SCIENCE FOR TECHNOLOGICAL INNOVATION

Kia kotahi mai –
Te Ao Pūtaiao me
Te Ao Hangarau

Data ILG

te hiku media

MĀORI DATA FUTURES HUI

INTELLECTUAL PROPERTY

20 - 21 MARCH 2019

TE AURERE, KAITAIA

He tohu maumahara tēnei ki Tā Hekenukumai Puhipi

Moe mai rā, e te Rangatira.

1. FOREWORD

Mānuka Hēnare. Image courtesy of Te Hiku Media.

It has been a privilege to attend this hui and have the opportunity to explore and reflect on Māori data and how we protect and use this taonga.

Our perspective on time is very important to this discussion. Some Māori data is older than Europe and North America, and it is linked by language and culture to the whole of Austronesia through Southeast Asia, Oceania and East Africa. Because Mātauranga Māori is so enduring, we don't need to try fitting it within a European economic model that has only been around for a couple of hundred years. Māori have the strength of being able to look past current troubles towards the horizon. We have survived because of our ability to look to the future and bring it into the present, where it immediately becomes part of the past. As kaitiaki of Māori data today, we should be inspired to value this taonga more greatly.

And this brings us to another important aspect of using and protecting our data: as Māori, our concept of ownership is different to Pākehā. In Māoritanga, someone else holding the land title does not stop us talking to the mountain as though we own it, and this same concept is relevant to our treatment of data. It has been said that the more you try to hold onto something, the more you lose it, and so perhaps widespread usage is the best defence. This is an area for further consideration.

It was symbolic that we were having these discussions on the land and in the presence of that great man Hekenukumai Puhipi, who is revered across the region for his knowledge of the seas, the skies, the star systems, how to read the waves, and GPS. He was the Dalai Lama of ocean sailing around the Pacific, and his approach to protecting all the data he holds was to share it – for others to hear and interpret, so that we do not lose the kaupapa.

A final thanks to the co-hosts for creating an open space for learning about and discussing this topic; I wish I knew all this 40 years ago.

Mānuka Hēnare

CONTENT

ACKNOWLEDGEMENTS

This hui was co-designed and organised by Dr Willy-John Martin (SfTI), Peter-Lucas Jones (Te Hiku Media) and Kirikowhai Mikaere (Data ILG).

We thank the speakers for their time and excellent presentations: Lynell Tuffery Huria, Tīpene Merritt, Tai Ahu, Māui Hudson, Stephanie von Gavel, Peter-Lucas Jones & Keoni Mahelona, Kirikowhai Mikaere, Callie Corrigan, Andrew Mason & Pikihuia Reihana, and Hēmi Whaanga.

The workshop notes were compiled by Jo-Anne Hazel. This report was written by Jo-Anne Hazel and Willy-John Martin, with contributions from Kirikowhai Mikaere and Peter-Lucas Jones and the assistance of Ryan Rangiwhetu.

Finally, a warm thank you to everyone who attended and contributed their thoughts to the discussion.

1. MĀORI DATA FUTURES HUI

The Māori Data Futures Hui 2019 is the second in a series of hui planned to take place around the motu.

The first hui was in May 2018 at Te Herenga Marae, Victoria University, Wellington. This hui brought together Māori data thought leaders, iwi and hapū representatives, Māori researchers and practitioners, rangatahi, and data specialists to explore a number of questions, including:

- How do we define data in a Māori context and why does it matter?
- In a world of open government data, blockchain, big data, and Google, what are the key issues and challenges in a Mātauranga Māori data landscape?
- How do we ensure appropriate tikanga around digital guardianship, data sovereignty, data security, and respectful use?

Hui attendees were overwhelmingly positive about the opportunity to discuss all aspects of data in a Māori setting. A full report of the 2018 hui is available through the SfTI website: www.sftichallenge.govt.nz.

Hui 2019 was held near Te Aurere at the home and request of Tā Hekenukumai Pūhipi (Sir Hector Busby), an internationally recognised world leader in traditional navigation, Māori astronomical knowledge and waka building.

At Te Aurere, we focused our attention on the mechanisms of protection for Māori data and knowledge, as intellectual property (IP). While attendees discussed what the ideal future for Māori data would look like, they were also asked to consider how to protect Māori knowledge, in the context of Māori data development, so that it may be used in the right way, and by the right people, to create this ideal future.

The co-hosts were: Te Hiku Media, the Data Iwi Leaders Group (DataILG), and the Vision Mātauranga team from the Science for Technological Innovation (SfTI) National Science Challenge.

The first day at Te Aurere began with a pōwhiri before a series of presentations about Intellectual Property, Mātauranga Māori, and other related topics. These presentations continued during Day Two. To the delight of attendees, Sir Hector took our group outside to tour Te Kāpehu Whetū (celestial star compass) that he had constructed onsite. Drawing on ancient and reclaimed knowledge, the celestial star compass represents star constellations and was used to navigate the oceans and seasons.

This report first outlines some of the key ideas generated from last year's Wellington hui, before providing summaries of the presentations and ideas shared by attendees at this year's hui.

2. LEARNINGS FROM HUI 2018 AT TE HERENGA WAKA MARAE

The diagram below represents the topic domains that emerged out of discussions at the first Māori Data Futures Hui, and how those domains relate to each other.

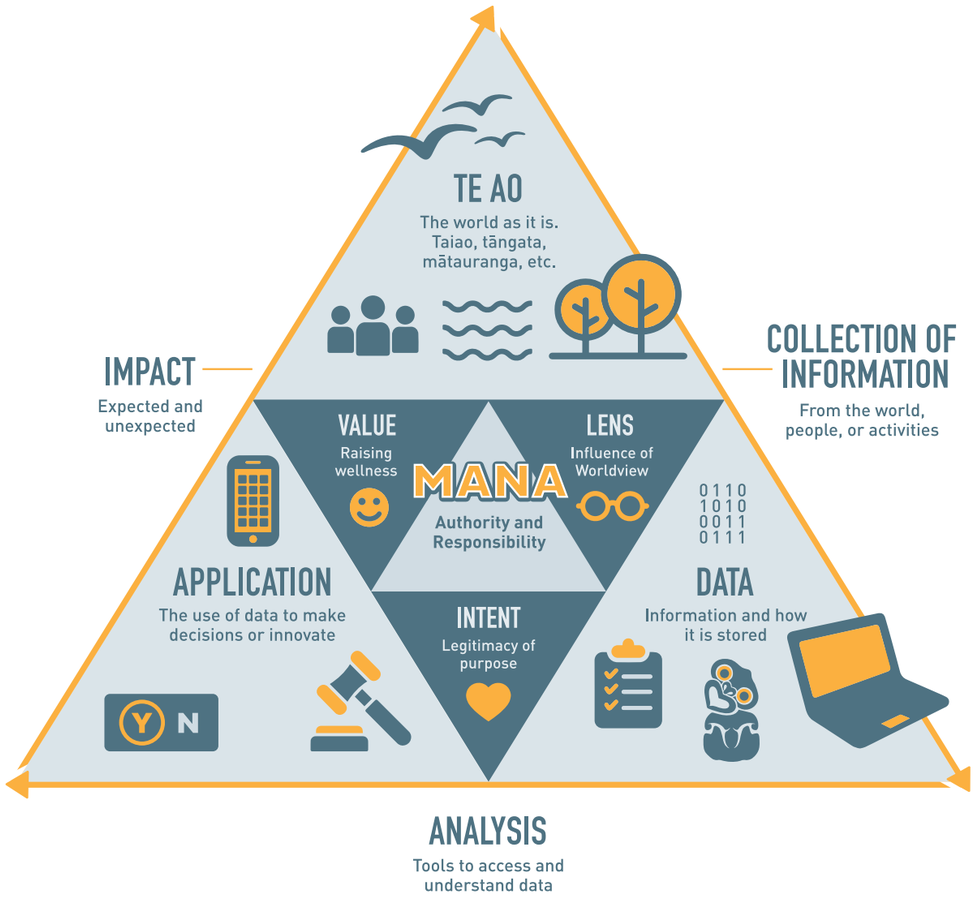


Figure 1. Te Aonui o Raraunga Māori – The Māori Data Triangle

THE WORLD - TE AO

Firstly, it was recognised that data come from, and describe, Te Ao - the world. Te Ao encompasses Iwi Māori and our relationships, including whakapapa, iwi, hapū and whānau; Māori resources including whenua, awa, maunga, moana, mātauranga; and Māori activities, including cultural, economic, educational and health activities, social interactions, where and how we live, and so on.

LENS

The kinds of information that are collected is dictated by the lens, or worldview, through which Te Ao is viewed. There was a consensus that a tirohanga Māori is the most appropriate lens, so that any information collected from Te Ao Māori can truly reflect and represent Māori. It was often raised that a Western, non-Māori lens was ill-fitting for Māori and had regularly led to misrepresentation of us. It must always be remembered that data is only useful if it is accurate and representative.

COLLECTION

One topic that was not extensively discussed at the hui was the appropriateness of how data is collected and conveyed. A discussion for future hui could be around appropriate ways, tikanga Māori, for accessing and gathering Māori data. Some questions could be: are hui and wānanga more appropriate than other methods; are electronic data collections appropriate, and if so, under what circumstances; and what are processes for collecting sensitive cultural data, or information viewed as tapu.

DATA

Once data is collected, it can be stored and encrypted in various forms. There was a consensus at the hui that data can not only be stored digitally, but imbedded within kōrero, tikanga, waiata, or art. In all cases, access to data is not only influenced by where and how data are stored, but by who has jurisdiction over the data, and who can decipher it.

INTENT

Much of the hui was focussed on why we should gain mana over our own data, and how Māori should be empowered to determine who has access to it, and why. Access to Māori data should be granted by the appropriate Māori representatives, based on the intent for which the data is to be used, and its benefit for Māori. Advocacy groups such as the Data ILG and Te Mana Raraunga are two groups attempting to push this agenda forward.

ANALYSIS

Good interpretations of data help us to make good decisions for our people and our resources. Analytical tools can help Māori and others to understand what data tell us about te Ao, and these tools are particularly important when data is complex. It was recognised at the hui that understanding the data world, the terminology, the analytics, and technologies, was an area for education and development for Māori, and that rangatahi are a vital part of that development.

APPLICATION

Data can be used to help generate new innovations, technologies, services and businesses. In this way, the right kinds of data interpreted in the right way, can lead to outcomes that are beneficial for Māori. These benefits could be financial, cultural, relational, or others. The hui clearly identified financial benefits as being desirable; however, raising Māori wellness was of the highest priority. It was proposed that this could be achieved by using data to reconnect Māori with our communities and resources.

