Te Māra o Hine-Raraunga

A framework for whānau voice data solutions

Report to Āti Awa Toa Hauora Partnership Board and Manatū Hauora | Ministry of Health

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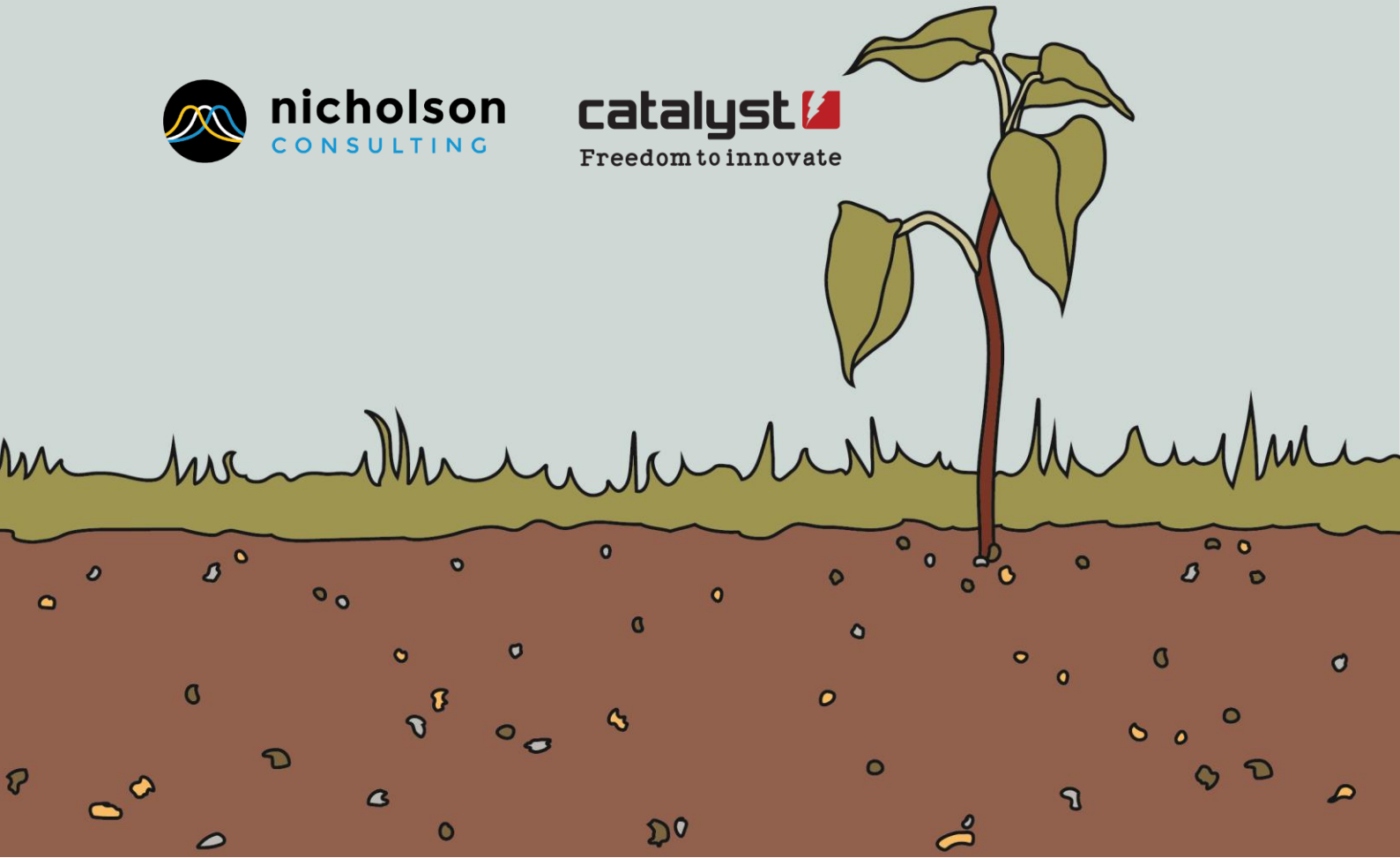

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ĀTI AWA
TOA HAUORA
PARTNERSHIP BOARD

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Introduction

This project has been commissioned in partnership between the Ministry of Health | Manatū Hauora and Āti Awa Toa Hauora Partnership Board, reflecting our shared commitment to supporting the role of iwi-Māori partnership boards (IMPB) within the health system.

As Manatū Hauora, we are the Government's lead advisor on Māori health, with responsibility for monitoring how the system enables IMPBs to fulfil their legislative functions. We have invested in this project to gain insight into the means of improving Māori health, particularly by understanding the power and place of whānau voice in influencing services that work for Māori. This project also supports our understanding of the resources and evidence required for IMPBs to achieve their statutory functions.

As Āti Awa Toa Hauora Partnership Board, we carry the statutory responsibility to gather, uphold and represent whānau voice and the lived experiences, aspirations and priorities of our people within local and regional health.

Together, we recognise that whānau voice is more than information. It is taonga. It carries whakapapa, identity and mātauranga and must be treated with care, integrity and respect. Protecting and enabling the appropriate use of this kōrero is central to upholding mana motuhake and Māori data sovereignty.

We also acknowledge the delivery partners, Nicholson Consulting and Catalyst IT, who have worked alongside us to explore practical, culturally grounded and sustainable approaches to the storage, protection and sharing of whānau voice.

Through this collaboration, we have strengthened our collective understanding of how trusted systems can support the safe holding and meaningful use of whānau voice. Ensuring that whānau can have confidence in how their kōrero is stored and shared is essential if that kōrero is to genuinely inform planning, commissioning and decision-making across the health system.

This partnership reflects our shared commitment to Te Tiriti o Waitangi and to advancing Māori leadership in hauora. The learnings from this work will contribute to a health system that is more responsive, locally grounded and guided by the aspirations of iwi, hapū and whānau.

