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Indigenous-led futures in Artificial Intelligence

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ABSTRACT: The entanglement of technoscience and coloniality is increasingly interrogated through Indigenous critiques of science, which challenge its epistemic authority and dominance in policy, governance, and resource management. The push to integrate Indigenous knowledge into research and decision-making frameworks is often seen as a response to equity and Indigenous rights, but it also speaks to the need for more holistic, relational, and contextually grounded approaches to addressing contemporary socio-environmental challenges. However, such integration efforts are not neutral interventions; they are sites of negotiation, translation, and contestation, shaped by the enduring legacies of colonial knowledge hierarchies and Indigenous assertions of sovereignty. Indigenous researchers, communities and organizations are also engaging with AI systems in diversified ways, including collaboration, reconfiguration, and adaptation, shaping technology to align with their own knowledge systems and priorities, and enacting alternative futures. This paper explores the trajectories of nascent movements to build Indigenous algorithmic futures through Indigenous-led initiatives focused on AI and data science, building links between the past and present to imagine and shape the possibility of a more diverse and culturally responsive algorithmic future.

KEYWORDS: INDIGENOUS PEOPLES, AI, DECOLONIZATION, TECHNOSCIENCE, INDIGENOUS-LED AI



1. Introduction

Artificial intelligence (AI) is increasingly embedded in everyday life, prompting questions about knowledge and decision making, the relationships between humans and non-humans and, ultimately, power and justice. As these technologies are woven into social and cultural practices, they influence not only daily activities but also the broader ways in which people make sense of the world; rather than simply reflecting the societies that produce them, they actively help to constitute and transform those societies. Understanding AI, therefore, demands more than technical description. Far from being a neutral tool, AI is better understood as a sociotechnical assemblage: a heterogeneous configuration of datasets, model architectures, human designers and engineers, data annotators and users, cloud infrastructures, mineral extraction chains, energy systems, labor regimes, and regulatory imaginaries¹.

Anthropology and Science and Technology Studies (STS) have developed approaches that examine AI as embedded in historical, political, and institutional formations. Within these traditions, AI could be analysed as a sociotechnical system (Forsythe 2001; Crawford 2021), as culture (Seaver 2017), as assemblage (Ong, Collier 2005), as boundary object (Star, Griesemer 1989), as normative regime (Johns 2016), and as imaginary (Jasanoff, Kim 2015; Becker 2021). Rather than competing descriptions, these frameworks illuminate distinct dimensions of a shared problematic: AI operates through infrastructures, institutions, and worldviews that render some knowledge computable while marginalizing others; what becomes computable, whose data is used, and whose interests are served are therefore deeply political questions.

This political dimension takes on particular acuity when AI is examined as a contemporary site of coloniality – the enduring structures of power, knowledge, and social control that persist beyond formal colonialism (Quijano, Ennis 2000). Theories of data colonialism and algorithmic coloniality further illuminate how colonial power resurfaces through every stage of AI systems' lifecycle – from resource extraction and data collection to model training, deployment, and use (Couldry, Mejias 2019; Mohamed *et al.* 2020; Birhane, Talat 2023). As Benjamin (2019) stressed, these processes are frequently obscured by

1. We would like to thank *Anuac* associate editor Francesco Bachis and the two anonymous reviewers for the careful reading of our manuscript and for the thoughtful and constructive comments provided. We are very grateful for the suggestions, which have helped us clarify and strengthen the argument.

claims of neutrality and innovation, enabling AI systems to reproduce pre-existing social hierarchies while maintaining an appearance of impartiality.

This critical perspective builds on a longer body of Indigenous scholarship arguing that modern science and technology are structurally entangled with colonial structures that continue to marginalize Indigenous epistemologies and lifeways (Cajete 2000; TallBear 2013; Kolopenuk 2020). Positioned within the broader framework of technoscience – where science, technology, and capital are mutually reinforcing (Glazebrook 2021) – AI inherits claims of objectivity and universality that obscure the social-embeddedness of scientific knowledge-making processes (Jasanoff 2004), enact forms of epistemic control, and perpetuate hierarchies central to the colonial project (Shiva 2014). As Prasad (2023) demonstrates, colonial modes of ordering knowledge were institutionalized as globally valid and continue to shape contemporary technological practice. While Smith (1999) does not address AI or technoscience directly, her work on decolonizing research methodologies provides a critical framework for confronting such epistemic hierarchies. By calling for the transformation of research practices – especially in terms of the participation and representation of Indigenous peoples – Smith offers a way to rethink not only what counts as knowledge but also how it is produced, by whom, and for whose benefit.

Building on these insights, this paper addresses how these dynamics shape the relationship between AI and Indigenous peoples and draws on a decolonial approach to centers Indigenous epistemologies, asserts Indigenous data sovereignty, and reconfigures the ethical and political logics that underlie technological development. As Clifford (2013: 1-2) reminds us, decolonization is not a singular, linear event but an ongoing, unfinished process – a recurring force of resistance that is continually obstructed and reinvented.

A decolonial approach requires careful conceptual attention to how Indigenous peoples' engagement with AI is framed. Indigeneity is not a bounded, essentialized category rooted in cultural or biological fixity, but a historically situated positioning, forged through ongoing struggles with states, markets, and global institutions (Niezen 2003). Indigenous actors navigate what Li (2000) calls the "indigenous slot" – the terms of recognition available to them – even as they seek to stretch or rework those terms. Recognition, however, is insufficient on its own: as Fraser (2003) argues, it must be accompanied by redistribution, lest structural inequalities remain intact. Povinelli (2002) sharpens this critique, warning that liberal recognition tends to translate Indigenous difference into administrable cultural forms – legible within

late liberal governance only insofar as they can be framed as bounded “culture” compatible with prevailing political and economic orders. This tension is acutely visible in debates on Indigenous AI, where inclusion may coexist with continued infrastructural dependency. If AI is a situated sociotechnical assemblage, and if Indigeneity is a relational positioning rather than a fixed essence, then “Indigenous AI” cannot denote a self-contained technological kind or an artifact that escapes existing infrastructural logics. Yet many Indigenous engagements with AI move beyond simple inclusion, interrogating the assumptions through which relations among humans, land, language, data, and technology are organized.