VALUE AND IMPACT

Te Ao is changed through applied data, whether the impact is on our people, the environment, the economy, or otherwise. The ideal is that these changes be desirable, beneficial, and expected. There have been many prior circumstances where data has been used in

ways that are harmful, without consent or that have led to unintended consequences.

MANA

Mana sits at the heart of the Māori data world, just as Mana sits at the centre of Figure 1 and touches every other section. Mana considerations must be explored, understood and enacted in the world of Māori data. Mana over Māori resources in te Ao, over data that are collected from te Ao Māori, and the use of Māori data. Mana over the lens used to collect data, and why and how data are being collected. Mana over how data are analysed, the decisions that result, and the impact that data has on Te Ao.

DEVELOPMENT AREAS

As a result of the first hui, seven principles were identified for development with Māori and Māori data.

1. Raraunga mana Māori

That Māori obtain control and authority over data about themselves and their resources.

2. Raraunga tirohanga Māori

That data be understood through a Māori worldview and using language, terms and symbolisms that are meaningful to Māori – reo, whakaaro, tikanga etc.

3. Raraunga mata tini

That the many forms that constitute data be explored and recognised – digital, analogue, biological, kōrero, whakairo, etc.

4. Raraunga uara nui

That the far-reaching value of data, financial and otherwise, be explored and recognised.

5. Raraunga hiringa whakamua

That data be used in new and innovative ways to produce outcomes that Māori want, pushing boundaries while taking care not to be seduced by financial benefit alone.

6. Raraunga whakaora

That the responsible use of data leads to revitalisation and reconnection of Māori with each other, and with Māori resources, to elevate Māori wellness.

7. Raraunga whakaakoako

That education about data and data technologies be integrated with data usage and practice, and that training be made available to address the wide capability needs of Māori in data and technology.

3. HUI 2019 AT TE AURERE

Māori Data Futures 2019: Intellectual Property, explored how raraunga and Mātauranga Māori might be protected, and how Māori might start capturing the benefits of data. Presentations were held over two days. Attendees were given the opportunity to ask questions, and some of these questions and answers have been included in this report.

DAY ONE PRESENTATIONS

- Intellectual Property - Lynell Tuffery Huria, AJ Park.
- Protecting Mātauranga Māori as a Consequence of Behaviour Change - Tīpene Merritt, Victoria University of Wellington.
- Mātauranga Māori Model IP Management Plan - Tai Ahu, Hineuru Iwi Trust.
- Enhancing Māori Control of Genomic Data - Māui Hudson, Genomics Aotearoa.
- Data Ecosystems - Stephanie von Gavel, CSIRO Land & Water, Australia.
- Te Hiku Media - Peter-Lucas Jones & Keoni Mahelona, Te Hiku Media.

DAY TWO PRESENTATIONS

- Māori Data Futures - Kirikowhai Mikaere, Data ILG.
- Our Data, Our Sovereignty, Our Future - Māui Hudson, University of Waikato.
- Haukāinga Observations about Data - Callie Corrigan, Haukāinga.
- Finding Missing Māori Beneficiaries & Shareholders: An Analytics Challenge - Andrew Mason, University of Auckland (SfTI), and Pikihuia Reihana, Victoria University of Wellington (SfTI).
- The Ātea Project - Hēmi Whaanga, University of Waikato (SfTI).

"[What I found most valuable was] hearing from a diversity of people. Hearing about both practical work and theoretical frames."

INTELLECTUAL PROPERTY

Lynell Tuffery Huria. Lawyer, AJ Park.

Intellectual Property (IP) includes:

- The tangible or intangible result of some creative or intellectual activity.
- An asset that can be bought, sold, licensed, exchanged or given away.

The owner of IP has the right to prevent unauthorised use or sale of the property.

Laws protecting IP originally stemmed from the need to protect interests in commerce and trade. These laws were developed from a Western point of view, wherein: the government is viewed as the ultimate authority; property ownership is geared to individuals, not communities; rights are granted only for a finite period of time; and anything that has been shared in the public domain can subsequently be used by anyone, unless formally protected.

Lynell Tuffery Huria.

In contrast, Mātauranga Māori is governed by a different set of rules. Authority over this knowledge comes from whānau, hapū, iwi, tūpuna, tikanga and kawa. Certain members of the group will hold knowledge and pass it on when appropriate to do so. Importantly, even though Māori often share their knowledge freely, it does not mean they give up all rights to it. Māori remain kaitiaki of that knowledge. And in the Māori world, rights and responsibilities last forever.

There is obviously a clash between Mātauranga Māori and Western IP practices. Current, Western-based IP law is unlikely to protect Māori rights and interests.

So, how do we negotiate these very different world views?

One way is through educating researchers who are using knowledge derived from Māori, taonga species or Mātauranga Māori, to understand the issues so they can ensure Māori maintain control over their taonga. This is a good start.

Another way is for businesses to think critically about their relationship with Mātauranga Māori:

- Do you use Mātauranga Māori or cultural heritage?
- Is your use consistent with kawa and tikanga?
- Do you have consent from kaitiaki?
- Are there practices and procedures you need to put in place to keep information a secret, protect Mātauranga Māori and cultural heritage and/or maintain IP rights?

Businesses can also lobby for change if the IP system is not protecting Mātauranga Māori or cultural heritage.

Q. Do stories have copyright?

A. This is a good example of the clash between Western IP and Mātauranga Māori. The story may have been around for generations, but if someone comes along now and makes some adjustments to it, the new way of telling the story becomes copyrightable.

Q. There are some traditional forms of knowledge, for example, a saying [whakatauākī] of a particular group or individual. We often attribute a source to these phrases. Could we tighten up some definitions to create a new and accepted body of knowledge [that could then be protected using current IP law]?

A. Acknowledging the source of a whakatauākī could make it copyrightable, but this would be time-limited under the current IP system. This system doesn't protect our knowledge long-term.

Q. We have a long history of storing our knowledge within our own systems, such as tukutuku and kanikani. Now we are storing our data in someone else's storage place - and possession is nine-tenths of the law.

A. Yes, we need to be more careful with where our data is stored, how long it is stored, and how it is used. Every time we give something over, we should ask: What does that mean? What rights am I giving up? What happens on the other side?

"Every time we give something over, we should ask: What does that mean? What rights am I giving up? What happens on the other side?"

PROTECTING MĀTAURANGA MĀORI AS A CONSEQUENCE OF BEHAVIOUR CHANGE

Tīpene Merritt. Research Advisor (Māori), Victoria University of Wellington.

MĀTAURANGA MĀORI AND THE LAW

In 2011, The Waitangi Tribunal released its report into the Wai 262 claim, Ko Aotearoa Tēnei ('This is Aotearoa' or 'This is New Zealand'). In this report, the Tribunal recommended foundational changes to government policies and laws affecting Māori culture and identity.

The report has helped us define Mātauranga Māori. Mātauranga derives from mātau, the verb 'to know'. It can be translated as 'knowing' or 'knowledge' and is also a reference to how things are known. Mātauranga Māori not only refers to Māori knowledge, but also to the Māori way of knowing.

Mātauranga is a Taonga, and as such is guaranteed protection under the Treaty of Waitangi. While it should be safe from misappropriation or offensive use, in reality, Mātauranga Māori remains either unprotected, or poorly protected by the law. Mātauranga Māori is more wide ranging and holistic than 'IP' (in the Western sense), so we have to ask whether the law is the best mechanism for protecting our Mātauranga. Should we get more creative?

The law as it stands is incapable of fully protecting Mātauranga Māori because it was not designed to do so. This is despite an ongoing obligation on the Crown to ensure that all law is Treaty of Waitangi compliant.

Figure 2: Western law was developed by and for non-Māori. It is about rights rather than duties and obligations. It is about ownership rather than guardianship. Tīpene Merritt.

There is one commonality we might exploit, however: Tikanga and Law are both based on Behaviour. Can we increase protection and reduce the misappropriation and offensive use of Mātauranga through encouraging behaviour change?

TE WHARE MĀTAURANGA AS A SOLUTION

A new approach could envisage Mātauranga as residing in whare (actual and metaphorical), as opposed to a more obvious strategy of trying to define individual instances of things that can be classed as Mātauranga. Can we create a simple framework to help those with little or no understanding of Mātauranga, perhaps Pākehā and those new to NZ, to understand this?

There is currently no single kaitiaki for Mātauranga Māori. Given the findings of the WAI 262 report, would it be useful to form a commission to act as a nationwide kaitiaki of Mātauranga Māori Intellectual Property? This would require careful consideration so that we don't end up with either no change, or something worse than the status quo.

Q. If law is not the compatible mechanism to protect Mātauranga, what might be?

A. I recommend a multipronged approach. We need a dynamic solution to a dynamic problem. The law has a role, as does education, researcher training, and the work of groups like the Kāhui Māori within SfTI, for example.

"Mātauranga Māori is more wide ranging and holistic than 'IP' (in the Western sense), so we have to ask whether the law is the best mechanism for protecting our Mātauranga."

MĀTAURANGA MĀORI MODEL IP MANAGEMENT PLAN

Tai Ahu. CE, Hineuru Iwi Trust.

As we have already heard, Western IP law is not well placed to protect mātauranga Māori. It is a blunt instrument that has specific purposes. Some examples of the shortfalls are:

1. There are not typically any IP rights over 'information', 'knowledge' or 'mātauranga' per se, only in expressions or manifestations of these types of information.
2. IP law protects the rights of authors or creators of works, not necessarily kaitiaki who are often a broader group.
3. IP law grants creators the 'right' to exclusive use, while kaitiaki have a 'responsibility' to uphold and protect the mana of taonga.
4. IP rights are individually or personally held. In contrast, kaitiaki responsibilities are collectively owed.

When it comes to research, there is tension between the kaitiakitanga responsibility to protect mātauranga and the Western research model which seeks to understand and derive societal benefit from data. How can we be innovative with mātauranga in ways that encourage creative knowledge and innovation while also providing protection?

The non-response[1] from government to the recommendations in the Wai 262 Report, and a piecemeal approach to protecting mātauranga Māori, suggests that the only way for us to address the current ad hoc protection of mātauranga is to take action ourselves. There are many options available in the law of contract, because the terms can be wide ranging. Also, other concepts such as informed disclosure and consent are important principles. For example, creating a repository of knowledge is one avenue worth further exploration. Such an initiative could be co-funded by the Crown and iwi, and allow Māori to work things out for ourselves, rather than having rules created by others and then applied to us.

[1] On 28th August 2019, Minister for Māori Development, Hon Nanaia Mahuta announced the Government's first formal response to the Wai 262 Report: Wai 262 – Te Pae Tawhiti.