Preface

This work acknowledges the mana and expertise of Āti Awa Toa Hauora Partnership Board, whose generous sharing of knowledge and vision has provided the foundation for this framework. Through their leadership and the voices of their whānau, we have learned that data, like all taonga, carries whakapapa – connections that extend beyond individual records to encompass relationships, responsibilities and the mauri of our communities. We recognise Te Kāhui Raraunga, whose Māori Data Governance Model provides the eight pou that underpin this work, standing firm like the posts of a whare that shelters and protects our most precious knowledge.

In our digital age, data has become the new whenua: fertile ground from which decisions grow and futures are shaped. Yet too often, this digital whenua has been colonised by systems that do not recognise the mana motuhake of Māori data or the tino rangatiratanga that iwi and whānau hold over their own stories. The Te Māra o Hine-Raraunga framework offers a different path, one where technology serves tikanga, where algorithms honour whakapapa and where every byte of information is treated with the same care we would give to the most precious taonga in our whare. Like the kūmara that sprouts from Papatūānuku, this framework emerges from the whenua of Aotearoa, nurtured by the wisdom of our tīpuna and guided by the aspirations of our whānau.

This framework speaks with many voices: the technical expertise of developers who understand both code and kawa; the wisdom of kaumātua who remind us of our responsibilities to future generations; the practical knowledge of kaimahi who work daily with whānau; and, most importantly, the voices of whānau themselves, whose stories and aspirations give life to every system we build. We have endeavoured to honour both mātauranga Māori and contemporary technical practice, recognising that true innovation lies not in trading one for the other but in weaving them together like the strands of a kete.

As you read these pages, we invite you to see beyond technical specifications to the vision they serve: data systems that nourish rather than extract, that strengthen rather than diminish and that honour the past while enabling the future. Like tending a māra, this work requires patience, persistence and the understanding that the most valuable growth happens slowly, with care and in community with others.

May this framework serve as fertile soil for the aspirations of all organisations responsible for whānau voice data across Aotearoa. May the data gardens that grow from it yield abundance for our whānau, our hapū and our iwi for generations to come.

Overview

This technical specification addresses a critical challenge in contemporary Māori health governance: the development of data systems that genuinely serve tino rangatiratanga rather than perpetuating digital colonisation. The technical specification has been developed in partnership with Āti Awa Toa Hauora Partnership Board and Manatū Hauora | Ministry of Health. This report establishes the foundation for culturally grounded whānau voice data solutions. Manatū Hauora funded this work and commissioned it in partnership with the Āti Awa Toa Hauora Partnership Board.

Research has demonstrated that conventional approaches to health data management characterised by offshore hosting, proprietary software dependencies and governance structures that marginalise indigenous authority fundamentally contradict the aspirations for mana motuhake articulated through extensive wānanga processes. As one participant observed: "We have to decolonise our approach to collecting this data."

Te Māra o Hine-Raraunga (the Data Garden Framework) emerges from this understanding, providing both a metaphorical foundation and a practical blueprint for data ecosystems that nourish rather than extract. The framework integrates Te Kāhui Raraunga's eight Māori Data Governance Pou with contemporary open-source technologies, demonstrating how technical architecture can embody tikanga principles rather than work against them.

Central to this approach is the recognition that true data sovereignty cannot be achieved through hybrid solutions or offshore hosting arrangements. Our analysis shows that international legislation in various jurisdictions can enable foreign government access to data held by multinational companies, regardless of where that data is physically stored. Jurisdiction often extends wherever data remains within a provider's "possession, custody, or control", ultimately making genuine sovereignty difficult to guarantee under global corporate cloud models.

The specification utilises a sovereignty-first, open-source solutions approach hosted within Aotearoa by Māori-owned or Aotearoa-owned providers. This approach eliminates licensing dependencies, enables unlimited customisation for tikanga alignment and provides complete transparency in system operations. While implementation may require greater initial investment in local capability building, the technical specification demonstrates that long-term costs remain comparable to corporate alternatives when vendor dependencies and compliance risks are properly calculated.

The technical architecture leverages proven open-source platforms including DSpace digital repositories, PostgreSQL databases and OpenSearch analytics systems. These mature technologies support sophisticated data management requirements while maintaining full

local control and customisation capability. The framework provides detailed implementation guidance across four development phases, from foundational systems to full digital tino rangatiratanga.

This work represents more than a technical specification; it demonstrates how digital infrastructure can serve indigenous self-determination rather than constraining it. By refusing to compromise on core sovereignty principles while acknowledging practical implementation constraints, the technical specification charts a pathway toward genuine digital tino rangatiratanga in Māori health data governance.

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Definitions

Term	Definition
Āti Awa Toa Hauora Partnership Board	An iwi-Māori partnership board representing the health interests and aspirations of two iwi: Te Āti Awa and Ngāti Toa Rangatira.
Māori data governance	The principles, structures, accountability mechanisms, legal instruments and policies through which Māori exercise control over Māori data.
Māori Data Governance Model	A model designed by Māori data experts and published by Te Kāhui Raraunga to provide guidance for the system-wide governance of Māori data.
Māori data sovereignty	The inherent rights and interests that Māori have in relation to the collection, ownership and application of Māori data.
Open source	A description of software or other products where the source code, design documents and content are made available for anyone to use, modify and distribute.
Whānau voice	Data that has been collected directly from whānau by an iwi-Māori partnership board. This includes both qualitative and quantitative data; responses come in a range of forms, such as written, audio and video. It does not include data that has been provided by government agencies.
Commissioning partners	Āti Awa Toa Hauora Partnership Board and Manatū Hauora, as commissioning partners, jointly set direction, agreed priorities, and oversaw the investment and outcomes.
Delivery partners	Catalyst IT and Nicholson Consulting, as delivery partners, were responsible for implementing agreed activities and producing outputs under the direction and oversight of the commissioning partners.

