Collaboration in Research: Weaving Kaupapa Māori and Computer Science

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COLLABORATION IN RESEARCH: WEAVING KAUPAPA
MĀORI AND COMPUTER SCIENCE

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Abstract

We describe a collaboration between Māori (indigenous people of Aotearoa/New Zealand) and Tauiwi (non-Māori) researchers on a software engineering project. Te Tiriti o Waitangi (The Treaty of Waitangi) provides the basis for Māori to lead research that involves Māori as participants or that intend to impact Māori outcomes. Through collaboration, an extension of the traditional four step software design process was created, culminating in a nine-step integrated process that included Kaupapa Māori (Māori ideology) principles. The collaboration experience for both Māori and Tauiwi highlighted areas of misunderstanding within the research context based on differing worldviews, and our ability to navigate and work through this has led to the reflections and recommendations reported here. This paper provides guiding principles, context, and process for research where Māori and Tauiwi have an intention to collaborate.

Key Words
Kaupapa Māori, software engineering process, community engagement, mahitahi, participatory design, co-design
Nā to rourou, nā taku rourou, ka ora ai te iwi

With your food basket and my food basket, the people will thrive

Introduction

In Aotearoa, Te Tiriti o Waitangi (Te Tiriti) is the founding document that dictates the principles for relationships with Māori by government mandated institutions. Te Tiriti includes active protection and equity for Māori, along with ensuring tino rangatiratanga (self-determination and sovereignty). In research, Te Tiriti provides assurance for Māori to be included and lead projects that involve Māori as participants or intend to impact on Māori outcomes. To this end, in academia, Māori research expertise is often sought by Tauiwi research teams to ensure they are meeting their obligations under Te Tiriti. Also, Māori academic expertise supports culturally sound processes and allows the integration of cultural practices and knowledge that will uplift the mana (prestige) of Māori who are engaged in a research project.

There is a historical mistrust of research and researchers by Māori, which has arisen from the presentation of Western men's earliest research in Aotearoa and the continued effect that deficit-based research has had on Māori and their research experience (Smith, 1999). Historically, information gathered led to a comparison of Māori and life in Aotearoa with other new environs within a Westernised worldview. In this point of view, the knowledge
gained was Imperial and measured against an Imperial standard. The picture, presented to the outside world, was one where the first knowledge of Māori was contrary to the Imperial standard. In simple terms, the earliest encounters as presented by the crews of Tasman and Cook found Māori to be primitive savages, and that intervention was necessary to ensure that their way of life was altered to meet the Imperial standard. A specific example of the early research performed by Elsdon Best with the Tuhoe people from Te Urewera, Aotearoa. Best, a Tauwi was considered to be an expert in all things Māori, and he sought to gain even the most sacred knowledge from the tohunga (experts) of Tuhoe. In the reports written by Best, he is acclaimed as the expert on Māori, the people, customs, traditions and history. In the meantime, his inquiry subjects, who gifted him the knowledge he sought, are left unnamed and unknown. Historian Michael King said that Best "took fragments of tribal traditions from different places and sought to weave them into a single Western-style chronological history" (King, 2001). Research has, therefore, been implicated in privileging Western knowledge and denying for Māori the validity of Māori knowledge, language and culture (Smith, 1999).

Of particular importance in research where communities are involved is the approach made by institutions, such as universities, directly to those communities. Therefore, high-quality community engagement is essential for any research team that wishes to conduct their work with Māori. However, the right process for engagement and the building of trust relationships are not well described or embedded within university systems. When a
Tauwi research team acknowledges their obligations under Te Tiriti and thus knows the importance of engagement and the relationship building process, then it is likely that they will engage Māori academics and researchers to initiate and establish relationships with whānau (families) and community. However, despite it being an unwritten expectation in areas such as health, where it is generally accepted and understood that projects need Māori expertise and leadership, this is not the case for other disciplines such as computer science and technology.

This paper is about the collaboration between Māori and Tauwi during Te Tini o te Hakituri (guardians of the forest) project. The authors are two Tauwi computer scientists, Author 2 and Author 3 (one Welsh, one German) and three Kaupapa Māori researchers (Author 1, Author 4, Author 5). The project started with a strong computer science focus and integrated Kaupapa Māori principles as it progressed. The aims are to:

- Describe and reflect on the process of collaboration between Māori and Tauwi colleagues on a technology focused research project
- Describe how collaboration between Māori and Tauwi led to positive outcomes for the project
- Provide recommendations to research colleagues for establishing and maintaining collaborative relationships for the benefit of communities
Te Tini o te Hakituri Project

Aotearoa's forestry industry is one of the most dangerous work environments in the country (Hutching, 2018). Like many other high risk work environments, forestry has a high proportion of Māori workers (38.5% of forestry workers identify as Māori) (MBIE, 2018). Also, the available data for serious, non-fatal work-related injury (2012-2014) shows that Māori had a significantly higher rate than workers overall. The Tauiwi computer science research team began working with the forestry industry in 2015 and were interested in technical interventions that could reduce the rate of injury and fatalities. The initial goal was to conduct data gathering about forestry workers' physical workload (Bowen, et al., 2019).