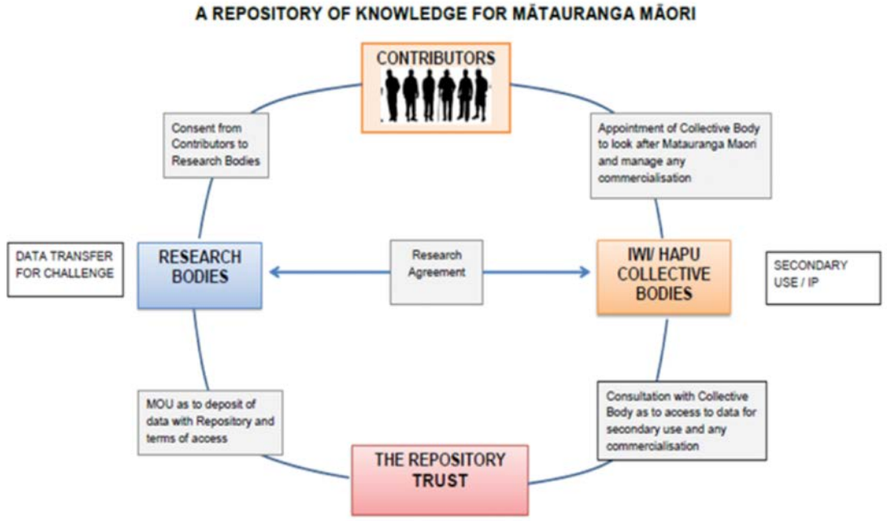


Figure 3: Example of a Repository of Knowledge (Repository Project, Sustainable Seas Challenge)

To date, conversations around research and data have tended to focus largely on protection. For example, creating MOUs agreeing to acknowledge the importance of mātauranga Māori and collective kaitiaki, where the issue of prior and ongoing (secondary use) consent is addressed, and where the tapu of mātauranga Māori is protected.

But we also need to start talking about how to maximise benefits, and focus on ongoing relationships. Perhaps advocating for widespread use of steering groups to provide guidance on mātauranga Māori use would be good practice moving forward.

Q. Te Hiku Media has carried out many, many interviews. There are different levels and types of knowledge, different levels of 'ownership', case by case. The word 'iwi' has shifted in meaning over time, so too have aspects of kaitiakitanga. Haukāinga at our radio station are both the researchers and the contributors, gathering information for future generations and innovation. We all want to look after our own things in our own ways depending on our own traditions, so is a single repository appropriate? For example, in this part of the country, the average annual income is $21,000, and so we are very protective of potential benefits.

"How can we be innovative with mātauranga in ways that encourage creative knowledge and innovation while also providing protection?"

A. A model is useful even though it may be enacted differently in different situations. This is really about enabling us as Māori to make decisions for ourselves. I'd like to create a model that offers back the mana of all Māori, and recognises local differences too. For example, there is a risk that if you don't have all the necessary information, you may unknowingly sign an IP agreement that minimises the benefit to you. A model might guide you in advance, to help you avoid that.

ENHANCING MĀORI CONTROL OF GENOMIC DATA

Māui Hudson. Genomics Aotearoa.

Everything in the environment is a taonga, but there are different levels of specialness which means we treat things differently. Data is no different. We need to work out the specialness boundaries for data so we can determine how best to act. We don't want to stop the data from being used, and we don't want to focus too much on protection alone. Within this context, how can we ensure the value of genomics can be captured by us?

Genomics Aotearoa provides funding for researchers to sequence some of our taonga species; my involvement has been to provide some Māori guidelines for genomic research and data management. For example, biorepositories collect, process, store, and distribute biomaterial for scientific investigation, including for secondary uses after the initial sequencing has been completed. Te Mana Raraunga has asserted, based on Te Tiriti, that tissue is a taonga, data is a taonga, and that these taonga need to be managed in certain ways.

Tikanga is about how we use things, plants for example, and how we stop others from using them. There are different levels – there is how we use things at a local level for ourselves, but we also have to think more widely about how companies might commercialise a plant on a much larger scale. For example, there may be a microbe living on the kawakawa that has special properties which account for the plant's medicinal value. We don't necessarily have a word to distinguish that microbe from the plant itself. Can the microbe be a taonga even though we've always assumed that the particular taonga properties had come from the leaf? What guidelines do we want to put around use?

We should recognise that there are different kaitiaki for different resources:

- **Primary** - Aunty looks after the plant in the field and is the kaitiaki
- **Secondary** - The tohunga uses the plant in medicine and is the kaitiaki
- **Tertiary** - The scientist investigates the microbes living on the plant

Once we go down to the level of genetics, protection of Mātauranga becomes even more complicated. Part of Genomics Aotearoa's work is to look at how we manage data appropriately. We have to be smarter than others to leverage the extra influence we need.

GENOMICS AOTEAROA (GA): MĀORI DATA REPOSITORY

Many countries are now regulating data sharing, and in line with this, GA is proposing a managed access approach for researchers and publishers, rather than allowing the data to be a public resource. Researchers would make applications to access data from the GA repository, and access and storage would be managed within a Māori Values Framework.

The Māori Values Framework is a 'living' approach to data management. It would be facilitated by the Kāhui Māori of Genomics Aotearoa, and decisions would be made with reference to the Framework. This initiative sits comfortably beside existing ethical frameworks, including: Te Mata Ira Guidelines for Genomic Research with Māori, and He Tangata Kei Tua Guidelines for Biobanking with Māori. Consents and permissions of tangata whenua, authorities, and genomic sample originators would be sought.

Q. The government has taken control of determining what exactly Mānuka honey is. Māori have been kept out of that conversation. We don't have a strong enough voice - and once they have made their determination, we don't derive any particular benefit. At the same time, we are capturing the value of kiwifruit, which was derived from Chinese gooseberry. Are we treating other people's taonga as we would want them to treat ours?

A. IP rights apply to a small subset of Pākehā knowledge, so we shouldn't expect IP rights to be suitable for all Māori knowledge. That's not where the solution lies.

Q. This becomes a power game: you're holding whakapapa. How do I ensure I have the ability to access my own whakapapa when this grows too big?

A. This still has to be worked through. We will need to establish the provenance of data to guide access to that data as well as access to subsequent benefits.

Q. How do we set this up and manage properly given the short time frame?

A. We have a small window and we have support from genomics researchers, but if nothing happens within the window, things will move on without us. Up until now, sequencing has been progressing through universities and CRIs with very little protection of the data/tissue. Time is of the essence and we will work out the details as we progress.

DATA ECOSYSTEMS

Stephanie von Gavel. CSIRO Land & Water, Australia.

When we think about data, we can consider it as existing within ecosystems. As data moves through different parts of an ecosystem, there are barriers to be navigated for data to move to the next stage, and these barriers must each be addressed before data can flow efficiently and finally be used to do or make something that has an impact. These barriers might be social (e.g. ethics, attitudes and social licence), institutional (e.g. legislation, standards, governance), economic (value of data & business models) or other barriers.

We might also think about data as part of a supply chain. Data flows from creation and collection, then is supplied to others and shared, analysed and visualised, experimented upon and used to plan and make decisions.

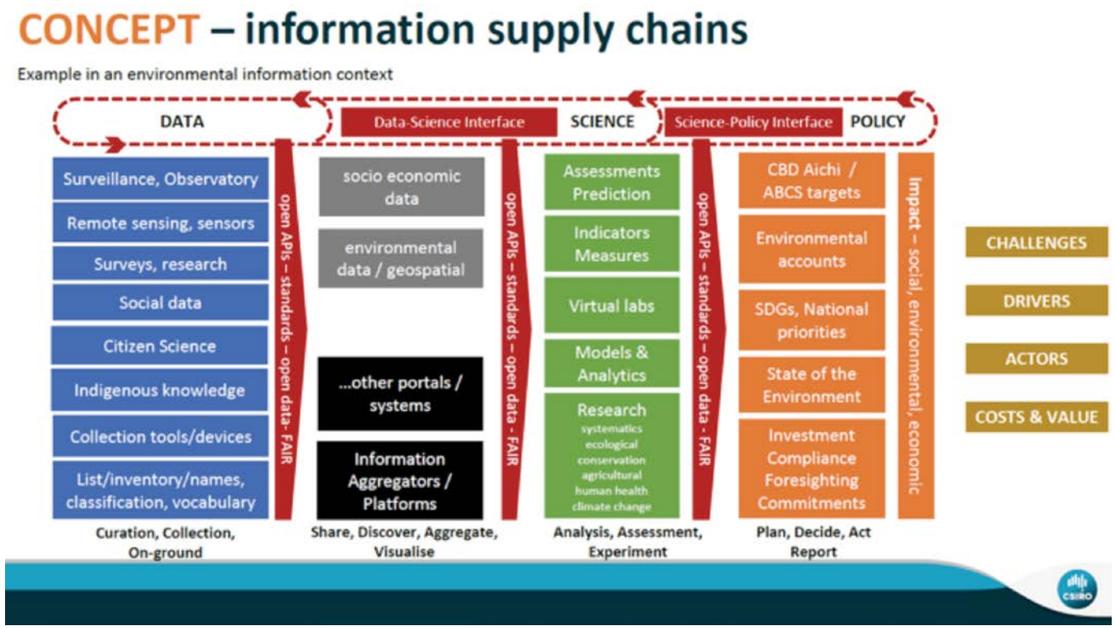


Figure 4: The Information Supply Chain

An important consideration is that data usually has 'transaction' costs at most stages. It is costly to collect, store, disseminate, and use data. This has implications for what people can do with data, and who can use it. Different people or organisations bear these costs in different ways depending on where and how they operate along the information supply chain.

The value and costs of data mean it can also be thought of as existing in a data marketplace. There are data providers, who have the resources to collect or hold data; data users, who may or may not be willing to pay to access or use data to make decisions or to provide a service; and data infrastructure providers that provide the software and information platforms for data to be shared and used.

An example of a publicly funded data marketplace is the Atlas of Living Australia (ALA), funded by the Australian Government. The ALA is an open infrastructure on Australian biodiversity, containing over 81 million data records. It exists to enable collaboration in biodiversity and environmental research and to empower science, industry and the general public to improve their understanding about biodiversity and support decision making. The ALA also provides platforms for the management and sharing of Indigenous ecological knowledge. The ALA doesn't own the data, instead it is an open marketplace where information is aggregated from many sources. Users can create apps that draw on ALA data through open APIs so that this data can be used for research, educational or other purposes.

Q. How does the ALA aggregate information that's owned by a number of different parties and meanwhile preserve any means of control over the data? Once the data is uploaded, doesn't ownership become irrelevant?

