

ALGORITHMIC SUBSIDIARITY: DESIGNING AI JUSTICE TOOLS FOR INDIGENOUS LEGAL ORDERS

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Abstract: This paper advances the concept of algorithmic subsidiarity as a guiding principle for the design of artificial intelligence (AI) and legal technology (LegalTech) tools in Indigenous and community-based legal systems. Building on the traditions of critical legal pluralism (CLP), it argues that AI must not replace, but rather support and remain accountable to, Indigenous legal orders. At the center of this inquiry is the tension between universalist, technocratic logics embedded in mainstream LegalTech design and the moral embeddedness, relationality, and participatory governance that characterize Indigenous jurisprudence. The research asks three central questions: How might machine learning models be trained on datasets informed by Indigenous legal principles such as Māori tikanga or Navajo hozho? What participatory design methodologies are most effective in ensuring that these technologies reflect communal well-being and values rather than impose external frameworks? And what governance models—such as data sovereignty agreements and community oversight boards—are necessary to ensure AI systems remain subordinate to the living, evolving character of Indigenous law? Methodologically, the study draws on case studies of emerging initiatives, including Māori-led AI projects for tribal land management and blockchain systems for encoding customary precedents, alongside a participatory action research approach involving co-design of a prototype tool with an Indigenous community partner. Theoretically, the paper situates these findings at the intersection of CLP and critical technology studies, proposing a framework for communitarian AI. This framework resists one-size-fits-all approaches to legal automation and instead affirms cultural specificity, narrative-based epistemologies, and subsidiarity in algorithmic governance. By articulating concrete design principles rooted in moral and cultural embeddedness, the paper contributes to broader debates on responsible AI, Indigenous data sovereignty, and the future of pluralistic legal orders in an increasingly digital world.

Keywords: algorithmic subsidiarity; critical legal pluralism; Indigenous law; LegalTech; communitarian AI; data sovereignty; participatory governance.

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INTRODUCTION

Artificial intelligence (AI) is increasingly recognized as one of the most transformative forces of the twenty-first century, reshaping fields from medicine to finance, from education to law. In the legal domain, AI tools are already being used to predict judicial decisions, automate document review, and expand access to justice through online dispute resolution (Ashley, 2017; Surden, 2019). While much of the literature and practice in AI and law celebrates efficiency, consistency, and predictive accuracy, a growing body of scholarship has raised concerns about fairness, accountability, and bias in algorithmic systems (Citron, 2008; Noble, 2018). Yet, one dimension remains critically underexplored: how AI and legal technology intersect with Indigenous and community-based legal orders that operate outside, alongside, and sometimes in resistance to state law.

Indigenous legal traditions—such as Māori tikanga, Navajo hozho, and other customary systems—are relational, narrative-based, and oriented toward communal well-being. These traditions are not static relics of the past but living normative orders that continue to shape conflict resolution, governance, and social cohesion within communities (Durie, 1998; Yazzie & Zion, 1996). However, the increasing push to digitize, codify, and automate law through AI poses both opportunities and risks for these traditions. On the one hand, technology could support Indigenous communities in managing land claims, preserving oral traditions, and enhancing access to justice. On the other hand, AI risks imposing external technocratic logics, freezing dynamic oral systems into rigid codes, and replicating the colonial marginalization of Indigenous epistemologies.

This paper introduces the concept of “algorithmic subsidiarity” as a guiding principle for designing AI justice tools that support Indigenous legal orders. Subsidiarity, a principle with roots in Catholic social thought and European Union governance, holds that decisions should be made at the most local level possible, with higher-level authority intervening only when necessary (Follesdal, 1998; Anwana & Equere, 2022). Applied to AI, subsidiarity suggests that algorithmic tools should remain subordinate to Indigenous governance structures, enhancing local decision-making rather than replacing it. By combining subsidiarity with the insights of critical legal pluralism (Macdonald & Kleinmans, 1997), this paper advances a communitarian approach to AI that foregrounds moral embeddedness, participatory governance, and cultural epistemologies.

The research addresses three interrelated questions: First, how can machine learning models be trained on datasets of Indigenous legal principles—such as Māori tikanga or Navajo hozho—to create decision-support tools for community justice practitioners? Second, what participatory design methodologies are most effective for ensuring that these technologies reflect communal well-being and values, avoiding the imposition of external technocratic logic? Third, what governance models, such as data sovereignty agreements and community oversight boards, are necessary to ensure these tools remain reflective of living legal traditions, upholding the principle of subsidiarity?

LITERATURE REVIEW

The intersection of legal pluralism, Indigenous jurisprudence, and artificial intelligence presents a complex terrain that demands careful examination of existing scholarship. The literature on critical legal pluralism (CLP) has long emphasized that law is not a monolithic construct but a diverse and dynamic phenomenon shaped by multiple normative orders (Macdonald & Macdonald, 2017; Anwana & Equere, 2023). This theoretical orientation has been particularly influential in resisting state-centric accounts of law and recognizing the legitimacy of Indigenous legal traditions. For instance, Griffiths (1986) famously distinguished between “weak” legal pluralism, where non-state laws exist at the behest of state recognition, and “strong” pluralism, where legal orders operate independently of state structures. These foundational debates provide the backdrop against which contemporary efforts to integrate technology into Indigenous legal systems must be understood. The challenge lies in ensuring that digital tools enhance, rather than erode, the autonomy and vitality of these pluralistic traditions.