Glossary

Te reo Māori	An English translation
ahua tinana	physical form; bodily appearance; physique
Aotearoa	traditional name now commonly used as a Māori name for New Zealand
hangarau	technology
hapū	subtribe
hau	vitality
hauora	health
hua	fruit
iwi	tribe
kai	food
kaimahi	staff
kaitiaki	guardian
kaitiakitanga	guardianship, stewardship
kākano	seed
kanohi ki te kanohi	face to face
kapa haka	Māori performing arts
kaupapa	plan, principle, philosophy
kawa	immutable protocols
mana	prestige, influence, status, spiritual power
mana motuhake	mana through self-determination and control over one's own destiny
manaakitanga	hospitality, kindness, generosity, support
māra	garden
mahi ā-ringa	handcrafts; handmade work; practical or manual arts
Māori	the indigenous people of Aotearoa
mātauranga	Māori knowledge system
māuiui	unwell; sick; illness
mauri	life force
mōteatea	traditional chant; lament; classical Māori song (often ancient, poetic)
noa	unrestricted; free of tapu
ora/oranga	alive, healthy, to be well; wellbeing, health
Papatūānuku	Earth mother
poipoia te kākano	nurturing the seed
pono	truth
pou	pillar
pūawaitia	to bloom, come to fruition
pūkana	Facial expression (used in haka and performance)
pūrakau	Story; narrative; traditional story (often carrying cultural knowledge)

Te reo Māori	An English translation
rangatahi	youth
Ringa toi	artisan; artist; practitioner of the arts
rangatiratanga	chieftainship
rohe	region
tā moko	traditional tattoo
taonga	those things and values that we treasure, both intangible and tangible
tapu	sacred, restricted or prohibited
te ao Māori	the Māori world
Te Hoahoanga Hangarau	the technical architecture
Te Huarahi Whakatupu	the future roadmap
Te Kāhui Raraunga	the operational arm of the Data Iwi Leaders Group
Te Kōrero Hangarau	the technical discussion
Te Māra o Hine-Raraunga	the Data Garden Framework
Te Pā Tūwatata	Name of the data storage network developed by Te Kāhui Raraunga
te reo Māori	the Māori language
Te Tiriti o Waitangi	New Zealand's foundational document
tika	correct
tikanga	custom, rules
tino rangatiratanga	self-determination, sovereignty, autonomy
tuakana-teina	reciprocal mentoring relationship where an older or more experienced individual (tuakana) guides and supports a younger or less experienced individual (teina)
tuarua	second
tuatahi	first
tuatoru	third
tupu	seedling
tūpāpaku	Deceased person; body of the dead (prior to burial)
waiata	song; chant (can include contemporary or traditional songs)
wānanga	educational seminar; to meet and discuss
whai hua	to be useful
whakairo	carving; carved artwork (wood, bone, stone)
whaikōrero	Formal oratory; ceremonial speech-making (especially on the marae)
whakapapa	genealogy
whakarite i te oneone	preparing the ground
whakatō	planting
whānau	family
whanaungatanga	relationship
whenua	land

Initialisms

Initialism	Expanded
AGPL	GNU Affero General Public Licence
AI	Artificial Intelligence
API	Application Programming Interface
BSD	Berkeley Software Distribution
GPL	GNU General Public License
IMPB	Iwi-Māori Partnership Board
JSON	JavaScript Object Notation
JSONB	binary format for storing JSON data
LTS	Long-Term Support
MIT	Massachusetts Institute of Technology
OWASP	Open Worldwide Application Security Project
RBAC	Role-Based Access Control
SSL	Secure Sockets Layer
UI	User Interface
WCAG	Web Content Accessibility Guidelines
ZAP	Zed Attack Proxy

Introduction

This report outlines a design specification for a whānau voice data solution based on the experience of the Āti Awa Toa Hauora Partnership Board. The design specification identifies the technical requirements for a culturally appropriate data solution for the storage, protection and sharing of whānau voice data.

"Whānau voice" is a term used to describe the hauora aspirations, priorities and needs of Māori individuals, families and communities. Whānau voice can come in a range of forms and be expressed through different platforms (e.g., photos, tā moko, whakairo, whaikōrero, kapa haka, waiata, mōteatea, pūrakau, ringa toi, ahua tinana, pūkana, mahi ā-ringa). Whānau voice collection can take place in many environments, including wānanga with whānau, hapū and iwi; online surveys; and interviews, and it can be gathered through existing resources such as haka and whaikōrero.

The collection and use of whānau voice enables iwi-Māori partnership boards (IMPBs) to develop more robust advice on priorities for investment and innovation in the health system, informed by the hauora aspirations, priorities and needs of local Māori. For whānau voice to be used effectively to set local and regional health priorities for Māori, trusted processes that uphold the mana of those voices are required.

Current whānau voice data storage systems do not have the appropriate protections. Whānau voice data is highly sensitive and tapu, capturing details of oranga journeys (including ora, māuiui and tūpāpaku), and therefore needs to be safely stored and protected. This report offers a design specification for the culturally appropriate storage, protection and sharing of whānau voice data.

This report has been significantly informed by a co-design process undertaken in partnership with Āti Awa Toa Hauora Partnership Board. This process was facilitated by Nicholson Consulting and Catalyst. Insights gathered through literature reviews, wānanga with Āti Awa Toa Hauora Partnership Board stakeholders, interviews with Māori data experts and technical sessions provide the practical basis for the requirements outlined herein.

The goal is to develop a generalisable yet adaptable solution that empowers whānau, respects tikanga Māori, upholds Te Tiriti o Waitangi and improves hauora Māori data insights to support IMPBs in their mission across all regions, starting with the specific context of Āti Awa Toa Hauora Partnership Board. The design specification and framework could be applicable across all established IMPBs. However, further work may need to be done to apply the framework in other IMPBs, acknowledging the unique needs and tikanga within iwi and rohe across Aotearoa.

Methodology and process

The development of this design specification followed a co-design process centred around te ao Māori principles, primarily engaging with Āti Awa Toa Hauora Partnership Board. The process involved a set of activities to gain a deep understanding of the existing environment for whānau voice data and to establish Āti Awa Toa Hauora Partnership Board's aspirations for a culturally appropriate data solution.