A pilot with three forestry workers was undertaken (Bowen et al., 2015). The outcomes (Griffiths, et al., 2017) of the pilot led to developing what would eventually be named Te Tini o te Hakituri project (Hakituri). The project aimed to predict hazardous work situations in forestry by exploring the potential use of technology and collecting personal data for worker safety through a co-design process. There was an intention to integrate Kaupapa Māori methodology because of the Māori participant population. The team understood that using technology to gather personal data from workers for measuring fatigue levels or hazard risk must be considered within an appropriate cultural perspective. Te Mana Raraunga (Māori Data Sovereignty Network) principles were,
therefore, central to this understanding and were incorporated into the project plan to ensure data democracy and indigenous data sovereignty (Te Mana Raraunga, 2018).

Methodological approaches

Participatory design is a well-established methodology in software engineering to ensure product development will have relevance for the end user. Kaupapa Māori methodologies also call on the inclusion and involvement of whānau and community in research. There are similarities in the approaches and the philosophy behind each approach, but there are also significant differences.

Computer science approach to participatory design

The designing of software or technology is not a linear process. A series of steps should be followed, each of which is typically iterative, and as the development progresses, there may be a return to earlier steps to incorporate new knowledge. Figure 1 shows the four main categories of activities, each of which may consist of several iterations. The first category is the gathering and analysis of requirements. The second is the software design,
where functionalities and interaction elements are decided. The third is implementation, where the software is created, and user interfaces are built. Evaluation then occurs, which may lead to insights that require adaptations. At any point in the process, previously hidden issues may be detected, causing a reiteration through previous steps.

![Software design process with iterations at each step (small blue arrows) and evaluation (large blue arrow)](image)

Figure 1: Software design process with iterations at each step (small blue arrows) and evaluation (large blue arrow)

The amount of user involvement within each category is dependent on the design methodology. *Co-design* suggests that the users are involved in all steps as an equal and active partner. In *participatory design*, the users may provide input to all steps but are not directly active in undertaking them. When designing for specialised domains,
participatory design has many benefits. End users involved at key stages in the design process work alongside the development team (Figure 2).

![Figure 2: Participatory design process showing user interaction (grey arrows)](image)

Participatory design ensures that the needs of users are identified, which might otherwise not be obvious. It also serves as a reminder that the development team are not themselves the intended system users. When the cultural background of the end-user is different from that of the development team, issues such as internationalisation, localisation, terminology, icons, and symbols must be included in design considerations. In this case,
the participants are recognised as experts. Cultural probes (Gaver et al., 1999) and ethnographic study techniques (Fetterman, 1989) are intended to ensure developers acknowledge cultural differences and build them into their proposed solutions. However, assuming that these methods alone can compensate for all cultural differences would be incorrect. Software developers should understand and address their preconceptions about different cultural contexts.

While there are examples of successful projects that involve designing for indigenous communities with a design team of non-indigenous people, there is no clearly-defined process to follow, which ensures that end-user engagement follows culturally-appropriate methods. For the Hakituri project, this meant engaging with Māori researchers and handing over the leadership for the community engagement and data gathering component to them and Māori communities.

Kaupapa Māori methodology

Kaupapa Māori is an accepted methodology in research. The word kaupapa is derived from the words *kau*, which is described as *the process of coming into view* or *being disclosed* and *papa*, which refers to the *foundation* or *base* coming from the word Papatūānuku (Earth Mother) and indicates a Māori view of the world (Taki, 1996). Kaupapa Māori relates to
the laying down of a plan, philosophies, and strategies based on Māori values, beliefs, and worldviews. Tuakana Nepe (1991) states that Kaupapa Māori is ancient with origins in Rangiātea (a place in the ancestral location of Hawaiki, known as the point of migration of canoes that came to Aotearoa). It has distinctly different epistemological and metaphysical foundations than Western philosophies and describes more than a post-colonial history and wish for acknowledgement of Te Tiriti. Therefore, Kaupapa Māori is "the conceptualisation of Māori knowledge" (Nepe, 1991, p.6). It sees the world from a Māori perspective, unconstrained by Western ideals, attitudes or societal structures.

Kaupapa Māori research is where all aspects of the research process are informed by Kaupapa Māori (Irwin, 1994). Bishop (2005, p. 205) described Kaupapa Māori research as:

"collectivistic and is oriented toward benefiting all the research participants and their collectively determined agendas, defining and acknowledging Māori aspirations for research, while developing and implementing Māori theoretical and methodological preference and practices for research."
Kaupapa Māori research was part of an international movement of Indigenous peoples to challenge the act of colonisation by settler states around land, culture and language subjugation. More specifically, in Aotearoa, this was by a greater commitment to Te Tiriti and its application within the research and academic space.