A. This is managed on the technical side of the ALA, and through licensing arrangements, particularly using Creative Commons. The ALA points back to the original owners. It's expensive, and is currently funded by the Australian government rather than end users.

TE HIKU MEDIA

Peter-Lucas Jones & Keoni Mahelona. Te Hiku Media.

Te Hiku Media is a charitable media organisation, collectively belonging to the Far North iwi of Ngāti Kuri, Te Aupōuri, Ngāi Takoto, Te Rarawa and Ngāti Kahu. The station is an iwi communications hub for radio, online TV and media services.

OUR PURPOSE

Our elders wanted us to have a Māori radio station to ensure support for the language in the everyday world rather than Te Reo being more of an academic experience. Māori language revitalisation is a core focus of Te Hiku Media, as are archiving and training. Our Vision and Mission reflect this, and were confirmed by a hui of kaumātua and kuia, and other native speakers of Te Reo Māori at Māhimaru Marae in 2013.

OUR VISION

"He reo tuku iho, he reo ora."

Living language transmitted inter-generationally.

OUR MISSION

"Whakatōkia, poipoia kia matomato te reo Māori o ngā haukāinga o Te Hiku o Te Ika."

Instil, nurture and proliferate the Māori Language unique to haukāinga of Te Hiku o Te Ika.

We also decided we wanted to build our own repository, so we sought permission from our kaumātua and they said, "Yes." So, we started putting some of our own content online.

Kaitiakitanga is a key principle for Te Hiku – we need to be clear about who we are responsible to. A show will usually have a director, but we are led by our people... and there are many, many instructions and requests! It was vital to develop trust with our 47 marae; we had to hui with tātou so that mātou had the mandate to get on with the mahi. Now, there is an expectation that the radio station will act responsibly.

"When we thought about the implications of putting our content onto YouTube, we realised that wasn't a good idea as YouTube would have rights over our taonga."

OUR OPERATION

We did live streaming before Facebook did by using iPhones that streamed back to raspberry pies (computers). We had limited resources so had to be innovative and use what was available, and we were able to call on some tech expertise to get that done. Since we have moved onto the digital platform, there are more than a million visitors to the website, and this includes our relatives in this region, but also those further afield who come to listen to our whare kōrero. This is how we know we're having an impact.

Te Hiku adds to the archive on a daily basis through interviews and streaming events. We want to secure the economic opportunity that this data has the potential to provide. Some resources are used for Te Reo lessons, for example, interviews have been manually transcribed and then details pulled out and recorded, including idioms, which helps students learn.

OUR CHALLENGES

When we started, WordPress and YouTube were the two important tools for setting up a website. But when we thought about the implications of putting our content onto YouTube, we realised that wasn't a good idea as YouTube would have rights over our taonga. So we had to build our own platform. Ultimately, we've created a website that's also a repository, and the information can also be accessed through an API. This level of functionality flowed out of our decision to build our own platform.

As part of our aim to create a learning tool, we wanted the audio to be transcribed into written Māori. We relied on volunteer university students who found this task hugely difficult, and we had to check everything, which was very time-consuming. To overcome this, we thought we'd teach computers how to understand Māori.

We were able to access funding because of our prior work, but it was still somewhat difficult. Our first challenge was a data challenge. Speech recognition already exists, and there are the base spoken English datasets already available for machine learning, but there wasn't the same corpus of Māori utterances. And it is not the right thing to put a big dataset of Māori utterances into the public domain anyway. Te Taka Keegan gave some guidance, and we also accessed Te Ara and other resources, and ultimately we created an app to gather this data.

There was concern that we wouldn't obtain the datasets we needed, but we follow our own style, tikanga, and timelines which are different from professionals who have tighter timelines. In the first instance, what enabled us to get a large dataset quickly was the trust we had already built in the community. When we went out to say this is the data we need, and we will be kaitiaki of that, people trusted what we said and so they helped. A social media campaign also helped. We were able to gather 316 hours of recorded Te Reo over 10 days, and build our speech recognition software as planned.

Q. Who owns this data?

A. There is a difference between Western ownership and indigenous guardianship. We haven't talked much about 'owning' the data, but we live in the Western world, so if we don't own it, how can we secure the benefits of it?

Q. Is all the data in Māori?

A. We have almost 400 hours of utterances now. This provides a kind of natural protection because Pākehā can't understand unless they master the language

Peter-Lucas Jones & Keoni Mahelona present at the hui.

Kirikowhai Mikaere discusses Māori data sovereignty with hui attendees.

MĀORI DATA FUTURES

Kirikowhai Mikaere. Data ILG.

The Data Iwi Leaders Group has been doing a lot of thinking in the data space and advancing mana to mana discussions for iwi Māori data with the Crown. They bring solid expertise to contribute to the hui.

WHAT IS MĀORI DATA?

- **Data from Māori** – data from Māori individuals, collectives, organisations and businesses.
- **Data about Māori** – data collected about Māori, from others, and often used to describe or compare Māori collectives & individuals with others.
- **Data about Māori resources** – data that emerges from the environment that we have connections with, often from research on Māori resources.

Why is Indigenous Data Sovereignty Important? Access and Use of data contributes to transforming the lives of our people. Governance and Control over data ensures it is relevant and responsive to our needs.

"Sovereignty as tribal nations was given to us by the Creator. It is sacred. Data to exercise our sovereignty is also sacred"

Tribal Leader, USA

Work in this space involves looking towards a future where people are enabled.

The Data Iwi Leaders Group (Data ILG) was established by the Iwi Chairs Forum at Waitangi in February 2016. It was established in response to the increasing need for iwi to better harness the potential of data to enable our development and to advance the recognition of iwi-Māori rights and interests in data with the Crown. The Data ILG has identified iwi data priorities in its strategy set around the 'ITI Framework' (Information, Translators, Infrastructure), which guides the objectives and goals as well as ensuring a focus on what is most important:

Kaupapa Matua (purpose)	Ngā Whāinga (Goals)
Our Shared Kaupapa Focus and drive our strategy **What:** Full, free access and control over data about and for iwi **Why:** For data to empower our development as Iwi **Our Shared Values** Guide and execution **Rangatiratanga**: Our right to self-determine what happens with our data. **Pukengatanga:** Utilise expertise to help make smart, informed decisions. **Kotahitanga**: He painga mo te katoa. Collaboration and working together for the greater good of all Iwi. **Kaitiakitanga**: Our guardianship, protection and the ability to improve outcomes for our people and place, informed by data.	**Information** Access and governance Iwi data **Translators** Enhance and build our capability to engage, use and design data **Infrastructure** Future-proof the information infrastructure for Iwi data

Figure 5: The ITI Framework

Despite the work already being done, people are at different stages of thinking and understanding of this area. To help explain the language of the field, here are some of the basics terms (albeit, this is still an evolving area):

- Data Sovereignty typically refers to the understanding that data is subject to the laws of the nation within which it is stored.
- Indigenous Data Sovereignty is about the rights of a nation (including tribal nations) to govern the collection, ownership and application of its own data, no matter where it is stored.
- Māori Data Sovereignty recognises the right of Māori to access, use, and have governance and control over Māori data.

There are many reasons why Indigenous Data Sovereignty is so important. For example, there is currently a great deal of data collected about Māori. Without our involvement in the design phase, it is usually captured in a way that is not relevant to us. We want the data to reflect us, and in order to do that, the right kinds of data have to be collected. Further, data is often collected to help government deliver their services, in other words, for their purposes. When it is reported, the data tends to tell a story of deprivation and desperation using statistics about Māori. Ideally, we want more of the positive data related to and measuring progress towards our own aspirations. For this to occur, we need to be integrally involved in the governance of data.

We must recognise the importance of data and treat it accordingly as something very precious:

Ahakoa he iti he pounamu

(Although small, it is precious)

OUR DATA, OUR SOVEREIGNTY, OUR FUTURE

Māui Hudson. University of Waikato.

The Data ILG and Te Mana Raraunga are working alongside each other to assert and gain recognition of the rights we have to our data, which is similar to our land rights.

Everything in the environment is a taonga, but there are different levels of specialness which means we treat things differently, and this includes data. Some data is somewhat removed from Mātauranga (e.g. doctor's notes), while other data is essentially Mātauranga (e.g. whakapapa). We treat these two types of data differently.

As with the treaty settlements, we all have overlapping interests and plans, and the same applies to data. Our approach is to think about sharing data with other iwi, but how do we do that? When it's your own Mātauranga you can do anything you want. But when you're trying to influence someone else whose data you have an interest in, a different approach is required.

In terms of capitalising on future opportunities, it's very important to have access to and control over the data as it impacts on our ability to access resources. Organisations who currently collect, store and use data about us are a good place to start; agencies already have their own frameworks for safe use of data, and this is what Te Mana Raraunga would like to influence too.

We have considered the concepts that relate to Mātauranga data and how they are similar or different when thinking about non-Mātauranga data. In particular, we are looking at: sensitivity (tapu/noa); data use in terms of integrity (tika/pono) and authenticity (mauri/wairua); and the data users themselves – what mandate they hold (whakapapa/pūkenga), and what stewardship role they will take (kaitiaki/wānanga). On this basis, we have started developing a framework for safe use of data with Statistics NZ.

"Ideally, we want more of the positive data related to and measuring progress towards our own aspirations."

The IDI (Integrated Data Infrastructure) Tikanga Framework is based on a points system. We are starting to test it, but it will only be applied if it is consistent with the Māori Data Governance Framework being worked on alongside the Data ILG.

When data requests are received from researchers, a points system (40 possible points) is applied to decide if access will be granted. This means that if a project gets 10-29 points (orange) the researchers are invited to improve their project. A red (0-9 points) project request for data is rejected. Access to data is only approved for green (30-40 points) projects.

Safe people	Pūkenga	Whakapapa	Scores /4
Researchers can be trusted to use data appropriately	Researchers have experience researching Te Ao Māori topics	Researchers have existing relationships with the communities the data comes from (2pts)	Pūkenga = X/2 Whakapapa = X/2
Safe Projects	Pono	Tika	Scores /6
The project has a statistical purpose and is in the public interest	Level of accountability to community of research is explained (3pts)	Use of data will add value to Māori and improve outcomes for Māori and NZ (3pts)	Pono = X/3 Tika = X/3
Safe Settings	Kaitiaki	Wānanga	Scores /10
Ensuring the data is secure and preventing unauthorised access to the data	Decision-makers of the project are identified and Māori are involved in decision-making (5pts)	Institutions have established systems, policies and procedures to ensure data is used in culturally appropriate and ethical ways (5pts)	Kaitiaki = X/5 Wānanga = X/5
Safe Data	Wairua	Mauri	Scores /10
Personal information is not identified	Māori community objectives align with project research objectives (5pts)	Level of transformation of the data from its original collection purpose is explained (5pts)	Wairua = X/5 Mauri = X/5
Safe Output	Noa	Tapu	Scores /10
Stats NZ results do not contain identifying results. Outputs must be confidentialised.	Accessibility of data and awareness of the impact on Māori (5pts)	Sensitivities in the use of data are identified including privacy issues for individuals and communities (5pts)	Noa = X/5 Tapu = X/5

Figure 6: Proposed IDI Tikanga framework

Q. Are you just talking about government-collected data? What about Universities, for example, how would you get that data?

