Tikanga in technology

Prepared for University of Waikato

Final Report

Prepared by

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Contents

Introduction 2
Thought space wānanga Māori for Māori partners 2
Ātea and Abundant Intelligences 2
Ātea Core 4
Ātea Telepresence and Interactive Experience 5
Ātea Tikanga 7
EWIP – digital repositories 8
EWIP – Virtual wānanga 8
Abundant intelligences: Placing AI within Indigenous knowledge frameworks 10
Abundant intelligences: AGM – Hosting 12
MBIE catalyst 13
Whānau identification of mātauranga and tikanga Māori through the engagement and interaction with emerging technologies that are generated by AI 14
Outputs for 2024 15

Thought space wānanga

Introduction

Over the period of this project, we have engaged with a broad range of Māori and Indigenous groups and communities and led a number of wānanga, kōrero, discussions, and focus groups reflecting on the impacts of AI. The wānanga space has enabled us to explore Māori and Indigenous concepts of addressing tikanga, develop protocols, contemplate risk, harm, and to carefully consider what success and value looks like in this dynamic space. In particular, our team (Professor Hēmi Whaanga; Dr Petera Hudson; and Tiriana Anderson) have focused working on tikanga and protocols for designing AI-centric repositories using new technologies in workstream RA1.3. Indigenous AI of Tikanga and Technology research project.

We investigated through wānanga, rangahau and kaupapa Māori methods the various avenues that whānau, hapū and iwi (as data owners), should/ could instil cultural and ethical principles that recognise their mātauranga, aspirations and goals when securing and storing a range of data sets (e.g. audio, text, image, taonga tuku iho, kōrero tuku iho etc.) in those repositories. From here we developed various technological tools and prototyped AI modelling techniques to some of those data sets to produce results that enabled us to reiterate on the insights gained from the various wānanga. These conversations, wānanga, outputs and findings are outlined in this report for TinT.

Thought space wānanga Māori for Māori partners

In RA1.3. Indigenous AI, we have focused on testing current AI modelling mechanisms on Māori data sets to determine levels of precision, processing timeliness and usable outcomes. In the language use-case and the framing for protocol and tikanga, we draw from the numerous collaborations, wānanga and rangahau we have conducted over the duration of the TinT project.

Much of the discussion presented here is part of two broader research projects and a PhD thesis called 'Whānau identification of mātauranga and tikanga Māori through the engagement and interaction with emerging technologies that are generated by AI' conducted by Petera Hudson at Massey University that was funded as part of the TinT project.

The first project Ātea, covers the work completed as part of a Science for Technological Innovation spearhead project that was funded as part of the NSCs (2020-2024); the second refers to the Abundant Intelligences research programme, a 26 million-dollar New Frontiers of Research Fund Transformation Canadian-funded and a 3 million-dollar Social Sciences and Humanities Research Council Partnership Grant Canadian-funded project, that were awarded in 2024. The insights, discussion and outputs presented here are drawn on many of the results, wānanga and hui that were undertaken as part of these research projects.

Ātea and Abundant Intelligences

The vision of the Ātea project was to create a virtual, digital space where Māori knowledge can be created, articulated, interpreted, interrogated and built. This spearhead aimed to support Māori, iwi and communities to connect their increasingly globally tribal members to their Mātauranga-ā-iwi, reo, tikanga, histories and knowledge. The benefits in using next generation of digital models, such as, for example the speech to text, handwriting to text and the text to speech developments, authentic cultural experiences in AI, VR & AR, mixed realities proposed, and its significance to cultural, economic, and international collaborative benefits for our communities worldwide were explored as part of the wider revitalisation and regeneration agenda.

With had a team of more than 30 team members (including early career Māori post-docs, programmers, RAs, PhD students,

Māori Masters and Honours students, and interns), with diverse ethnic backgrounds and cultural expertise. We instilled VM and kaupapa Māori principles into our interactions, practices and workstreams including tika (incorporating tikanga Māori into researcher behaviour), pono (being authentic and sincere), and manaaki tangata (ensuring cultural safety of researchers, rūnanga, iwi, community, tauira and participants). Our approach focused on scoping, relationship building, access, authentication, security and producing assets and tools for adding value and impact on how we engage with Māori content and communities. These interactions were supplemented with ongoing wānanga and focus group hui to interrogate and internalise the impact of these technologies on tikanga and mātauranga and how we responded as a project team to these developing changes.

The overall goal of Ātea was to conduct impactful and meaningful research with experts in artificial intelligence (AI), virtual and augmented realities (VR & AR), mixed realities, machine learning (ML), leading Māori academics engaged in Indigenous data sovereignty and digital repositories, Māori industry partners, tohunga, iwi, rangatahi and collaborators. Its overall aims were:

> (i) to support Māori, iwi and communities to connect their increasingly globally connected tribal members to their Mātauranga-ā-iwi, reo, tikanga, histories and knowledge; and
> (ii) to deliver to Māori communities a technology based solution that provides them with the means with which to fulfil their own cultural, educational, economic and environmental purposes.

In exploring these goals and aims the Ātea research team explored a number of questions including:

- How does tikanga and mātauranga /taonga tuku iho have relevance when designing and deploying VR & XR experiences?
- How can tikanga be applied in ways that ensure physical, mental and cultural safety with VR & XR experiences?
- Is time, space and place different for Indigenous peoples in a VR & XR experience? What are Indigenous realities in a VR & XR experience?

During this project we worked closely with a vast array of collaborators, tohunga, advisors, researchers, institutes, and communities to realise these aims. Our tohunga and key advisors brought together some of leading thought leaders on tikanga and technology including:

- Tā Pou Temara,
- Professor Rangi Mātāmua,
- Te Kanapu Anasta,
- Che Wilson,
- Paulette Tamati-Elliffe,
- Mataia Keepa and
- Kristin Ross

Our research team spanned three computer science departments (University of Waikato, University of Otago and the HITLab at the University of Canterbury), international collaborators like Professor J. Stephen Downie at the Hathi Trust, and a team of experts on VR, AR, XR, 3D User Interaction in immersive VR, Visualisations, Digital repositories, User interfaces, Voxels, 3D storytelling, NLP, te reo Māori, mātauranga Māori and digital technologies. The team included:

- Professor Holger Regenbrecht (University of Otago – Virtual, Augmented and XR Reality),
- Professor Rob Lindeman (University of Canterbury, HITlab - VR and 3D User Interaction in immersive VR; multisensory displays),
- Professor David Bainbridge (University of Waikato – Digital libraries),
- Associate Professor Te Taka Keegan (University of Waikato - te reo Māori and User interfaces),
- Associate Professor Steven Mills (University of Otago - computer vision, reconstruction of 3D scenes from multiple views),
- Associate Professor Heide Lukosch (University of Canterbury - virtual and augmented reality in relationship with game elements have the true

power to extend the boundaries of the physical world),
- Dr Kris Tong (PhD student – University of Canterbury – 3D storytelling),
- Dr Noel Park (PhD student – University of Otago – Voxels and presence),
- Dr Stuart Duncan (Otago – University of Voxels, programmer),
- Laurie Lloyd-Jones (Masters student – University of Otago – Voxles, virtual pōhiri),
- Rosa Lutz (Masters student – University of Otago – storytelling, Voxels and VR),
- Kerian Varaine (University of Otago – Voxels and VR, programmer),
- Associate Professor Claudia Ott (University of Otago - education and learning analytics in Ar and VR),
- Dr Rory (University of Canterbury Post doc – VR, AR),
- the late Dr Paora Mato (University of Waikato Post doc – User interfaces, Māori and technology),
- Senior Lecturer Hōri Manuirirangi (Waikato/ Massey – te reo Māori),
- Robyn Kamira (Paua Interface Ltd - Māori ICT sector),
- Antony Royal (Te Tupu Ltd – Māori ICT sector),
- Te Hiku Media (Peter-Lucas Jones (media and NLPs), Keoni Mahelona (media and NLPs),
- Finn Innes (University of Waikato Intern),
- Tiriana Anderson (Maniapoto – tikanga, technology and te reo Māori),
- the late Bubba Thomson (Te Rau Aroha Marae),
- Dean Whaanga (Te Rau Aroha Marae),
- Corey Bragg (Te Rau Aroha Marae), and
- Nadia Jones (Project Manager).

Over the course of this project, we worked with a number of rūanga, marae and communities including:
- Te Reo Irirangi o Te Hiku,
- Te Rūnanga o Awarua,
- Te Rau Aroha Marae,
- Ngāti Maniapoto,
- Rauawaawa Kaumatua Charitable Trust,
- Okapu Marae Trust,
- Waipapa Marae Trust,
- Te Ahoroa Marae Trust,
- Ngā Marae Tōpū and
- Te Whakakitenga o Waikato.

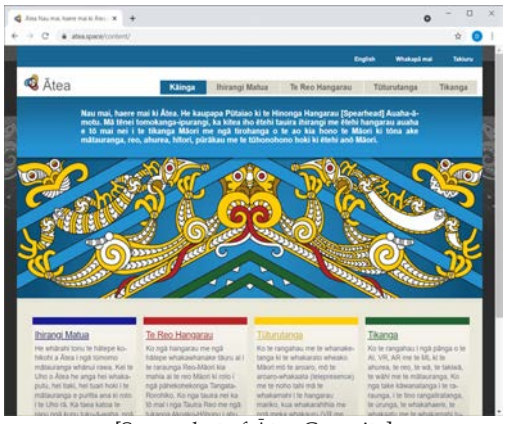
Four integrated work packages formed the Ātea project:
(i) Ātea Core,
(ii) Reo Māori NLP and AI,
(iii) Telepresence and Interactive Experience and
(iv) Tikanga.

Ātea Core

In the Ātea Core (led by Professor David Bainbridge and Associate Professor Te Taka Keegan) we researched and development the integration of the Greenstone digital library software architecture with Cloud platform APIs. Given that our open-source digital library architecture already has an established record as a versatile design, the work in Ātea helped propel this further, particularly in the area of at-ingest time of content. We added a hierarchical-based user authentication scheme and access rights model that can be mapped to iwi/hapū/whānau which can support multiple membership where needed—something that goes beyond what is provided in western-centric content management systems. We also developed the concept of the Data Capsule platform developed by the HathiTrust Research Center (Illinois and Indiana Universities) originally devised as a solution to address the problem of non-consumptive for text, and how this system can be applied to multimedia forms enhanced through GPU processing.

In the Reo Māori NLP and AI we developed a set of tools and gained some key insights into te reo Māori NLP. First, it is increasingly possible to obtain high quality reo Māori corpora that can be used for Reo Māori NLP. We built software tools that can refine and store Māori medium knowledge from datasets of video, of sound recordings and written texts providing the datasets are in a digital format.

Consequently, there is a growing awareness amongst iwi to regenerate their knowledge into a digital format so that it can be made available to assist in building NLP tools particular to their iwi (see for example the work of Te Hiku media). We can now demonstrate how te reo Māori voice to text systems are becoming so accurate that it is now the most economical method to digitise spoken text. In addition, te reo Māori text to voice systems are becoming so lifelike that they are starting to be used to assist with pronunciation.



[Screenshot of Ātea Core site]

Ātea Telepresence and Interactive Experience

In the Telepresence and Interactive Experience (led by Professors Holger Regenbrecht and Rob Lindeman) we created work streams established on a true partnership model amongst all collaborators and stakeholders. The relational model which mentored and integrated our computer science collaborators into our communities formed the core of this approach. The approach to establishing trust relationships between scientists and technologists with communities has been reported on in Tong's and Park' PhD theses, multiple conferences and articles.[1] One of the critical factors that arose from these interactions was the trust-model that was developed between community and technologists. The building of trust allowed for the various technological and tikanga avenues that the whānau, hapū, marae, rūnanga and iwi (as data owners) wanted to wānanga, explore and co-develop, to grow over time. The trust-model enabled the team of students and senior technologists to work closely with the community leaders to build and reiterate on their Telepresence and Interactive Experiences in addition to building their awareness of the range of issues around Indigenous and localised data sovereignty and their own cultural competencies in te reo Māori, Murihiku history and Te Ao Māori.

One of the critical factors was allowing the time to familiarise the team with community and the community with the team.

The team was invited to Te Rau Aroha marae in the first few months of the project and formally welcomed on by the leadership of both marae committee and the rūnanga (both chairs of the committees at that time were crucial informants, knowledge holders and named investigators in the project). The chairs had previously visited the computer lab facilities at the University of Otago where they met with the research team from Waikato, Canterbury and Otago.

The chair of the marae (Bubba Thompson) invited the team and their whānau to Te Rau Aroha to formally start the project. Bubba mentioned at that time that the rationale for inviting both the researchers and their respective whānau was to get to know who the researchers were and their whānau as well noting that creating relationships was about getting to know each other's whakapapa, history and the contexts in which they operated. Not only were they going to meet members of the broader marae

[1] Tong, K. (2022). Exploring effective storytelling guidelines for cinematic virtual reality (PhD - University of Canterbury); Park, N. (2024). Supporting Māori practices using a virtual tele-co- presence application (PhD – University of Otago); N. Park et al., "Mixed Reality Co-Design for Indigenous Culture Preservation & Continuation," 2022 IEEE Conference on Virtual Reality and 3D User Interfaces (VR), Christchurch, New Zealand, 2022, pp. 149-157, doi: 10.1109/VR51125.2022.00033.; https://ir.canterbury.ac.nz/items/21aad7ff-ab1a-49fc-b457-203863502f4e; Regenbrecht, H., Park, N., Duncan. S., Mills, S., Lutz, R., Lloyd-Jones, L., Ott, C., Thompson, B., Whaanga, D., Lindeman, RW., Tong, K., Clifford, R., Jones, N., Mato, P., Keegan, TT, and Whaanga, H. (2022). Ātea Presence—Enabling Virtual Storytelling, Presence, and Tele-Co-Presence in an Indigenous Setting. Submitted to IEEE Technology & Society. IEEE Technology and Society Magazine, 41(1), 32-42.

community (our uncles, aunties, cousins, siblings, children and mokopuna), the kaimahi from the marae and rūnanga, they were going to be introduced to our history, tīpuna, whakapapa, whakairo, tukutuku and kōrero tuku iho. He wanted to instil in the team a sense of responsibility and care for the taonga and kōrero that they were going to interact with. Many of the team had never visited or stayed on a marae before (even though some of them had lived in Aotearoa for a number of years). As a team we utilised this time together to share kōrero, experiences and learn from each other (e.g., the technical team stepped the team through AR, VR, XR, Ai and digital repositories and cultural experts explained the intricacies of tikanga, taonga and kōrero tuku iho).