Critical and indigenous theory underpins Kaupapa Māori methodology and weaves together social justice, self determination, and decolonising action methods. According to Smith (2012), critical theory with its focus on social and political change means paying close attention to action focused on Māori self-development and the structures, policies and discourse that give way to capitalism and colonisation. Kaupapa Māori reflects the embeddedness of research within Te Ao Māori (the Māori world), with the research emerging from community need (Smith, 2012).

The guiding principles of Kaupapa Māori research are:

- *Tino rangatiratanga* – sovereignty, autonomy and self-determination, where control and determination of the research sit within Māori cultural understandings, values and practices;
- *Manatika pāpori* – social justice, where Māori benefit from the research, and there is the opportunity to build Māori research capabilities;
- *Te Ao Māori* - the recognition and privileging of the Māori world
• *Whakawhanaungatanga* - the process of establishing and maintaining relationships that allow for an in-depth conversation to occur between the researcher and the participants;

• *Te reo Māori* - the Māori language, using te reo Māori whenever possible, and although the reality is that many Māori researchers and participants may not be fluent in te reo Māori, the opportunity is given to gain more understanding of the research;

• *Whānau* – refers to family and extended family. Whānau affirms the idea of the collective in understanding and sharing research findings (Walker, Eketone, & Gibbs, 2006).

Using Kaupapa Māori principles and concepts ensures Māori beliefs and values are central to the research, and interpretation of findings are based on a Māori worldview. Kaupapa Māori is founded on, and accountable to, whakapapa (genealogical) relationships and is about creating solutions to problems identified by Māori communities while retrieving space to legitimise Māori realities (Smith, 2012). If research provides evidence that informs policy and service provision, for example, for Māori, then Kaupapa Māori research is essential for ensuring Māori appropriate outcomes.
Alongside Kaupapa, Māori can be mahitahi methodology. Mahitahi means working in unison as one and reflects collaboration, collective responsibility, accountability to each other and the care and support of one another (Walker, Eketone & Gibbs, 2006). Mahitahi is distinct from but aligned to co-design, which is a non-linear process that differs in characteristics and processes depending on the challenge presented by each project (Martin et.al., 2003). Mahitahi processes draw on all aspects of Te Ao Māori to inform the entire research process.

**Technical co-design with Kaupapa Māori methodologies**

In health, Kaupapa Māori has been used alongside western methodologies to imbed a best-of-both-worlds approach when Māori are participants. Elder (2013) used marae wānanga (a forum for discussion held at a traditional Māori building complex for gatherings) as a data collection process in the project Te Waka Oranga about health journeys of Māori whānau where a member had traumatic brain injury. The concept of Te Waka Oranga was introduced, which provides a framework of intervention in two stages; (1) Hoe Tahi (establishing ground rules - learning to paddle as one) and (2) Te Haerenga o Te Waka Oranga (whānau and clinical team - launching, sailing and arriving together, towards achieving recovery objectives). While the integration of Kaupapa Māori occurs extensively for education and social science research (Cram, 2009; Kennedy and Cram, 2010), in a technical field, it is rarely used.
Rolleston et al. (2016) have applied a Kaupapa Māori philosophical approach within a medical care setting. The project aimed to determine the impact of incorporating Māori values into a 12-week exercise and lifestyle management programme for cardiac risk reduction. Māori participants were able to remodel a usual care programme to incorporate Māori values and knowledge. A programme was produced that supported a Māori worldview while still maintaining key clinical outcomes.

Te Morenga et al. (2018) describes the integration of co-design methods with Kaupapa Māori research that were used to design the OL@-OR@ app. The OL@-OR@ team included a European professor, a Māori researcher, a Pacific Island researcher, and representatives from Māori and Pacific Island health providers. The Kaupapa Māori research principles and tikanga (traditions practices) used involved leadership by Māori partners to design, implement, and interpret research outcomes. The project team worked with communities and established strong relationships. Te Morenga observed that the research team should meet often for a successful project, building a team culture. Although the team experienced tension due to research priorities and expectations, they could resolve their differences using principles of engagement they established during their meetings.
Yeo et al. (2020) describe a work-integrated learning placement within Māori communities. Using a co-design approach, a placement student worked with Tauiwi supervisors and Māori advisors from a Māori organisation on developing a digital library prototype over a 10-week placement. Ensuring participation by key Māori stakeholders such as kaumātua (elders), and having the project driven by mātauranga (Māori knowledge) were success factors. Supervisors and the student understood and respected the local tikanga and the goals, values and aspirations of their host. The student identified that collaborations need to be long-term, equal and mutually-benefitting. Rapport and whanaungatanga are important, and frequent communication helps to address ambiguities. Clearly defined roles, with a local champion connecting the supervisors and student to the right people in the community and facilitating access to resources, were also seen as critical.

Despite some good examples of projects that weave Māori and Tauiwi worldviews, there seem to be critical factors for partnership that underpin a successful collaboration. The relationship and the non-research aspects of the processes are not often articulated in dissemination documents focused on reporting methods and outcomes. In Aotearoa, having a Māori foundation for collaboration provides a clear process.
The Engagement process

The process of engaging with Māori academic and community support for the Hakituri project was, on reflection, a significant learning journey for the Tauiwi team. This section describes the engagement process, with critical reflection, from Māori and Tauiwi perspectives.

