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## Introduction

Indigenous Data Sovereignty (IDSov) upholds the rights of Indigenous Peoples, communities, and Nations to "govern the collection, ownership, and application" of datasets created with or about Indigenous communities, Indigenous Lands, and the community's non-human relations.[1] IDSov shifts from Western transactional approaches to data governance characterized by rights-based, relational approaches that enact responsibilities to Peoples and Land. We describe IDSov as a means to disrupt colonial infrastructures, policies, and practices through centering Indigenous systems of governance and knowledges. Indigenous Peoples have diverse, specific relationships within their Lands, so there is no single approach to IDSov.[2] We might best think of IDSov as a social movement that began by Indigenous Peoples in the 1990s living within English-speaking settler-colonial nation-states (see the principles section below), so while IDSov might claim examples and practitioners, not all cases and practitioners use the term or identify with IDSov. Ultimately, as Elders remind us, IDSov renews our ancestral instructions — our traditions, protocols, and responsibilities for the care and transmission of communal knowledges and information — in the digital world.

1 Stephanie Russo Carroll, Desi Rodriguez-Lonebear, and Andrew Martinez, "Indigenous Data Governance: Strategies from United States Native Nations," *Data Science Journal* 18, no. 1 (July 2019): 31, https://doi.org/10.5334/dsj-2019-031; Tahu Kukutai and John Taylor, *Indigenous Data Sovereignty: Toward an Agenda* (Canberra: ANU Press, 2016).

2 Kukutai and Taylor, *Indigenous Data Sovereignty.*

A key concept within IDSov is Indigenous sovereignty itself. In the Americas, Aotearoa, Australia and other places, European colonizers signed treaties with Indigenous Peoples to establish boundaries for distinct neighboring governments. Indigenous Peoples signed with the force of their inherent sovereignty: the political will of Peoples who know those Lands and territories to be rightfully their own. However, European colonizers signed such treaties with the goals of settlement and national expansion. Leaders and citizens within modern nation-states have come to confuse self-governing Indigenous Peoples for minority populations within the settler nation-state (the government put in place by colonists that survives today). This is a settler mentality, one that: a) consciously and unconsciously legislates that Indigenous Peoples either no longer exist or do not have a legal right to self-govern, and b) presumes that the modern, settler nation-state is the ideal mode of governance for managing the affairs of Indigenous Peoples. Any analysis of data governance that assumes the settler state is the sole sovereign for making data-driven decisions also marginalizes Indigenous Nations and our data practices, ethics, and infrastructures. IDSov responds to these assumptions.

IDSov is premised on Indigenous sovereignty and our continued governance of our Lands and Peoples. In data-sharing protocols, Indigenous Peoples are not stakeholders or interest groups such as industry partners or NGOs. Instead, Indigenous Peoples bear distinct *legal and moral rights* that supersede commercial interests. We are *rights-holders*, not stakeholders. Accordingly, IDSov research and data protocols defend a broad range of Indigenous rights.[3] Many of these rights are outlined within the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). For example, the right to practice and revitalize cultural traditions and customs: "this includes the right to maintain, protect, and develop the past, present,

**3** Maui Hudson, Stephanie Russo Carroll, Jane Anderson, Darrah Blackwater, Felina Cordova-Marks, Jewel Cummins, Domonique David-Chavez, Adam Fernandez, Ibrahim Garba, Danielle Hiraldo, Mary Beth Jager, Lydia L. Jennings, Andrew Martinez, Rogena Sterling, Jennifer D. Walker, and Robyn Rowe, "Indigenous Peoples' Rights in Data: A Contribution Toward Indigenous Research Sovereignty," *Frontiers in Research Metrics and Analytics* 8 (May 2023), https://www.frontiersin.org/articles/10.3389/frma.2023.1173805/full.

and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies, and visual and performing arts and literature."[4]