The activities were as follows.

Whānau voice data landscape review: A deep dive into existing practices and recommendations for storing data in a culturally appropriate manner was conducted through scanning literature and holding interviews with Māori data experts. A report was prepared to review existing Māori data governance frameworks, data sovereignty initiatives and relevant technologies. Through the landscape report, we receive the Māori Data Governance Model as the foundational framework for Māori data initiatives and affirm locally owned data infrastructures as a necessity.

Wānanga: Multiple wānanga were held with Āti Awa Toa Hauora Partnership Board representatives, whānau members and other stakeholders. These sessions focused on understanding aspirations, identifying challenges, exploring desired functionalities and discussing governance requirements within specific rohe. These insights form the basis for understanding potential IMPB needs more broadly.

Technical session – Wānanga Hangarau: A dedicated session focused on the technical aspects and user experience of a potential solution, exploring user personas, data interactions, administrative needs and technical considerations relevant to the Āti Awa Toa Hauora Partnership Board context, providing insights to transform into requirements.

Iterative refinement: Findings were documented, shared back to Āti Awa Toa Hauora Partnership Board participants for feedback and used to refine understanding of requirements and potential solutions applicable both specifically and generally.

Assumptions and disclaimers

Assumptions and disclaimers applicable to this design specification are as follows.

Generalisable framework, specific insights: This specification proposes a general framework for IMPBs, but the detailed requirements are primarily derived from the Āti Awa Toa Hauora Partnership Board case study. Further engagement with other IMPBs will be necessary to validate and adapt the framework as required to reflect tikanga and kawa meaningful to each IMPB.

Co-design partnership: The specifics related to Āti Awa Toa Hauora Partnership Board are based on input gathered during the co-design process. Further refinement may follow.

Evolving landscape: The fields of Māori data sovereignty, IMPB roles and data technology are continually evolving. The proposed solutions aim for flexibility and adaptability.

Resource dependencies: Implementation roadmaps and specific solution choices for any IMPB will depend on available funding, technical expertise and ongoing partnership commitments.

Focus: The primary focus is outlining options and requirements for a data solution grounded in Māori data governance principles, applicable generally to IMPBs and specifically demonstrated through the Āti Awa Toa Hauora Partnership Board example.

Te Māra o Hine-Raraunga: The Data Garden Framework

This design specification is guided by the metaphor of Te Māra o Hine-Raraunga – the Data Garden – where whānau voice and wellbeing can flourish through carefully cultivated data practices. Just as a māra kai nourishes the body, this design specification aims to nourish decisions, relationships and tino rangatiratanga.

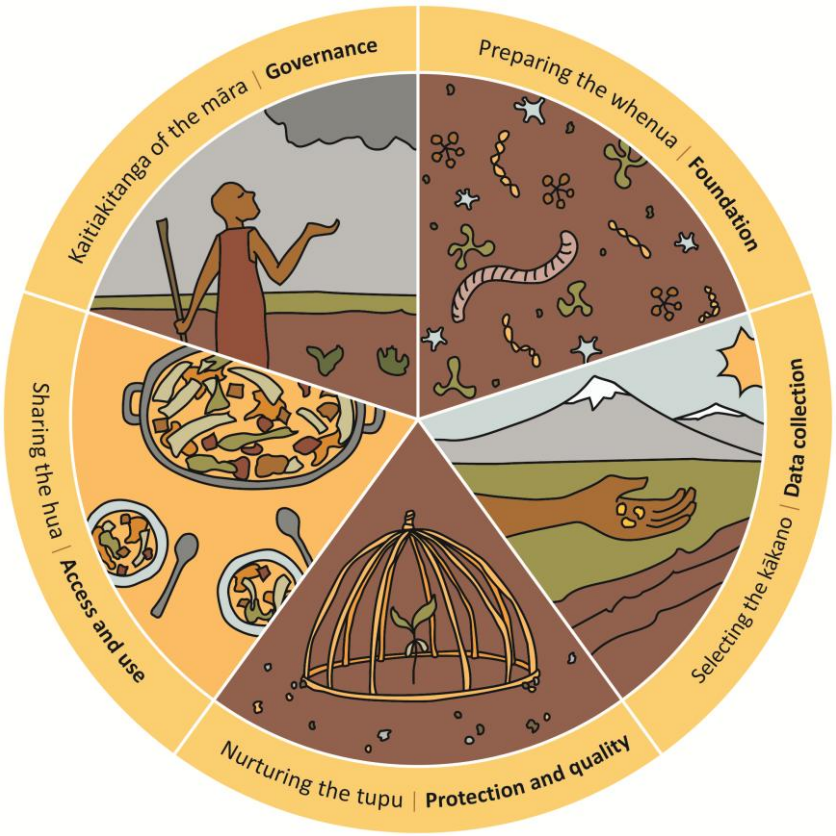


Figure 1. The five components of Te Māra o Hine-Raraunga

Like a thriving garden, a Māori data system requires intentional design, culturally appropriate technologies, ongoing stewardship and ethical use of its fruits. This metaphor guides our approach across all elements:

Preparing the whenua (foundation): Just as soil must be properly prepared before planting, our data infrastructure must be built on secure, sovereign foundations within Aotearoa.

Selecting the kākano (data collection): As a gardener carefully selects seeds appropriate for the whenua and climate, we must determine what data is genuinely needed and collect it in mana-enhancing ways.

Nurturing the tupu (protection and quality): Young plants require protection from harsh conditions and pests; likewise, data requires protection from misuse and corruption.

Sharing the hua (access and use): The harvest of a māra is meant to nourish the community; similarly, data must be accessible to those it belongs to and used for their benefit.

Kaitiakitanga of the māra (governance): The māra requires knowledgeable kaitiaki who understand its rhythms and needs; data requires similar stewardship guided by tikanga.