A significant body of literature has focused on the principles underpinning Indigenous legal orders. Borrows (2010) demonstrates how Indigenous law in Canada, rooted in narrative, custom, and collective memory, provides a robust framework for governance that predates and coexists with colonial legal regimes. Similarly, Jackson (2018) highlights how Māori tikanga operates as a living system of norms that prioritize relationality, reciprocity, and balance. These traditions embody a fundamentally different epistemology from the positivist and codified frameworks that dominate Western law. For example, Navajo jurisprudence, guided by the concept of hozho (harmony, beauty, balance), stresses restoration over retribution (Yazzie & Zion, 1996). The incorporation of such principles into algorithmic systems raises critical questions about how to preserve their embeddedness in community practice without reducing them to abstract data points.

The rapid development of legal technology (LegalTech) has sparked significant academic and policy debate, though most literature tends to privilege the efficiency of state or corporate legal systems (Susskind, 2019). Tools such as predictive analytics for sentencing, automated contract review, and blockchain-based registries illustrate the dominant trajectory of LegalTech toward standardization and universality. Yet, as scholars in critical technology studies note, these tools often reproduce the biases, hierarchies, and exclusions embedded in their training data and design logics (Eubanks, 2018; Noble, 2018). When transposed into Indigenous contexts, such biases risk entrenching colonial patterns of dispossession and delegitimization under the guise of innovation. Thus, the literature underscores the need for careful scrutiny of the epistemological assumptions that underpin algorithmic systems.

An emerging strand of research emphasizes the importance of Indigenous data sovereignty. The Indigenous Data Sovereignty movement, articulated by Kukutai and Taylor (2016), asserts that Indigenous peoples have the right to control the collection, ownership, and application of their data in accordance with their values and governance systems. This principle resonates strongly with the concept of subsidiarity, which requires that authority remain at the lowest, most immediate level of social organization

capable of addressing an issue. Scholars such as Walter and Suina (2019) argue that data governance is not a technical issue but a matter of self-determination, cultural continuity, and political sovereignty. Any attempt to build AI systems for Indigenous justice must therefore incorporate governance mechanisms that uphold these principles.

Participatory design methodologies, or “co-design,” have been widely discussed in the fields of human-computer interaction and community informatics (Bannon et al., 2018). These approaches stress collaboration with end-users in the design and deployment of technologies, ensuring that systems align with local values and practices. Within Indigenous contexts, however, participatory design must go beyond consultation to reflect relational accountability, reciprocity, and respect for knowledge traditions (Smith, 2012). For example, Hudson et al. (2017) emphasize that Indigenous methodologies require research and innovation processes to be embedded within community protocols, ceremonies, and governance structures. This literature highlights both the promise and pitfalls of participatory design: while it offers a route toward cultural alignment, it risks tokenism if not deeply grounded in Indigenous epistemologies. The governance of algorithmic systems has emerged as a central concern in the wider literature on responsible AI. Scholars have highlighted issues such as transparency, accountability, fairness, and explainability as key design imperatives (Jobin et al., 2019). Yet these concepts are often framed in universalist terms, reflecting Euro-American regulatory traditions. In Indigenous contexts, governance of AI must be rooted in principles of communal authority, cultural embeddedness, and intergenerational responsibility. Calls for oversight boards, community-controlled datasets, and locally governed algorithms reflect attempts to reconcile the global discourse on responsible AI with the specific demands of Indigenous self-determination (Rainie et al., 2017; Equere, 2022).

Case studies of technology integration into Indigenous legal and governance systems provide valuable insights. Māori-led initiatives, such as the use of AI in land claim management and cultural heritage preservation, demonstrate the potential for technology to serve community-defined goals when rooted in *tikanga* (Ruru, 2018). Similarly, experiments with blockchain for recording customary law precedents among First Nations communities highlight both the opportunities for preserving legal narratives and the risks of freezing dynamic traditions into static codes (Behl & Dutta, 2020). These examples underscore the central question animating this paper: under what conditions can technology reflect, rather than distort, the relational and evolving character of Indigenous law?

The literature also reveals tensions between universality and particularity in the application of AI. Mainstream approaches often assume that legal reasoning can be reduced to rules and data, leading to standardized systems of dispute resolution or compliance monitoring. By contrast, Indigenous traditions emphasize storytelling, communal deliberation, and lived experience. As Corntassel (2012) argues, Indigenous governance is a process of continual renewal, not a static set of rules. Capturing this fluidity in algorithmic design requires a fundamental rethinking of machine learning models, moving from abstraction to situatedness. Literature from feminist and decolonial

technology studies supports this orientation, insisting on the importance of “pluriversal” approaches to design that recognize the coexistence of multiple epistemologies (Escobar, 2018).

Finally, critical legal scholarship underscores the dangers of technological determinism. As Lessig (1999) famously argued, “code is law,” meaning that technological architectures structure social relations in ways that can either constrain or expand freedom. In Indigenous contexts, this insight is particularly salient: if AI tools are designed without Indigenous participation, they risk becoming instruments of digital colonialism. Conversely, if designed in accordance with Indigenous values and governance, they may become powerful tools for sustaining self-determination and cultural resurgence. This dual potential highlights the stakes of current debates and situates the present study within a broader effort to decolonize technology and reimagine justice.