Original expectations

The first steps for Author 2 and Author 3 were to engage with Te Pua Wānanga ki te Ao (Faculty of Māori and Indigenous Studies) at Waikato University. Initial contact was made because Author 3 had worked with a Māori professor on a previous project. This led to the inclusion of the Māori professor (Author 5) into the research team. Having worked in the forestry industry as a young man, he was aware of the health and safety challenges faced by Māori workers. Throughout several meetings and conversations, Author 3, Author 2 and Author 5 worked to identify the project's key features from a Māori perspective. Author 5 also gifted the name Te Tini o te Hakituri (guardians of the forest) to the project.
Within Hakituri, Author 2 and Author 3 had the role of software designers, aiming to design and create technical solutions to improve forestry workers' safety. Author 5 acted as Māori advisor. While a typical participatory design process would have entailed techniques to support both Māori and Tauiwi workers, it was clear to Author 2 and Author 3 that participatory design alone would not meet the needs of the post-colonial context of Aotearoa and Te Tiriti. Even with the guidance of Author 5, there was an understanding that engaging in Māori-focussed research needed additional Māori support within the research team. The need for Māori leadership for engaging with Māori workers was implicitly understood to enable a Kaupapa Māori philosophical approach to be used. The intention was to extend the participatory design process to include te ao Māori, as shown in Figure 3.

Figure 3: Enhanced participatory design process
A Māori postdoctoral fellow, who had recently completed a PhD in Computer Science, was approached to join the research team. However, he was unsurprisingly in high demand and took up another opportunity. Despite extensive advertising through Te Wananga o Aotearoa, Te Kotahi Research Institute and across other New Zealand Universities, Author 2 and Author 3 were unable to find a suitable candidate with the required Māori and computer science expertise.

A chance conversation with a colleague from the School of Health led to a recommendation to contact Manawa Ora | The Centre for Health (MCH). MCH is a local Kaupapa Māori primary care health clinic that also runs a robust Kaupapa Māori research arm. The managing director, an established Kaupapa Māori researcher, had previously held academic positions at both Waikato and Auckland universities. This project could bridge the gap in terms of the need for qualified personnel who could also lead the Kaupapa Māori aspects of the work. When connecting with MCH, they would work collaboratively with the research team to undertake the participatory design focus groups. In hindsight, both parties had their own interpretation of what collaboration meant.
"We appreciated that we were not experts in incorporating Te Ao Māori into the software design process. We knew we needed to ensure a proper engagement process with the Māori forestry workers throughout the development of our proposal. We had planned to employ a Māori postdoctoral fellow for the project, but it became clear very quickly that this was considerably harder than we had anticipated. In discussions with colleagues, we were advised to contact Author 1 at MCH to see if they would be interested in working with us. There were initial challenges, not least because we did not have a shared vocabulary or real understanding of how we each typically worked. We needed to think differently about the process, and we couldn't just put together a design focus session and ask Author 1's team to run it. If we wanted to engage with a tikanga Māori process, then we had to relinquish ownership of the process and trust in the relationship with Author 1 and Author 4. There were definitely times where we realised we were not on the same page and had made assumptions about outcomes. One of the things that made it work was talking openly about the challenges and having 'difficult conversations'. Our relationship with Author 1 and Author 4 has a much broader context which hopefully has the advantage of being the first step in interesting future collaborations. "[Author 2]

The team at MCH had experience with engaging with universities to perform aspects of research work on behalf of Māori, had firm expectations of the arrangement, including
leadership, management, data analysis and interpretation and dissemination. However, it was later discovered that these aspects were *lost in translation* for the Tauiwi team.

"We received an email asking for assistance with an already established and funded research project where it had been identified that there was a large proportion of Māori in the participant population and the research team were Tauiwi. We get these requests now and again, but we don't always engage, as it can sometimes be more trouble than it's worth, especially if a team has never worked in Māori communities before and are looking for token support. We make our first decision about engaging based on the nature of the research, whether it fits both our philosophical framework and our current research priorities. This project was aligned on both, so we agreed to an initial hui (meeting) with Author 2 and Author 3. A kanohi-ki-te-kanohi (face-to-face) hui was scheduled to hear about the project, convey our way of working, including our *must do's* and *won't do's* and to get a *feel* for them as people. We always look for a connection, get a feel for peoples āhua (character or nature). They came to us; they introduced themselves, they were cognisant of our tikanga, we liked them. You get a sense for whether people understand equity, Te Tiriti and have aroha (love) for Te Ao Māori, or if they don't. The conversation was easy, it flowed, there were connections made, and there was humour. We agreed to progress based on that initial hui." [Author 1].
Māori community engagement and tikanga

As part of the ongoing research that Author 2 and Author 3 had been undertaking more generally in forestry, they had been discussing upcoming plans at a meeting with a forestry consulting company, who recommended that they get in touch with a Māori worker (WS1) from Worksafe (New Zealand's primary workplace health and safety regulator). As part of his role, WS1 is directly responsible for the health and safety of Māori forestry workers. Author 2 made initial contact by email with a brief description of the project. Several phone conversations followed, and WS1 agreed to suggest suitable forestry teams for the research group to meet with and also volunteered to help facilitate the meetings. WS1 thus became an adjunct to the research team as Māori community support.