In this paper, “Indigenous-led AI” refers to projects in which Indigenous actors play key roles in designing, governing, appropriating, or contesting AI systems according to collective priorities. The term is approached simultaneously as a conceptual category and as an emerging empirical field. Conceptually, it denotes a situated positioning within technoscience – one that foregrounds Indigenous priorities, relational ontologies, and collective governance principles – rather than a distinct technological object. Empirically, it manifests in concrete initiatives: research projects, policy frameworks, community workshops, language revitalization technologies, and governance protocols developed or directed by Indigenous scholars and representatives. These initiatives do not exist outside contemporary AI infrastructures but operate within them, appropriating and reorienting their epistemic, material, and governance logics.

This understanding resonates with Arturo Escobar’s rethinking of technoscience through design and ontological plurality (2018). Drawing on Blaser’s concept of political ontology (2009), he proposes a “design pluriverse”: a move beyond market-driven production toward practices sustaining communal autonomy and relational modes of being, oriented toward “worlds in which many worlds fit” (Escobar 2018: xvi). Design here is neither technical configuration alone nor cultural expression, but the material and institutional shaping of sociotechnical systems: architectures, governance arrangements, resource flows. Since every design process enacts particular forms of existence, knowledge, and relationality, design is inherently ontological and political. Indigenous-led AI initiatives, read through this lens, are neither marginal technological alternatives nor cultural modifications grafted onto existing infrastructure; they are efforts to reconfigure the ontological assumptions embedded in AI systems and governance – pluriversal interventions within contemporary technoscience.

We ask: How are Indigenous-led initiatives engaging artificial intelligence beyond critique or resistance? What trajectories emerge across design, governance, deployment, and infrastructural arrangements? How do Indigenous engagements with AI navigate and rework the late liberal governance of difference that structures contemporary technological infrastructures?

To address these questions, the article draws on multi-sited engagement with Indigenous-led AI initiatives in Aotearoa New Zealand and transnational Indigenous networks. The authors combine collaborative and reflexive ethnographic approaches with semi-structured interviews and analysis of policy documents, reports, and online material, conducted through in-person and online participation in events, workshops, formal and informal meetings, and wānanga/talanoa.

The primary ethnographic grounding is the Tikanga and Technology (TinT) project; other initiatives – including the IAI Protocol / Abundant Intelligences (ABInt), Oceania Moana, and Te Hiku Media – are examined through document analysis, participation in public events, and Hudson's professional engagement within these networks.

This analysis is informed by the authors' distinct and complementary positionalities. Sapignoli, as a non-Indigenous scholar, conducted fieldwork in Aotearoa New Zealand between 2022 and 2023, attending workshops, conducting interviews and extended conversations, and following the networks of AI practitioners and Indigenous experts engaged in governance and *tikanga*-in-AI discussions. Hudson brings more than a decade of engaged Indigenous scholarship in Māori/Indigenous data sovereignty and AI, including as a co-founder of the Global Indigenous Data Alliance and co-author of the CARE principles; his analysis draws on reflexive engagement with initiatives – among them TinT – which he led. Together, these positionalities enable both ethnographic proximity and critical reflexivity, tracing how Indigenous actors engage and reshape contemporary AI assemblages from within.

Before turning to examples of Indigenous-led AI projects, the following section introduces Indigenous Data Sovereignty, which informs the discourse and practices underlying the development of these emerging forms of Indigenous AI.

2. Indigenous data sovereignty

Indigenous Data Sovereignty (IDSov) refers to the discourse and movement centred on Indigenous peoples' rights and interests in relation to data, spe-

cifically advocating for increased Indigenous control over data that pertains to them (Walter, Suina 2019). The term draws conceptually from the notion of “data sovereignty” in cloud computing, which holds that data is subject to the legal jurisdiction of the country where it is stored. However, IDSov reinterprets this principle through the lens of Indigenous self-determination, asserting that data should instead be governed by the laws, protocols, and governance structures of the Indigenous nations from which it originates. This fundamentally challenges the nature of rights and responsibilities associated with data being shared in global contexts and over the past decade IDSov has emerged as a critical perspective in debates around data governance, ethics, and justice, highlighting the necessity of respecting Indigenous values and governance in data-related practices.

Early efforts to advance IDSov were primarily concentrated within Indigenous networks in the CANZUS nations (Canada, Australia, New Zealand, and the United States). This focus shaped the first foundational workshop, held in 2015, which brought together Indigenous scholars and advocates from these countries and led to the foundational publication *Indigenous Data Sovereignty: Towards an Agenda* (Kukutai, Taylor 2016). However, the scope of engagement expanded significantly in subsequent years through two key international events.

In 2018, during *International Data Week* in Botswana, the *RDA International Indigenous Data Sovereignty Working Group* convened a series of discussions including a workshop that marked a critical turning point. This gathering included a broader, more globally representative group of participants, including delegates from Africa and Latin America. The outcome of this workshop was the development of the *CARE Principles for Indigenous Data Governance* – emphasizing Collective benefit, Authority to control, Responsibility, and Ethics. The CARE framework articulates a distinctly Indigenous approach to data governance, centring relational accountability and cultural relevance in data stewardship, making data storage and management responsive to Indigenous expectations of appropriate governance and use (Carroll *et al.* 2020).