[The research whānau in front of Tahu Pōtiki – photograph by Maija Stephens]

At the beginning of the project the technologists were very keen to digitally capture the wharerau (Tahu Pōtiki). The marae leadership decided that it would be safer and wiser to begin with a local kōrero to assess the potential of the relationship (one that Bubba Thompson had put into book form – the story of the navigator Tama Rereti). The reasoning for this was simple – it was a test. If the research team could produce something to the required standard of the marae leadership in terms of understanding, respecting, comprehending, and caring for this kōrero, then getting access to the kōrero about stories on our whakapapa and whare rau could then commence.

The team dynamic and collegiality developed quickly over this period. Trust within the team began to grow. It became obvious that this was going to a steep learning curve for everyone involved, both from a technical standpoint and as a cultural/ historical journey. One of the major learnings from these interactions was the significant shift in thinking around what constitutes data, Māori data and data sovereignty. Over the course of the project, we developed processes around data sharing, access, and control. These processes have since become 'common practice' for our technologists. For example, the conversations have shifted from one of the Māori members drawing attention to sharing, access, and control protocols, to all members of the team instigating these principles in their work. The technologists are now very aware of what constitutes data, Māori data and data sovereignty in their everyday work.

As a direct result of the work on building relationships and trust we produced outcomes in three main areas: 3D reconstruction, storytelling, and co-presence. The team reconstructed in high quality detail the wharerau of Te Rau Aroha marae, the marae ātea and the main pathway from the waharoa, the Mere Pi Ackers Cottage in Rakuira, several 3D taonga and 360 video experiences as parts of the marae and places in Rakiura. In addition, we have captured and reproduced mono, 2D, and 3D sound to recreate the mauri of Te Rau Aroha. We have recorded and integrated numerous stories and story segments as 3D voxelvideos and/or as 360 videos on Tama Rereti, the pakitara of the wharerau, the night sky and other features that were deemed important by the marae. We also developed a framework for effective storytelling and mechanisms for recording and playback. Finally, we have developed an integrated tele-co-presence system which allows two remote parties to meet in the virtually reconstructed wharenui, incl. storytelling experiences. We have demonstrated such an experience in evaluations between Ōtepoti, Ōtautahi and Motupōhue respectively.

[Dean Whaanga being recorded in 360 Video explaining the Te Whānau wall in Tahu Pōtiki – photograph by Kris Tong]

Ātea Tikanga

In the tikanga work package (led by Professor Hēmi Whaanga) it became obvious that the impact of Covid and the physical distance and restrictions this created, highlighted the urgency needed to provide guidance and clarity on the ways in which our tikanga is applied and interpreted in the technoscience space. The myriad of discussions and wānanga with researchers, tohunga, technologists, iwi, whānau and hapū illustrated the gap and need to provide well informed pathways to develop technical responses to this issue. Over the course of this project we met with tohunga, such as Tā Pou Temara and other cultural experts, to articulate a pathway to engage the virtual and digital world. Working with Tā Pou Temara and these cultural experts provided us with insights into how their thinking and processes differed significantly from those of us who have not received the level of training that tohunga undertake and the wealth of mātauranga they retain and use in their everyday lives. We also had the privilege to have more than 10 one-on-one wānanga with Tā Pou on constructing a framework/guideline in which our future generations can safely interact in these developing technologies.

He created three karakia based on the discussions and questions we posed to him. One karakia was to be used for preparing and clearing the digital pathway, another for building and constructing the technology itself, and another for interacting with the mātauranga once it has been built and made available. Each of these karakia were framed in a concept he described as 'Haere pai atu hoki pai mai', a simple phrase that reminded us to go safely and return safely from the virtual/ digital realms and knowledge that you are interacting with. We are currently putting together and finalising this framework with him to make available to others exploring this space.

During these discussions with Pou we discussed AI and digital avatar. These discussions were profound and inspiring. Listening to Pou speak to the potential of his mokopuna speaking with an avatar shifted our thinking about the negative aspects of creating a digital twin of him into one which we could explore the potential of this space to make it a possibility. He describes it fully in an axiom he created for Te Kotahi Research Institute 'Koi te mata punenga, maiangi te mata pūihoiho' ('Imagine the invisible, explore the potential, defy the impossible'). In the final years of the NSC our team put together two EWIPs (ending with impact) proposals. Our discussions with the communities identified two areas for further exploration (e.g., wānanga and digital repositories).

[The late Bubba Thompson being recorded in Voxel Video explaining the Te Ahi Kā wall in Tahu Pōtiki – photograph by Holger Regenbrecht]

[A Voxel Video recording of Bubba Thompson inside Tahu Pōtiki with Noel Park and Stuart Duncan listening to his kōrero inside the VR experience – image from Holger Regenbrecht]

[Kimiora Whaanga at the HITLab in Canterbury listening to a recording of Bubba Thompson narrating Tama Rereti – image by Maija Stephens]

EWIP – digital repositories

For the digital repositories EWIP we continued to build the work we completed as part of the Ātea Core. In EWIP we developed a technology focus that is an amalgam of Cloud-Based Infrastructure, Deep Learning, and Digital Content Management to develop a platform that is grounded in te ao Māori, designed to propel iwi, hapū and whānau. We leverage the groundwork undertaken in the current Ātea project that has formulated and built trust relationships with our researchers, partnering Māori communities, iwi, technology and mātauranga experts. In addition, we built on the expertise we have developed in low-resourced language NLP Tools and Indigenous access rights management. We have developed a prototype Maniapoto repository and repatriated over 1000 audio files to Maniapoto. These are stored securely on a Network Attached Server and are currently being used as part of their prototype repository. We have created a Maniapoto Metadata App. This App was developed to reduce and streamline metadata collation and management. It also can be used to digitize documents and images.

EWIP – Virtual wānanga

For the wānanga EWIP we coordinated wānanga around the topic of technologies to support virtual/immersive wānanga. We undertook a technologically driven wānanga based learning and development process, grounded in te ao Māori. One that was forward thinking and de-colonising. We worked towards establishing autonomous infrastructures, and ways of doing our own processes for ourselves, rather than waiting for the new Silicon Valley "wave of goodness." Technology, protocols and tikanga were developed side-by-side — in a user-centred and goal-directed design, development, and evaluation methodology, which inherently requires close end-user involvement. We once again collaborated with Te Rau Aroha marae and Te Rūnanga o Awarua and the local community as our direct end users, continuing and building on our existing networks within Ngāi Tahu, and a set of tikanga experts as informing users and stakeholders.