Author 1 and Author 4, with support from WS1, embedded a Kaupapa Māori approach to engagement shared with Author 2 and Author 3. The approach was contextualised as creating a Kaupapa Māori korowai (cloak) that wrapped around the research proper to ensure that Māori values, beliefs, systems, and culture were privileged and woven throughout the research process. The korowai for this work included the concepts of tuakana (older sibling) - teina (younger sibling), which refers to the reciprocal
relationship between an older person and a younger person and is specific to teaching and learning, manaakitanga (kindness and care), tikanga and ngāwari (flexibility).

The tuakana - teina model stems from a well-known Māori concept about the relationship between an elder and younger sibling or cousin (Mead, 2003). The relationship is based on reciprocity and responsibility and can be applied in various settings "… in mutually beneficial ways that uplift the mana of both tuakana and teina" (Winitana, 2012, p. 32). The tuakana – teina model situates whānau and communities as the experts and positions the researcher as the teina or learner, the one who is there to listen, observe, learn and, if necessary, to talk. Whānau and community, therefore, hold the mana and tino rangatiratanga over the process, and they decide what they want to discuss as their needs or concerns that are inherent to the research (Walker, Eketone & Gibbs, 2006).

The concept of manaakitanga in the project included the researchers understanding their role as manuhiri (visitors) and the importance of being a good visitor and creating good memories with the participants (Kennedy & Cram, 2010). It was also important to acknowledge the gift of the kōrero (conversation) and mātauranga that the participants shared, and thus the research team provided kai (food) and koha (gift) to the research whānau.
The tikanga and kawa (protocols) in place for each community were adhered to by the researchers. Tikanga allows a pathway that works for each given situation. For instance, with one community, the team participated in a whākatau (short welcome encounter) and thus were appropriately welcomed onto a worksite to conduct hui. In another community, a pōwhiri (ritual welcome ceremony) was held, and the team were welcomed onto a marae (traditional Māori building complex for gatherings) to facilitate the research process.

The approach of ngāwari included the researchers being able to be flexible with what was happening on the day, for example, Friday afternoon sessions with participants not wanting to be held up for too long, or making sure that the research team stayed an extra night, so there was not a rush to catch a flight. Also, having the flexibility to allow the appropriate tikanga to be observed for each of the locations. This supported the development of relationships and connections between researchers and participants and allowed for a richer, more open kōrero to occur.
Since the research was undertaken within the community, making whakapapa connections to those communities was essential. Bishop (1998) argues that by identifying the whakapapa connections it gives an understanding that those involved in the process are connected by being nurtured by the same whenua (land) and are part of the same, albeit extended, whānau and this creates a shared sense of belonging. In this way, it also gives the participants the power to assess if they feel the researcher fits both from a whanaunga (kin) and cultural way as well as the role of the researcher (Walker, Eketone & Gibbs, 2006).

"We met the second community group at their marae. While the hui with both groups had started with pepeha (traditional Māori method of introduction) by the researchers (in Te Reo/English [Author 4], in Welsh/English [Author 2], in Te Reo/German [Author 3]), in the second, smaller, group each person from the whānau also introduced themselves. I had previously attended hui in which people introduced themselves with their pepeha but did not typically relate to my background. In this meeting, the group actively aimed to identify possible links with our background and thus build relationships. For example, some talked about a possible German ancestor and others about their part-Welsh heritage. Through these conversations, I did feel there was a link, some common ground, independent of the research project. It helped to build the relationship." [Author 3]
Three hui had been planned with the forestry workers. The initial plan created by Author 2 and Author 3 saw these hui beginning in an introductory session and initial feedback on the project itself. Of specific concern from the research team were questions of the use of technology to monitor workers, sharing of health information, and what was acceptable for personal data sharing. The second hui was to focus on storyboards and scenarios of technology used to explore ideas around useful live feedback from technology to the workers and their whānau. The third hui was to be a participatory evaluation session to explore refined storyboards and scenarios to clarify and finalise the data's proposed uses. The plan was shared with Author 4, who then developed the actual sessions from her Kaupapa Māori perspective. Each hui was undertaken utilising the kawa and tikanga of the mana whenua (the people who have jurisdiction over the land). That included pōwhiri or whakatau to welcome the team, karakia (prayer) and whanaungatanga to introduce and connect the researchers to the whānau.