Designing data-sharing protocols with regard to UNDRIP and IDSov results in: Indigenous-centered practices of provenance (origin) and attribution (authorship) in labeling datasets;[5] requirements to abide by sovereign Indigenous jurisdiction and law;[6] informed consent, including collective community consent;[7] limiting data collection with regard for sacred spaces, seasons, situations, and sub-populations;[8] and monitoring data sharing to ensure appropriateness, accuracy, meaningful use, confidentiality, and the overall security of the sovereign nation.[9]

IDSov work reveals how Indigenous Peoples' approaches to data collection, data sharing, and data governance are not about retrofitting settler-state forms of data governance for Indigenous communities and Nations. As a mode of governance, Indigenous sovereignty is generally not founded on the presumption of private property, generating profit through alienating labor from the land, and the accumulation of wealth toward personal happiness. Indigenous sovereignty is rather a paradigm of governance premised on obligations to Land, relatives (humans and not), future generations, and ancestors. For example, if someone obtains data within an IDSov paradigm, the question is not "what can I do with this data?" but "to whom am I obliged with this data? What does this data and its data holder owe to community and Land, and how do I best meet those obligations in how this data is stored, shared (or not) and interpreted?"[10] In an interview with Northern Cheyenne demographer Desi Small-Rodriguez, an Elder said, "Sovereignty as tribal nations was given to us by the Creator. It is sacred.

4 Megan Davis, "Data and the United Nations Declaration on the Rights of Indigenous Peoples," in *Indigenous Data Sovereignty*, eds. Tahu Kukutai and John Taylor (Canberra: ANU Press, 2016); The United Nations, "United Nations Declaration of the Rights of Indigenous Peoples," https://social.desa.un.org/issues/indigenous-peoples/united-nations-declaration-on-the-rights-of-indigenous-peoples.

5 Jane Anderson and Kimberly Christen, "Decolonizing Attribution: Traditions of Exclusion," *Journal of Radical Librarianship* 5 (June 2019): 113–52.

6 William Haney, "Protecting Tribal Skies: Why Indian Tribes Possess the Sovereign Authority to Regulate Tribal Airspace," *American Indian Law Review* 40, no. 1 (January 2016): 1; Sarah D. Littletree, "'Let Me Tell You About Indian Libraries': Self-Determination, Leadership, and Vision," (PhD diss., University of Washington, 2018).

7 Krystal Tsosie, Joe Yracheta, and Donna Dickenson, "Overvaluing Individual Consent Ignores Risks to Tribal Participants," *Nature Reviews Genetics* 20 (July 2019): 1, https://doi.org/10.1038/s41576-019-0161-z; Max Liboiron, Alex Zahara, and Ignace Schoot, "Community Peer Review: A Method to Bring Consent and Self-Determination into the Sciences," *Preprints* (June 2018), https://doi.org/10.20944/preprints201806.0104.v1.

8 Kawika B. Winter, Noa Kekuewa Lincoln, Fikret Berkes, Rosamma A. Alegado, Natalie Kurashima, Kiana L. Frank, Pua'la Pascua, Yoshini M. Rii, Frederick Reppen, Ingrid S.S. Knapp, Will C. McClatchey, Tamara Ticktin, Celia Smith, Erik c. Franklin, Kristen Oleson, Melissa R. Price, Margaret A McManus, Megan J. Donahue, Kuulei S. rodgers, Brian W. Bowen, Craig E. Nelson, Bill Thomas, Jo-Ann Leong, Elizabeth M.P Madin, Malia Ana J. Rivera, Kim A. Falinski, Leah L. Bremer, Jonathan L. Deenik, Sam M. Gon III, Bran Neilson, Ryan Okano, Anthony Olegario, Ben Nyberg, A. Hijei Kawelo, Kelij Kotubetey, J. Kanekoa Kukea-Shultz, and Robert J. Toonen, "Ecomimicry in Indigenous Resource Management: Optimizing Ecosystem Services to Achieve Resource Abundance, with Examples from Hawaii," *Ecology and Society* 25, no. 2 (2020): 26, https://doi.org/10.5751/ES-11539-250226.

