

MĀORI ALGORITHMIC SOVEREIGNTY

*Whāki Webinar Series from
Tikanga in Technology*



TUESDAY 30 APRIL 2024

1.00 PM – 2.00 PM

SPEAKERS

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KEEGAN



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Māori Algorithmic Sovereignty

Paul Brown, as part of the TinT R.A.3 Team

Whāki Webinar, Paengawhāwhā

Presentation Outline

- What is an algorithm?
- Māori Algorithmic Sovereignty
- Underlying Principles
- Use

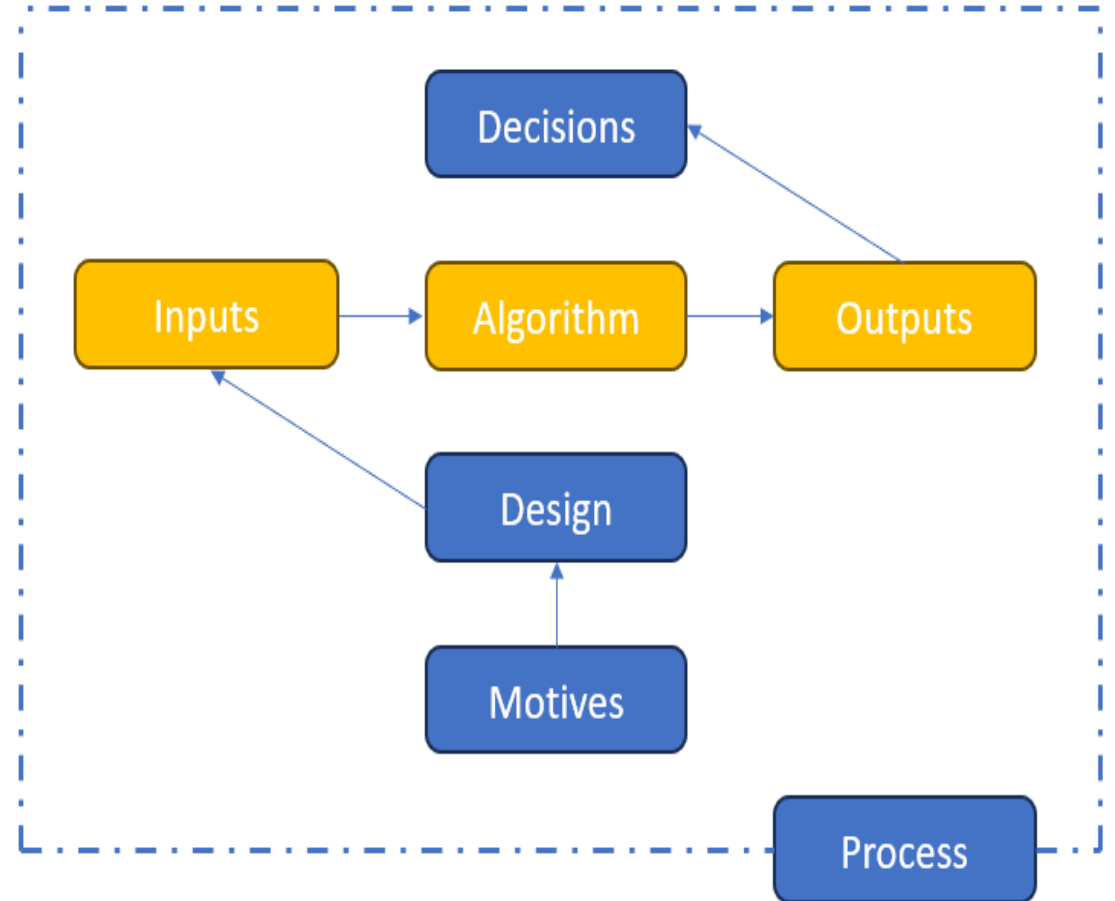
What is an Algorithm?

Algorithm synonyms: AI, AI systems/technologies, algorithmic systems, models.

(Computational) Algorithms: A computational function that turns inputs (data) into outputs.

Algorithmic systems: An iterative decision-making process driven by data, computational algorithms and humans.

Since algorithms/algorithmic systems depend on data, we can think of algorithms as a particular use of data.