This design specification incorporates an existing framework: the Māori Data Governance Model, developed by Te Kāhui Raraunga. The model comprises eight Data Governance Pou, included in this specification. Each pou will contribute to developing and sustaining this data garden, providing detailed guidance on how to implement a system that empowers whānau, respects tikanga Māori and supports improved hauora outcomes.

Comparative solutions analysis

Throughout this process, we undertook a comprehensive evaluation of technological approaches to determine which would best support mana motuhake and the aspirations expressed through our wānanga. This analysis was essential to demonstrate that our recommended approach represents the most appropriate pathway for achieving true data sovereignty, rather than merely selecting technology based on convenience or familiarity.

The three solution pathways evaluated

The three solution pathways we evaluated were as follows.

Open-source sovereignty-first approach (recommended): This approach prioritises Māori data sovereignty through fully open-source technologies hosted exclusively within Aotearoa by Māori-owned or Aotearoa-owned providers. Key characteristics include complete source code accessibility, freedom from vendor lock-in, alignment with tikanga principles through customisable frameworks and full compliance with data sovereignty requirements as outlined in Te Kāhui Raraunga's Māori Data Governance Model.

Corporate cloud solutions (Microsoft, Amazon, Google): These solutions offer rapid deployment and comprehensive feature sets but operate under foreign jurisdiction with limited sovereignty protections. While potentially faster to implement, they fundamentally compromise the mana motuhake aspirations articulated through our wānanga process.

Hybrid commercial-sovereign approaches: These models attempt to balance commercial efficiency with sovereignty concerns through selective use of offshore services combined with local data storage. Our analysis revealed that such approaches cannot provide genuine sovereignty protection.

The following table summarises these three pathways.

Criteria	Opensource Sovereignty -first	Corporate cloud solutions	Hybrid commercial sovereign	Analysis notes
Māori Data Sovereignty	Strong	Weak	Compromised	Only the sovereignty-first approach eliminates foreign jurisdictional access
Implementation speed	Medium (8–12 months)	Fast (4–6 months)	Fast (6–8 months)	Corporate solutions deploy quickly but compromise foundational sovereignty principles
Technical capability	Fully customisable	Comprehensive	Mixed capabilities	Open source provides unlimited customisation for cultural requirements

Vendor lock-in risk	None	Complete dependency	Partial dependency	Open source is based on freedom; corporate solutions create permanent dependencies
Cultural adaptability	Unlimited	Constrained	Limited	Only open source allows code sovereignty, enabling full integration of tikanga principles in system design
Alignment with Te Mana Raraunga Principles	Fully compliant	Non-compliant	Non-compliant	Corporate and hybrid approaches cannot satisfy "storage in Aotearoa" and jurisdictional control requirements
Future flexibility	Complete control	Vendor-dependent	Partially constrained	The sovereignty-first approach enables evolution according to Māori priorities

Why open-source sovereignty-first is the recommended path

Our analysis, informed by the legal opinion on government use of cloud, jurisdictional risk, and contemporary developments in international data law, demonstrates that only a sovereignty-first approach can truly support mana motuhake aspirations.[1]

Certain national laws empower governments to compel technology companies to provide access to data stored on their servers globally, irrespective of local laws or data residency arrangements. Legal experts note that jurisdiction often extends wherever data remains within a provider's "possession, custody, or control," rendering genuine data sovereignty challenging under corporate cloud models.[2]

The Te Mana Raraunga principles emphasise that "decisions about the physical and virtual storage of Māori data shall enhance control for current and future generations" and that "whenever possible, Māori data shall be stored in Aotearoa New Zealand."[3]

Cost-benefit analysis of approaches

While corporate solutions may appear to offer lower initial implementation costs, our analysis reveals that total cost of ownership over five years remains comparable when

[1] Every-Palmer, J. (2022). *Opinion re Government use of cloud and jurisdictional risk*. Legal opinion prepared for Catalyst Cloud, 22 December.
[2] Buddle Findlay. (2023, October 24). *New Zealand based data centres and jurisdictional risk*. Retrieved from https://www.buddlefindlay.com/insights/new-zealand-based-data-centres-and-jurisdictional-risk/
[3] Te Mana Raraunga. (2018, October). *Principles of Māori Data Sovereignty - Brief #1*. Retrieved from https://static1.squarespace.com/static/58e9b10f9de4bb8d1fb5ebbc/t/5bda208b4ae237cd89ee16e9/1541021836126/TMR+Ma%CC%84ori+Data+Sovereignty+Principles+Oct+2018.pdf

factoring in licensing fees, compliance costs and the hidden costs of vendor dependency. More importantly, the sovereignty benefits of the open-source approach provide value that cannot be quantified in purely monetary terms, including the ability to exercise genuine control over data systems that contain the voices and experiences of whānau.

Technical feasibility and risk assessment

Our technical analysis shows that open-source solutions provide equivalent or superior functionality to corporate alternatives while maintaining complete transparency and customisability. The maturity of platforms like DSpace (used by major universities globally), PostgreSQL (deployed by government agencies worldwide) and Kubernetes (the foundation of modern cloud infrastructure) provides robust foundations for IMPB data systems.

Risk mitigation through open-source approaches includes elimination of vendor lock-in, community-driven security updates and the ability to modify systems to meet evolving cultural and technical requirements. Corporate solutions, by contrast, create dependencies that limit future flexibility and autonomy.

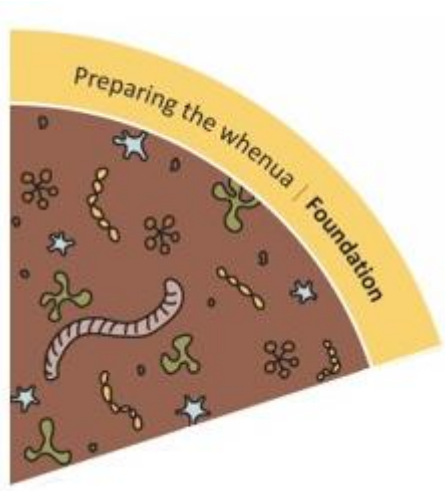
The comparative analysis demonstrates that while multiple technological pathways exist, the open-source sovereignty-first approach aligns best with the fundamental aspirations for mana motuhake expressed throughout our wānanga process and required by contemporary understanding of Māori data governance principles.