It is widely known that wānanga are used for many purposes, from high-level discussions and learning by experts, through strategic topics, to more applied topics. They vary in duration, with some lasting only a couple of hours or for an entire weekend, while others might meet regularly over several weeks, months or even years. Face-to-face is normally the default mode and the most common method of gathering participants together. However, the logistics around physically coming together to carry out critical wānanga are becoming ever-more complex, as are the negative impacts of travel on the environment, disruptions to whānau and iwi, pandemics and conflicts and general wellbeing of the participants.

We held a multi-session wānanga approach on the topic of immersive wānanga, using a different set of technologies for each session. We explored a distinct set of technologies (five in all) for each session:

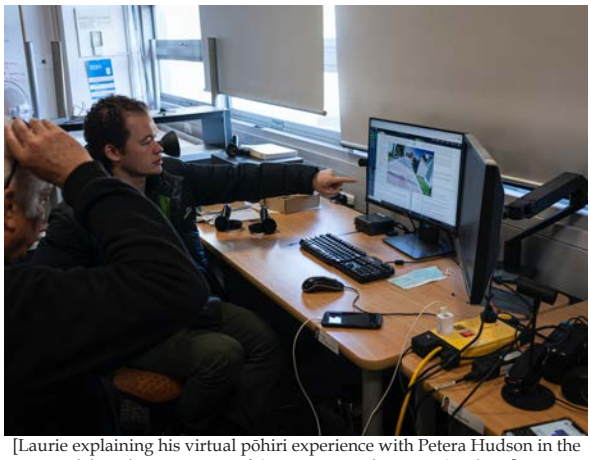
1. Face-to-face (current default),
2. Desktop Video (OhJay),
3. Computer-generated VR
4. 360-degree Video, and
5. Voxelvideo (with headsets).

This 'bottom up' approach resulted in fit-for-purpose systems and the procedures informed by end-users who are community, iwi, reo, tikanga and technology experts. We leveraged the groundwork undertaken in Ātea that formulated and built trust relationships with our researchers, partnering Māori communities, iwi, and mātauranga experts. This EWIP differed significantly from the work we undertook as part of the Ātea spearhead project as in it explored

various technologies as Ātea focused on the (significant) effort of setting up and modifying the Voxelvideo system to support improved tele-co-presence which allows for volumetric 3D storytelling in a mixed reality environment (virtual marae, reconstructed artefacts, 3D-recorded storytellers played back as Voxelvideos) by people who are geographically separated.

Through our interactions and research with the Voxelvideo system we witnessed many unexpected things from observing users working with the system. We observed behaviours and reactions of people visiting the virtual wharerau that strongly indicated they felt like they were actually visiting the whare. For example, when they saw that their digitised avatars were wearing shoes in the virtual wharenui, they reported feeling uncomfortable.

Others wondered whether they should have had to take part in a pōwhiri/ whakatau/ karakia prior to their first visit. This part of creating a virtual pōhiri was completed by one of master's students in 2024 (Laurie Lloyd-Jones)[2] who has since enrolled in a PhD at Massey investigating virtual transitions from real, augmented to full virtual environments incorporating an AI element to build the background elements of the experience.



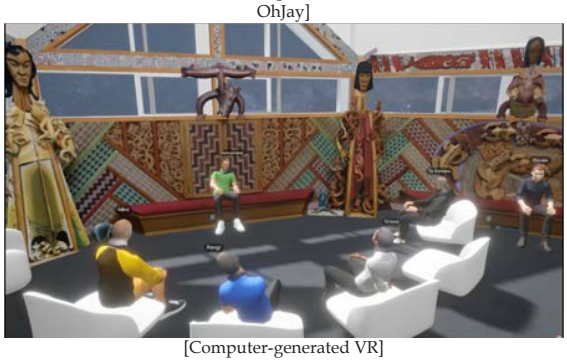
[Laurie explaining his virtual pōhiri experience with Petera Hudson in the lab at the University of Otago – image by Maija Stephens]

The work we completed as part of the EWIP allowed us to extend on our thinking around the proper protocols for virtual interactions.

A tikanga framework was developed for this form of wānanga alongside each iteration of development and user evaluation by end users, community, tohunga, tikanga, technology and mātauranga experts. The final framework is currently being completed with Tā Pou Temara.

[Face-to-face]

[Desktop Video – OhJay]



[Computer-generated VR]

[360-degree Video]

[2] Lloyd-Jones, L. (2024). *Investigating the increase in pōwhiri understanding and confidence using Virtual Reality* (Masters thesis). University of Otago.

[Voxelvideo]

Abundant intelligences: Placing AI within Indigenous knowledge frameworks

Abundant Intelligences is an Indigenous-led, Indigenous-majority international, interdisciplinary research program that imagines anew how to conceptualise and design AI based on Indigenous knowledge systems. Our approach is grounded in the Indigenous epistemologies containing robust conceptual frameworks for understanding how technology can be developed in ways that integrate it into existing lifeways, support the flourishing of future generations. Our goal is to advance methods for improving AI to better serve everybody through exploring and developing culturally grounded AI systems that support Indigenous ways of knowing. Organised in locally-rooted 'Pods', the Abundant Intelligences research programme is an international alliance currently consisting of 48 co-investigators and collaborators at 13 universities/research institutes and (to date) 8 community-based organisations in Canada, the United States, Hawai'i, and Aotearoa New Zealand.[3]

This 6-year programme is co-directed by Professor Jason Lewis at the Indigenous Futures Research Centre at Concordia University, Montreal, and Professor Hēmi Whaanga at Massey University. The questions posed in 'Abundant Intelligences (AbInt)' are:

- How can we integrate and adapt existing advanced computational methods into Indigenous Knowledge systems?
- How can we develop new computational practices within Indigenous contexts to support the flourishing of Indigenous communities?
- How can we use the knowledge we generate to help guide the development of AI generally towards a more humane future?

The 'Abundant Intelligences (AbInt)' team includes Indigenous community members from Aotearoa New Zealand, Australia, North America, the Pacific, and Africa based at digital media labs, most of which are Indigenous-led with Indigenous community-engaged research agendas. It includes participants from Anishinaabe, Barada, Cree, Crow, Cheyenne, Coquille, Euskaldunak, Gabalbara, Gadigal, Inuit, Kanaka Maoli, Kapalbara, Lakota, Māori, Métis, Mohawk, Palawa, Rwandan, and Samoan communities. The 48 co-investigators and collaborators at 13 universities/research institutes include:

- Aaron Courville -Mila Quebec AI Institute, Université de Montréal;
- Amethyst First Rider - Iinii Initiative
- Archer Pechawis -York University
- Ashley Cordes - University of Oregon
- Blake Richards - McGill University, Mila Quebec AI Institute
- Bryan Kamaoli Kuwada - University of Hawai'i Manoa
- Caroline Running Wolf - Buffalo Tongue Inc.
- Ceyda Yolgörmez - Concordia University
- D. Fox Harrell - Massachusets Institute of Technology (MIT)
- Donavan Kealoha - Purple Mai'a, Startup Capital Ventures
- Eilif Muller - Institut de Valorisation des Données (IVADO), Mila Quebec AI Institute, Université de Montréal
- Eliane Ubalijoro - Concordia University
- Fenwick McKelvey - Concordia University, Institut de Valorisation des Données (IVADO)
- Graham Hingangaroa Smith - Massey University