A. We can make the argument that our data is sitting in all types of organisations, but the easiest place for us to start this conversation is with government, because of the Treaty. We are trying to start influencing the ways they give access to our data. We have also found some private companies interested in this. But it is early days, and we need to create a foundation and some practical examples as we're trying to influence others. The hope is that this work with government will spread into other organisations.

Q. Where are we heading with all this data? Are you talking about money, or something else?

A. The world is heading in a direction of exploring how to create value/money from data. Having better access to our information ourselves can create cultural value for us. Once that's in place, you can probably think of other ways of creating value. We all want things to be local because of the mana attached – there is cultural value to that, but a different kind of value is created out of collective/aggregated large sets of data.

"The hope is that this work with government will spread into other organisations."

HAUKĀINGA OBSERVATIONS ABOUT DATA

Callie Corrigan. Haukāinga.

Haukāinga are kaitiaki of data, and there are lots of us in the room today. I observe that the narrative and language we use at these types of hui can either connect us to, or separate us from, data and the story it tells. I consistently ask myself, "How does this kupu relate to me?" So I thought I'd share some of my whakaaro and observations.

Callie Corrigan.

OBSERVATION 1 – START WITH TE AO MĀORI

People position themselves at different points on the continuum, in this case in terms of expertise around both data and Mātauranga. But there is a tension here today because the two worlds don't quite meet. Kaimahi Māori in this space are often trying to align Māori whakaaro to Pākehā data constructs, putting our ideas into boxes. But who are we doing this for? If we do this, we are starting to separate and disconnect our thinking. However, as Māori, we know that the richness and strength in our thinking lays as a collective people with interwoven whakaaro, not singular voices. What are the long term repercussions? I understand people are doing the best they can with the capacity of Māori within this sector, influencing Māori thought to this space. But within our own spheres of power in data, we need to start in Te Ao Māori. If we are trying to contribute to a data world for Māori, we should start mai Te Ao Māori, rather than putting our concepts into Pākehā boxes.

OBSERVATION 2 – DATA IS A REO WITH 'CONNECTION' AT ITS CORE

I often get lost with this kupu 'data'. My understanding of data is that it is a reo. It is a reo of nama, it's a reo of kupu, it's a reo of taiao, it's a reo of pūrākau. And for us, te reo is a taonga.

As with any language, patterns emerge with data that take us on a journey. From a pū, to a kupu, to a rārangi to a pūrākau. If I understand those patterns, like the tukutuku around the whare, my ability to communicate will be sharper.

Data has a beginning and from that, it has whakapapa. Data becomes a taonga if its whakapapa, its connection, its creation, its relationships and its environment, connect to our people and our knowledge or taiao as Māori. The connections that data provide to our people mean we are kaitiaki of this taonga.

OBSERVATION 3 – KAITIAKITANGA OF DATA IS A SIMPLE CONCEPT

I don't think the kōrero around the kaitiakitanga of data needs to be complicated. For example, Peter Lucas will be held to account if he damages the mana of the data; the nannies will growl at him at hui if he does anything to takahi (belittle) the mana and mauri of that reo of data. The implications go far beyond him as an individual, because they will also apply to his whakapapa and whānau. Don't complicate it. There are inherent roles of kaitiakitanga. As kaitiaki, we can either whakamana (build the mana) or takahi the mana of data in multiple facets. And it's that uncomplicated.

OBSERVATION 4 – LOCAL KAUPAPA V GLOBAL KAUPAPA

A challenge in the conversations about data is the tendency to focus on specific points on a data journey. It is dissected and analysed in isolation by the skilled individuals who have that specialised knowledge, but this obscures the whole knowledge journey and our intentions within it. As haukāinga, we often don't have that luxury to just look at one point. We have the responsibility and privilege of the whole journey. Connect those of us who see across the journey with those of us with skillsets at points of the journey.

We are kaitiaki of our own stories, and we have our own kawa and tikanga to manaaki our own data. Of course, as we move geographically wider there are naturally different ways of looking after data. That is, if we move from Ngāti Kahu to Ngāti Kahungunu we have whakapapa to support our kaitiakitanga processes.

Thinking about Tīpene's earlier presentation about using the whare as a metaphor for storing data, I wonder if the pātaka (storehouse) may be a better representation. Acknowledging Hauiti Hakopa, I say this because a pātaka has protections to stop rodents entering, rather like encryptions, rather than the whare where there are no barriers. There are also mechanisms to communicate what is within and how to access it. This is simple but fits well.

Finally, as a haukāianga, my wero (challenge) to 'data sharpians' in this space is that we don't have to 'flashinify' this kaupapa so much that we disconnect our own from this taonga. Start with our own mātauranga and be authentic to who we are as we contribute to and develop this space.

FINDING MISSING MĀORI BENEFICIARIES & SHAREHOLDERS: AN ANALYTICS CHALLENGE

Andrew Mason. University of Auckland (SfTI). Pikihuia Reihana. Victoria University of Wellington (SfTI).

This SfTI research was created to design smart analytics tools to address the challenge of Māori succession. Several factors are at play here, including the shared ownership structures Māori are commonly party to, and the difficulty of keeping track of the growing number of descendant beneficiaries over time.

The current project is a partnership with researchers from the Victoria University of Wellington and the Parininihi ki Waitotara (PKW) Incorporation. PKW has around 10,300 shareholders, 55% of whom are 'missing' for a number of different reasons. These missing shareholders are collectively owed over $4.6M in unclaimed dividends. Trying to find these people has to date been a manual process; we are creating new data science to help make this more efficient.

Our methodology is underpinned by tikanga that reflects the often sensitive nature of this task. PKW's historic records are more than just shareholder lists; they are a Taranaki taonga that we recognise and respect. Every day our software scans recent death notices looking for missing shareholders. These death notices don't just provide us with data, but refer to tupuna that we acknowledge by outputting a karakia gifted to us by Mitchell Ritai (General Manager - Shareholder Engagement, PKW):

Rere ki uta	Fly inland
Rere ki tai	Fly coastward
Tau mai te manu	The bird settles
Pītakataka ki to pae e	And flits about on its perch

Karakia. Mitchell Ritai, PKW

On the technical side, we have taken the time to understand and respond to the data (messy and incomplete) and the cultural landscape. We have taken four aligned tracks:

- **Smart algorithms for matching names from multiple sources**

A big challenge was finding a way to match different name versions (often using various combinations of Te Reo and English names) associated with the same person. Mathematical optimisation, fuzzy word matching and transcription-error probabilities have all been applied and new algorithms developed.

- **Software to search public records for missing PKW shareholders**

As well as scanning death notices across multiple publications, we also draw on public information from Māori Land Online, the National Pānui of the Māori Land Court, and other Māori Land Court records.

- **OCR software to access names in historical public Māori Land Court records**

Standard Optical Character Recognition (OCR) software was unable to decipher old records due to poor print quality so customised algorithms were developed for the task.

- **Algorithms to 'infer' new information from data**

Inference algorithms were developed to analyse the large amounts of data and complex relationships evident across our data sources so that we can find the 'most likely' person matches.

Q. I'm interested as a Māori landowner – what is the error rate of your model? We've had situations where people with the same name have inherited land in error.

A. We will probably never know the truth – all we can do is pass on suggestions. Maybe in the future when our algorithms improve, we can be more sure.

Q. On the question of IP: the algorithm developed is specific to kaupapa Māori. Will you look at protecting it in some way?

A. The algorithms are reasonably general, but the data they are working with is sensitive. We still haven't decided the best way to release the algorithms, but at this stage the plan is for the software to be open source rather than commercial.

"Our methodology is underpinned by tikanga that reflects the often sensitive nature of this task."

THE ĀTEA PROJECT

Assoc. Prof Hēmi Whaanga explaining the Ātea Project.

Hēmi Whaanga. University of Waikato (SfTI).

This SfTI Spearhead Project grew out of a small idea from the SfTI 2018 Mission Lab. At that workshop, Rikirangi Gage shared a whakaaro:

What if in 200-300 years' time I was able to be a hologram and my mokopuna could sit there and talk to me and I could explain, for example, how the Star Compass worked. Wouldn't that be awesome!

Our task was to think about how we would lay the foundation for that to happen based on Māori principles.

Our purpose is to create Ātea: a virtual digital space that uses our own protocols in which Māori knowledge can be created, articulated, interpreted, interrogated, and built. It is about creating pathways for our people, especially our children, to move successfully into the future. We envisage giving this tool to you in 5-10 years.

Ātea is a collaboration that involves a multidisciplinary team. Based throughout the country, it includes academics, industry and community organisations such as Te Hiku Media and HIT Lab NZ. At this stage, we are building relationships and negotiating the IP agreements (for example, with Te Hiku) which is not an easy task; but we hope people like Lynell Tuffery Huria and Kirikowhai Mikaere will help with this side of it.

This diverse team of associates has been chosen purposefully so that we can conduct impactful research that brings together experts in artificial intelligence, artificial realities, machine learning, indigenous data sovereignty and digital repositories, as well as Māori industry partners, tohunga, iwi, rangatahi and other collaborators, through a kaupapa Māori approach.

We have divided this research into six interlinked work packages:

- Ātea Core System
- Reo AI presence
- Telepresence
- Tikanga
- Marae Ātea
- Web

Q. Wairua requires a different whakaaro to the man-made world. How do you create a new world outside of Pākehā funding?

A. Ātea is a space that you can build, from a Māori base, outside the current realms. We have a group of advisors that are exploring questions such as: does an AI have a wairua or a mauri? The thinking is all based on our own data, including how you give and take information, and that has wairua.

Q. It will take courage. Kia kaha.

A. Thinking about our navigators - when the tech allowed us to take that final step, it was our belief that made us launch the boat. It takes visioning.

Attendees tour Te Kāpehu Whetū. Image courtesy of Te Hiku Media.

4. WHAT DOES THE IDEAL FUTURE LOOK LIKE FOR MĀORI DATA?

Attendees were invited to break into smaller groups to discuss what the ideal future for Māori Data looked like to them. Several important themes emerged.