A further milestone came in 2019 with the establishment of the Global Indigenous Data Alliance (GIDA). GIDA was adopted as an acronym for the organisation in part because it also means “guide” in the local Euskara language. GIDA has emerged as a key transnational advocate for IDSov, the CARE principles, and two central themes: the “governance of data” and the use of “data for governance”. These twin emphases underscore both the right of In-

digenous peoples to control data about themselves and their communities, and the strategic use of data to strengthen Indigenous governance capacities. CARE has since been translated into multiple languages and incorporated into national and international policy frameworks (Carroll *et al.* 2021; UNESCO 2023; Jennings *et al.* 2023; O'Brien *et al.* 2024).

The growing global significance of IDSov was recently underscored at the *Global Indigenous Data Sovereignty Conference*, held in Canberra from 1–3 April 2025. This event marked ten years of scholarship, advocacy, and practice within the IDSov movement. Bringing together approximately 300 Indigenous academics, community leaders, policymakers, and data practitioners, the conference celebrated the movement's impressive growth while also advancing critical conversations around its future. Initially, the IDSov movement focused on data rights within big data and data-holding institutions; however, AI has become an increasingly urgent concern (Maiaam nayri Wingara 2025).

The most recent GIDA meeting held in Mexico City (2026) focused specifically on IDSov and AI, with participants emphasising the way AI exacerbates harms previously articulated in the context of IDSov, and advocating for greater Indigenous participation and Indigenous led applications of AI. Within this evolving landscape, Indigenous scholars have increasingly emphasized that AI systems are not neutral but function as contemporary tools of colonization embedded in settler-colonial structures – encoding biases, erasing Indigenous presence, and privileging settler epistemologies.

3. *Indigenous peoples and AI*

At the 2025 National Kapa Haka Festival in Aotearoa/New Zealand, a performance addressed the complexities of AI, highlighting a shift from academic concern to community consciousness. Following the event, Pere Wihongi, leader of the group 'Angitū', stated: "E tika ana kia whakamatāra i te iwi ki tēnei taonga, tēnei taniwha rānei" (Absolutely, it's crucial to raise awareness about the potential of AI, both its benefits and risks). As he warned of its dangers – especially for children and online safety – he also shared that part of their haka, "EI AI" (reflecting the te reo Māori phonetic spelling of AI), was composed using ChatGPT and then refined by the group². This act of creative engagement illustrates not only a critical awareness of AI's risks, but also an

2. <https://www.rnz.co.nz/news/te-manu-korihi/543153/haka-written-by-ai-performed-at-matatini>, (last access 5 June 2025).

active appropriation and reshaping of the technology within Indigenous cultural frameworks.

Williams and Shipley (2021) suggest that indigenous epistemologies can augment AI applications and shift the focus beyond ideas of utility and efficiency towards concepts such as harmony with others, deeper ecological understanding, and close kinship networks. Similarly, Irwin and White (2019: 1) assert that “indigenous philosophy has a lot to offer the world, as we face the necessary shift from an exploitative, extractive economy, to a more sustainable one”. While these perspectives underscore the transformative potential of Indigenous knowledge systems, there is a risk of positioning Indigenous peoples solely as alternatives to non-Indigenous technological paradigms, thus othering them and overlooking the points of contact and co-creation already shaping AI. In particular, this view can obscure the forms of relational creativity, creative appropriation, and adaptation that have long characterized Indigenous engagements with external influences in Oceania (Favole 2010). These initiatives, however, do not simply seek representation within AI systems, they challenge how AI relates to knowledge, land, language, and community authority, advocating for relational, place-based, and just pathways for AI development grounded in self-determination (Abdilla *et al.* 2021; Shedlock, Hudson 2022; Munn 2023; Brown *et al.* 2024; Lewis *et al.* 2024; Ofosu-Asare 2024).

A key moment in the Indigenous AI movement occurred in Honolulu in 2019, when representatives from fourteen communities including the Anishinaabe, Māori, Lakota and Kanaka Maoli came together to explore how Indigenous peoples could make relations with AI (Lewis 2020). One of the organizers of this gathering was Jason Edward Lewis, a Kanaka Maoli of Samoan heritage and professor of communication and media at Concordia University in Montreal, who has been a key figure in articulating the foundations of the Indigenous AI movement. The fusion of technology and identity in the concept of “Indigenous AI” reflects a self-identified Indigenous-led approach to reforming the relational strands between AI applications and diverse Indigenous communities, and grounding AI in Indigenous epistemologies.

Indigenous AI is not defined by a static set of attributes or by a singular technical implementation, it arises through its embeddedness in Indigenous knowledge, its adherence to community protocols, and its participation in networks of reciprocal relations. Lewis emphasizes that the term “Indigenous” should not be viewed as a restrictive label, but “as a living and dynamic

connective tissue rather than descriptive skin” (2023: 212) – one that highlights the intersections among diverse Indigenous traditions while honouring their differences. This framing, he argues, allows Indigenous communities to draw from their long histories of scientific and technical innovation, treating tradition not as static heritage but as a source of inspiration for creating future technologies (Lewis 2023). In this vision, Indigenous AI is not a bounded technological object but a site of negotiation over intelligence, agency, and relationality.

