the story length, and the addition of humour. Humour in this regard would be subtle interactions and reactions to the environment. *You as Hatupatu are thirsty and come across a creek. Bending down to the water with cupped hands you scoop it up to your mouth. “Ha- Makariri!” You stand up fast and shake away the icy liquid.*

¹²⁵ Timothy Russell, “Putting the Noble Savage to Bed,” (Presented at Play by Play, Te Papa, Wellington, April 23, 2021).

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Glossary

Kupu hou

Ātiamuri:	Area between Rotorua and Taupō.
Hatupatu:	Ancestor of Te Arawa.
Kākahu Kura:	Cape of red feathers.
Karakia:	To recite ritual chants or prayer (verb), incantation, charm, blessing, or prayer (noun.)
Kaupapa Māori:	Conceptualization of Māori knowledge
Korowai:	A cloak ornamented with black twisted tags or thrums or used as a general term for cloaks (Modern Māori).
Kurī:	Māori dog (extinct).
Kurungaituku:	Half-bird half-woman entity that lives in or around Whakarewarewa or Rotorua
Mā te huruhuru ka rere te manu:	Adorn the bird with feathers so that it may soar.
Makariri:	To be in a state of coldness.
Mana:	Prestige and spiritual power.
Mauri:	vital essences/the essential quality and vitality of a being or entity.
Ngā ākonga:	Students.
Ngā Atua:	Gods.
Ngā kōrero tuku iho:	The words that were remembered and handed down by voice over generations
Ngā tukanga me ngā haerenga:	Processes and journeys.
Ngākau:	Heart
Onioni:	Clay
Papatūānuku:	The Earth Mother.
Puhi:	To adorn with feathers.
Pūrākau:	Stories, histories, world view, and methodology
Ranginui:	The Sky Father.
Tapu:	Scared or precious, prohibited.
Taonga Puoro:	Māori musical instruments.
Te Ao Māori:	“The Māori World”
Te Ao Mārama:	“The World of Life and Light,” Earth, physical world.
Te Arawa:	Tribe in the Bay of Plenty, canoe which brought the ancestors of the Arawa and Ngāti Tūwharetoa tribes to Aotearoa (personal noun), people descended from the crew of this

Te Kore:	canoe from Hawaiki who form a group of tribes in the Rotorua-Maketū area (personal name).
Te Pō:	“The Nothing,” a state of nothingness,
Te Whaiao:	“The Endless Night,” night time.
Tī Rākau:	“The World of Light,” daylight.
Tikanga:	Stick games.
	Protocols, habit, lore, reason, purpose, meaning, method.
Wairua:	Spirit or soul.
Waka Hourua:	Double-hulled canoe,
Waka taua:	War canoe.
Wānanga:	To meet and discuss (verb). Tribal knowledge, wise person or conference.
Whai:	String games.
Whakamana:	Power and empowerment
Whakapapa:	To lie flat, place in layers, recite in proper order (verb). Genealogy, lineage, descent (noun).
Whakarewarewa:	Geothermal location on the outskirts of Rotorua.
Whakataukī:	Māori proverbs
Whānau:	Family or extended family.
Whanaungatanga:	Relationship, kinship or sense of family connection
Whare:	House or dwelling
Whenua:	Land, nation, ground, territory, placenta and afterbirth.

Game Design Terminology:

Gameplay:	Formalized, focused interaction that occurs when players rules of a game in order to play it.
Grey Box (Level):	A level that focuses on mechanics and interaction with the virtual environment rather than aesthetics, using placeholder boxes in place of the visuals.
Head-Mounted Display (HMD):	A head-mounted display is a display device, worn on the head or as part of a helmet, that has a small display optic in front of one or each eye.
Immersion:	Absorbing involvement, and is the act of immersing, or state of being immersed (in something).
Iterative Design Process (IDP):	is a system of receiving, evaluating, refinement (of an initial idea).
Level Design:	The process of constructing the experience that the game offers directly to the player, using the components provided by the

	game designer.
Liminal Space:	Transitory periods, happening all throughout the phases of life.
Low Poly:	A polygon mesh in 3D computer graphics that has a relatively small number of polygons.
Ludic Activity:	Non-game behaviours in which participants are “playing” such as two tussling animals.
Motion Controllers:	Controllers that allow players to interact with the system through body movements.
Photorealism:	The rendering of images in an extremely realistic way.
Play:	The act of experiencing a game (noun), or any activity that goes beyond the requirements of the moment (verb).
Player Experience:	The feel of a game and its user interface (UI).
Playtesting:	Is the testing of gameplay.
Polish:	Any artificial enhancements without changing the underlying simulation.
Prototyping:	Creation of ideas and form of initial visualization.
Real-time:	The actual time during which a process or event occurs.
Real-Time Control:	An almost instantaneous process of information and action between participants.
Sensorium:	The faculties of an organism’s perception, a ‘seat of sensation’ where it experiences and interprets the environments within which it lives.
Unreal Engine (UE):	Game making engine developed by Epic Games.
User Interface:	The point of human-computer interaction and communication in a device.
Virtual Reality (VR):	A tool to experience a space that are immersive 360-degree simulations of the real or alternate worlds using a head-mounted display (HMD).
Virtual Reality Sickness (VR Sickness):	similar to Motion Sickness but can emerge from virtual lag (delay between action and reaction) and latency (time taken for data moving between its source and destination).
Wayfinding:	Is how people find their way around an environment.

Appendices

[Appendix 1](#)

See next page for Ethics.

Auckland University of Technology Ethics Committee (AUTEK)

Auckland University of Technology
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T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

12 May 2022

Nova Paul
Faculty of Design and Creative Technologies

Dear Nova

Ethics Application: **22/93 Moving Through Strangeness: Using Virtual Reality as an Interactive Immersive Environment to Inhabit Pūrākau from te ao Māori.**

We advise you that the Auckland University of Technology Ethics Committee (AUTEK) has **approved** your ethics application at its meeting of 2 May 2022.

This approval is for three years, expiring 2 May 2025.

Non-Standard Conditions of Approval

1. Please ensure that the data and Consent Form are stored for a minimum of 6 years. The committee did note that the interview might be considered taonga for whanau and may require indefinite storage in a place nominated by the whanau.

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be submitted to or reviewed by AUTEK before commencing your study.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the [Auckland University of Technology Code of Conduct for Research](#) and as approved by AUTEK in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEK prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEK Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEK Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTEK grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTEK Secretariat
Auckland University of Technology Ethics Committee

Cc: pmf4762@autuni.ac.nz; Gregory Bennett