The following analysis uses the recommended open-source sovereignty-first approach. It ensures that our recommendation represents not merely a technical preference, but the approach that best supports the data sovereignty aspirations that emerged from our extensive engagement with Āti Awa Toa Hauora Partnership Board and aligns with broader indigenous rights frameworks recognised internationally.

Te Huarahi Whakatupu: Potential roadmap overview

This section provides a unified roadmap that brings together implementation considerations across all elements of the data solution. This roadmap acknowledges practical constraints where compromises may be needed to achieve a functional system at each phase, while building toward the ideal state of tino rangatiratanga over data.

Phase 1: Foundation – Initial fundamental state



Whakarite i te oneone – Preparing the whenua

In this phase, we establish the essential foundations needed to safeguard data sovereignty while allowing operations to begin. We also establish the key requirements for Aotearoa-hosted infrastructure that incorporates core sovereignty protections, essential security controls and standard open-source database implementations. This infrastructure must also support whānau engagement by providing secure access to personal information through simple and transparent consent mechanisms. Additionally, operational capabilities should include essential reporting functions for kaimahi and the ability to perform initial data sensitivity classification, ensuring both practical management and protection of sensitive information.

Trade-off consideration: Focus on establishing sovereignty and security fundamentals while providing essential functionality. Cultural elements are present but there may be room for improvement.

Indicative timeframe: six to nine months

1. **Foundation infrastructure**

Task	Description	Estimated duration
Aotearoa-hosted infrastructure	Establishing hosting with core sovereignty safeguards	-
Database setup	PostgreSQL with initial security hardening	4–8 weeks

Web server configuration	Nginx and SSL setup	1–3 days
Backup procedures	BorgBackup implementation for essential backups	2–4 hours
Containerisation	Standard Docker setup	1–2 weeks

2. Core application development

Task	Description	Estimated duration
Backend framework	Django implementation	8–16 weeks
Authentication	Keycloak integration	3–5 days
Data collection forms	Simple forms with validation	2–4 weeks
	RBAC: Essential permissions setup	1–2 weeks
Audit logging	Implementation	1–2 days

3. Initial whānau capabilities

Task	Description	Estimated duration
Whānau portal	Simple interface for viewing personal data	4–8 weeks
Consent capture	Mechanisms for whānau approval	2–4 weeks
Data classification	Initial framework for sensitive information	2–4 weeks
Reporting	Essential reporting for kaimahi	1–2 weeks

4. Cultural foundations

Task	Description	Estimated duration
Te reo Māori integration	Terminology incorporated across the system	Ongoing
Cultural appropriateness	Interface design reflecting tikanga principles	Ongoing
Tikanga-based policies and procedures	Initial policy development	Ongoing

Phase 2: Capability building – Transitional state

Whakatō – Selecting the kakano

In this phase, we focus on strengthening both technical capabilities and cultural foundations. Infrastructure improvements include enhanced security, granular access controls and advanced monitoring. Culturally, the system supports a fully bilingual interface and incorporates narrative-based data collection tools. Functionality is expanded with configurable reporting dashboards and features that enable whānau to easily review their own data.

Progression focus: Focus on building local capability while enhancing cultural elements and improving user experience.

Indicative timeframe: four to six months

1. Enhanced infrastructure

Task	Description	Estimated duration
Kubernetes orchestration	Implementation for improved scalability and deployment	1–2 weeks
Enhanced security monitoring	OpenSearch setup for continuous monitoring and alerting	3–5 days
API Gateway setup	Kong configuration for secure and efficient API management	1–2 weeks
Backup and disaster recovery	Improved procedures for system resilience	2–4 hours

2. Improved user experience

Task	Description	Estimated duration
Frontend development	Vue.js interface for responsive and dynamic user experience	4–8 weeks
Bilingual support	Full internationalisation and bilingual capability	2–4 weeks
Accessibility	Compliance improvements to WCAG Level AA	2–4 weeks

Cultural customisation	Options for cultural and visual alignment	2–4 weeks

3. Data capabilities

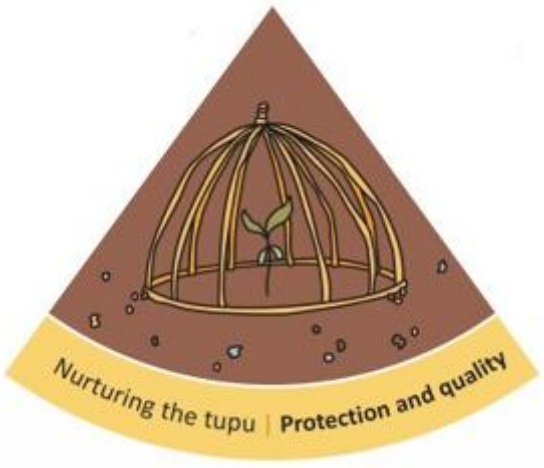
Task	Description	Estimated duration
Narrative data tools	Accessible tools for qualitative data collection	4–8 weeks
Data validation and quality controls	Enhanced systems for accuracy and reliability	2–4 weeks
Consent management	Improved interface for whānau data approval	2–4 weeks
Reporting dashboards	Configurable dashboards for tailored reporting	1–2 weeks

4. Analytics foundation

Task	Description	Estimated duration
OpenSearch dashboards	Implementation for essential analytics and insights	3–5 days
Data quality monitoring	Tools for ongoing data integrity checks	2–4 weeks
Classification system	Enhanced framework for data categorisation	2–4 weeks

Phase 3: Advancing autonomy – Approaching ideal state

Poipoia te kākano – Nurturing the tupu



In this phase, we implement advanced capabilities within a mature governance framework. This includes sophisticated tools for narrative data and analytics supported by strong governance. Wherever possible, systems are migrated to Māori-owned hosting with documentation to enable independent local operation. Governance is integrated into every layer, with data classification guiding access and protection rules and structured workflows facilitating secure and intentional data sharing.