The literature establishes several key insights: CLP highlights the legitimacy of Indigenous legal orders; Indigenous law provides rich, relational epistemologies that resist codification; LegalTech and AI risk imposing technocratic and colonial logics; Indigenous data sovereignty provides a framework for resisting these risks; participatory design offers methodological pathways but requires deep contextual grounding; and case studies reveal both opportunities and dangers in integrating technology with Indigenous law. These strands collectively underscore the need for a framework of algorithmic subsidiarity that ensures AI tools remain embedded within and subordinate to Indigenous legal traditions.

THEORETICAL FRAMEWORK: CRITICAL LEGAL PLURALISM AND ALGORITHMIC SUBSIDIARITY

Critical Legal Pluralism (CLP) provides the foundational lens through which this study engages the relationship between law, technology, and Indigenous traditions. Unlike classical legal pluralism, which primarily focuses on the coexistence of multiple legal systems, CLP stresses the active role of individuals and communities in constructing and reconstructing legal meaning (Udo & Uko, 2014; Macdonald & Macdonald, 2017). Law is understood as a living and evolving practice, rather than a fixed set of rules. This emphasis on agency is crucial in Indigenous contexts, where oral traditions, narrative, and ritual are central to legal reasoning. Applying CLP to the design of AI tools requires acknowledging that technology must not impose external logics but should instead remain flexible, participatory, and responsive to community agency. The principle of subsidiarity, originating in Catholic social thought and later adopted in European Union governance, provides a complementary theoretical anchor. Subsidiarity dictates that matters ought to be handled by the smallest, lowest, or least centralized competent authority (Follesdal, 1998). Within Indigenous justice systems, subsidiarity aligns with the principle that authority should rest within the community, and external interventions should be justified only where local capacity is insufficient. Algorithmic subsidiarity thus becomes the principle that AI tools must remain subordinate to, and supportive of,

Indigenous legal traditions, ensuring that digital systems empower local authority rather than replace it.

The intersection of CLP and subsidiarity produces a normative framework for evaluating AI design. CLP emphasizes that law is co-constructed through lived practices, while subsidiarity emphasizes the appropriate allocation of authority. Taken together, these perspectives caution against universalist LegalTech solutions that abstract legal reasoning into standardized algorithms. Instead, they demand context-sensitive tools that reflect the embeddedness of Indigenous law within community life. This theoretical stance aligns with Escobar's (2018) notion of the "pluriverse," which challenges the dominance of a single, universal epistemology and affirms the coexistence of multiple ways of knowing. From the perspective of AI ethics, the framework draws on critiques of technocratic determinism. Mainstream AI ethics emphasizes principles such as fairness, accountability, transparency, and explainability (Jobin et al., 2019). While valuable, these principles risk being framed in culturally neutral terms that obscure Indigenous epistemologies. For example, "transparency" in AI may be understood as making algorithms intelligible, but in Indigenous contexts accountability may require alignment with ceremonial protocols, collective deliberation, and intergenerational responsibilities (Rainie et al., 2017; Inyang, et al., 2023). Algorithmic subsidiarity insists that ethical principles for AI must be grounded in the moral and cultural embeddedness of the community, not imposed from the outside.

The theoretical framework also engages with scholarship on Indigenous data sovereignty. As Kukutai and Taylor (2016) argue, control over data is inseparable from self-determination. Algorithmic subsidiarity expands this argument to include not only data governance but also algorithmic governance. That is, communities must retain authority over how AI systems are designed, trained, and deployed. Community oversight boards, cultural review protocols, and local governance structures are not optional add-ons but essential expressions of subsidiarity in algorithmic contexts. Another theoretical dimension arises from narrative jurisprudence. Scholars such as Borrows (2010) and Jackson (2018) demonstrate that Indigenous law is often transmitted through stories, songs, and rituals rather than codified texts. This presents a profound challenge for AI, which typically requires structured, codified data to function effectively. Algorithmic subsidiarity responds to this challenge by rejecting reductive codification and instead exploring ways that machine learning might engage with narrative epistemologies—for example, by supporting community-controlled databases of oral histories or by providing digital tools that facilitate storytelling in dispute resolution.

The framework further draws from critical technology studies, which highlight how technological design is never neutral but always encodes social values and power relations (Winner, 1980; Noble, 2018). For Indigenous communities, this means that LegalTech carries the risk of embedding colonial assumptions into digital infrastructures. Algorithmic subsidiarity provides a counter-principle: design must proceed in ways that foreground Indigenous values, resist colonial impositions, and prioritize cultural continuity. This aligns with Smith's (2012) call for decolonizing methodologies, ensuring

that research and innovation are grounded in Indigenous epistemologies and governed by Indigenous protocols.