The Honolulu meeting served as a convergence point for multiple initiatives, including the Old Ways, New Incubator for Indigenous AI projects, led by Angie Abdilla – a Palawa scholar, co-founder of the *Indigenous Protocols*, and researcher at the Australian National University. Using a Country Centred Design methodology, her team translated “Aboriginal cultural protocols” into programming logic by turning ethics into standards, protocols, and rules as code, demonstrating how cultural concepts can be re-expressed within new technologies (Abdilla *et al.* 2021). This move is not merely symbolic; it demonstrates how ethical and territorial commitments can shape infrastructural logics.

The expanding scholarly engagement at the intersection of Indigenous knowledge systems and AI further signals the consolidation of this field. Perera *et al.* (2024) identify 53 peer-reviewed publications between 2013 and 2023, six of them Indigenous-led, covering AI for language and knowledge preservation, AI for community-defined needs, concerns about bias and data governance, and the use of Indigenous knowledge systems to inform AI development.

The growing political salience of these issues was evident in the 2025 United Nations International Day of the World’s Indigenous Peoples, dedicated to “Indigenous Peoples and AI: Defending Rights, Shaping Futures”. Discussions highlighted concrete risks – such as the extraction of Indigenous data for AI training, cultural misrepresentation in generative systems, and the exclusion of Indigenous governance structures from technological decision-making – alongside Indigenous-led responses calling for rights-based regulation and community authority over digital infrastructures. These developments move the debate beyond questions of representation or inclusion within existing systems. Instead, they foreground more fundamental concerns: how AI is designed, who governs it, which infrastructures sustain it, and which epistemologies are recognized as authoritative. A 2026 report prepared by the Secretariat of the United Nations Permanent Forum on Indigenous Issues similarly situates

artificial intelligence within these broader political and epistemic dynamics, documenting both its potential to support language revitalization, environmental monitoring and community data governance, and the structural risks it poses through digital exclusion, algorithmic bias, cultural appropriation and weak protections for Indigenous data sovereignty and collective rights.

4. Indigenous-Led AI futures: Interwoven trajectories of practice, politics, and possibilities

The emergence of Indigenous AI is not a single, linear development, but a constellation of relational practices, epistemic interventions, and speculative imaginings. Across diverse geographies and traditions, Indigenous communities are engaging with AI in ways that range from cautious use to pragmatic adaptation, from political critique to visionary reimagining.

4.1 INDIGENOUS AI PROTOCOLS AND RELATIONAL ONTOLOGIES

A seminal articulation of the emergence of Indigenous AI took place during the 2019 Indigenous AI Workshops (Lewis 2020), where participants refused the notion of simply adapting Indigenous perspectives to fit within existing AI frameworks. Instead, they posed a foundational and speculative question: “What might AI have become if it had been conceived from the outset through Indigenous epistemologies?” (2020: 25). One of the key outcomes of these workshops was the Indigenous Protocol and Artificial Intelligence Position Paper (Lewis 2020), which set out seven guiding principles aimed at rethinking approaches to AI development.

The document emphasizes partnership with local communities, accountability, and the centrality of reciprocity, while engaging a critical stance that interrogates the colonial foundations of mainstream AI systems. This commitment to relationality is deepened in the work of Indigenous scholars and artists such as Noelani Arista, Archer Pechawis, and Suzanne Kite, each of whom advances alternative frameworks for understanding the interface between AI and Indigenous life-worlds (Lewis 2020).

From a Kanaka Maoli standpoint, Arista foregrounds the concept of ‘āina (land), positioning AI within networks of reciprocal care rather than control. Her ethical framing, drawn from the principles of *mana* (spiritual force) and *pono* (balance and righteousness), advocates for AI systems that serve mutual benefit and uphold relational accountability (Lewis *et al.* 2018). Similarly, Archer Pechawis, working from a Plains Cree perspective, challenges anthro-

pocentric classifications of the animate and inanimate. Rather than privileging human over machine, he invites a view of AI as a potential kin entity, situated within a broader relational field – an ontological repositioning that resists utilitarian logics in favour of interdependence and reciprocal accountability (Lewis *et al.* 2018). Suzanne Kite, informed by Lakota ontologies, extends this perspective by tracing AI's material entanglements – from code and data structures to the mineral and ecological substrates that sustain its existence. She argues that AI is not merely a digital abstraction but is embedded in extractive supply chains that implicate both land and life. For Kite, forming a relationship with AI thus necessitates a simultaneous ethical relationship with the land and elements from which AI is materially composed. Her work centres a relational ethic that attends to the full lifecycle of AI technologies, embedding them within Indigenous approaches to obligation, kinship, and care (Lewis 2020: 75-80).

Together, these indigenous scholars and artists illustrate how long-standing Indigenous knowledge systems already recognize complex relationalities that extend beyond the human. Their interventions reframe AI as a participant in these networks, rather than as an external tool. What emerges is a call to re-imagine AI as a non-human kin, and to cultivate languages, protocols, supply chains, and technical systems that can support reciprocal, non-dominating relations between humans and artificial agents; a shift that calls for non-anthropocentric epistemologies and languages capable of expressing reciprocal ties between the human and the algorithmic. These perspectives collectively advance a synthesis of decolonising and indigenizing approaches, critiquing the epistemic violence of colonial data regimes and resource extractions while simultaneously offering alternative ontological foundations for reimagining AI within Indigenous worlds.

4.2 THE IMPORTANCE OF PLACE MAKING IN THE FORMATION OF AI IN MOANA OCEANIA

The intersection of relational worldviews and technological practice was also explored in a series of meetings between researchers and communities in Aotearoa in 2020. Three culturally grounded gatherings were led by the Indigenous members of the research team: two *wānanga*, a Māori teaching method that harnesses collective intelligence (Mahuika, Mahuika 2020), and one *Ta-lanoa*, a Pacific research method involving story telling (Vaiolleti 2006). The gatherings “elicited re-imaginings about the origins and possible futures of AI in Moana Oceania’s ancestral ways of knowing and being” highlighting the

importance of creating spaces to explore connections between the past and the future (Lythberg *et al.* 2025: 2-3).