Milestone achievement: The system enables substantial local control, sophisticated capabilities under robust governance and significant cultural alignment.

Indicative timeframe: four to six months

1. Advanced capabilities

Task	Description	Estimated duration
DSpace integration	Digital repository integration with data migration	8–16 weeks*
Advanced search	OpenSearch configuration for enhanced discovery	1–2 weeks
Sophisticated analytics	Apache Superset implementation for advanced insights	1–2 weeks
Advanced data validation	Great Expectations setup for data quality assurance	2–4 weeks

*Depending on data migration.

2. Cultural enhancement

Task	Description	Estimated duration
Bilingual parity and interface	Full bilingual support and cultural interface elements	4–8 weeks
Custom visualisations	D3.js data visualisations reflecting Māori design	3–5 days (setup), ongoing

Narrative and mixed media	Enhanced capabilities for stories, images and multimedia	4–8 weeks
Cultural customisation	Interface and experience tailored to local tikanga	Ongoing

3. Governance integration

Task	Description	Estimated duration
Advanced access controls	Role-based access with attribute-level governance	2–4 weeks
Dynamic classification	Data classification actively driving access rules	2–4 weeks
Ethical review workflows	Formalised review processes for data governance	2–4 weeks
Audit and monitoring	Enhanced logging and behavioural monitoring	1–2 weeks

4. Self-service capabilities

Task	Description	Estimated duration
Whānau data tools	Data export and correction tools for whānau	2–4 weeks
Self-service analytics	Accessible analytics dashboards for approved users	1–2 weeks
Advanced consent management	Tools for dynamic and granular consent options	2–4 weeks

Phase 4: Tino rangatiratanga – Ideal state

Pūawaitia – Sharing the hua

In this phase, the system achieves full expression of tino rangatiratanga, with complete infrastructure sovereignty under Māori control. Whānau are empowered through intuitive control over their data and access to community insights. The classification system is fully aligned with te ao Māori perspectives, clearly demonstrating benefits that flow back to whānau.

The detailed implementation roadmaps in each pou provide specific guidance for progressing through these phases, with the ultimate goal of a system that embodies digital tino rangatiratanga – supporting data sovereignty while enabling innovation and collaboration across the Māori health ecosystem.

Ultimate goal: The system fully embodies digital tino rangatiratanga, supporting data sovereignty while enabling innovation and collaboration across the Māori health ecosystem.

Indicative timeframe: ongoing

1. Complete sovereignty

Task	Description	Estimated duration
Migration to Māori-owned hosting	Transition hosting to Māori-owned infrastructure where feasible	1–2 weeks
Infrastructure sovereignty documentation	Comprehensive documentation of infrastructure sovereignty standards	Ongoing
Advanced security	Implementation of behavioural monitoring and proactive defence measures	2–4 weeks
Disaster recovery and continuity	Full disaster recovery and business continuity systems	Ongoing

2. Advanced analytics and AI

Task	Description	Estimated duration
AI governance framework	Implementation of a responsible AI governance structure	Ongoing
Bias detection and mitigation	Continuous identification and reduction of bias in data and models	Ongoing
Trend analysis and prediction	Development of advanced analytics for foresight and planning	Ongoing
Community insights platforms	Platforms enabling whānau and community access to insights	4–8 weeks

3. Inter-IMPB capabilities

Task	Description	Estimated duration
Secure data-sharing protocols	Establishment of protocols for safe inter-IMPB data exchange	Ongoing
Shared infrastructure systems	Development of collective hosting and technical systems	Ongoing
Knowledge exchange platforms	Tools and environments for collaboration and shared learning	Ongoing
Collective advocacy data	Data capabilities supporting coordinated advocacy and representation	Ongoing

4. Continuous evolution

Task	Description	Estimated duration
Community-driven development	New features guided by community priorities and needs	Ongoing
Tikanga alignment reviews	Regular cultural and tikanga-based reviews of systems and practices	Ongoing
Technology evaluation	Assessment and integration of emerging technologies	Ongoing
Knowledge transfer systems	Frameworks supporting intergenerational learning and leadership	Ongoing

Te Hoahoanga Hangarau: Potential technical architecture overview

The Whānau Voice Data Solutions platform leverages a carefully selected suite of open-source technologies that align with both technical requirements and cultural principles. This summary provides a consolidated view of possible technologies, organised by function and implementation priority.

Budget planning: The software components listed within this technical architecture have no licensing fees. Pricing would differ between vendors and would largely be charged on a time and materials basis. The indicative implementation timeframes listed below are suggestions. They may vary from estimates presented by vendors during a procurement process.

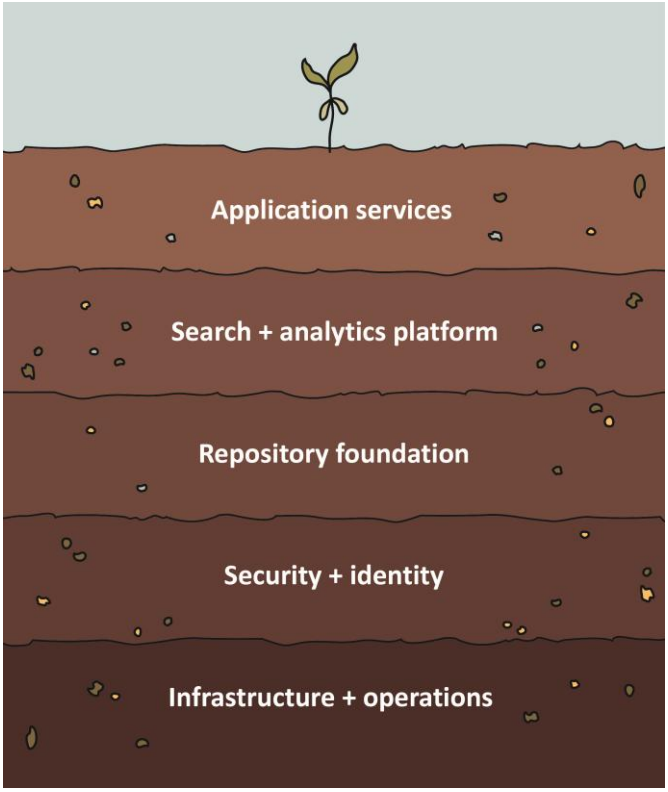


Figure 2: Artistic rendition of the technical architecture stack as layers of soil