Māori Algorithmic Sovereignty

- Data Sovereignty vs Indigenous Data Sovereignty
 - ID Sov corrects power imbalances that DSov gives to those that hold the data
- Māori Algorithmic Sovereignty (MASov)
 - Algorithms that use Māori data, or are applied to Māori individuals, collectives, or environments that Māori have rights or interests in, should be subject to Māori governance structures
 - Values underpinning MDSov apply here – we just need to extend the values to fit for the context of algorithms

MASov Principles and Sub-Principles

Rangatiratanga (Authority)

1. **Control** – Māori have the right to control the development, and use of an algorithm, including (but not limited to) motives, design, choice of inputs, interpretation of outputs, maintenance, management, and deployment.
2. **Jurisdiction** - Decisions about the physical and virtual storage of the inputs and computational algorithms used, and the outputs generated from the algorithms shall enhance control for current and future generations. Whenever possible, the inputs and the outputs of the algorithms shall be stored in Aotearoa New Zealand.
3. **Self Determination** – Māori have the right to participate in the development and use of algorithms in a way that empowers sustainable self-determination and effective self-governance.

Whakapapa (Relationships)

1. **Context** – Transparency about all aspects of the algorithm, including (but not limited to) who is involved, motivations, data, outputs, management, maintenance, and deployment, should be clear prior to the application of the algorithm on Māori individuals and communities.
2. **Data Lineage**– The governance, history, and use of Māori data used in the algorithm should be clear, transparent, and uphold the principles set out in the MASov principles.
3. **Future Use** – It must be shown that algorithms must provide sustainable benefits to Māori now and into the future.

MASov Principles and Sub-Principles

Whanaungatanga (Obligations)

1. **Balancing Rights** – Individuals’ rights, risks, and benefits in relation to the algorithms need to be balanced with the collectives they may be a part of.
2. **Redress** – Māori have the right to challenge the output of an algorithm if applied to them, and mechanisms for redress must be established in the process of algorithm development.
3. **Accountability** – Individuals and institutions that are responsible for the development of the algorithms are accountable to the Māori individuals and communities that the algorithm affects.

Kotahitanga (Benefits)

1. **Benefit** - Algorithms must be designed in ways that enable Māori to derive both individual and collective benefits, and to minimize harms.
2. **Capacity Building** – Individuals and institutions developing and using algorithms must include Māori in all parts of the process.
3. **Solidarity** – Māori must be supported to connect with other Indigenous groups for the purposes of sharing knowledge, ideas, and strategies regarding the development and use of algorithms. Where appropriate, Māori should also be supported to work with other marginalised groups.

MASov Principles and Sub-Principles

Manaakitanga (Reciprocity)

1. **Respect** - The use of algorithms shall uphold the dignity of Māori individuals and communities.
2. **Privacy** – Individual and collective privacy must underpin the collection of data/inputs, and the dissemination of the outputs of the algorithm.
3. **Consent** – Any Māori community that an algorithm is applied to must give free, prior, and informed consent, for both the development and use of the system. This includes consents for data, outputs and elements of the system that Māori control.

Kaitiakitanga (Guardianship)

1. **Protection** – Inputs used in the algorithms and the resulting outputs must be treated in such a way that enables and reinforces the capacity of Māori to exercise kaitiakitanga over all components of the algorithm, including the inputs, outputs, and computational algorithms.
2. **Ethics** – Tikanga, kawa (protocols) and mātauranga (knowledge) must underpin the protection, access, and use of the data and algorithms.
3. **Restrictions** – Māori shall decide how the inputs and outputs of the algorithms shall be considered tapu (restricted) or noa (accessible).

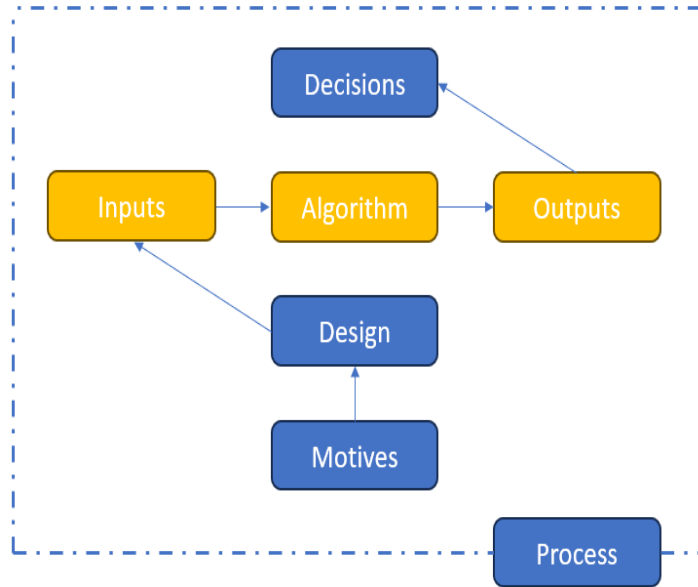
Algorithmic Bias?