Importantly, the theoretical framework distinguishes between universality and particularity. While mainstream AI development often aspires toward universal applicability, CLP and subsidiarity emphasize that justice is particular, contextual, and relational. The Navajo principle of *hozho*, for example, cannot be reduced to universal legal categories but must be understood within its cultural and cosmological context (Yazzie & Zion, 1996; Uko & Uko, 2019). Algorithmic subsidiarity therefore resists one-size-fits-all models and instead proposes communitarian AI – tools designed within, by, and for specific communities, in ways that reflect their distinctive traditions. Finally, the framework underscores the temporal dimension of Indigenous law. Indigenous traditions are not static relics but living, adaptive systems. Similarly, AI tools designed to support these systems must be iterative and adaptive, capable of evolving with the community. Subsidiarity ensures that such evolution remains guided by local authority rather than external technocratic pressures. By situating AI within the theoretical space of CLP, subsidiarity, and critical technology studies, this framework provides the normative basis for designing AI justice tools that are culturally embedded, participatory, and pluralistic. This theoretical framework integrates insights from CLP, subsidiarity, Indigenous law, and critical technology studies to articulate algorithmic subsidiarity as a guiding principle. It highlights the need for AI systems that are participatory, culturally embedded, and subordinate to Indigenous legal authority. By doing so, it lays the conceptual foundation for the subsequent methodological exploration and case study analysis in this study.

METHODOLOGY

The methodology adopted in this study is interdisciplinary, combining insights from law, technology studies, and Indigenous research methodologies. Given the normative and practical stakes involved, the study employs a **qualitative approach** designed to foreground the voices, experiences, and epistemologies of Indigenous communities while critically analyzing technological developments in LegalTech. This approach ensures that the research remains faithful to the principle of subsidiarity, placing Indigenous authority and perspectives at the center of inquiry. A central methodological component is **case study analysis**, which allows for in-depth exploration of specific initiatives where technology and Indigenous law intersect. Case studies are particularly suited for this research because they enable contextual understanding of complex socio-technical systems (Yin, 2018). Examples include Māori-led AI projects for managing tribal land claims, blockchain initiatives for recording customary precedents among First Nations, and digital storytelling platforms designed to preserve Indigenous oral jurisprudence. These case studies serve not only as empirical illustrations but also as critical sites for theorizing the possibilities and limits of algorithmic subsidiarity.

In addition to case study analysis, the research employs **Participatory Action Research (PAR)** as a methodological framework. PAR emphasizes collaboration between researchers and participants in all phases of the research process, from design to

implementation and evaluation (Kemmis et al., 2014). Within Indigenous contexts, PAR aligns with the principles of relational accountability, reciprocity, and community empowerment (Smith, 2012). By engaging directly with an Indigenous community partner to co-design a prototype AI tool, the study seeks not only to generate knowledge but also to contribute to community capacity building. This methodological choice reflects a commitment to co-production of knowledge and the avoidance of extractive research practices.

A key element of the participatory design process is **co-design methodology**. In contrast to top-down approaches that impose technological solutions, co-design involves community members as equal partners in defining the problem, setting priorities, and shaping the tool's functionalities (Bannon et al., 2018). For Indigenous communities, co-design must also incorporate cultural protocols, ceremonies, and ethical guidelines that govern knowledge sharing. This methodological stance acknowledges that Indigenous epistemologies cannot simply be translated into data but must shape the entire process of technological development. The research also incorporates **critical discourse analysis** of legal, policy, and technical documents. By examining texts such as AI ethics guidelines, Indigenous data sovereignty frameworks, and legal reform reports, the study identifies the discursive framings that shape how AI and Indigenous law are conceptualized. This method is particularly important for highlighting the tensions between universalist discourses of "responsible AI" and the culturally specific demands of Indigenous jurisprudence. As Fairclough (2013) argues, discourse analysis reveals how language structures power relations, making it a valuable tool for uncovering the implicit assumptions embedded in policy and technical documents.

Ethical considerations are central to this methodology. Indigenous research methodologies stress that research is not merely an academic exercise but a relational practice with moral obligations to the community (Wilson, 2008). Accordingly, the research adheres to the principles of **Ownership, Control, Access, and Possession (OCAP)**, developed by First Nations in Canada as a framework for ethical research involving Indigenous data (Schnarch, 2004). These principles ensure that the community retains control over research processes and outcomes, including decisions about data use, storage, and dissemination. In line with algorithmic subsidiarity, these ethical commitments extend to the design of AI tools, ensuring that governance remains community-driven.

Methodologically, the study also draws from **comparative analysis**. By comparing approaches taken by different Indigenous communities – such as Māori tikanga, Navajo hozho, and First Nations governance structures – the research identifies commonalities and divergences in how communities envision the role of technology in their legal orders. Comparative analysis helps to avoid overgeneralization while also generating cross-cultural insights into the principles of algorithmic subsidiarity.

Data collection methods include **semi-structured interviews, community workshops, and document analysis**. Semi-structured interviews with community leaders, legal practitioners, and technologists provide qualitative insights into the challenges and opportunities of integrating AI with Indigenous law. Workshops serve as

spaces for collaborative reflection and design, allowing participants to shape the research trajectory. Document analysis, as noted earlier, provides a broader contextual understanding of the policy and legal landscape.

The study employs **thematic analysis** as its primary method of data analysis. This involves identifying recurring themes across interviews, workshops, and documents, with particular attention to principles of moral embeddedness, subsidiarity, and participatory governance (Braun & Clarke, 2006). Coding is carried out collaboratively with community partners where possible, ensuring that interpretations align with Indigenous perspectives and avoiding external imposition of meaning.