Core architecture stack

Repository foundation

Component	Technology	Licence	Purpose	Indicative implementation timeframe
Digital repository	DSpace 7+	BSD	Primary data storage, preservation and community management	8–16 weeks, depending on size of data ingestion and level of metadata refinement, with ongoing maintenance
Database	PostgreSQL 15+	PostgreSQL	Relational data, metadata and JSONB for flexible schemas	4–8 weeks, with ongoing maintenance
Object storage	MinIO	AGPL v3	File storage for multimedia and large documents	1–2 weeks, with ongoing maintenance

Search and analytics platform

Component	Technology	Licence	Purpose	Indicative implementation timeframe
Search engine	OpenSearch 2.x or Elasticsearch	Apache 2.0 / Elastic License	Real-time search, analytics and cultural data discovery	3–5 days
Analytics interface	OpenSearch Dashboards or Kibana	Apache 2.0 / Elastic License	Kaimahi reporting and system monitoring	3–5 days
Data processing	Data Prepper or Logstash	Apache 2.0 / Elastic License	Audit log processing and data transformation	1–2 days
Security	OpenSearch Security Plugin or Elasticsearch Security	Apache 2.0 / Elastic License	Document-level security and access control	1–2 days

Application services

Component	Technology	Licence	Purpose	Indicative implementation timeframe
Backend framework	Django 4.2 LTS	BSD	Core application logic and workflow management	8–16 weeks
API layer	Django REST framework	BSD	RESTful APIs for frontend integration	8–12 weeks
Task processing	Celery + Redis	BSD	Background jobs and caching	1–2 days
Frontend framework	Vue.js 3 + Nuxt.js	MIT	Accessible, responsive user interfaces	4–8 weeks
UI components	Vuetify/ PrimeVue	MIT	WCAG-compliant design system	1–2 weeks

Security and identity

Component	Technology	Licence	Purpose	Indicative implementation timeframe
Identity management	Keycloak	Apache 2.0	Authentication and authorisation	3–5 days
API gateway	Kong Gateway	Apache 2.0	Rate limiting, security policies and routing	1–2 weeks
Web server	Nginx	BSD 2-Clause	Reverse proxy and SSL termination	1–3 days
Intrusion prevention	Fail2Ban	GPL v2	Automated security response	2–4 hours

Infrastructure and operations

Component	Technology	Licence	Purpose	Indicative implementation timeframe
Containerisation	Docker + Podman	Apache 2.0	Application packaging and deployment	1–2 weeks
Orchestration	Kubernetes (k3s)	Apache 2.0	Container management and scaling	1–2 weeks

Component	Technology	Licence	Purpose	Indicative implementation timeframe
Backup	Barman + BorgBackup	GPL v3 / BSD	Database and file system backup	2–4 hours
Security scanning	Trivy + OWASP ZAP	Apache 2.0	Vulnerability assessment	2–4 hours
Hosting	Te Pā Tūwatata	Not applicable	Secure, tikanga-based hosting	1–2 weeks

Specialised tools by function

Data collection and forms

Tool	Licence	Cultural alignment	Indicative implementation timeframe
LimeSurvey	GPL v2	Multilingual surveys with te reo Māori support	2–4 hours to get set up, with ongoing usage and upkeep by IMPB
ODK/Open Data Kit	Apache 2.0	Mobile data collection for community engagement	1–2 weeks to get set up, with ongoing usage and upkeep by IMPB
axe-core	MPL 2.0	Accessibility testing for inclusive design	2–4 hours
Pa11y	LGPL v3	Automated WCAG compliance validation	2–4 hours

Analytics and research

Tool	Licence	Cultural alignment	Indicative implementation timeframe
R + Shiny Server	GPL / AGPL	Statistical analysis with cultural visualisation	2–4 weeks
Apache Superset	Apache 2.0	Self-service analytics with security controls	1–2 weeks
D3.js	BSD 3-Clause	Custom visualisations reflecting Māori design	3–5 days to get started, with ongoing usage by IMPB
Great Expectations	Apache 2.0	Data quality validation with configurable rules	2–4 weeks, with ongoing maintenance
OpenRefine	BSD 3-Clause	Data cleaning while preserving lineage	3–5 days to get started, with ongoing usage and upkeep by IMPB

Data flow and integration

Tool	Licence	Cultural alignment	Indicative implementation timeframe
Apache NiFi	Apache 2.0	Secure data movement for sharing and repatriation	10–30 days, depending on level of data flow development and refinement

Conclusion

Te Māra o Hine-Raraunga represents a vision for a data ecosystem that nourishes hauora and tino rangatiratanga. Just as a flourishing māra sustains a community physically while connecting it to ancestral knowledge and practices, this design specification aims to sustain IMPBs and whānau with the information they need while strengthening connections to tikanga and mātauranga Māori.

The Te Māra o Hine-Raraunga framework acknowledges that, like establishing a māra, building this system requires patience, persistence and a willingness to start with essential foundations while working toward the ideal. By maintaining clear alignment with tikanga principles and keeping the ultimate vision in focus, even the early phases can begin to yield benefits for whānau.

As a māra grows and develops with each season, so too will this data ecosystem evolve through ongoing learning, adaptation and the contributions of many hands working together.

The eight pou provide the structure for this growth, ensuring that at every stage, the system honours its foundations in te ao Māori while addressing practical needs for secure, accessible and valuable data systems that support improved hauora outcomes.