- Problem: Algorithmic Bias
 - Outputs of an algorithm benefit or disadvantage one group over other groups without justification or reasons, other than belonging to that group.
- Colonising Bias
 - Prejudice or injustices against an indigenous group due to colonisation that results in negative outcomes for that group.
 - *Nested colonising bias*: colonising bias within an algorithm, or colonising bias that results from the outcomes of an algorithm.

Decolonising Algorithms Strategy

- Kaupapa Māori Mixed Methods (Quant + Qual) Approach:
- Setup: we have an algorithm that uses Māori data, or applied to Māori populations or environments:
 1. Quantify if, and scale of, nested colonising bias
 2. Generate a framework of questions based on MASov (Qualitative Analysis of the algorithm) and fix where possible
 3. Re-quantify scale of colonising bias
 4. Rinse and repeat if necessary

Qualitative Analysis – Generate Framework



- Steps
 - Break down algorithm into components
 - Apply MASov principles at each component to generate questions for analysis
 - Resolve issues found

<p>Motives</p>	<p>The Motives component looks at understanding what problems the algorithm is solving (or goals it is trying to achieve) and asks questions involving what the problem/goals are, and who is involved when defining the problems/goals, and where/if Māori consultation has been sought. This helps understand if an algorithmic system is the correct tool for solving the problem/achieving the goal.</p> <p>Preliminary steps before analysis would be to understand the underlying motivations for the algorithm, and whose motivations are driving the process, what the system is trying to achieve, who is involved in the process, and if Māori in any way have been involved in defining the motivations and in what capacity?</p>
<p>Example Questions</p>	<p>Rangatiratanga: Do the motivations/purpose of the algorithm further Māori collective aspirations?</p> <p>Whakapapa: Are the motivations underlying the use of the algorithm clear in providing future benefit to Māori</p> <p>Whanaungatanga: Which individuals and institutions have defined the motivations of the algorithm, and what are their obligations to Māori?</p> <p>Kotahitanga: What harms and benefits do the motivations provide for Māori?</p> <p>Manaakitanga: Do the motivations uphold and maintain dignity for Māori individuals and communities?</p> <p>Kaitiakitanga: Do Māori have the right to change the motivations if tikanga values are not involved in the construction of the motivations?</p>

Further Whakaaro

- For fixing algorithmic systems, there are (1) procedural fixes, and (2) technical fixes
 - MASov frameworks identify procedural issues nicely
 - Technical fixes can also be identified, but can be harder to find solutions to
- Decolonising vs Indigenising
 - Decolonising – fixing/retrofitting already developed algorithms to work better for Māori
 - Indigenising – developing new algorithms that are built on tikanga values

Further Reading

- Māori Algorithmic Sovereignty: Ideas, Principles, and Use. *Data Science Journal*, <https://datascience.codata.org/articles/10.5334/dsj-2024-015>
- MASov – 2-pager. *Te Mana Raraunga Website (Resources > Digital Sovereignty)*.
<https://static1.squarespace.com/static/58e9b10f9de4bb8d1fb5ebbc/t/6572a0aa8323fc667bc79a31/1702011050546/MASov+two-pager.pdf>