9 Diane E. Smith, "Governing Data and Data for Governance: The Everyday Practice of Indigenous Sovereignty," in *Indigenous Data Sovereignty*, eds. Tahu Kukutai and John Taylor (Canberra: ANU Press, 2016).

10 Jennifer Wemigwans, *A Digital Bundle: Protecting and Promoting Indigenous Knowledge Online* (Regina: University of Regina, 2018).

Data to exercise our sovereignty is also sacred."[11] This means that IDSov is not simply about Indigenous individuals collecting data toward an imagined gain, but rather is also a form of Indigenous *governance* through data based *in right relation*. It also means that under specific circumstances, because of the relational requirements, non-Indigenous people can be part of but never solely responsible for IDSov work.

## Colonial Legacies in Data Infrastructures and Practices and Our Responses

For centuries, settler-colonial and colonial states have used data to control, erase, and enact genocide against Indigenous Peoples, from military intelligence to national censuses[12] to standardized education tests.[13] Data practices around Indigenous Peoples continue to benefit non-Indigenous Peoples today. For example, Inuit Tapiriit Kanatami, the national representational organization for Inuit in Canada, writes that:

> Inuit in Canada are among the most studied Indigenous peoples on earth. The primary beneficiaries of Inuit Nunangat [Inuit homelands] research continue to be researchers themselves, in the form of access to funding, data and information, research outcomes, and career advancement. Inuit remain largely marginalized from research governing bodies and in turn from experiencing the benefits of research.[14]

As another example, Indigenous scholars have commented on how intellectual property regimes are designed toward commodification of Indigenous Knowledge (IK), contributing to promiscuous uses of datasets and information about Indigenous Peoples.[15] When combined with state

**11** Desi Rodriguez-Lonebear, "Building a Data Revolution in Indian Country," in *Indigenous Data Sovereignty*, eds. Tahu Kukutai and John Taylor (Canberra: ANU Press, 2016).

**12** Chris Andersen, "From Nation to Population: The Racialisation of 'Métis' in the Canadian Census," *Nations and Nationalism* 14, no. 2 (2008): 347–68, https://doi.org/10.1111/j.1469-8129.2008.00331.x.

**13** Wendy M. Pearce and Cori Williams, "The Cultural Appropriateness and Diagnostic Usefulness of Standardized Language Assessments for Indigenous Australian Children," *International Journal of Speech-Language Pathology* 15, no. 4 (August 2013): 429–40, https://doi.org/10.3109/17549507.2012.762043.

**14** Wemigwans, *A Digital Bundle*, 5; Inuit Tapiriit Kanatami, *National Inuit Strategy on Research* (Ottawa: Inuit Tapiriit Kanatami, 2018), https://www.itk.ca/wp-content/uploads/2018/04/ITK_NISR-Report_English_low_res.pdf

**15** Pinar Oruç, "Documenting Indigenous Oral Traditions: Copyright for Control," *International Journal of Cultural Property* 29, no 3 (2022), 243–64. doi:10.1017/S0940739122000273.

practices of record keeping sans Indigenous Nation-to-Nation trust negotiations, such uses are unearned, transactional, and sustaining conditions of elite cultural theft, appropriation, resource extraction, and data violence against Indigenous Peoples.[16] Indigenous Peoples have found that measures from settler perspectives based in good intentions and respect for "all parties" often
amplify rather than mitigate existing power asymmetries. For example, calls for open data, public reporting, and transparency often do not address colonial politics and the structural inequities shaping Indigenous marginalization, resulting in more non-Indigenous access to Indigenous data.[17]