"There were lots of processes that are a normal part of engagement for us as Māori that happened in the project. These processes keep us and our participant whānau, safe. We had a pōwhiri and whakatau process the first time we met each community, and whakawhanaungatanga was obviously part of that. We invited whānau, not just the workers, to come to the hui to support and participate, and at one hui, we had whānau representatives across three generations. We also allowed the space for kōrero to happen outside of the actual hui. I found that some participants felt more comfortable having a kōrero while we sat outside the wharekai (eating place) or even through social media platforms and felt better
able to discuss their concerns and ideas rather than through the hui process. We even went back to each community to ask for feedback on our dissemination plans, allowing them to change or add kōrero" [Author 4]

The first forestry group was 30 rangatahi tāne (young men) and their supervisors, with the hui being held in a small room at the forestry offices. The sessions were often noisy and full of laughter. The second group was made of 15 participants, including forestry workers and their whānau. The hui with this group was held on a marae. The researchers were supported to facilitate the workshops by WS1 and the leaders within the forestry group itself.

**Data Coding**

Following the hui, Author 4 and a member of the MCH Kaupapa Māori research team performed an initial brainstorming workshop using information, notes and photographs collected from the hui. An initial coding outline was developed. A subsequent session was held with Author 1, Author 2, Author 3, Author 4, and an independent qualitative researcher who was not involved in study design or data collection. In this session, the initial coding outline was discussed, codes were modified, refined, and the coding framework to be applied to the transcripts was agreed upon. On commencement of coding, based on the developed framework, a further discussion ensued between the
coding researcher and the research team and minor amendments were made, and parent and child nodes were included in the final coding framework.

The coding framework provided a practical structure that described the key themes that arose from the hui. These themes constitute the findings of the research work. However, because the philosophical basis of the hui was Kaupapa Māori, the framework was themed within a Te Ao Māori context. The key themes that were derived from the workshops were presented in the Coding Framework as Parent Nodes. These themes were wrapped within a korowai of hauora (health and wellbeing). This meant the conversations and reflections to answer the research questions were framed for Māori within the context of health and wellbeing. This was to ensure that the kaupapa had a meaningful context for the audience.

The transcribing was challenging as there were multiple recordings for the same session, and it was often hard to hear and interpret the discussions, which were in both English and Māori. This is not unusual in Kaupapa Māori research, where hui are held with collectives of people, and both languages are used throughout. Transcriptions are written as accurately as possible, with more than one recording device being used to capture discussions from different angles and side conversations. It was valuable for Author 4,
Author 3 and Author 2 to maintain a reflective practice and have a debrief after each hui, which helped flesh out the themes, and this was then used to overlay the coding and transcriptions.

"During the transcription process, we started to do our coding work once we had a good amount of material to work with. After a short period of analysis, and based on the post hui reflections, it became clear to us that there were already clear themes being told by whānau. Transcribing takes up a lot of time and resource, especially for big groups when you need to listen hard to get everyone's kōrero who speaks. We decided that we had reached a good level of saturation of content once we were three-quarters of the way through the recordings. In fact, when we did the formal analysis and theming, it was evident what the messages were. Our context and our way of understanding the kōrero was not the same as for our colleagues, however. We didn't figure this out until later when they wanted to see all the 'data'. We had presented all the analysis, and that's what our contract was for - to provide qualitative analysis. When our colleagues kept asking for the 'rest of the information', we were confused. What other information was there? Well, apparently, every word is a data point. Who knew?" [Author1]

"Typically, when we transcribe recordings of participatory design sessions, we are analysing the data to generate requirements. We want to ensure that everything that is said is captured and considered. A single word or phrase may be vital for the final software product. When we set up the contract and agreed that MCH
would do the transcribing and coding, we assumed that our interpretation of what this meant was the only interpretation. We appreciated that there would be a richer interpretation of the kōrero and recordings, but we still imagined there would be a full set of data that we could then use to determine requirements. It led to one of those email conversations where we had to work through the misunderstandings and reflect on what constitutes data analysis and what the kōrero and recordings represent." [Author 2]

**Dissemination**

A Māori designer was engaged to create posters for each group as part of dissemination; see example poster in Figure 4. The posters represented reminders of the workshops undertaken and some of the insights gathered. These were presented to participants along with transcribed material from the hui (on a USB stick), an overview of design activities, copies of photographs taken and a summary of the coded data was provided. These items were gathered into a kete (flax woven bag) and presented to the groups. During the visits to disseminate information and give back data, we were also able to update them on the work's progress and reaffirm their importance within our design process. WS1 insights were that the joint engagement between himself, Author 4 as the Māori research facilitator
and Author 2 and Author 3 as the technical team was successful because it was based around a shared kaupapa.