MASov in application

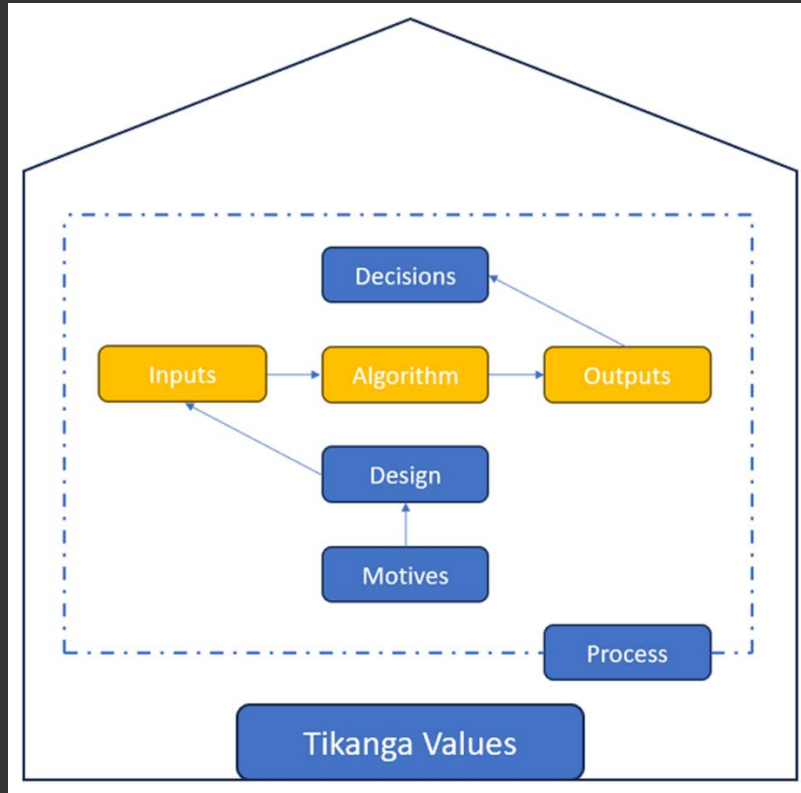
Ben Ritchie TnT RA3
30 April 2024





MASov Application Paper

- Purpose
- Audience
- Youth Service Model
- Approach to assessment
- I won't be discussing findings
- Takeaways



Purpose and Audience

- Refining the model through practical application
- Community enabling
- Devs and managers
- Governance and accountability
- Provide a perspective on how algorithms should be applied



Youth Service Model

- Voluntary programme
- Assistance for rangatahi aged 15-17
- Predicts time spent on benefit
- Significance to Māori
- PHRaE application, ongoing review, and openness to improve



Approach to assessment

- Questions for each principle against each component of the framework
- Technical specifications
- Analysis of underlying data
- Kōrero

MASov PRINCIPLE	RESPONSIBLE ALGORITHM PRINCIPLES
Rangatiratanga	Fairness and Justice, responsibility, beneficence, freedom, trust, dignity
Whakapapa	Transparency, responsibility, non-maleficence, beneficence, sustainability
Whanaungatanga	Transparency, fairness and justice, responsibility, trust, solidarity
Kotahitanga	Fairness and justice, non-maleficence, beneficence, dignity, solidarity
Manaakitanga	Responsibility, privacy, trust, dignity
Kaitiakitanga	Transparency, fairness and justice, responsibility, privacy, trust, sustainability, solidarity



You don't have to wait for a paper

- Current ethics frameworks are a good starting point, but are limited
- MASov will produce guidance, but you can start now
- Be prepared to ask yourself hard questions and answer honestly
- Preferably early in the process
- If you've already got algorithm in flight, are you prepared to stop or change?

“Trustworthiness”

Daniel Wilson

MASov Whāki seminar

Māori seats 2023: Polling vs. Results

Electorate	Curia Poll: Winner	Curia Poll: Runner-Up	Und.		Actual Winner	Actual Runner-up	
Ikaroa-Rāwhiti	Tangaere-Manuel (33%)	Whaitiri (25%)	29%				
Te Tai Hauāuru	Peke-Mason (34%)	Ngawera-Packer (29%)	16%				
Hauraki-Waikato	Mahuta (36%)	Maipi-Clarke (32%)	14%				
Waiariki	Waititi (50%)	Boynton (22%)	15%				
Tāmaki Makaurau	Henare (37%)	Kemp (27%)	11%				
Te Tai Tokerau	Davis (32%)	Kapa-Kingi (26%)	??				
Te Tai Tonga	Tirikatene (36%)	Ferris (25%)	18%				

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Ikaroa-Rāwhiti	Tangaere-Manuel (33%)	Whaitiri (25%)	29%		Tangaere-Manuel (51%)	Whaitiri (40%)	
Te Tai Hauāuru	Peke-Mason (34%)	Ngawera-Packer (29%)	16%		Ngawera-Packer (60%)	Peke-Mason (26%)	
Hauraki-Waikato	Mahuta (36%)	Maipi-Clarke (32%)	14%		Maipi-Clarke (49%)	Mahuta (38%)	
Waiariki	Waititi (50%)	Boynton (22%)	15%		Waititi (70%)	Boynton (19%)	
Tāmaki Makaurau	Henare (37%)	Kemp (27%)	11%		Kemp (37%)	Henare (37%)	
Te Tai Tokerau	Davis (32%)	Kapa-Kingi (26%)	??		Kapa-Kingi (36%)	Davis (34%)	
Te Tai Tonga	Tirikatene (36%)	Ferris (25%)	18%		Ferris (45%)	Tirikatene (35%)	