[3] https://abundant-intelligences.net/

- Guillaume Dumas - Institut de Valorisation des Données (IVADO), Université de Montréal
- Heather Igliorte - University of Victoria
- Holly Grimm - Sustia LLC
- Jackie Cheung - McGill University, Mila Quebec AI Institute
- Jackson Leween TwoBears - Western University
- Jacqueline Rice - University of Lethbridge
- Jason Edward Lewis - Concordia University
- Jason Leigh - University of Hawai'i Manoa
- Johnson Witehira – Massey University
- Jonathan Deenik - University of Hawai'i Manoa
- Kamuela Enos - University of Hawai'i
- Kelsey Amos - Purple Mai'a
- Keolu Fox - University of California San Diego (UCSD)
- Keoni Mahelona - Te Hiku Media
- Kiera Ladner - University of Manitoba
- Krystal Tsosie - Native BioData Consortium
- Leroy Little Bear - University of Lethbridge
- Linda Tuhiwai Smith - Te Whare Wānanga o Awanuiārangi
- Manulani Meyer - University of Hawai'i West Oahu
- Maroussia Levesque - Harvard University
- Melanie Cheung
- Michael Runningwolf - McGill University, Mila Quebec AI Institute
- Michelle Lee Brown
- Oiwi Parker Jones - Oxford University
- Peter-Lucas Jones - Te Hiku Media
- Pou Temara - Te Whare Wānanga o Awanuiārangi
- Rangi Matamua - Massey University
- Sara Diamond - OCAD University
- Scott Benesiinaabandan - University of Winnipeg
- Susan E. Crow - University of Hawai'i Manoa
- Suzanne Kite - Bard College
- Yoshua Bengio - Université de Montréal

Our 8 community-based organizations in Canada, the United States, Hawaii, and Aotearoa New Zealand include:

- Te Hiku Media;
- Thru the Red Door;
- Indigenous in AI;
- Native BioData;
- Purple Mai'a;
- Indigenous Design and Innovation Aotearoa;
- SZKaiao Creative Studio;
- Te Whare Wānanga O Awanuiārangi.

Specific academic disciplines covered by this diverse team include computer science (Cheung, Davison, Grimm, Harrell, Leigh, Shedlock, M Running Wolf), neuroscience (Cheung, Jerbi, Parker Jones), soil sciences (Crow), genetics (Fox, Tsosie, Ubalijoro), linguistics (Whaanga), visual and performing arts (Benesiinaabandan, Grimm, Kite, Lewis, Pechawis), Indigenous methodologies and practice (Brown, Mātāmua, L T Smith, G H Smith, Temara), philosophy (Meyers, Leween, Lewis), communication and media studies (Brown, Cordes), art history (Igloliorte, Nagam), literature (Kuwada), political science (Kiera Ladner), policy (Enos, Lévesque, Ubalijoro), design (Witehira), and anthropology (C Running Wolf).

This diversity allows us to think about AI from across disciplinary and cultural boundaries and thus to expand the operational definition(s) of intelligence to include a wider spectrum of behaviours that humans and non-humans use to make sense of the world. Exploring epistemologies and methods beyond the Western approaches favoured by current AI research, we will draw upon Indigenous epistemologies to develop imaginations, frameworks, and languages to enrich our understanding of what it means to be intelligent.

The 'Abundant Intelligences (AbInt)' program is composed of three main axes:

- The Integration Axis explores how Indigenous Knowledge practices and frameworks can be synthesized with

the mainstream knowledge frameworks used by AI researchers.
- The Imaginaries Axis develops future imaginaries and speculative designs of Indigenous AI to guide the design of novel AI systems better suited to Indigenous flourishing.
- The Intelligence Axis brings Indigenous perspectives to bear on technical challenges currently facing mainstream AI research. It also attempts to better understand ways of translating the full range of human intelligence into machine intelligence.

The three Axes underlie the work plan. All Axes will be active throughout the grant but will have different emphases over time as the research program matures. The 'Abundant Intelligences (AbInt)' program is in its second year. The team have spent the first year establishing the management and administration team, formalizing agreements, and partnership relationships, working on policies and procedures and finalising governance, funding, and management processes.

Three Pods have been developed over the past two years of discussions, and an additional Pod will be added per year until we reach a maximum of six. The current Pods are:

- Niitsitapi / Kanien'kehá:ka Pod, based in the Onkwehonwe Research Environment at Lethbridge University, Canada;
- Ka Hawai'i Pae Aina Pod, based in the Create(x) Immersive Media and Data Visualization Lab at the University of Hawai'i, USA;
- and the Aotearoa Pod Hiringa Te Mahara.

An Epistemological Foundations, Methodological Mixer, and Future Imaginary (FI) series will be conducted throughout the length of the programme. This series will be locally-grounded through the Pods where leading experts in AI, Indigenous methodologies and creative practice will share knowledge and expertise with co-investigators and collaborators, students, interns, academics, community members, to train future generations of Indigenous researchers and increase the capacity of Indigenous community members to engage with AI.

A Summer Institutes for Indigenous AI (SIIAI) will be established and start in Year 3 and be held annually through the remainder of the program. The intent is to build capacity with Indigenous undergraduate, graduate students, and faculty for engaging with cutting-edge AI research. Mila (Mila – Quebec Artificial Intelligence Institute, is recognized worldwide for its major contributions to AI) will provide the Institute's physical location and resources as well as Mila members who will help co-design with the AbInt team the curriculum, provide instruction, and mentor participants. SIIAI will also develop a track for community members interested in AI to obtain familiarity with the technologies and support in thinking through how such technologies might be beneficial to their communities, and the SIIAI activities will help support Pod-based community workshops on AI.

The AbInt-Aotearoa (Hiringa Te Mahara) will focus on articulating, shaping, and designing AI through a Māori lens. We aim to mobilize AI technology to explore the centrality of hapū and connection in creative, language, cultural, and wellbeing contexts. Projects hosted by the Pod will be grounded in kaupapa Māori methodologies and will use mixed methods with wānanga to shape how the underlying computational architectures might need to be reshaped to inform different kawa /tikanga, place, space, and design.

Abundant intelligences: AGM – Hosting

Hiringa Te Mahara hosted the AbInt AGM in Aotearoa at the end of last year. This was the 2nd AGM that has been held and the first face-to-face gathering. We had 60 attendees during the 10-day gathering. We utilised this opportunity to get to know and socialise with the broader AbInt research programme, share research interests, conduct a series of presentations and outreach with community, introduce the team and students to our

communities and build relationships. We travelled the length of the country from the Treaty Grounds at Waitangi where we held the AGM, to Waipapa marae in Kāwhia where we held kōrero, workshops and presentations with local hapu, iwi on AI, across to Te Whare Wānanga o Awanuiārangi where we had hui and panels presentations with students, staff, hapū and iwi, up to Wellington to run panels, conversations and future imaginaries with the research team and students on AI and protocols, and finally to Motupōhue/ Bluff to facilitate an HQ management teams building / planning hui for 3 days. During the two-week gathering we worked on research and impact strategies, planning for funding student research projects, research alliances, project networking and community outreach.