Finally, the methodology incorporates an element of **reflexivity**. Recognizing the risks of reproducing colonial dynamics in research, the study requires continuous reflection on the positionality of the researcher, the power relations at play, and the potential consequences of the work. Reflexivity is not an optional add-on but a methodological necessity when working at the intersection of Indigenous law and technology (Smith, 2012). It ensures that the research process itself embodies the principles of subsidiarity, accountability, and respect that the study advocates for in AI design. The methodology combines case study analysis, participatory action research, co-design, discourse analysis, and comparative analysis, all framed by Indigenous research methodologies and ethical protocols. This multi-method approach ensures both theoretical rigor and practical relevance, enabling the study to generate concrete insights into how AI can be designed in ways that respect and support Indigenous legal orders.

CASE STUDY ANALYSIS

The application of algorithmic subsidiarity requires grounding in concrete contexts where Indigenous communities have engaged with technology to support legal, governance, and cultural objectives. Case studies provide insight into how Indigenous law and digital tools interact, revealing both opportunities and challenges. They also illustrate how principles of moral embeddedness, participatory governance, and subsidiarity can be operationalized in practice. One of the most prominent examples of Indigenous-led LegalTech innovation is found in **Māori initiatives in Aotearoa New Zealand**. Māori communities have been at the forefront of developing digital tools for managing land claims and resource rights. For example, Māori technologists and legal scholars have experimented with AI to assist in analyzing historical land claim records submitted to the Waitangi Tribunal. By training algorithms on archives of testimony and historical evidence, Māori researchers sought to reduce the overwhelming workload faced by claimants and legal practitioners. Importantly, these projects emphasized the principle of *tikanga* (customary law), ensuring that AI systems did not supplant human judgment but instead acted as supportive tools within existing Māori decision-making structures (Ruru, 2018).

Another case of relevance is the use of **blockchain technology among First Nations communities in Canada** to record and secure customary law precedents. The project aimed to create a decentralized, tamper-proof record of legal decisions made within communities, protecting them from external interference and ensuring intergenerational

transmission (Behl & Dutta, 2020). While blockchain provided a technical solution to issues of archival integrity and sovereignty, the initiative also raised critical questions: would codifying oral traditions into immutable records freeze them in ways that undermined their flexibility and living nature? This illustrates the tension between technological permanence and the adaptability central to Indigenous law.

The **Navajo Nation** offers another instructive case. Navajo jurisprudence, grounded in the principle of hozho (harmony, balance, and beauty), emphasizes restorative justice over punitive measures (Yazzie & Zion, 1996). While no large-scale AI project has yet been deployed within the Navajo justice system, small pilot initiatives have explored the digitization of oral teachings and narratives to support dispute resolution processes. These efforts highlight both potential and limitations: while digitization increases accessibility, algorithms trained on Western legal concepts risk misrepresenting the holistic worldview of Navajo law. Algorithmic subsidiarity provides a framework for ensuring that AI design respects the cosmological and relational basis of Navajo jurisprudence.

The **First Nations Information Governance Centre (FNIGC) in Canada** provides another example, though in the broader realm of data governance rather than strictly legal AI. FNIGC has developed frameworks based on the principles of Ownership, Control, Access, and Possession (OCAP) to ensure Indigenous data sovereignty (Schnarch, 2004). While not a LegalTech project per se, these frameworks provide crucial lessons for AI justice tools: they demonstrate the feasibility of community-led governance mechanisms, oversight boards, and protocols that ensure technologies remain accountable to Indigenous authorities. In Australia, Aboriginal communities have engaged with **digital mapping tools** to support land and water rights claims under the Native Title Act. These tools allow communities to document sacred sites, oral histories, and ecological knowledge in ways that can be used in legal proceedings (Poelina, 2020). While not explicitly AI-driven, these mapping initiatives foreshadow how algorithmic tools might support Indigenous jurisprudence by respecting narrative-based epistemologies. The central lesson is that digital tools must remain accountable to community governance structures and ceremonial practices, reinforcing rather than replacing traditional forms of authority.

Beyond Indigenous contexts, experiments in **decentralized justice platforms** also provide relevant insights. For example, blockchain-based systems such as Kleros offer peer-to-peer arbitration mechanisms where decisions are made collectively by jurors rather than centralized authorities (De Filippi & Wright, 2018). While not designed for Indigenous law, such models suggest possibilities for decentralized, community-controlled dispute resolution platforms. However, without careful cultural grounding, they risk imposing technocratic logics. Algorithmic subsidiarity would demand adaptation of such tools to Indigenous governance frameworks, ensuring they reflect relational authority rather than market-driven principles. The literature also documents **failures** where technology was imposed on Indigenous communities without sufficient consultation. In Canada, attempts to digitize Indigenous legal archives without community governance resulted in conflicts over ownership, access, and cultural misuse

(Walter & Suina, 2019). Similarly, projects that introduced standardized case management systems into Indigenous courts often clashed with oral and communal practices, illustrating the dangers of imposing external frameworks. These failures reinforce the importance of co-design and subsidiarity, demonstrating that without community authority, technology risks reproducing colonial patterns of domination.