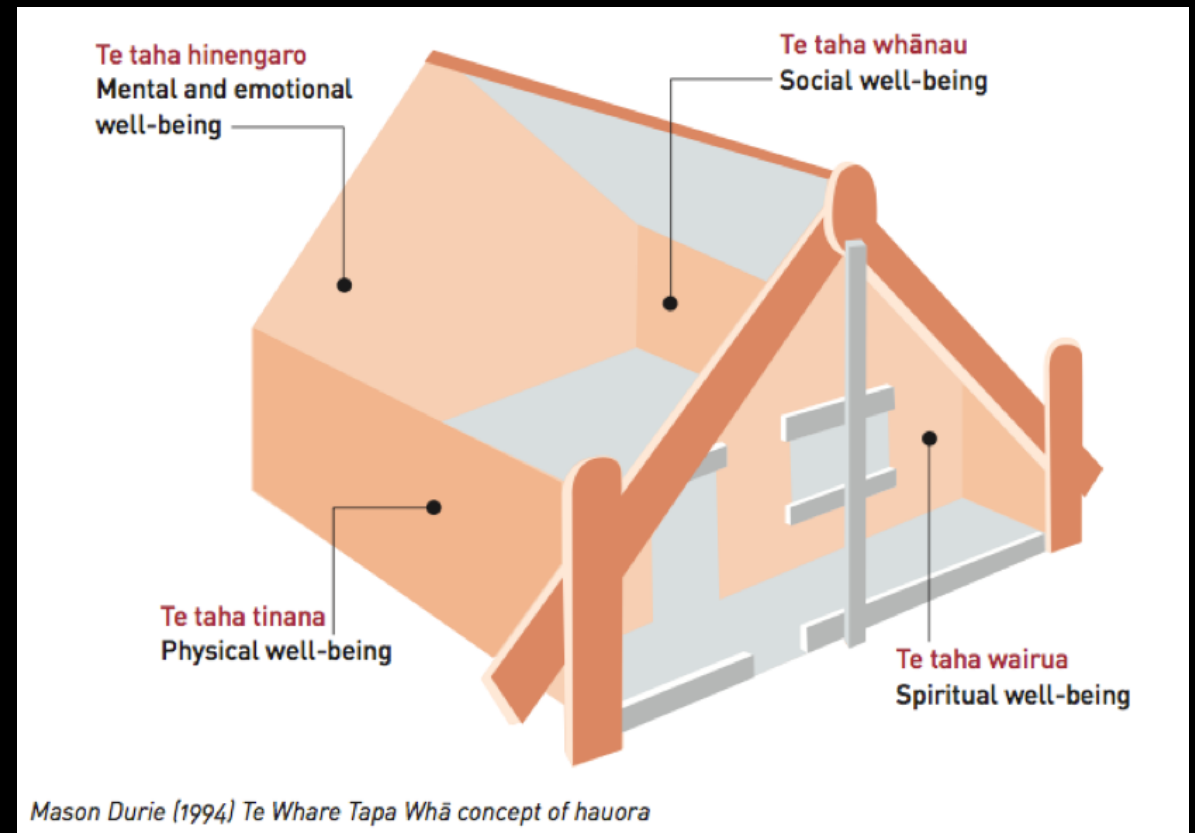
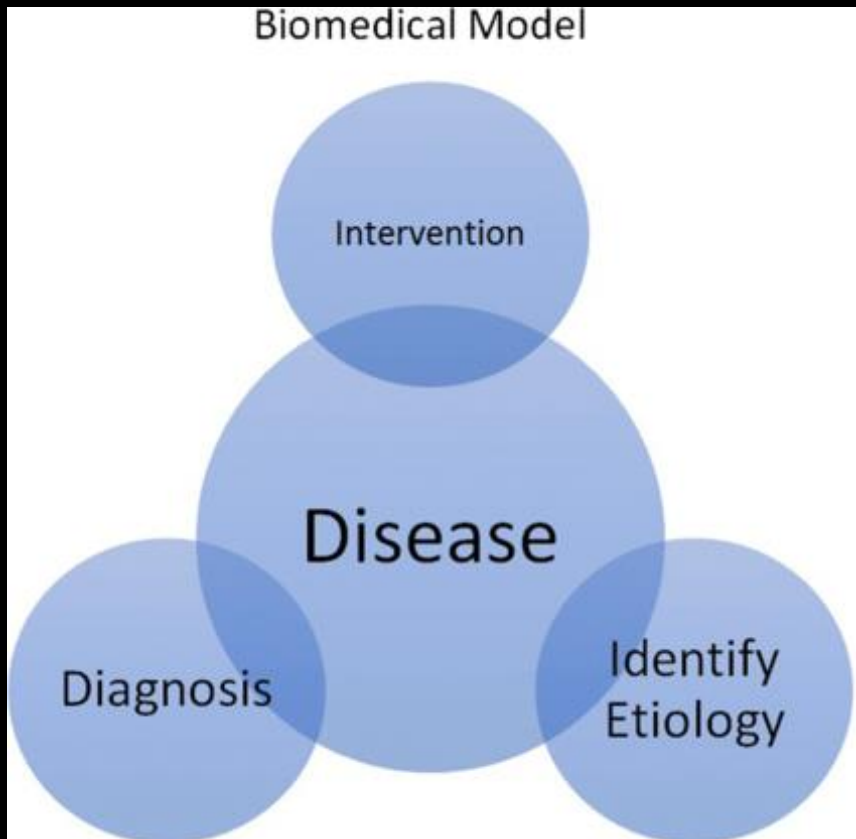
An argument for representative data in ML