[AbtInt team – AGM Waitangi Treaty Grounds – photograph by Melanie Cheung]

[AbInt whakawhanaungatanga - Hihiaua Cultural Centre – photograph by Melanie Cheung]

[AbInt – Waipapa marae – photograph by Melanie Cheung]

[AbInt presentations - Awanuiārangi – photograph by Melanie Cheung]

[AbInt & Awanuiārangi – photograph by Melanie Cheung]
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MBIE catalyst

We have also secured an MBIE catalyst grant in 2024 ($1 million over three years) to connect our local team of experts with an international and interdisciplinary team of AI, Indigenous knowledge, and creative experts who form part of the 'Abundant Intelligences: Expanding Artificial Intelligence through Indigenous Knowledge Systems' Canadian-funded New Frontiers in Research programme.

Our communities have been adapting knowledge protocols and practice to new scientific and technological advances for millennia and developing and integrating new protocols for AI into our knowledge practices will be the latest example of this ongoing innovation.

The overall objective of the Catalyst will be to find a different way forward when working with AI for and with Māori and Indigenous communities, one that will help guide the development of AI locally and globally. This proposed 'Catalyst' connects our local team of experts in AI, Information Communication Technology (ICT), Virtual Reality (VR) and Augmented Reality (AR), Indigenous NLP (Natural Language Processing) and community-centred language revitalization, cultural IT artefacts, data repositories and data sovereignty, Indigenous and Māori epistemologies and methodologies, ontology, ceremony, practice and incantation, neuroscience, linguistics and ethics, with the 'Abundant Intelligences: Expanding Artificial Intelligence through Indigenous Knowledge Systems' (AbInt) Canadian-funded New Frontiers in Research programme.

AI has enormous potential to help us better understand, interact and make sense of our world. The critical challenge ahead for Indigenous and Māori peoples is to:

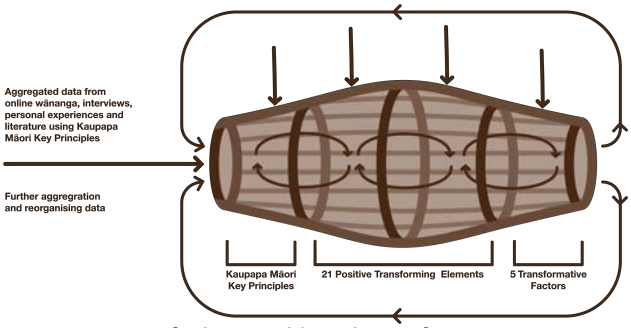
(i) consider how to effectively develop, integrate and advance computational advances like AI into our knowledge systems, and
(ii) consider how these developments can support and bolster flourishing Indigenous communities.

The Abundant Intelligences Aotearoa Pod (AbInt-Aotearoa) is co-hosted at Indigenous Design & Innovation Aotearoa (IDIA) (Wellington) and Te Pūtahi a Toi – School of Māori Knowledge at Massey University (Palmerston North) and supported by Te Hiku Media (Kaitaia). The Pod will focus on articulating, shaping, and designing AI through a Māori lens. Our work will be founded on Māori methodologies, epistemologies, ontologies, modes of engagement, practice, and language.

Whānau identification of mātauranga and tikanga Māori through the engagement and interaction with emerging technologies that are generated by AI

In his PhD thesis, Petera Hudson strategically positioned to demonstrate whānau connections to one another as an extended whānau, to our lands, to our socioeconomic situation, and to our emotional identity as Māori people raised in the Whakatōhea. The purpose of this research was to identify mātauranga Māori and tikanga Māori that have the potential to, when woven into algorithms, inform next-generation AI systems, that have the propensity to promote cultural well-being for our whānau and their futures. A critical review of selected literature was undertaken to understand the dialectic between te ao Māori and AI (see Chapter 2 in the thesis). The eclectic methodologies according to Kaupapa Māori theorising were outlined to aid in the identification of potential issues confronted when undertaking this research. These methodologies justify the selection of specific methods and their suitability for understanding Māori in AI-related development and their beliefs and practices (see Chapter 3). Following this, the findings are presented by addressing each question with supporting data. Subsequently, the aggregation of this data revealed critical elements and factors of transformation that would enable the promotion of cultural well-being for our whānau and their futures (see Chapter 4). Finally, this research supported the conclusion that Māori can develop transformative practices of change that has the potential to decolonise imperial-dominated AI systems. The research provided an opportunity for further exploration around developing knowledge-sharing interventions to help understand the prominence of the Western perspectives and to confront contemporary AI-related issues for our whānau (see Chapter 5).

Hudson produced the Nukutere Model as a means to extend transformative practices of change that has the potential to decolonise imperial-dominated AI systems. The model begins by extending Kaupapa Māori Key Principle insights and utilising research praxis through online wānanga, hui, interviews, observations and literature. These practical research-based activities generated twenty-one Mātauranga and Tikanga Māori Elements aggregated as the key 'success' elements, which the whānau themselves identified. These twenty-one Mātauranga and Tikanga Māori Elements have been subsequently reorganised into five Whakatōhea-a-Iwi Factors. The Whakatōhea-a-Iwi Factors inform a culturally sensitive algorithm to respond positively to Māori cultural well-being.



[Nukutere model – Hudson 2024]

Outputs for 2024

We have engaged in a range of talks, publications, hui, wānanga, presentations and knowledge exchanges on AI and technology in 2024. Many of these outputs were organised as part of our collaboration with Ātea and Abundant Intelligences.

Article

- Yolgormez, C., Lewis, J., & **Whaanga, H.** (2024). Abundant Intelligences: Placing AI Within Indigenous Knowledge Frameworks. *AI & SOCIETY: Journal of Knowledge, Culture and Communication.*

Conference Keynote

- Kummargii Yulendji Symposium 2024 - Keynote Future proofing our knowledge: Developing digital and virtual protocols - H.Whaanga
  7 September 2024 RMIT, Melbourne
- NZALT Confence 2024 – Keynote Tōitu te reo: Inamata, onamata, anamata - H.Whaanga
  7 July 2024 Auckland University, Auckland

Conference Presentations

- i. 29th International Symposium on Electronic Art (ISEA) Institutional Presentation - Abundant Intelligences: Indigenous Knowledges and AI - H.Whaanga
  25 June 2024 Brisbane, Australia
- 29th International Symposium on Electronic Art (ISEA) Indigenous Epistemologies - H.Whaanga, T.Anderson, J.Witehira (Panel discussion)
  26 June 2024 Brisbane, Australia
- S'TEN̓ISTOLW̓ Conference 2024 A Pedagogy for Re-Connecting Indigenous diaspora living away from their tribal/ cultural/ roots 20-23 August 2024 Victoria, BC, Canada P.Hudson

Symposium Presentation

- Te Wheke a Toi Doctoral Symposium Ōhu Kainga Waewae: The places my feet have taken me 11 July 2024 Palmerston North P.Hudson (40 pax)