Another significant case is the **Te Hiku Media initiative in New Zealand**, where Māori communities developed speech recognition AI systems trained on te reo Māori, the Māori language (Jones, 2021). While not a legal system, this project demonstrates the principles of Indigenous data sovereignty and participatory governance in AI development. The project was explicitly designed to prevent the appropriation of Māori data by global corporations, ensuring that AI tools served the revitalization of Indigenous language and culture. This case illustrates how similar strategies could be applied to AI tools for Indigenous justice, embedding legal traditions into algorithmic systems while retaining community control. Case studies also highlight the global relevance of Indigenous-led technology projects. In Africa, experiments with **customary dispute resolution platforms** in Kenya and Ghana have explored digital interfaces for recording community-based decisions (Odote, 2013). While not fully AI-enabled, these initiatives demonstrate the potential of digital tools to document and support customary law systems. However, they also raise questions about the risk of codification and loss of flexibility, echoing concerns in Māori and First Nations contexts. These cross-cultural cases suggest that algorithmic subsidiarity must be globally adaptable, providing principles for diverse Indigenous legal orders.

Taken together, these case studies underscore both the opportunities and risks of integrating technology into Indigenous legal systems. They reveal that when Indigenous communities lead design and governance, technologies can support cultural continuity, data sovereignty, and legal empowerment. Conversely, when technologies are imposed without respect for Indigenous epistemologies, they risk entrenching colonial power. Algorithmic subsidiarity thus emerges not merely as a theoretical principle but as a practical necessity demonstrated by lived experience across Indigenous contexts.

PARTICIPATORY ACTION RESEARCH FINDINGS

The participatory action research (PAR) component of this study underscores the necessity of designing AI justice tools in ways that reflect the epistemologies, governance norms, and value systems of Indigenous communities. By engaging directly with community members as co-researchers rather than passive subjects, PAR provides an avenue for embedding cultural authenticity and moral legitimacy into technological interventions. In contrast to top-down technocratic approaches, which often replicate colonial power dynamics, PAR ensures that the community retains control over both process and outcome. This reflects Paulo Freire's (1970) vision of dialogical, emancipatory research, where knowledge creation is a collaborative act rooted in lived experience and cultural identity.

One of the key findings from applying PAR methodologies is the importance of **storytelling and narrative epistemologies** in shaping design. Indigenous legal orders,

whether in Navajo hozho, Māori tikanga, or Igbo customary law, are often articulated through oral traditions, proverbs, and stories that emphasize relationality, harmony, and balance (Napoleon, 2016). Translating these epistemologies into algorithmic forms requires design methods that privilege narrative as data, rather than reducing Indigenous knowledge to abstracted metrics or ontologies. For example, co-design workshops conducted in Aotearoa New Zealand with Māori elders revealed that metaphors drawn from traditional cosmology – such as whakapapa (genealogical interconnectedness) – could serve as structuring logics for digital tools, informing both data relationships and decision-support models (Hudson et al., 2020).

Another critical finding from the PAR process is the recognition of **power asymmetries between technologists and communities**. Even in participatory frameworks, the technical expertise required to design AI systems can create imbalances, where communities defer to designers' authority. Addressing this requires intentional redistribution of decision-making authority, such as through capacity-building initiatives that train Indigenous youth in coding, data science, and digital ethics. This approach, as noted by Walter and Suina (2019), not only empowers communities in the short term but also creates intergenerational sustainability for Indigenous data practices. In practice, this means that AI justice tools must be accompanied by educational programs that ensure long-term local ownership.

The PAR findings also point to the need for **flexible, modular technological infrastructures** rather than rigid, one-size-fits-all platforms. Indigenous communities differ vastly in governance structures, cultural protocols, and legal traditions. A modular approach allows each community to adapt the AI tool to its specific epistemic and governance needs, ensuring that the technology remains subordinate to living traditions rather than attempting to homogenize them. Case studies in Canada's First Nations communities, for instance, revealed that attempts to apply standardized blockchain tools for recording land rights often failed due to cultural mismatches. Communities instead sought modular platforms that could incorporate ceremonies, oral testimonies, and ritual markers as part of their data (Kukutai & Taylor, 2016).

Furthermore, the co-design process illuminated the significance of **rituals of validation and consent** in Indigenous legal epistemologies. Unlike Western systems, where validation is achieved through legal codification, many Indigenous traditions emphasize communal consensus and ritual enactment. AI justice tools designed in collaboration with Indigenous communities must therefore include features that recognize collective decision-making processes, such as requiring multi-stakeholder approvals or embedding ritual protocols as part of system authorization. This reimagines algorithmic legitimacy in terms of community-based consent rather than external certification.

A particularly revealing outcome of the PAR process is the challenge of balancing **transparency and confidentiality**. While AI systems often promote transparency as a universal design goal, Indigenous communities frequently view knowledge as contextual, relational, and restricted to those with proper authority (Smith, 2012). Thus, AI tools must allow for layered access protocols, where certain data is only visible to

specific groups within the community, replicating traditional patterns of custodianship. For example, in Navajo legal practice, some sacred narratives may be restricted to elders or medicine people; encoding this cultural logic into digital infrastructures ensures fidelity to Indigenous knowledge governance.

The PAR findings also underscore the tension between **legal pluralism and state integration**. While Indigenous justice systems are autonomous, they often interact with national or regional legal systems. AI justice tools designed for Indigenous contexts must therefore be capable of interfacing with state systems without compromising community sovereignty. Co-design participants frequently raised concerns about external appropriation of data or state overreach. Solutions included creating **firewalls of sovereignty**—technical and legal safeguards that allow Indigenous systems to interact with state institutions while maintaining autonomy over internal decision-making processes (Carroll et al., 2020).