The gatherings were held in diverse settings, each shaping the scope and depth of the discussions that unfolded. One *wānanga* was held in a campus meeting room, another held as part of a practical exercise restoring a carved *pou* (totem), and the *Talanoa* as part of a *kava* drinking ceremony (Aporosa *et al.* 2025). The grounded nature of place-based discussions was evident in the differences between the university-based workshops, which explore the risks and benefits of AI, and those that occurred alongside cultural practices which traversed deeper epistemological and ontological questions. By embedding discussions within cultural practices such as carving restoration and *kava* ceremonies, these events revealed questions not normally considered in AI design processes including: “Where did AI have its origin?” and “Were there any *atua* (gods) associated with AI?” (Lythberg *et al.* 2025: 5).

Here, place was not merely a backdrop for discussion but an active participant in shaping the kinds of questions that could be asked and the futures that could be collectively imagined. These speculative inquiries called into question whether Indigenous cosmologies could coexist with Western AI architectures, or whether wholly distinct platforms were needed. In this way, place – whether in a *marae*, during the restoration of a carved *pou*, or within a *kava* ceremony – becomes an active collaborator in Indigenous AI futures, ensuring that these initiatives are not only technically innovative but also culturally and politically grounded, reflecting the diverse worlds and responsibilities of the communities they are intended to serve. For this project, place-making was central to how AI was imagined, designed, and situated within Moana Oceania’s relational worlds.

4.3 ABUNDANT INTELLIGENCES AND TEMPORALITIES

The Abundant Intelligences research program was launched in 2024 by Jason Lewis and Hēmi Whaanga, two of the authors of the *Indigenous AI Protocol*. Designed to reconceptualize the very notion of intelligence, this six-year trans-Indigenous initiative spans Aotearoa, Australia, the Pacific, North America, and Africa aiming to “extending the operational definition(s) of intelligence” to encompass the diverse ways in which human and non-human beings make sense of the world (Lewis *et al.* 2025: 2142). The program’s three research axes – Integration, Imaginaries, and Intelligence – bridge the practical with the visionary, combines infrastructural engagement with ontological

rethinking, and embeds research in community-led pods. It grounds emergent visions in community knowledge, with the intent of creating equitable, plural, and culturally situated AI futures (Lewis et al 2025: 2150-2151).

For instance, at the end of 2024, the Hiringa te Mahara Pod hosted the Abundant Intelligences Annual General Meeting in New Zealand – a ten-day gathering that brought together over 60 participants. As part of the event, the research team engaged with communities across the country, sharing insights and building relationships to deepen the programme’s collective knowledge base. A strong focus was placed on embedding Māori values to confront structural inequities and ensure digital personas are treated with cultural integrity. Speaking at a panel hosted by Te Whare Wānanga o Awanuiārangi (a Māori Tertiary Institution), Chief Executive Professor Wiremu Doherty noted that while “just-in-time learning and instant access to knowledge are supported by the advance of AI”, these systems often lack “regard for time and provenance, which are critical values in te ao Māori”, stressing the importance “to consider how our values system can be recognised through the development and use of AI”³.

Doherty’s reflections highlight a core concern within Abundant Intelligences: the ontological misalignment between dominant AI cultural paradigms and Indigenous epistemologies. This observation underscores that place is not the only active participant in Indigenous-led AI initiatives; time and provenance are equally central to how knowledge, data, and learning are understood and mobilised. Within Indigenous worldviews, knowledge is not detached from its source, context, or *whakapapa* (genealogy); it carries obligations across generations and relationships, linking the past, present, and future. By centering Māori temporalities and relational ethics, the program resists the abstraction and decontextualization typical of mainstream AI development. Instead, it advances a model in which AI is not merely localized, but fundamentally indigenized, reconfigured through Indigenous philosophies of time, place, kinship, and accountability.

4.4 TIKANGA IN TECHNOLOGY. USING CULTURAL PROTOCOLS TO CREATE GENERATIVE SPACES

The Tikanga in Technology project (TinT) (2020-2025), based at the University of Waikato sought to infuse values grounded in te ao Māori (Māori worldview) – *tikanga* (cultural protocols) and *mātauranga* (Indigenous knowl-

3. <https://www.wananga.ac.nz/experience/news/integrating-ai-with-indigenous-knowledge/> (last access 05 June 2025).

edge) – into the design of digital infrastructures, data governance and AI development. Hudson was the PI for the project designed to explore the construction of digital identities and relational responsibilities to data, creating tools, processes and mechanisms that contribute towards more responsive data ecosystems for Indigenous communities. A core component of the project also focused on decolonising and indigenising AI which was informed by community engagement.

As part of his involvement in the TinT project, Hudson observed and participated in the unfolding of AI conversations within Māori spaces, sitting in on *wānanga* (workshops) where *karakia* (prayer) and *mihi whakatau* (formal greetings) opened discussions, participants were introduced through *whakawhanaungatanga* (sharing ancestral connections), *kai* (food) was shared, and stories of community aspirations and concerns around technology were exchanged. They did more than provide cultural legitimacy to the gatherings; they actively invited participation from community members who would otherwise be more hesitant to engage in technical discussions. These *wānanga* were spaces where Māori relational ethics, sovereignty, and community aspirations were actively negotiated within the complex terrain of emerging technologies, reminding us that the development of AI within Indigenous contexts is as much about cultural and political sovereignty as it is about technical innovation.