1. Machine learning can be used to create valuable tools to improve **health outcomes**.
2. Machine learning for health applications depends on **health data** to train models.
3. Further, in order for these tools to be effective for Māori, there needs to be **representative health data for Māori** to train these models. [ML bias]

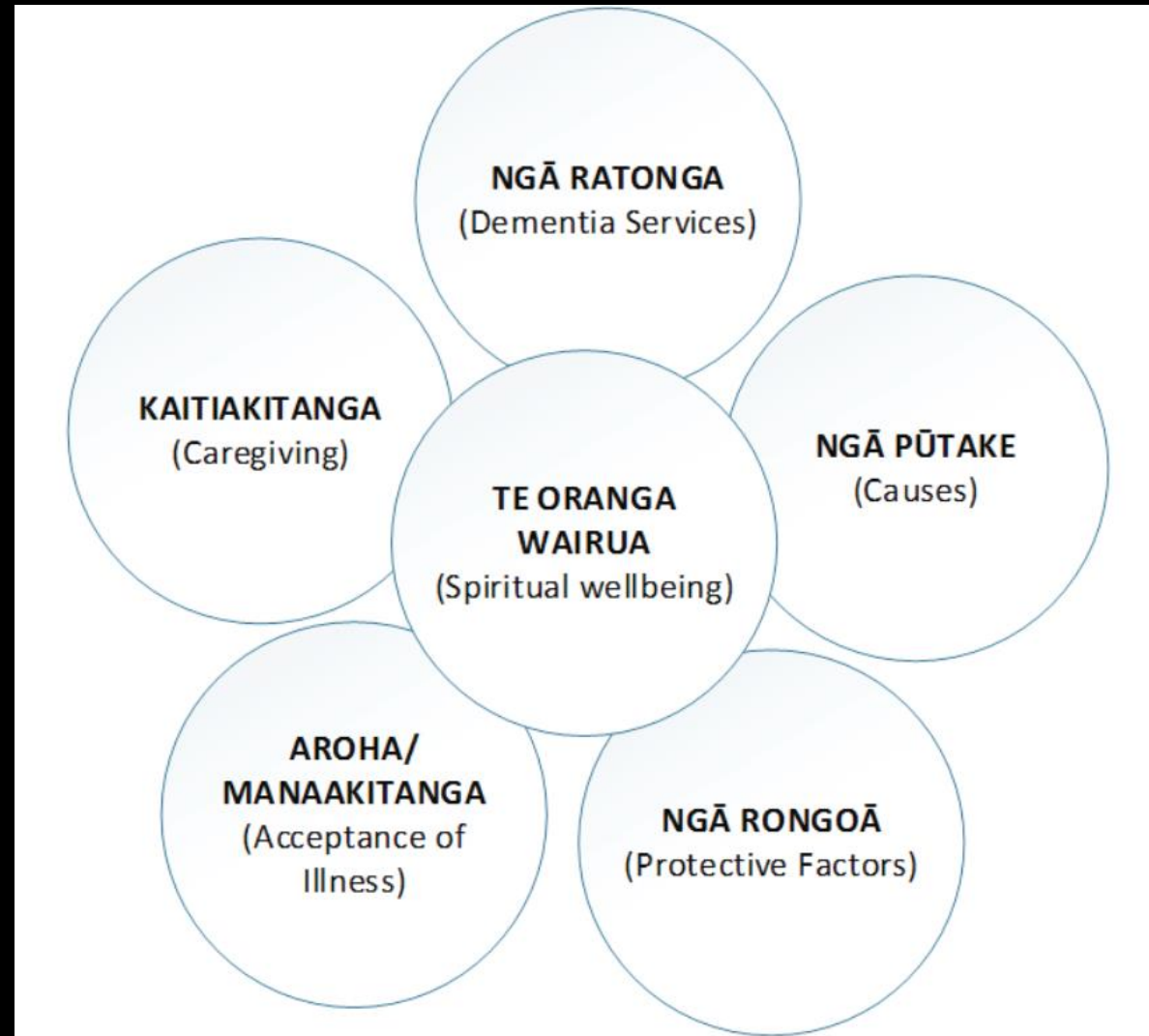
Therefore, probably,

- Machine learning requires access to representative levels of Māori health data to train models that will improve health outcomes equitably.

Multiple Conceptions of Health



Te Oranga Wairua model



Even if you have representative health data for Māori, that doesn't necessarily mean your model could be optimised for what is important for Māori.

“In this report, when we talk about **trust**, we are talking about people feeling comfortable and confident when they are affected by other people’s decisions or actions” (p. 12)

But *trustworthiness* additionally requires the following: That “ADM systems are only used in ways that are appropriate, reliable and accurate, mitigate against negative bias, and are safe, just and effective.” (p. 14)



Cristoph Kelp and Mona Simion on “trustworthiness”:

“a disposition to fulfil one's obligations.”

Christoph Kelp, Mona Simion (2023) [What is trustworthiness?](#) *Noûs* Vol. 57, Iss. 3 p. 667-683.

Trustworthy AI in Aotearoa The AI Principles

The following principles aim to foster both innovation and trust in the design, development and deployment of artificial intelligence (AI) in Aotearoa New Zealand.

1. FAIRNESS AND JUSTICE

Designers, developers and users of AI systems (AI stakeholders) must respect:

- **Applicable laws** in New Zealand and other relevant jurisdictions
- **Human rights** recognised under domestic and international law
- **Rights of Māori** articulated in Te Tiriti o Waitangi
- **Democratic values** including the electoral process and informed public debate
- **Principles of equality and fairness** so that AI systems do not unjustly harm, exclude, disempower or discriminate against individuals or particular groups.

2. RELIABILITY, SECURITY AND PRIVACY

AI stakeholders must ensure AI systems and related data are reliable, accurate and secure and the privacy of individuals is protected throughout the AI system's life cycle, with potential risks identified and managed on an ongoing basis.

3. TRANSPARENCY

The operation and impacts of an AI system should be transparent, traceable, auditable and generally explainable to a degree appropriate to its use and potential risk profile so outcomes can be understood and challenged, particularly where they relate to people.

4. HUMAN OVERSIGHT AND ACCOUNTABILITY

AI stakeholders should retain an appropriate level of human oversight of AI systems and their outputs. Technologies capable of harming individuals or groups should not be deployed until stakeholders have determined appropriate accountability and liability.

5. WELLBEING

Where appropriate, AI stakeholders should design, develop and use AI systems to promote, as much as possible, the wellbeing of New Zealand's people and environment in areas such as health, education, employment, sustainability, diversity, inclusion and recognition of the unique values of Te Ao Māori.