Underpinning these themes were some general comments about what would underpin the ideal future. For example, Māori data would be recognised as a taonga under Te Tiriti (and with reference to He Whakaputanga), and this would guarantee tino rangatiratanga over this data. But the point was made that this is a newly discovered taonga: he taonga hou. When we kaitiaki a new taonga, we have an obligation to use it wisely - we cannot waste it because if we do nothing, it loses value, its life force will be destroyed.

"It's interesting when you think about it. All the taonga of our ancestors, by and large, were created by Rangi and Papa; but we've reached an age where humans are creating the taonga to go with what the natural world has done."

The ideal future for Māori would be founded through a 'by Māori, for Māori' approach, ensuring we are able to determine the how and the why around data. In particular, this means taking action that stems from Māori principles rather than trying to meet our needs using Pākehā-created tools, rules and systems.

Another thread that ran through this hui was the importance of marrying the technological with the human. This was encapsulated by one group in two questions:

- Q1 How does technology enable our ideal future e.g. block chain, machine learning, etc
- Q2 How do our artists reflect data in a way that is human-oriented e.g. infographics, etc

This breakout session also revealed many of the questions that still remain about achieving an ideal future for Māori data.

IN OUR OWN HANDS - STORAGE AND OWNERSHIP

This topic was a focus for many: ownership, control and protection. Data sovereignty should be given back to our people, but how then would we effectively manage that? How would we protect our data for our people? We cannot govern something we don't hold, so once we obtain sovereignty,

The ideal future for Māori would be founded through a 'by Māori, for Māori' approach.

we need to ensure we have possession of the data. With this in mind, we need an appropriate onshore database infrastructure.

"Storage is the first thing to sort out before the data itself, otherwise we may be putting the cart before the horse."

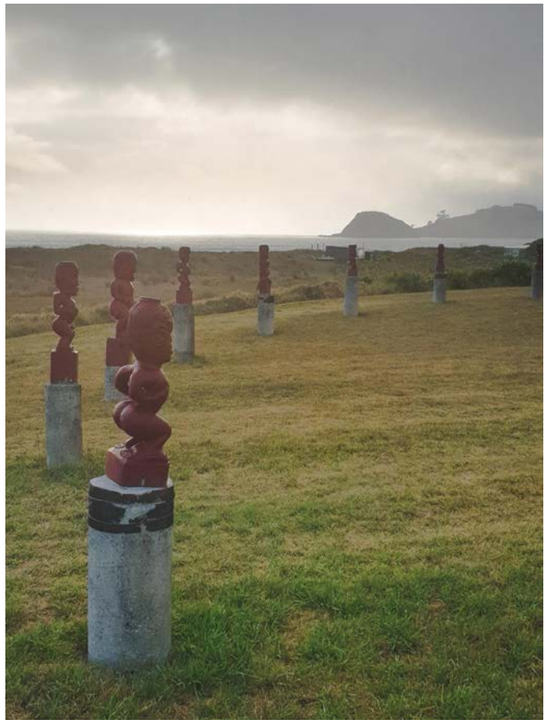
The Status Quo

Most of New Zealand's data is currently stored overseas and this presents risks. In the first instance, data is controlled by the laws of the country it is stored in – these are not our laws and we have no control. Second, access to data in foreign lands can be severely restricted in times of upheaval such as war.

The other significant issue for Māori currently is that, because we do not store the data (whether it's housed in New Zealand or overseas) we do not control who accesses our data or how they use it; our ability to protect our data is limited. Further, we don't automatically have access to our data; our ability to create value from our data is limited.

The Ideal Future

Given that storage underpins everything, Māori need to store our own data within our whenua. In addition, we need the resources to develop our storage facilities as technology changes over time. This Māori data storehouse would be a place where Māori can access information according to a set of protocols and for accepted intentions and uses. Self-storage of Māori data is key to the principle of rangatiratanga.



Te Kāpehu Whetū – The Celestial Star Compass.

"Iwi should own their own, and hapū should own their own, as opposed to Apple or another American company, or the government."

So how would this be achieved in practice? Some groups talked about creating a different model of storage that is "by us, for us." An important element of this is ensuring that Mātauranga is prioritised all the way along the value chain. A number of attendees were in favour of having these databases sited at Marae around the country to ensure proper protection as well as improving the ability to use the data to help people thrive.

"Can we take Māori Land Court records of our land ownership to create databases within our own Marae so that rather than us paying to make applications, we have all the information stored that we can access anytime we want."

"Maybe we can set up a database with other iwi, perhaps a private-iwi partnership, with real rangatiratanga for us."

"It creates accessibility. It's a cool place, a safer place. We know it's our place."

"I can see a pātaka kai, gardens, carvings, children running around singing and a little pātaka holding our taonga. We design it in a way that reflects us. Not just anyone can come in and look, but it's not too exclusive so that no one can access it."

ESTABLISHING TRUST THROUGH ENFORCEABLE DATA MANAGEMENT BASED ON TIKANGA

The hui was a wonderful forum within which to highlight the mismatch between the Western legal IP framework and Mātauranga Māori. The general consensus amongst attendees was that this is a key challenge to Māori Data Sovereignty, and one that would ideally be rectified.

The Status Quo

Currently, data is collected, stored and used according to the Pākehā framework. This does not allow us to protect our data; essentially there are no consequences for anyone who uses our data in ways that run counter to what is appropriate to Māori. Further, there appears to be scant understanding amongst Pākehā of what does constitute appropriate use from a Māori perspective. The natural consequence of this is that non-Māori continue to use Māori data in ways that are deficit-focused and upsetting, and there is no recourse to challenge this.

An example was shared about a woman on social media giving a short 45 minute lesson on how to make wahakura waikawa (baby basinet). This is something that would normally have been taught over several wānanga, but she was able to go so quickly because she left out the Mātauranga aspect, the wairua, and she left out why these baskets are made.

"I felt so angry and so naked that she'd taken our stuff and just given it to the world. She had the privilege to share that, but she didn't have the right."

The ideal future for Māori would be founded through a 'by Māori, for Māori' approach.

Attendees discuss the ideal future for Māori data.

The internet has created a space where anybody can access information and there are no rules about it. The question was asked: How do we fight against YouTube and Facebook to protect our property rights? And does the solution lie in enforceable legal sanctions, or a softer approach of developing a standard process for responding when this happens. In the example above, it would have been good to let her know she had presented only part of the story.

The Ideal Future

A common thread running through the groups' conversations was that the ideal future would see tikanga and kaupapa Māori incorporated into everything data-related at a national level. In this scenario, Pākehā would be familiar with and follow these guidelines. If everyone understood tikanga, we would not have to keep teaching it. One group agreed that ideally Te Reo will be compulsory and tikanga would flow from that.

There was some exploration of meeting somewhere at the middle point between the two worlds, but by and large it was agreed that Māori don't want to be subsumed under a new hybrid framework that doesn't fully achieve Te Ao Māori-based data management.

"Māori are innovative and transformative, and data will need to be driven by tikanga if we are able to be innovative in the data space. It needs to be a safe space for us."

In the future, there could be a system that is trusted, and that ensures no one is going to take advantage of the information available. Ideally, everyone would have morals and act accordingly so that Māori would not have to worry about misuse of data or that it would be commodified. Respect would underpin this approach.

Discussions raised another question: If data management is going to be driven by tikanga, whose tikanga will be applied? Is there going to be a universal Māori framework developed, or will each hapū have their own take on it? One participant thought we might learn from the Reo journey. During the first generation of kura kaupapa, only Tūhoe reo was taught, but later on there was more diversity. A practical approach to data management may be to start with a single version of tikanga that all can agree to, with the understanding that this will be revised in the future. The important thing is to create a sustainable legacy.

While there was strong support for a 'by Māori, for Māori' approach, there was also an appetite to cultivate practical collaboration with non-Māori, as long as partners subscribe to guidelines based on Māori frameworks that can be enforced. Under this scenario, trust would be fostered.

A related area of discussion was whether there would be different rules for different types of data, for example, data about Māori compared with knowledge from Māori. Additionally, if one of the potential benefits of data is financial, what is for sale and what is not?

BEING INTEGRALLY INVOLVED IN DATA COLLECTION

Participants widely acknowledged the need for Māori to be actively involved in collecting data about Māori, from question design through to the early identification of what the data would subsequently be used for.

In the past, we were satisfied with being passed information and stories orally, but things are changing and we want information recorded more tangibly through writing and audio recording. Our mokopuna will rely on this in the future so it is vital that we take control of writing this new history about ourselves.

The Status Quo

Data currently being collected, especially by government, is not necessarily relevant to Māori. One group made the distinction between explicit and implicit data. While the government collects explicit demographic and behavioural information, for example, other data might be described as implicit and of particular importance for Māori, this includes allegories or tikanga.

Additionally, data is often collected according to a 'deficit' perspective, where the intention is to measure negative behaviour, for example, the proportion of the Māori population that smokes. What is missing is the positive data that is more relevant to Māori aspirations.

Finally, data can be incorrectly recorded, either through lack of care or lack of comprehension of Te Ao Māori. One participant shared an experience of having attended a Land Court sitting, and when they received the minutes, the document was at odds with the kōrero they had had, and it needed correcting.

"This is what happens with data – garbage in, garbage out. Diligent record keeping is really important at the time things happen. We have the heart and the emotion to get it right, and this will reduce the number of errors."

How will data be used, and for the benefit of whom?

Each of these factors is limiting in terms of Māori realising the full benefits of our data.

The Ideal Future

In the future we will gather the data that is relevant to us in ways that are relevant to us. How we ask questions is very important when collecting data, and we have to consider intentions – how will the data be used and for the benefit of whom?

This relies on several other aspirations listed in this section being achieved, such as growing the expertise of Māori to carry out this task, increasing general data literacy amongst Māori, and establishing trusted relationships with non-Māori experts.

Acknowledging the originator of the data was considered important during data collection in order to attribute ownership and determine subsequent access rights.

USING DATA FOR POSITIVE OUTPUT AND IMPACTS

Data will have a growing role in the Māori economy, which is based on mana. It is time to start using our new tangata-created tools to allow new ways of doing things that will produce wealth and other benefits.

Interestingly, this area generated the most questions for further consideration – how exactly can we create benefits, and who should these benefits be for?

The Status Quo

Māori are not currently able to realise the full potential of our data because we have little influence along the data journey, which is governed by a Pākehā framework.

The Ideal Future

At its heart, our intention for data is that it enables our people to thrive. We can realise the potential benefits most effectively if we bring digital data together with more traditional forms of knowledge. We will ensure alternative storage options for digital information, while also continuing to protect different forms of data including ā-waha, ā-waiata, whakairo, pātaka kōrero, tukutuku, mahi toi, and kapahaka. Equally, we should draw on the past when interpreting new data, especially when making decisions for the future.