A Māori AI *wānanga* was hosted as a collaborative exercise in August 2022 by the AI Institute and the TinT team at the University of Waikato. This two-day event brought together approximately 80 participants, including Māori community and *iwi* (tribal) members, Māori researchers, and other regional stakeholders. The *wānanga* featured presentations and discussions on understanding AI, decolonising algorithms, increasing Māori participation in AI, and exploring where AI in Aotearoa should be heading. Paul Brown, a member of the Decolonizing AI team, presented a framework designed to assess the cultural appropriateness of operational algorithms. Responses emphasised the need to raise awareness, maintain control over processes, ensure tangible benefits for Māori communities, uphold respect for Māori values, and protect Māori knowledge. Perspectives shared during the *wānanga* contributed to the writing of the *Māori algorithmic sovereignty principles*, a conceptual model for decolonising algorithms (Brown *et al.* 2024) and an information sheet for algorithm developers, *10 Simple rules for decolonising and indigenizing AI* (O’Neale *et al.* 2025).

The Indigenizing AI team was headed by Te Taka Keegan, who had previously led the development of the Māori language interface at Google, and included Hemi Whaanga, a contributor to the development of the Indigenous AI Protocol. Their team identified processes to integrate cultural protocols with IT artefacts (Shedlock, Hudson 2022); and twenty-one *mātauranga* (knowledge) and *tikanga* (protocol) based elements to inform the development of culturally sensitive algorithms (Hudson 2024). Keegan's work tested the ability of AI models to recognize and respond appropriately to questions in te reo Māori while assessing the possibility of creating a Māori generative AI model. He adapted tools and prompt engineering techniques necessary to improve the performance of LLM's in producing more accurate and culturally appropriate outputs. While he suggests that building an entirely Māori Generative AI model will be cost-prohibitive, it is possible to adapt foundational GenAI models through controlled access to collections of *mātauranga Māori* held on sovereign digital repositories. As Keegan states:

Building sovereign AI models is not just a technical or legal challenge; it is a cultural and political necessity. When language technologies learn from, reproduce, and distribute Indigenous languages without Indigenous oversight, they effectively displace the authority of the people who have historically protected and nurtured those languages. (Keegan 2025: 1)

Indigenous digital sovereignty does not imply the creation of a “digital state”. Rather, it refers to the recognition of Indigenous authority over the linguistic and cultural resources from which digital technologies learn, and to the right of Indigenous communities to regulate how these resources are extracted, processed, and circulated within digital infrastructures.

Although the TinT project was initially conceived as part of a broader effort to decolonise AI and to explore new relational approaches to Indigenising technology, it became necessary to make pragmatic decisions and adapt existing technologies rather than develop entirely new AI models. Indigenising technology became a process of creating control and asserting authority over as many parts of the AI chain as possible to enhance the relative interdependence with digital platforms and AI models.

4.5 TE HIKU MEDIA AND THE VALUE OF COMMUNITY RELATIONSHIPS

An initiative that reflects community interests and engagement in overseeing the development and use of AI technology is led by the Indigenous grassroots organization Te Hiku Media, based in a small town in the upper North Island of Aotearoa. For over 30 years, Te Hiku Media has produced and

archived radio, television, and digital content, preserving community stories and te reo Māori recordings. The archive (*whare kōrero*) contains more than 1,000 hours of native-speaker audio and in 2020, Te Hiku Media received seven years of funding to build a multilingual language platform for Aotearoa, focused on developing natural language processing tools for te reo Māori. Grounded in strong community relationships, the Te Hiku Tech team collaborated closely with elders to collect and label speech data through their crowdsourced campaign, Kōrero Māori. Over just ten days, they gathered more than 200,000 phrases from 2,500 contributors, generating 300 hours of labelled speech data⁴. This result was possible through the collaboration with community members deeply connected to place over time, who hold vital knowledge of the provenance and nuance of local dialects, idioms, and stories. Te Hiku Tech have utilised their speech data to develop te reo Māori automatic speech recognition (ASR) models, and an online transcription service called *Kaituhi*. Te Hiku Tech are also sharing their expertise with other Indigenous communities helping them build their own speech and language technologies through *Papa Reo*. A cornerstone of their work is data sovereignty, to protect community ownership of the data, and the *Kaitiakitanga License* ensuring all collected data is used for the benefit of Māori communities.

This project is creating practical applications delivering direct benefits to the Māori community by decolonising governance through its ethical frameworks, participatory methods, and transformative licensing innovations. Te Hiku are also indigenising the sociotechnical process, embedding Māori values into each stage of design and development, asserting cultural authority over how AI interacts with Indigenous knowledge, while adapting technical capabilities through cutting-edge AI tools.

4.6 EARTH FRIENDLY COMPUTATION

Earth Friendly Computation is a project attentive to the decolonization and indigenization of the infrastructures and their environmental dimension. These interventions do not operate only at the level of epistemology or representation but extend to the material infrastructures that sustain artificial intelligence.

Keolu Fox, one of the central advocates for Earth Friendly Computation, focuses on the connection between data as a resource and the emerging value of genomic health data from Indigenous communities. He co-founded the In-

4. www.koreromaori.com/ (last access 15 May 2026).

digenous Futures Institute at the University of California San Diego and is also a co-founder of the Native BioData Consortium, a nonprofit research institute led by Indigenous scientists and tribal members.