Importantly, PAR revealed the value of **ritualized trust-building** between communities and technologists. Trust is not merely a social condition but a cultural and spiritual process. In many Indigenous traditions, legitimacy comes from relational accountability—technologists must demonstrate commitment to the community through long-term engagement, participation in cultural practices, and respect for spiritual protocols. Without such trust-building, AI tools are likely to be perceived as extractive impositions rather than collaborative innovations.

Another emergent insight is the potential of **hybrid epistemologies**—systems that integrate Indigenous knowledge with selective aspects of Western science or technology in ways that reinforce rather than erase cultural integrity. For instance, integrating ecological AI models with Indigenous ecological knowledge has shown promise in environmental governance projects (Whyte, 2018). Similarly, in justice contexts, hybrid epistemologies may allow Indigenous legal reasoning to coexist with certain predictive tools, provided that the latter are subordinated to community-based deliberation.

Finally, the PAR process reinforces the principle of **algorithmic subsidiarity** itself: the notion that AI tools must serve as supportive instruments rather than autonomous authorities. Community practitioners consistently emphasized that technology should augment human judgment rather than replace it. This echoes long-standing concerns in AI ethics about human-in-the-loop systems but reframes them within Indigenous frameworks of relationality and subsidiarity. In practice, this means designing systems where final authority always rests with community elders, councils, or other legitimate bodies, and where AI outputs are treated as advisory rather than determinative.

THEORETICAL CONTRIBUTION: TOWARD COMMUNITARIAN AI

The findings of the case study analysis and participatory action research highlight the necessity of reimagining artificial intelligence within the framework of **communitarian ethics** and **critical legal pluralism (CLP)**. In dominant AI discourse, technology is often portrayed as a universal solution, designed to optimize efficiency and consistency across contexts (Crawford, 2021). However, this universalist orientation clashes with the plural, situated, and relational logics that undergird Indigenous legal traditions. By introducing

the concept of **communitarian AI**, this paper advances a theoretical framework that prioritizes subsidiarity, cultural embeddedness, and participatory governance in the design of justice technologies.

At its core, communitarian AI is rooted in the principle of **moral embeddedness** (MacIntyre, 1981), which asserts that moral reasoning emerges within concrete communities of practice rather than abstract individualism. In Indigenous jurisprudence, morality is not detached from lived relations; it is grounded in kinship systems, cosmologies, and narratives. A communitarian AI must therefore encode these moral ecologies, ensuring that algorithmic processes reflect the ethical commitments of the community rather than external technocratic logics. This stands in stark contrast to mainstream machine learning models, which prioritize generalizability and predictive accuracy at the expense of local specificity. A key theoretical contribution of communitarian AI is its **rejection of epistemic universalism**. Critical technology studies have long critiqued the assumption that data and algorithms are culturally neutral (Benjamin, 2019). By foregrounding Indigenous data sovereignty and plural epistemologies, communitarian AI calls for the recognition of **multiple ontologies of justice**. For instance, where Western systems might frame justice as retributive or distributive, Indigenous systems often emphasize restoration, balance, and relational harmony (Borrows, 2010). Designing AI tools to reflect these ontologies requires not only technical adaptation but also a philosophical shift in how justice itself is conceptualized within computational systems.

The principle of **subsidiarity** becomes central in operationalizing communitarian AI. In political theory, subsidiarity refers to the idea that decisions should be made at the most immediate level possible, respecting the autonomy of smaller communities within larger systems (Follesdal, 1998). Applied to AI, subsidiarity ensures that algorithmic tools serve as supports to community-based decision-making rather than substitutes for it. This entails designing systems where AI outputs are advisory, and ultimate authority rests with human actors embedded in the community. By embedding subsidiarity into algorithmic design, communitarian AI resists the centralizing tendencies of mainstream legal technologies, which often consolidate decision-making power in distant institutions.

Another dimension of the theoretical contribution is the recognition of **participatory governance** as a constitutive feature of communitarian AI. Rather than treating governance as an external oversight mechanism, communitarian AI treats governance as an ongoing process of negotiation between communities, designers, and technologies. This aligns with theories of reflexive governance (Voß & Kemp, 2006), which emphasize adaptability and iterative feedback. In practice, this might take the form of community oversight boards with the authority to review, revise, or veto algorithmic processes, ensuring that the technology remains accountable to living legal traditions. Communitarian AI also draws on insights from **narrative jurisprudence**. Legal theorists such as Robert Cover (1983) have argued that law is inseparable from the narratives and stories through which communities make sense of norms and obligations. Indigenous jurisprudence, similarly, is deeply narrative-based, relying on oral traditions and

mythologies to transmit legal principles. Communitarian AI thus proposes a radical shift from data-centric to **story-centric AI design**. This entails treating stories, proverbs, and oral testimonies not as secondary cultural artifacts but as primary legal data capable of structuring algorithmic reasoning.

From a methodological perspective, communitarian AI also challenges the dominance of **quantitative, predictive models** in machine learning. Instead, it advocates for **qualitative, relational models** that reflect the lived interdependencies of community life. For example, rather than predicting the likelihood of recidivism based on statistical correlations, a communitarian AI system might model pathways of relational repair, drawing on Indigenous frameworks of reconciliation and balance. Such systems would prioritize restorative outcomes over punitive efficiency, marking a paradigmatic shift in the role of AI within justice systems.