Creating positive impacts relies on teaching next generations. There is only so much you can learn from a computer, but to get to a higher level, you have to sit with someone. We need to talk to our rangatahi about the old and the new, and how they work in tandem. In practice, this means teaching tamariki in schools/kura about the moon, the stars and the sun, as well as block chain and machine learning.

A key challenge here is: how do we distribute benefits fairly? The iwi-hapū model varies across the country, and it was acknowledged that displaced Māori can miss out. Nevertheless, an attempt to share benefits equitably is considered highly important. Further, though, are we saying that Māori data is by and for Māori? Outputs may have benefits for Māoridom as a whole, or for particular iwi or hapū. Or might we share it for the benefit of society across Aotearoa? Should access cost money?

Telling our stories ourselves

One important aspect of creating positive outcomes from data is increasing our ability to tell our own stories.

"I liked what Māui was saying that data is used to tell stories, and we need to tell our stories ourselves."

Ideally, individual iwi would have all the information about people in that iwi so they can tell the iwi story themselves. This is in contrast to being given a narrative by someone else, such as Stats NZ, who might report on how many Māori smoke cigarettes. That is factual but it's also important to create the narrative from the Māori perspective. Further, if we tell the narrative in the right way, it can inform our future action plans to maximise benefits.

The question was asked as to what channels Māori might use to tell our own stories? Communication will be essential! One idea was direct beaming information into people's brains (this is the future after all). Others wondered if Māori health organisations and schools would be the best avenues for sharing positive stories and creating beneficial impacts. Whatever methods are chosen, we want an abundance of Mātauranga all the way along the chain.

INCREASING SKILLS AMONGST MĀORI TO ACHIEVE THE IDEAL FUTURE

Māori must actively participate in order to achieve the ideal future for Māori data, and this will require skills development.

Status Quo

Currently, there is relatively low data literacy amongst Māori, both in terms of the data we are generating, and the science and technology used to manage and utilise that data. This leads to the population being very relaxed about their digital privacy, and it keeps Māori out of roles that oversee data management.

One group explored the example of large scale facial recognition being widely used in China. In this case, who is it actually benefitting? Is it the people or the government? Even in Aotearoa we accept that data is routinely collected about us to provide data for social policy etc, but the specifics are a mystery to most.

"Someone said that we won't need the Census in the future because we will be interacting so much online that the government will have plenty of information about us."

Ideal Future

We are aiming for: fluent users, protectors, and advocates.

At a community level, we will ensure our people understand that their data is important. Personal information is being collected all the time in different forms without anyone really realising. Further, data isn't just something IT specialists deal with in a lab – it has real world consequences. Everyone will be clearer about: how their data is stored; who is accessing it and how; and what it is being used for. The same applies for IP, it needs to be normalised just like maths, science and kapahaka, so that everyone knows they can join in the conversation.

Additionally, we will ensure there are tohunga in our communities that will pick up on the unseen processes in the background that aren't so obvious to lay people. This will give everyone confidence we are heading in a good direction – data processing, for example, is unseen but how that processing is carried out can either enhance or detract from Māori. To achieve this we need to increase STEM ability amongst muriwhenua and throughout Aotearoa.

Hui Attendees

Other skills to help Māori realise the benefits of our data include storytellers who can move away from the deficit perspective commonly used when telling Māori data stories – we want positive stories about surplus and aspirations. We want people who understand the data and can translate this into ways of creating opportunities. We want designers who can create positive infographics, and other artists who can represent our data back to us in ways that help us thrive. We need innovative, knowledgeable leaders who can influence the current system while we build the new one (by Māori, for Māori).

"Māori hold some knowledge that the rest of the world will want at some stage."

5. FEEDBACK ON HUI 2019

Following the hui, attendees were invited to take part in a survey where they could share their thoughts about the event. A total of 41 responses were received, which provided verbatim comments related to several questions.

Those who attended the hui rated if very positively overall, with 98% rating it as good (27%) or excellent (71%).

HE AHA NGĀ MEA PAI O TE HUI? WHAT DID YOU FIND VALUABLE ABOUT THE EVENT?

Feedback was overwhelmingly positive, with attendees valuing the opportunity to learn and share ideas about Māori data and IP with like-minded people. The venue was also appreciated.

Everything was awesome ... great venue and people.

Learning and thinking about Māori data and IP is much needed:

Hua mai he māramatanga mō ngā kaupapatanga o te ture IP me ngā tukanga, ngā āhuahanga hoki e tiaki pai ai i ngā rawa, mātauranga, me ngā mana māori. [It was abundantly enlightening on IP legal policies and processes, and the elements that adequately protect Māori resources, knowledge and rights.]

Quality of the presentations - particularly enjoyed the blend of industry practice vs academia.

Everything that was talked about was new to me, so I found all the presentations/conversations valuable.

Whakawhiti kōrero, whakaaro rānei. [The exchanging of dialogue, or ideas.] The input of the various attendees was especially thought provoking.

I hura ngā whakaaro mō tēnei mea te data. E kitea nei te teitei, te whānui, me te hōhonutanga o tēnei kaupapa. [Concepts relating to data were uncovered. One could see the size, breadth and depth of this matter.]

Listening to the many perspectives about data, observing how data collection and storage is now both a social science issue, as much as a technical one. Realising how important to have Māori involved from the start when we create a degree in Data Engineering.

The specific discussion relating to the "Finding lost shareholders" project I'm involved in. The involvement of Te Hiku (pure inspiration!).

Connecting with like-minded others was a key benefit:

The type of people that were there. Māori, young and old, from all sectors. Very diverse as Māori are.

"Participation by local kaumatua [was most valuable]. Their input provided a sanity check on whether we were tika in our thoughts and actions; that we had considered the future of our whanau, hapū and iwi."

Whanaungatanga. [Connectedness.]

The many perspectives shared by the innovative minds and the whānau simply interested in maintaining our unique cultural identity as Māori.

Te rongo i ngā kōrero kua kōrerotia, te tūtaki i ngā tāngata i tae atu, te noho i te wāhi ātaahua rā. [Hearing the discussions, meeting the attendees, being situated at a stunning location.]

The venue was special:

The venue was amazing and set an invaluable Wairua for the hui.

Everything: the site itself, the powhiri / proper welcome into what is clearly a special place.

E TAUTOKO ANA KOE KIA HAERE Ō HOA KI ĒNEI MOMO HUI? HE AHA AI/E KORE AI? WOULD YOU RECOMMEND THIS HUI TO OTHER PEOPLE? TELL US WHY/WHY NOT.

39 out of 41 respondents said they would recommend this hui to others. Key reasons for recommending included: the importance of this topic; the opportunity to explore the issue within a Māori context; and it drew on multiple perspectives.

Surely! Because it is important mahi and ideas. Because many voices need to be heard. Because the people who ran it were just lovely :)

Absolutely - well thought-out; achieved its purpose; important kaupapa; Māori whakaaro.

Māori data and IP is an important topic for others to understand:

Āe ka kaha tautoko mārika, i te mea, me kaua te māori e kūare ki ngā mana tūturu o te mātauranga, o te reo, me te rawa māori; kei moumou noa, kei whānako noa. [Yes, I overwhelmingly support this, because Māori must not be naïve to the intrinsic significance of Māori knowledge, language, and resources; in case these are squandered or appropriated.]

We need to be aware of data sovereignty. Good conversation, looking forward to where to from here.

I think it is a very important topic that all researchers should be aware of.

Definitely recommend this to everyone I know. This kaupapa touches all aspects of our life now and in the future. Health, Education, Business, Opportunity, Development etc...

Āe. He whānui te totoro o tēnei kaupapa. Ki te mātiro whakamua - me huihui te tangata ki te whakapuaki i ō rātou whakaaro. Mā tērā e kitea ai ngā kokonga kōrero o te kaupapa. [Yes. This topic has far reaching implications. When looking towards the future – one should gather people together to deliberate. From that, the dimensions of the matter will be realised.]

I would recommend this hui to others because more people need to understand how important it is for us to tell our own stories in a way that truly reflects Māori.

Āe, taro ake te wā mō tētahi hui anō kia taea te hanga i tētahi rautaki kia taea ai tātou te tiaki pai i ō tātou raraunga kei runga katoa i te ipurangi [Yes, it will soon be time for another hui to devise a strategy enabling us to adequately protect all of our online data.]

This type of hui provides a Māori context within which to discuss these issues:

Āe, the location of the hui was really special and allowed dialogue to be open with many different people from different areas. This was the place to have this hui and future hui around data sovereignty.

Āe, he ātaahua rawa te wāhi rā me te whare. Me māori tonu te āhua o ērā momo hui. [Yes, the location and venue were extraordinarily beautiful. Those kinds of hui have a sense of being distinctively Māori.]

For Māori, by Māori, with Māori.

Multiple perspectives can be explored:

Great opportunity to think creatively; to speak plainly, kōrero; and to collaborate. The experience was energising and validating.

Yes - local perspectives and engagement and contribution.

HE KŌRERO MUTUNGA ĀU? ANY OTHER FINAL COMMENTS OR SUGGESTIONS?

Many attendees offered their thanks for the opportunity to attend this kind of hui:

Thank you so much for the opportunity and to Sir Hector Busby for his warmth and unique knowledge that he shared with us all.

Mutunga kē mai o te pai. [It was exceptional.]

Me mihi ki ngā kaiwhakarite ka tika! [The organisers should be congratulated!]

Tēnā koutou katoa, me maha atu ēnei kaupapa taunaki i ngā mahinga me ngā kaimahi Māori . [Thank you all, so many of these subjects support Māori endeavours and workers.]

A number of attendees were keen to see more of these hui organised to continue the conversation:

Can we have another tailored for rangatahi in Kaitaia? I would love to help to improve data literacy within our generation 15-30 y/o.

It would be great to take this hui around the motu (country) to our places of Wānanga. And even try one international hui with other closely linked indigenous knowledge systems and peoples who may be interested in participating in this type of discussion.

It would be good to have follow up hui to move the kōrero along and inform people like me about any progress.

Suggestions were offered for how the next hui could be improved:

Regular wānanga and copies of each speaker's presentation.

Maybe provide a few pointers for the workshops to achieve more in a short time e.g.: Purpose for data storage, current priorities for data storage, types of data to consider - Māori Health stats/research, Māori education stats/research, Hapū/Iwi Census etc..

I understand the day was long and there was a lot of information. However, I would've liked to have a breakdown and more opportunity to discuss even if it was at night.