Fox and his collaborators' proposal for "Earth Friendly Computation 574" – where 574 represents the number of federally recognised tribes in the US – offers a concrete attempt to rethink the infrastructures that underlie contemporary computation. Their proposal envisions decentralized, renewable-powered micro-data centers situated on sovereign tribal lands and governed through Indigenous frameworks of stewardship. Drawing inspiration from circular ecological models of governance such as the Hawaiian *ahupua'a* – an integrated land-to-sea resource management system – the project frames computation as part of a broader socio-ecological cycle rather than as a detached "cloud" infrastructure (Fox 2025). As Fox describes it, "kanaka Maoli manage the flow of energy and water in and out of the ahupua'a, allowing people to take as much as they can for their sustenance, only when the environment itself can be sustained. We have to include computational infrastructures in the way we think about how to manage all of our ahupua'a" (Seattle, 3 March 2026).

Within this vision, reclaiming control over data infrastructures becomes central to shaping technological futures. Initiatives such as decentralized micro-data centers, community-controlled datasets, and the development of small or "little" language models tailored for Indigenous communities seek to redistribute computational power while maintaining local governance over data and knowledge production. Rather than treating computation as placeless or abstract, these efforts situate AI infrastructures within specific territories, energy systems, and political relations.

By foregrounding renewable energy integration, edge computing, and environmentally accountable data governance, Earth Friendly Computation reframes AI as materially and ecologically embedded. In doing so, it advances both a decolonizing project – challenging extractive ownership regimes and the concentration of computational power – and an indigenizing one, embedding infrastructural design within Indigenous principles of stewardship, reciprocity, and intergenerational responsibility. AI here is not merely culturally reframed; its material substrate, energy flows, and governance architectures become sites of Indigenous intervention.

5. Trajectories for Indigenous-led AI

Despite the expanding body of research in the field, there remains a dearth of Indigenous-led projects where Indigenous actors play central roles in designing, governing, appropriating, or contesting AI systems according to their collective priorities. Building on literature, empirical research, and personal engagement with a nascent indigenous movement on data sovereignty and AI, we outline four interrelated trajectories for Indigenous-led AI Futures. As with many analytic distinctions, the purpose is not to mirror empirical reality in a one-to-one manner, but to render visible patterns, tensions, and orientations within a complex field of practice. These trajectories reflect the diverse positionings Indigenous researchers and communities assume when engaging with AI technologies, these are not linear or hierarchical steps – they are fluid, context-sensitive, and politically potent pathways.

5.1 UTILISING AI

The *utilising trajectory* treats AI as a tool – used as-is or not at all – based on local relevance and impact and leveraged to address immediate community priorities and challenges. This trajectory is characterized by the use, selective adoption, or outright rejection of AI technologies in their existing, largely unmodified forms, with a focus on functionality based on their perceived utility or risk in Indigenous contexts. In cases of adoption, AI is leveraged as a practical tool to address challenges with the aim to generate benefits through its general application. Indigenous researchers and communities may utilise or be affected by these technologies without full awareness of their implications or even without being aware that they are engaging with AI systems, leading to unexamined impacts on their knowledge sovereignty and cultural practices. However, communities might choose to reject AI altogether, particularly when these technologies are seen as reinforcing patterns of discrimination, exploitation, or the marginalization of Indigenous decision-making and control over knowledge and resources.

5.2 ADAPTING AI

The *adapting trajectory* moves beyond use toward modification. It modifies and reconfigures foundational logic models hardwired into AI systems through use of Indigenous knowledge and data to reduce bias and enhance cultural responsiveness. It is about adapting the system that travels to the new context or setting, to make it more usable, inclusive, and fit for purpose. This

may involve incorporating Indigenous datasets, refining training processes, adjusting governance frameworks, or embedding culturally grounded standards into system deployment. Unlike simple utilisation, adaptation requires collaboration between researchers and communities in the design phase and a degree of technical participation. The goal is not to redesign AI ontologically, but to reconfigure its operation within specific Indigenous contexts.

5.3 DECOLONIZING AI

The *decolonizing trajectory* moves beyond technical fixes or inclusion efforts. It calls for a fundamental political and epistemological shift, challenging dominant frameworks. It interrogates the full lifecycle of AI – from data extraction and mineral supply chains to cloud infrastructures, ownership regimes, and governance frameworks – through the lens of colonial legacies, power asymmetries, and systemic injustice – AI is a political terrain as a site where historical and contemporary inequalities are materially reproduced. While decolonizing AI may include the application of Indigenous values and ethical frameworks, its distinctive contribution is in reframing AI as a site of resistance, justice-seeking, and relationality, ensuring that AI systems are not complicit in reproducing colonial harms. Its central concern is structural transformation – challenging ownership patterns, governance exclusions, and the concentration of technological authority. It foregrounds questions of power, redistribution, and accountability within AI's sociotechnical assemblages embedded in global capital and extractive material substrates. In this sense, decolonizing AI situates Indigenous engagement within broader struggles over redistribution as well as recognition.

5.4 INDIGENIZING AI

The *Indigenizing trajectory* seeks not only reform but reorientation. Rather than primarily challenging existing structures, it reimagines AI from the ground up, embedding its architecture with the logics and epistemologies of Indigenous worldviews. Here, AI is understood as an assemblage whose configuration participates in world-making – one that must be designed in alignment with the specific values, cosmologies, and governance practices of Indigenous communities, not retrofitted to them. This approach advances speculative, future-facing design practices that do not merely seek inclusion within dominant technological paradigms but instead cultivate alternative epistemic frameworks through which technology can be imagined, built, and

governed. It asks how relations among land, data, language, kinship, and technological systems might be differently conceptualized and materially organized. As such this trajectory becomes a practice of ontological innovation, grounded in collective well-being, self-determination, and a refusal to separate knowledge from life, ethics from systems, or culture from code; while still navigating the constraints of existing infrastructures. Crucially, Indigenizing AI requires deep, long-term commitment to co-production of knowledge as a transformative, relational process that must be guided by community-defined priorities.