"I really appreciate that you came back because so often with these types of projects, it's an email, and you've been introduced into their world, and now you're going to say thank you by sending an email, and that means nothing to them. Not only does it mean nothing to them, but you just become those two Tauwi scientists that came and were never heard from again, but you didn't, you did the Māori thing and came back and took ownership, and you shared a kai and you participated in tikanga, it was, yeah it's been a great example." [WS1]
**Discussion & Reflections**

It became clear that through our joined efforts, we had effectively extended the initial four steps of the software design process (shown in Figures 1 to 3) into nine steps (see Figure 5) through our collaboration. Originally the requirement analysis is the first step of the software engineering process. However, in our project, we found three steps that needed to be acknowledged before the requirement analysis. These steps were an initial planning phase, a preparation phase and then a team-building phase. The initial planning includes preparation of the funding application and integration of Kaupapa Māori within the project plan and budget. The preparation phase includes the contract negotiation with partner organisations and defining clear outcomes and expectations at this time. The team-building phase was about developing a shared vocabulary and understanding for the collaboration at an operational level. The requirement analysis phase of the process has been split into two steps to acknowledge: the engagement with end-users and whānau for data collection and the subsequent data analysis. The returning of collected data and reporting back of insights to participants is different from what usually happens in computer science (symbolised by the bi-directional arrows).
The next three steps (design, implementation and evaluation) within the software design process are maintained as described in Figures 1 to 3 (shown in white in Figure 5).

Finally, the relationships built within the project do not cease with the completion of the
research. We acknowledge this here by the inclusion of the ninth step, ongoing relationships.

Learnings that occurred as a result of interaction with each other on this project are presented in Table 1 according to the phases that were undertaken (those in orange in Figure 5). We adopt a weaving analogy to illustrate how the learnings for Māori, for Tauiwi and those that were collective experiences of learning come together to create a strength that previously did not exist. Strands coming from the left of Table 1 (yellow) are learnings from a Tauiwi perspective. Strands coming from the right (green) are learnings from a Māori perspective. Strands that go across the whole width of the table (blue) are joint reflections.

Table 1: Reflections on learnings from Tauiwi (left, yellow), Māori (right, green) and shared across the team (centred, blue)
## Preparation phase (before signing partnership contract)

Outline expectations for dissemination back to community and include dissemination visits in timeline and budget

Clearly articulate how findings gathered from both Māori and Tauiwi aspects will be analysed and interpreted, by whom, and where independence occurs for quality assurance

## Team building and whanaungatanga

Recognise fields of expertise and set boundaries, so all team members know which parts of the project for which they are responsible

Recognise that the post-colonial power structures create systemic imbalance when collaborating

Develop a shared vocabulary and shared understanding of the project and expectations

‘Catch' uncertainty when the feeling arises. Chances are if we are feeling uncertain, so too are our colleagues. Trust the wairua (spirit) of the situation and delve into any unease to highlight concerns and potential issues before they become an actual problem

Develop a process for engaging in awkward conversations from the outset

## Engagement with whānau and end-users

Establish Kaupapa Māori procedures from the outset of the relationship, including tikanga processes in initial hui and continuation of tikanga in other engagements as a research team

Making time for food and manaakitanga is essential.

Responsibility of Tauiwi to educate themselves about manaakitanga

Outline key te ao Māori principles for the relationship and get agreement that the relationship will be founded and operated by these principles

Ensure relationships with community support person are nurtured and maintained
'In-person' dissemination is essential, and this includes sharing of findings and return of data

<table>
<thead>
<tr>
<th>Data analysis</th>
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<tbody>
<tr>
<td>Do not assume a common vocabulary</td>
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<tr>
<td>Include Tauiwi researchers in analysis and interpretation processes as observers to support understanding of Kaupapa Māori process</td>
</tr>
<tr>
<td>Taking time with the evaluation team is important (not just with &quot;end users&quot;)</td>
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<tr>
<td>Talking through methodology and insights based on methodology is important for proper understanding of the data</td>
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<table>
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<tr>
<th>Ongoing relationships</th>
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<tbody>
<tr>
<td>Understanding and acknowledging that relationships between team members need to be continually honoured (for example, co-authoring of publications)</td>
</tr>
<tr>
<td>Leadership of publications needs to be based on the papers' purpose and the expertise of the team</td>
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<tr>
<td>Ensuring that everyone (researchers and community) benefits from the relationship</td>
</tr>
<tr>
<td>Navigating the academic need to publish when computer science journals may not be interested in Kaupapa Māori approaches.</td>
</tr>
<tr>
<td>Māori team feel they hold the responsibility for community relationships despite a research contract ending or a project completing. There is always more work in continuing relationships that are never budgeted or in a research time when the work is not Kaupapa Māori.</td>
</tr>
<tr>
<td>Providing a positive research experience for participants.</td>
</tr>
<tr>
<td>Acknowledging that relationships with Māori are an important use of research time despite there being no benefit in terms of, for example, Performance-Based Research Funding,</td>
</tr>
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</table>
Discussions and Conclusions

We have described a collaboration between Māori and Tauwi researchers on a software engineering project. While the computer science researchers' initial motivation was finding appropriate ways to engage with Māori participants, it developed into a larger endeavour. Leveraging off a strong relationship created at the outset between the two groups of researchers, we learned together about each other and gained insights about researching in partnership.