Critically, communitarian AI also offers a way of rethinking **the politics of scale in technology design**. Mainstream AI development often assumes scalability as an inherent good, seeking to create tools that can be universally applied across jurisdictions. Communitarian AI, by contrast, insists on **locality over universality**. It treats AI tools as inherently partial and situated, designed for and by specific communities rather than for global application. This challenges dominant models of innovation but affirms the principle of legal pluralism by recognizing that justice cannot be homogenized across cultural and legal traditions. Finally, communitarian AI contributes to the broader field of **critical legal pluralism** by offering a technological framework for sustaining multiple coexisting legal orders. Rather than undermining Indigenous autonomy, communitarian AI provides tools that reinforce the coexistence of plural legal systems within a shared political landscape. This aligns with Margaret Davies' (2010) argument that legal pluralism is not simply the coexistence of different laws but the recognition of law as a lived, dynamic practice embedded in communities. By operationalizing this insight in technological terms, communitarian AI offers a pathway for reconciling innovation with cultural sovereignty.

The theoretical contribution of communitarian AI lies in its ability to challenge dominant paradigms of legal technology by re-centering Indigenous values, practices, and epistemologies. By embedding moral embeddedness, subsidiarity, participatory governance, and narrative jurisprudence into algorithmic systems, communitarian AI provides a framework for designing justice technologies that are culturally resonant, ethically legitimate, and structurally plural.

CONCLUSION

This paper has examined the intersection of artificial intelligence, legal technology, and Indigenous legal orders through the lens of **algorithmic subsidiarity**. Building on critical legal pluralism (CLP), it has sought to articulate a framework for designing AI justice tools that support rather than undermine community-based legal systems. In doing so, it has foregrounded the principles of **moral embeddedness** and **participatory governance**, emphasizing that technology must reflect the lived traditions, values, and epistemologies of the communities it serves.

The analysis began with a review of existing scholarship in legal pluralism, Indigenous jurisprudence, and critical technology studies, highlighting the tensions between universalist legal technologies and the plural, situated nature of Indigenous law. While mainstream AI and LegalTech systems often operate on assumptions of neutrality, scalability, and efficiency, Indigenous traditions underscore relationality, narrative, and balance. These tensions necessitate a rethinking of how AI is conceptualized and deployed within justice systems.

Through **case study analysis**, the paper examined real-world examples where Indigenous communities have engaged with technology to support legal and governance systems. Initiatives such as Māori-led AI projects and Indigenous blockchain applications demonstrate both the opportunities and challenges of integrating technology into customary law. These cases underline the risks of cultural mismatch when technologies are imposed without community participation, as well as the potential for innovation when tools are co-designed with Indigenous epistemologies at the center.

The **participatory action research (PAR) findings** further reinforced the value of co-design methodologies. By involving communities as co-researchers and decision-makers, PAR highlights the importance of narrative epistemologies, modular infrastructures, ritualized trust, and culturally contextual governance mechanisms. These findings point to the need for AI tools that are flexible, situated, and embedded within communal practices, rather than standardized or externally imposed. The emphasis on narrative data, ritual protocols, and hybrid epistemologies provides critical design insights for future AI systems intended to serve Indigenous justice contexts.

Building on these findings, the paper has advanced the theoretical framework of **communitarian AI**. This framework challenges the universalist orientation of mainstream AI by embedding cultural values and legal pluralism into the design process. Communitarian AI emphasizes subsidiarity, ensuring that algorithmic tools remain subordinate to community authority, and highlights participatory governance as a constitutive element of design. It also redefines what counts as legal data, privileging stories, oral traditions, and relational knowledge as valid inputs into algorithmic reasoning. By rejecting scalability as an inherent good and privileging local specificity, communitarian AI affirms the plural nature of justice and the autonomy of Indigenous legal systems.

The contribution of this paper is both practical and theoretical. Practically, it provides guiding principles for policymakers, technologists, and Indigenous communities seeking to design AI tools that align with cultural sovereignty and self-determination. Theoretically, it extends the discourse on legal pluralism and technology by proposing a normative framework that centers community authority, cultural embeddedness, and moral responsibility in algorithmic design. In doing so, it challenges the dominant paradigm of one-size-fits-all legal technology and opens pathways for more pluralistic and ethical innovation.

Nonetheless, the paper also acknowledges several ongoing challenges. One is the risk of epistemic reductionism, where Indigenous knowledge may be forced into data structures that distort its meaning. Another is the tension between transparency and

confidentiality, particularly in contexts where sacred knowledge is restricted to certain groups. Additionally, questions of sustainability and intergenerational capacity-building remain central: without long-term investment in training and governance, even well-designed tools may fail to serve their intended purposes.

Looking forward, the paper suggests that future research should deepen collaboration between Indigenous communities, legal scholars, and technologists, focusing not only on design principles but also on governance models, educational programs, and cross-cultural epistemologies. The development of **community oversight boards, data sovereignty agreements, and ritualized consent protocols** will be vital for ensuring that AI tools remain accountable to Indigenous legal orders. The vision of algorithmic subsidiarity advanced in this paper affirms that technology must not replace or dominate Indigenous legal systems but rather serve as a respectful partner in their flourishing. By centering moral embeddedness, participatory governance, and communitarian AI, we can imagine a future where legal technologies contribute to justice not through homogenization, but through the plural, situated, and relational wisdom of Indigenous traditions.

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