“Trustworthy AI” (AI Forum):

- Fairness, justice

- Reliability, security, privacy

- Transparency

- Human oversight, accountability

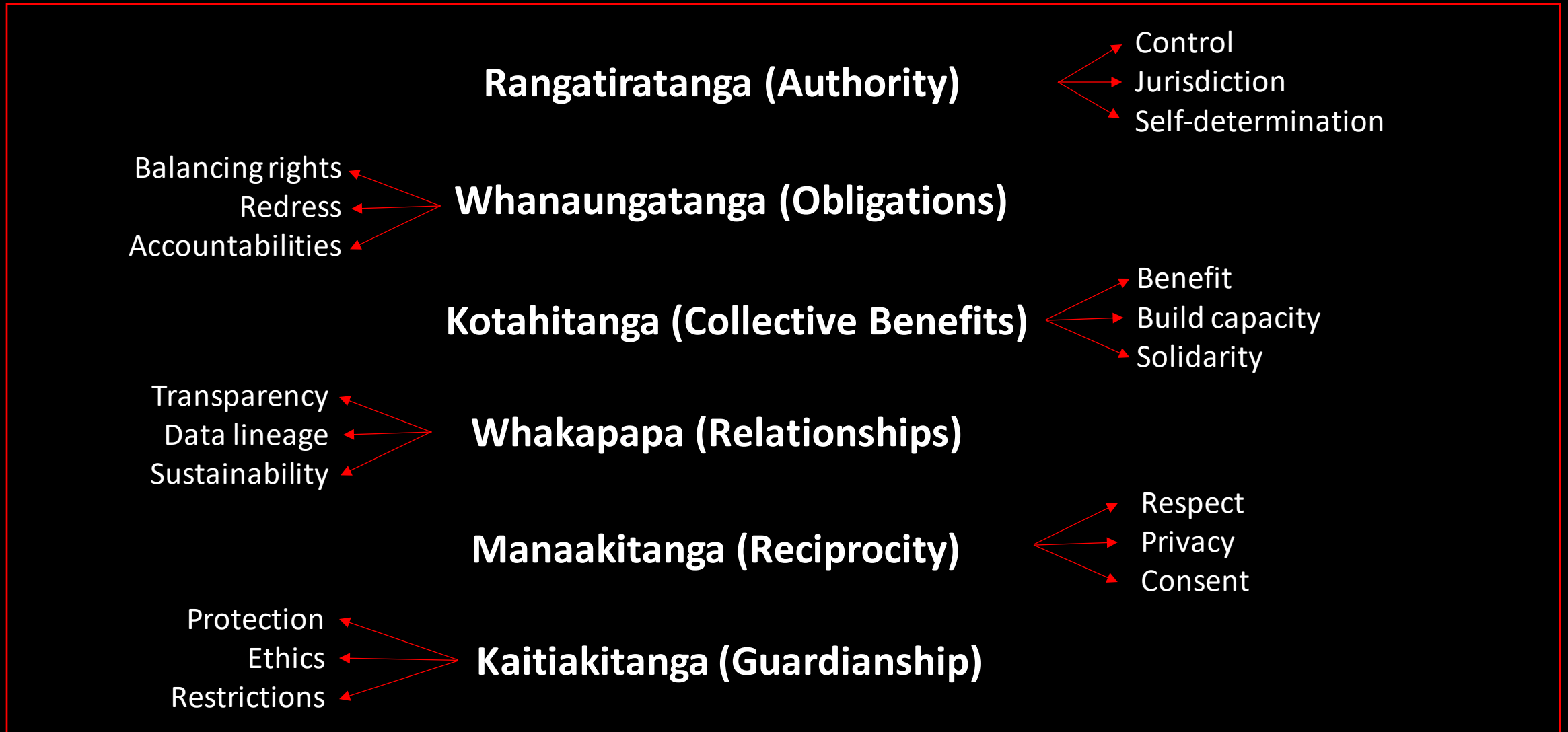
- Wellbeing

- “1. **Trust** is relational.
2. **Trust** is reciprocal.
3. Tikanga builds **trust** and confidence.
4. The power imbalance thwarts **trust**.”

Te Mana Arotake | The Office of the Auditor-General (2022)

[Māori Perspectives on Trust and Accountability](#)

Principles of Māori Algorithmic Sovereignty (MASov)



JULY 2020

New Zealand Government

ALGORITHM CHARTER FOR AOTEAROA NEW ZEALAND

This Charter demonstrates a commitment to ensuring New Zealanders have confidence in how government agencies use algorithms. This Charter is one of many ways that government is demonstrating transparency and accountability in the use of data. However, it cannot fully address important considerations, such as Māori Data Sovereignty, as these are complex and require separate consideration.