This paper attempts to capture the knowledge attained to act as a starting point or template for others seeking to integrate apparently disparate worlds. The need to collaborate across cultures is ongoing, and having a successful model to guide the process makes future work possible and beneficial for the end-user and community and researchers. The learnings listed in Table 1 provide guiding principles for projects in which teams of Māori and Tauwi researchers collaborate. While our project had a software engineering focus, we believe these guiding principles apply to other contexts. Kaupapa Māori values underpinned the research team's partnership, and those values
were also used in the research process within the community. Kaupapa Māori contexts and understandings can be weaved into all contexts of a research process.

Whanaungatanga has been central to the success of the collaboration and has provided the basis for working through the hard parts. From the outset, the team formed and nurtured a trust relationship at an individual and a collective level. Our engagements became less formal over time, and we were able to be vulnerable, acknowledging when things were confusing, confronting and uncomfortable. The connections we made with each other in the beginning through whanaungatanga held us in good stead throughout the project.

The ability to safely raise concerns and hold awkward conversations was essential for the project's success but was not easily achieved. In the initial stages, while still developing our trust base, there was a tendency not to offend. However, our relationship's eventual strength ensured that each party was able to safely express their point of view without fear of having that view be diminished. Upholding both parties' mana was an innate part of our trust relationship and ensured that general planning could be achieved efficiently and respectfully.

Hearing a contrary view, sitting with that view alongside your own, and then coming to a point of re-setting was not always easy. However, being mindful of one's own worldview and implicit bias is essential to be able to understand another. Despite there being equity in the partnership between Māori and Tauiwi, there was also an obvious privileging of a
Māori worldview and the ability to enact tino rangatiratanga by the Māori team. The ability to be mindful of each other's worldview, yet still being able to assert oneself and place a privilege for the right context and at the right time, is essential when in partnership with Māori. These approaches and processes uphold Te Tiriti's integrity and ensure that research is performed in the right way where Māori are the ones benefiting.

The connection with communities by university-based researchers can be mana enhancing or diminishing for that community. To address the trauma of past transgressions by Western scholars, researchers must spend time planning and preparing for community engagements. In this work, the Māori research team, who are experienced with Māori engagement, led the community connection process and lay down the values that would guide the interactions with whānau who were to be participants. Also, engaging with key community contacts was significant for ensuring the process was right from the outset. These things may seem trivial, but when a research team understands the context of a Māori community, they can ensure that their interactions are always mana enhancing for those who give their time and knowledge to a project.

The tension that exists for researchers to achieve outcomes to enhance their academic careers, for example, appropriate publications, means that the benefit of following a
Kaupapa Māori process and building and maintaining strong relationships is often not supported in a university setting. A shift in understanding that these processes and relationships are not merely altruistic but essential as learning not only for individual researchers but for institutions and government authorities as an obligation under Te Tiriti. In addition, acknowledgement and having value placed on the amount of time and effort Māori researchers spend on essential aspects of process and relationships is an area for the research community to progress so that research in Aotearoa is connected, safe and responsive to all.

There is a danger that this article is "preaching to the converted" because only those who are interested in cross-cultural partnership might take the time to read. We hope that the descriptions of the Kaupapa Māori principles that guided the project team and our reflections on parts of the research that are not normally written about will nevertheless be helpful to others. In conclusion, by highlighting the 'ups and downs' in our work, we provide a starting point for more genuine collaboration by Māori and Tauiwi for the benefit of the community.
Glossary

Aotearoa (New Zealand)

āhua (character or nature)

aroha (love)

hauora (health and wellbeing)

hui (meeting)

kanohi-ki-te-kanohi (face-to-face)

karakia (prayer)

kaumātua (elders)

kau (process of coming into view)

kaupapa (process)

Kaupapa Māori (Māori ideology)

kawa (protocols)

kete (flax woven basket)

kōrero (conversation)

korowai (cloak)
mahitahi (working in unison as one)

manaakitanga (kindness and care)

mana (prestige)

manatika pāpori (social justice)

mana whenua (the people who have jurisdiction over the land)

manuhiri (visitors)

Māori (indigenous people of Aotearoa)

marae (traditional Māori building complex for gatherings)

marae wānanga (a forum for discussion held at a traditional Māori building complex for gatherings)

mātauranga (Māori knowledge)

mokopuna (grandchildren)

ngāwari (flexibility)

papa (foundation)

Papatūānuku (Earth Mother)

pepeha (traditional Māori method of introduction)

pōwhiri (welcome ceremony)
rangatahi tāne (young men)

Rangiātea (a place in the ancestral location of Hawaiki)

Tauwi (non-Māori)

Te Ao Māori (the Māori world)

teina (younger sibling)

tikanga (traditions practices)

tino rangatiratanga (self-determination and sovereignty)

tohunga (experts)

tuakana (older sibling)

Tūhoe (tribal group of Te Urewera, Aotearoa)

wairua (spirit)

wānanga (forum for discussion)

wharekai (place for eating)

whakapapa (genealogy)

whakatau (short welcome, encounter)

(whaka)whanaungatanga (process of establishing relationships)

whānau (family)
whanaunga (kin)

whenua (land)
References


https://www.temanararaunga.maori.nz/nga-rauemi