These trajectories are analytically distinct but empirically entangled. In practice, a single initiative may move across several trajectories at once, combining pragmatic use, technical adaptation, political critique, and speculative redesign. All four trajectories recognize the importance of Indigenous participation, but they do so through distinct forms of self-determined engagement – ranging from pragmatic navigation of existing systems to infrastructural critique and ontological redesign. Each trajectory requires varying levels of technical capacity, cultural expertise, collaboration, and co-production – whether that involves navigating context-specific technological environments and configuration of Indigenous settings, synthesizing Indigenous knowledge and data, operationalising Indigenous values and practices, or integrating Indigenous logics and worldviews. Collectively, these trajectories contribute to the emergence of an expansive Indigenous AI landscape.

6. *Building AI futures*

The cases discussed here illustrate how Indigenous-led AI futures are being built through overlapping forms of engagement rather than through one coherent pathway. Projects such as Te Hiku Media and TinT combine adaptation, governance, and efforts to assert infrastructural control. Moana Oceania gatherings and the *Abundant Intelligences* program foreground speculative and ontological work, rethinking intelligence, temporality, and relation. Earth Friendly Computation extends these concerns into the material substrate of AI, linking computation to land, energy, and ecological stewardship.

What binds these diverse efforts is not a shared method, but a shared commitment: to ensure that AI reflects Indigenous values, protocols, and futures. Whether resisting, redesigning, or reinventing, recognition and redistribution inform the way in which Indigenous researchers and communities are building technical capacity, asserting epistemic diversity, and enabling digital

sovereignty, making space for a “pluriversal AI” that does not just include Indigenous peoples, but is co-created by them.

Indigenous-led initiatives do not oppose an “Indigenous AI” to a “Western AI”; rather, they expose AI’s presumed universality as historically and politically situated, revealing that what presents as neutral intelligence is embedded in specific epistemologies, ownership regimes, and extractive arrangements.

Resourcing is vital to open spaces for exploring the interface of AI with Indigenous epistemologies, enable consultation on AI related topics, as well as explore application of AI to Indigenous contexts. Research funding is often the primary source of support for Indigenous communities seeking to engage with, discuss, and develop Indigenous-led AI systems. However, funding programs frequently require Indigenous communities to adapt their visions to fit external frameworks, creating challenges for projects that aim to indigenize processes throughout their development. Community-centered programs (e.g. IndigiGenius, Indigidata, Indigidata Aotearoa, Indigenous Pathfinders in AI, Papa Reo) function as important platforms for skill-sharing and learning about AI tools, and collaborative reflection on how AI might support Indigenous livelihoods, knowledge systems, and ways of life.

Indigenous-led AI Futures are also being articulated through regionally specific initiatives, that combine technical experimentation with political vision. One example is the Aboriginal and Torres Strait Islander AI Futures Communique, developed through a 2025 community workshop. It outlines a ten-year vision for AI grounded in Indigenous knowledge systems, care for Country, and meaningful Indigenous participation in national and international governance (Barrowcliffe *et al.* 2025). Initiatives of this kind demonstrate how Indigenous AI futures emerge not only through technical experimentation but also through collective political articulation. They combine pragmatic engagement with institutional structures, critical interventions into existing governance regimes, and culturally grounded visions of technological possibility.

7. Conclusion

The relationship between science and Indigenous peoples should not be viewed solely as a site of historical and/or contemporary tension, but also as a dynamic and generative space in which Indigenous epistemologies actively confront and reshape dominant technoscientific paradigms. As the cases examined here make clear, Indigenous researchers and communities have stressed that engagement demands more than inclusion; it requires the af-

firmation of epistemic diversity, greater accountability and transformation of power relations through co-design and the redistribution of authority and resources. Such engagements disrupt dominant technological imaginaries that universalize epistemology and innovation, instead creating different trajectories for AI systems to be developed through pluralistic, accountable, and context-specific forms of co-production.

Across regions Indigenous communities are making strategic choices shaped by distinct socio-historical conditions and collective aspirations. These trajectories are neither singular nor convergent; they are plural and contingent, grounded in a shared responsibility for sustaining Indigenous worldviews within a rapidly shifting technological landscape. Yet they unfold within a structural tension that cannot easily be resolved: Indigenous-led AI initiatives operate within infrastructures shaped by extractive supply chains, hyperscale cloud platforms, and global data economies. This entanglement carries the risk that Indigenous AI becomes an object of liberal recognition, acknowledged within dominant AI regimes while leaving their architectures largely intact.

At the same time, this risk does not fully capture the dynamics of Indigenous engagement with AI. When Indigenous-led initiatives challenge how relations among humans, land, language, data, and technological systems are organized, they do more than introduce ethical constraints. They unsettle the “geontological” divisions intensified by AI systems – where language becomes data, land extractable substrate, and knowledge computable representation (cf. Povinelli 2016). Indigenous initiatives cannot fully exit these infrastructures, but neither do they simply reproduce them. Instead, they navigate and incrementally reconfigure them from within – sometimes adapting, sometimes redirecting, and sometimes building alternatives that redistribute authority over data, energy, and computation.

Indigenous-led AI therefore emerges not as a technological alternative external to contemporary technoscience, nor as a cultural modification within it, but as a field of strategic intervention where epistemic transformation and infrastructural constraint remain deeply entangled. It is within this tension – between ontological reconfiguration and material dependency, between accommodation and refusal – that the political and anthropological significance of Indigenous AI futures resides.

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