One of the Waka at Te Aurere.

Te Kāpehu Whetū.

6. SUMMARY

Ngā Kōrero mō te take Raraunga. Discussion about Data.

The themes that emerged in the 2019 workshop discussions reinforced the seven development areas that surfaced at Hui 2018. Here are the main 2019 examples.

1. **Raraunga mana Māori** – That Māori obtain control and authority over data about themselves and their resources.

   Teams discussed how owning or creating data storage would be important for Māori. There was discussion around how this could be resourced. Attendees agreed that tikanga should be developed to control access to these data. Ownership, control, and protection consistently arose as key foci.

2. **Raraunga tirohanga Māori** - That data be understood through a Māori worldview and using language, terms and symbolisms that are meaningful to Māori – mā reo, whakaaro, tikanga etc.

   This theme emerged strongly. An image of the pātaka was offered to symbolise data storage. There was a call to start with Māori thinking to develop ideas around how data should be managed and used.

3. **Raraunga mata tini** - That the many forms that constitute data be explored and recognised – digital, analogue, biological, kōrero, whakairo, etc.

   Where the initial focus of Raraunga mata tini at Hui 2018 was around acknowledging various data formats, attendees at Hui 2019 advanced this by proposing that talented designers could use art and design, to create thoughtful ways of encapsulating and communicating data, including infographics.

4. **Raraunga uara nui** - That the far-reaching value of data, financial and otherwise, be explored and recognised.

   The cultural value of mātauranga and data were reinforced. Financial value began to emerge as an acceptable outcome of appropriate data use. It was agreed that Māori need to know how data can be protected in a manner that the financial benefit can come back to Māori.

5. **Raraunga hiringa whakamua** - That data be used in new and innovative ways to produce outcomes that Māori want, pushing boundaries while taking care not to be seduced by financial benefit alone.

   There was stimulating discussion around this. The technology projects, including those of Te Hiku Media, helped illuminate how Māori data can be used and managed, and the tools that it can produce.

6. **Raraunga whakaora** - That the responsible use of data leads to revitalisation and reconnection of Māori with each other, and with Māori resources, to elevate Māori wellness.

   There was a real emphasis that the use of data be focussed on aspirations and opportunities, and not just have a deficit focus.

7. **Raraunga whakaakoako** - That education about data and data technologies be integrated with data usage and practice, and that training be made available to address the wide capability needs of Māori in data and technology.

Attendees view the Kāpehu Whetū.

Attendees expressed a desire to develop fluent users, protectors, advocates, and tohunga in the use of Māori data.

NGĀ KŌRERO TIAKI MĀTAURANGA. DISCUSSION ON KNOWLEDGE PROTECTION

From the presentations and discussions on data and knowledge protection, four themes surfaced as important.

1. He aha ngā tūmomo raraunga o te ao: What are the kinds of data that exist.

This underpinned many of the topics that were discussed, even though it wasn't discussed explicitly. In line with Raraunga mata tini, data has many formats and is generated in many ways. Data might be ancient, imbedded within whakairo or kōrero; or it could come from a person clicking a link on Facebook; from making an online purchase; or filling out a census form. Understanding different types and categories of data will play a big part in how we manage sovereignty of them, or not.

This could be a topic that can be explored at future hui. Some aspects to consider for data characterisation could be: is it traditional data or new; does it have tapu/noa and why; is it collective or individual; commercial or cultural; resource data or people data; public or private; government or iwi/citizenry.

2. Ko ēhea ngā raraunga motuhake: How do we determine the level of importance or specialness of each dataset.

This quality of specialness was raised in one of the presentations. Once we decide what different kinds of data there are, we can then start to choose which data are the

most special and require the best kinds of protection.

Some kinds of data that were considered special at this hui were: Mātauranga Māori; reo; whakapapa; genetics and genomics; information to bring oranga to people, whenua, and taiao; and Māori resources and knowledge that could lead to commercial value. Even within these categories, there are likely to be nuances in how important each dataset is.

3. He aha ngā tikanga tiaki raraunga: What are the mechanisms of data protection.

The presentations on knowledge protection were overwhelmingly clear on one issue: the current Intellectual Property laws are not set up to protect Mātauranga Māori. Depending on data specialness, and the kind of data it is, different approaches could be used or developed. Some that were discussed were:

Storage – creating secure local storage for information that is important for Māori (iwi, hapū, etc) that Māori can have control over

Governance and Access– creating tikanga-based processes for appropriate access and use of data

Kaitiaki – having a specified kaitiaki or kaitiaki organisation to monitor important data for Māori data of interest

Behavioural Change – promoting and encouraging people to behave responsibly with data and products that access data; creating labels for products that can demonstrate that they have used ethically sourced or accessed data.

Legal Protection – Using the standard legal mechanism such as trade secrets, trademarks, copyright, and patents in situations where the law could protect data or mātauranga. Each of these has a distinct approach, benefit, and risk. The easiest is trade secret, where you simply keep the important information a highly protected secret. The others are more costly. Patents, in particular, cost a lot of money and time to secure. Prosecuting those who have infringed on your legal protections will also be costly, so both securing IP and managing IP require funding. Also, a patent protection generally lasts only 20 years, after which the knowledge becomes available for anyone to use.

4. He aha ngā mahi kia nui ai ngā hua pai mō te iwi Māori: How do we maximise the benefit for Māori.

Maximising the benefits of data was a central part of discussions. Whether the benefit be cultural, oranga or commercial, there was consensus that data be used to maximise the benefits for Māori. Control and protection were seen as ways to ensure benefit would come back to those who own the data.

Once data is available and accessible, data become a part of marketplaces and data ecosystems. There are ways to commercialise data in these marketplaces, and only some were raised at the hui. There was no discussion on open source data, where data is made available to everyone, free of charge or restriction. Open source is seen as a method to speed up innovation, because many people can pick up the data and use it straight away to develop technologies faster. Commercial benefit can sometimes be made in these settings by creating inventions or apps that sit over the top of (and use) the open source data. People may pay to use the apps or inventions while the data itself is free. The question of open source could be a part of future discussions, and could arise out of discussions about the different kinds of data that exist and the ways they could be useful for Māori.

Open source, as well as the internet in general, could also be an entry point into discussing how to think about the data that Māori will want to use for international opportunities vs local ones; and how local Māori tikanga for data might interact with international ways of using and managing data.

One of the Waka at Te Aurere.

Maximising the benefits of data for Māori was a central theme during the hui.

POSTSCRIPT: PROTECTING MĀTAURANGA MĀORI IN TECHNOLOGY DEVELOPMENT

Responding to the lack of protection provided to Mātauranga Māori through existing IP laws, the SfTI Challenge has developed a set of guidelines for its new research projects. The new Intellectual Property Management Plan is aimed at ensuring Mātauranga Māori and taonga species are given appropriate protections throughout the research process and beyond.

A key element of this new approach is acknowledging the status of Mātauranga Māori, taonga species, and more specifically, any Mātauranga Māori IP associated with the research. With this perspective, those working within and alongside a project can determine whether standard IP rules are sufficient, or if alternative options should be implemented.

Further, the IP Management Plan requires that, for research involving Mātauranga Māori or taonga species, an Identifiable Kaitiaki be named as the owner of any Mātauranga Māori IP associated with the project. This party will lead the protection, management, commercialisation, and subsequent use and ownership decisions.

A third important aspect of the new approach is, unless otherwise agreed, keeping Mātauranga Māori, taonga species and Mātauranga Māori IP out of the public domain, and this is to be formally considered prior to any research publication. The aim here is to protect the data from misuse and misappropriation by third parties.

While the Management Plan includes a number of additional points, these three expectations go quite some way to redressing the mismatch between Mātauranga Māori and the standard Western-based IP laws NZ currently operates within. As such, we hope it supports a two-way exchange of knowledge systems that ensures Māori are integrally involved in knowledge creation, data management, and realising all the potential benefits that research should enable.

One of the pou Kāpehu at Te Aurere

7. GLOSSARY

ā-waha	audio and vocal
ā-waiata	lyrical and musical
awa	river or stream
hapū	subtribal group or groups
haukāinga	local people of a marae, home people
hui	meeting or gathering
iwi	tribal group or groups
kaitiaki	guardian, custodian
kaitiakitanga	guardianship, stewardship
kanikani	dance
kapahaka	Māori cultural performing arts and performing groups
kaumātua	elder or elders
kaupapa	topic, matter
kaupapa Māori	Māori ideology
Kawa	Local protocols
Kawakawa	Pepper tree
kōrero	discussion, dialogue
kuia	female elder or elders
kupu	word or words
kuputaka	glossary
kura	School
Kura kaupapa	primary schools operating under Māori language and customs
mahi	work, activity
mana	authority and responsibility
manaaki	support, care, hospitality
Mānuka	NZ tea-tree
Māoritanga	Māori identity and way of being
marae	the open area in front of wharenui where formal greetings and discussions take place
mātauranga	knowledge
mātou	we, us, excluding the listener(s). Said of 3 or more people.
maunga	mountain
moana	ocean

mokopuna	grandchildren
Muriwhenua	a region and group of five iwi in the Far North
oranga	wellness
Pākehā	non-Māori, usually of European descent
pātaka	storehouse
pātaka kōrero	places(s) where stories and information are collected and stored
pōwhiri	invitation, official welcome ceremony, welcome
pū	letter of the alphabet, source, origin
pūkenga	skill
pūrakau	story or stories
rangatahi	youth
rangatiratanga	right to exercise authority
rārangi	line
raraunga	data
taiao	nature
tamariki	children
tangata	person, human
tangata whenua	local indigenous people
taonga	an item of significance or value
tapu	sacred, private, restricted
tātou	we, us, including the listener(s). Said of 3 or more people.
Te Ao Māori	The Māori World
Te Reo	Shortened version of Te reo Māori
Te reo Māori	The Māori Language
Te Tiriti	The Treaty of Waitangi
tikanga	correct procedure
tino	very
tirohanga Māori	Māori worldview
tohunga	expert
tukutuku	ornamental lattice-work
Vision Mātauranga	A NZ Government science innovation policy
waiata	song or songs
wairua	spirit, soul, spiritual dimension, or atmosphere of an occasion
waka	vehicle
wānanga	to meet and deliberate
whakaaro	thought, opinion, plan, understanding, idea, intention, gift, conscience
whakaaro Māori	Māori concepts, Māori framework
whakairo	carving or carvings
whakapapa	genealogy, lineage
whakatauākī	a saying, proverb
whānau	family and extended family
whenua	land, country

“Data becomes a taonga if its whakapapa, its connection, its creation, its relationships and its environment, connect to our people and our knowledge or taiao as Māori.”

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