Panels on AI

- *The challenges of addressing AI in an Indigenous institutional context* - Hēmi Whaanga, Jason Lewis, Vaughan Bidois and John Clayton 15 Nov 2024 Te Whare Wānanga o Awanuiārangi, Whakatāne (100pax)
- *The creative potential of AI for Indigenous institutions* - Scott Benesiinaabandan, Suzanne Kite, Michelle Lee Brown Mawera Karetai and Karaitiana Taiuru 15 Nov 2024 Te Whare Wānanga o Awanuiārangi, Whakatāne (100pax)
- *Panel Discussion - What is AI and should we use it?* Suzanne Kite, Kevin Shedlock and Holly Grimm (Panelists). Hēmi Whaanga facilitator Marae Trusts – Hikairo, Mahuta, Te Wehi, Rereahu-Maniapoto, Waikato Iwi Organisations – Waikato Tainui (Arataua/Whakakitenga), Te

Nehenehenui, Raukawa, Wairere Iwi Trust
13 Nov 2024 Waipapa Marae, Kāwhia (90pax)

- *Panel Discussion - Storytelling – Ethical considerations in AI applications within indigenous contexts.* Jackson Two Bears, Bryan Kuwada (Panelists). Hēmi Whaanga facilitator Marae Trusts – Hikairo, Mahuta, Te Wehi, Rereahu-Maniapoto, Waikato Iwi Organisations – Waikato Tainui (Arataua/Whakakitenga), Te Nehenehenui, Raukawa, Wairere Iwi Trust
  13 Nov 2024 Waipapa Marae, Kāwhia (90pax)
- *Panel Discussion - Environmental Stewardship – AI in environmental monitoring and land management.* Jason Leigh, Kari Noe, Kirsty Lam (Panelists). Hēmi Whaanga facilitator. Marae Trusts – Hikairo, Mahuta, Te Wehi, Rereahu-Maniapoto, Waikato Iwi Organisations – Waikato Tainui (Arataua/Whakakitenga), Te Nehenehenui, Raukawa, Wairere Iwi Trust
  13 Nov 2024 Waipapa Marae, Kāwhia (90pax)
- *Exploring Digital and Virtual Protocols: Visiting Scholar Talk with Prof. Hēmi Whaanga*, 4TH SPACE Concordia University, Montreal. 13 August 2024, 13 August (30pax)

Presentations

- *Methodology, Indigenous knowledge, technology and relationships with Professor Linda Tuhiwai Smith*
  17 Nov 2024 Te Rau Karamū Marae, Massey University, Wellington (50pax)
- *Mātauranga Māori, Indigenous and environmental knowledge, astronomy and technology with Professor Rangi Mātāmua*
  17 Nov 2024 Te Rau Karamū Marae, Massey University, Wellington (50pax)
- *Abundant Intelligences with Hēmi Whaanga, Tiriana Anderson & Kevin Shedlock* to Massey and Victoria University staff and local governance
  17 Nov 2024 Massey University, Wellington (10pax)

Masters and PhD Theses

- *Whānau identification of mātauranga and tikanga Māori through the engagement and interaction with emerging technologies that are generated by AI* - Petera Hudson – PhD November 2024 Massey University, Palmerston North (H.Whaanga - Chief Supervisor)
- *Investigating the increase in pōwhiri understanding and confidence using Virtual Reality* – Laurie Lloyd-Jones (2024). Masters thesis, University of Otago. (H.Whaanga - Supervisor)
- *Mapping an Indigenous Procedure for the Construction of an IT Artefact* - Kevin Shedlock – PhD
  September 2024 Monash University, Australia (H.Whaanga - examiner)
- *Ipurangi: Māori, the internet and implications for tikanga Māori* - Krystal (Te Rina) Warren – PhD July 2024 Massey University, Palmerston North (H.Whaanga - examiner)

Workshops

- *Abundant Intelligences* - Taonga Pūoro with Libby Gray Workshops
  13 Nov 2024 Waipapa Marae, Kāwhia (20pax)
- *Abundant Intelligences* - Creative Expression of Future Imaginaries participants use various media (art, writing, digital tools) to express their imagined futures - Michelle Lee Brown & Renee Waiwiri, Scott Benesiinaabandan & Kimiora Whaanga & Johnson Witehira
  17 Nov 2024 Te Rau Karamū Marae, Massey University, Wellington (20pax)
- *Abundant Intelligences* - Reflections - Guided visualization exercises to help participants imagine AI technologies that align with their community values with Michelle Lee Brown
  17 Nov 2024 Te Rau Karamū Marae, Massey University, Wellington (40pax)
- IDIA with Johnson Witehira Indigenous design and AI
  18 Nov 2024 IDIA, Wellington (15pax)

- Tikanga in technology to Indigidata Aotearoa Emerging Māori Leaders in Data Science - H.Whaanga
  26 August 2024 Victoria University Wellington
- Future Imaginaries workshop on AI Hokianga Room, Tahuaroa Function Centre, Waitangi Treaty Grounds
  11 Nov 2024 Waitangi Treaty Grounds (70pax)

Knowledge Exchange

- *Kōrero on the landscape and history of Ngāpuhi and Te Ruapekapeka pā* by K.Shedlock
  10 Nov 2024 Bus - Taitokerau (60pax)
- *Kōrero on Te Whare Rūnanga Marae* at Waitangi by K.Shedlock
  11 Nov 2024 Te Whare Rūnanga Marae, Waitangi Treaty Grounds (70pax)
- *Kōrero on the landscape and history of Maniapoto* by T.Anderson
  14 Nov 2024 Bus - Maniapoto (60pax)
- *Kōrero on the history of Waiapa marae* by T.Anderson
  14 Nov 2024 Waipapa (70pax)
- *Kōrero on his life and journey* – Tā Pou Temara
  14 Nov 2024 Te Whare Wānanga o Awanuiārangi, Whakatāne (70pax)

Cultural Exchange

- AbInt whakawhanaungatanga
  10 Nov 2024 Hihiaua Cultural Centre, Whangarei (65pax)

Community Dinner

- Dinner with Community with Sara Stratton: Ngati Hine (Māori Lab), Ned Peita: Te Kapotai (Ngapuhi kaumatua/ rangatira), Ned (partner): Te Kapotai (kuia), Phoebe Davis Ngati Manu & Ngapuhi spokesperson, Kapuarangi Davis Ngati Manu, Te Piha Niha (Ngati Hine Rangatahi: Engen Tech Room), Thelma Horne (Ngati Hau ki Akerama), Arapeta Barber Horne (Ngapuhi ki Hokianga), Kateao Barber-Horne, Tana Apiata: Te Tii Marae, Ngati Kawa: Te Tī Marae.
  11 Nov 2024 Hokinga Room, Tahuaroa Function Centre, Waitangi Treaty Grounds (70pax)

Community Meeting

- Open Conversation with Community – to discuss digital activities and digital initiatives happening in this community include: The Whare Tupuna (Meeting House) becoming a SMART digital space; Indigi-data project; Waitangi River restoration project; Rangatahi digital project. Sara Stratton: Ngati Hine (Māori Lab), Ned Peita : Te Kapotai (Ngapuhi kaumatua/ rangatira), Ned (partner): Te Kapotai (kuia), Phoebe Davis Ngati Manu & Ngapuhi spokesperson, Kapuarangi Davis Ngati Manu, Te Piha Niha (Ngati Hine Rangatahi: Engen Tech Room), Thelma Horne (Ngati Hau ki Akerama), Arapeta Barber Horne (Ngapuhi ki Hokianga), Kateao Barber-Horne, Tana Apiata: Te Tii Marae, Ngati Kawa: Te tii Marae.
  11 Nov 2024 Hokinga Room, Tahuaroa Function Centre, Waitangi Treaty Grounds (70pax)

Networking

- NASA IPI/NZ Hui on NASA Data - H.Whaanga
  3 October 2024
  Online (8pax)
- Meeting with Kevin Miniter from Cawthron Institute and AI Forum of NZ Environmental Working Group (H.Whaanga)
  16 December 2024 Online
  (4 pax)

Hui

- Ātea hui with community - Awarua Hui with marae updates and reports
  20 March 2024, 20 May 2024 Online (4 pax)
- Ngā Tai o te Uru. Is the collective of West Coast Marae Representatives that sit as Members of Te Whakakitenga o Waikato, the trustees to the Waikato Raupatu Settlement - T.Anderson
  21 March 2024 Online (15 pax)
- Ngāti Pare Marae Hui - A group of 3 Ngāti Rereahu Marae that are part of a grass roots Marae Based Digital Archiving system, this hui was called

specifically to discuss what opening up collection might look like - T.Anderson
6 April 2024 Hikairo, Waikato (40pax)

- Te Tari o te Kiingitanga Hui with the King's Office regarding AI and our involvement - T.Anderson
  2 May 2024 Ngāruawāhia, Waikato (7 pax)
- Ngā Marae Tōpu Executive Hui. A group of kaumātua which gives guidance on tikanga within Waikato-Tainui - T.Anderson
  2 May 2024 Hamilton (9 pax)
- Ngāti Wairere Marae hui T.Anderson spoke on AI and tikanga
  14 June 2024 Hukanui Marae, Waikato (200 pax)
- Te Tai Hauauru Collective Tai Hauaauru Collective is a group of Indigenous owned businesses that operate primarily on digital platforms, delivering services across Aotearoa and the Pacific. There was interest in the development of whanau based Digital Archives so a hui was held with the different business owners. T.Anderson
  21 July 2024 Hamilton (5 pax)
- Te Kaunihera Kaumatua o Ngāti Hikairo Kaumatua Council. Tiriana presented on AI and tikanga
  21August 2024 Hamilton T.Anderson (12 pax)

Poukai presentations on AI

- i. Poutu Poukai Poukai - T.Anderson presentation on AI
  2 March 2024 Foxton, Shannon (200+ pax)
- Aotearoa Poukai - T.Anderson presentation on AI
  10 March 2024 Wharepapa South (500+ Pax)
- Rākaunui Poukai Poukai described as above 11 March 2024 Hauturu T.Anderson (500+ Pax)
- Waipapa Poukai Poukai - T.Anderson presentation on AI
  12 March 2024 Kāwhia (500+ Pax)
- Mirumiru Poukai Poukai T.Anderson presentation on AI
  30 March 2024 Marakopa T.Anderson (500+ Pax)
- Te Tokanganui a Noho Poukai - T.Anderson presentation on AI
  31 March 2024 Te Kuiti T.Anderson (500+ Pax)

Wānanga

- Research wānanga with community for closing of projects and upcoming projects on technology
  8-13 Mar 2024 Bluff (6 pax)
- Wānanga with tohunga Tikanga and protocols in technology
  25 March 2024 Online (10 pax)
- Wānanga with tohunga and other university partners - Tikanga and protocols in technology 11 April 2024 Online (16 pax)
- Wānanga with tohunga and university partners - Wrap up of project and sharing with community
  21-24 April 2024 Bluff (25 pax)
- Research wānanga with university partners in project Virtual Immersive Wānanga – wrap up with research team 6 -7 Jun 2024, Dunedin
  H.Whaanga, N.Jones, T.Anderson (10 pax)

Interviews

- AGM participant interviews with Melanie Participants: Sara Stratton (Ngāti Hine – Māori Lab), Ngati Kawa (Te Tii Marae), Kevin Shedlock, Johnson Witehira, Petera Hudson, Jason Leigh, Bryan Kuwada, Jason Lewis, Scott Benesiinaabandan, Karim Jerbi, Jackson Two Bears, Michelle Brown, Ashley Cordes, Suzanne Kite
  Nov 2024 Waitangi, Kāwhia, Whakatane, Wellington (14pax)
- AGM participant interviews with Hohepa and Montel Participants: Hēmi Whaanga, Pou Temara, Tiriana Anderson, Melanie Cheung, Kari Noe, Daniel Richardson, Lehua Matsumoto, Kristy Lam
  Nov 2024 Waitangi, Kāwhia, Whakatane, Wellington (8pax)
- Emerging Māori Leaders in Data Science Tikanga in technology to Indigidata H.Whaanga
  26 October 2024 Victoria University Wellington, Wellington (4pax)

- Interview on Indigenous Knowledge & AI. ATLANTIS with Kyriaki Papageorgiou - H.Whaanga
  Online 19 April 2024 (2 pax)
- Interview with Professor Angie Abdilla on Indigenous Data Old Ways New Discussion on Australia's New South Wales state government and its commitment to developing transparency and access to Indigenous data. H.Whaanga
  24 July 2024 Online (3 pax)

Museum visit – knowledge exchange

- Te Papa Museum tour with Professor Rangi Mātāmua
  17 Nov 2024 Te Papa, Wellington (30pax)

Noho Marae

- *Abundant Intelligences Management Team* - Te Rau Aroha Marae, Bluff 19-22 Nov 2024 (20pax)

Pōwhiri & Whakatau

- *Abundant Intelligences* - Hihiaua Cultural Centre
  10 Nov 2024 Whangarei (65pax)
- *Abundant Intelligences* - Waipapa Marae
  13 Nov 2024 Kāwhia (100pax)
- *Abundant Intelligences* - Te Whare Wānanga o Awanuiārangi 14 Nov 2024 Whangarei (100pax)
- *Abundant Intelligences* - Te Rau Karamū Marae 16 Nov 2024 Te Rau Karamū Marae, Massey University, Wellington (50pax)
- *Abundant Intelligences* - Te Rau Aroha Marae, Bluff 19 Nov 2024 Te Rau Aroha Marae, Bluff (25pax)
- *Abundant Intelligences* - Whakatau – Waipapa Marae, Kāwhia
  12 Nov 2024 Waipapa Marae, Kāwhia (70pax)

Visit to sites of significance

- i. *Abundant Intelligences* - Te Rau Aroha - War Museum Visit and ceremony to remember Tā Robert Gillies
  11 Nov 2024 Waitangi Treaty Grounds (70pax)

Institution Degree

- AI major in Computer Science at Massey University Undergraduate degree proposal - H.Whaanga
  4 February 2025 (2 pax)