In response, much IDSov practice deliberately disrupts discrimination against Indigenous Peoples from the data practices of the settler state. For example, Indigenous Nations deal with the categorizations of Indigeneity via "blood quantum" (a settler-state concept) by making their own policies for who belongs to their communities and how to record that data, or challenge how the settler state's census fails to capture meaningful data about Indigenous Peoples.[18] Indigenous Peoples may offer their own data collection and interpretation. These strategically align with and oppose aspects of colonial scientific paradigms in, for example, archaeology[19] or environmental contamination,[20] both of which continue traditions of genocide, Indigenous erasure, Land-based harm, and non-Indigenous access to Indigenous Lands.[21]

Often Indigenous researchers develop community- and discipline-specific methods of control that prevent misuse of datasets, in particular where misuse could result in unjust criminalization of activists, resource extraction, or misinterpretation in courts of law. For example, a requirement

16 Sue McKemmish, Livia Iacovino, Eric Ketelaar, Melissa Castan, and Lynette Russell, "Resetting Relationships: Archives and Indigenous Human Rights in Australia," *Archives and Manuscripts* 39 (2011): 107–144.

17 Walter et al., *Indigenous Data Sovereignty*; Stephanie Carroll Rainie, Tahu Kukutai, Maggie Walter, Oscar Lusi Figueroa-Rodriguez, Jennifer Walker, and Per Axelsson, "Indigenous Data Sovereignty," in *The State of Open Data: Histories and Horizons*, eds. Tim Davies, Stephen B. Walker, Mor Rubinstein, and Fernando Perini (Cape Town: African Minds, 2019), 300–320.

18 Desi Rodriguez-Lonebear, "The Blood Line: Racialized Boundary Making and Citizenship among Native Nations," *Sociology of Race and Ethnicity* 7, no. 4 (October 2021): 527–42, https://doi.org/10.1177/2332649220981589; Julie Wailing, Desi Small-Rodriguez, and Tahu Kukutai, "Tallying Tribes: Waikato-Tainui in the Census and Iwi Register - Ministry of Social Development," *Social Policy Journal of New Zealand*, no. 36 (2009), https://www.msd.govt.nz/about-msd-and-our-work/publications-resources/journals-and-magazines/social-policy-journal/spj36/36-tallying-tribes.html.

19 Matthew C. Sanger and Kristen Barnett, "Remote Sensing and Indigenous Communities: Challenges and Opportunities," *Advances in Archaeological Practice* 9, no. 3 (August 2021): 194–201, https://doi.org/10.1017/aap.2021.19.

20 Michelle Murphy, "Alterlife and Decolonial Chemical Relations," *Cultural Anthropology* 32, no 4 (2017): 494–503, https://doi.org/10.14506/ca32.4.02.

21 Max Liboiron, *Pollution is Colonialism* (Durham: Duke University Press, 2021).

in Canada's Species at Risk Act has specific language about the inclusion of Indigenous Traditional Knowledge when determining the risk or recovery of species.[22] In some ways, this is a good thing, but there are also concerns that the inclusion of Traditional Knowledge in settler-state policy-driven documentation means that sacred, protected, private, place-based, and relational knowledge can be discoverable in court and used in ways that are not appropriate or consented to. In response, Indigenous Peoples use a variety of techniques to control our data, such as encryption, timed destruction of datasets and keys, anonymization, selective reporting, access limitations, metadata that relay protocols and permissions, use of Indigenous languages or dialects, and reliance on tribal regulations, such as research review processes. Indigenous communities, organizations, and governments also informally educate community members and outsiders about data privacy and security, personal information management, research quality, and informed consent toward protecting the Nation. Indeed, much IDSov work concerns the creation, ownership, control, access, possession, and demonstration of collective benefits around scientific data practices, including Indigenizing infrastructure and data regimes, building trustworthy relationships, and addressing planned and future use of datasets and even data infrastructure.[23]

## IDSov as Responsibility to Land

IDSov is a responsibility to Land. Here, Land doesn't refer to just dirt and bees and trees (though it includes those too), but also waters, stars, histories, spirit, ancestors, future ancestors, and place (each variously defined by different Indigenous cosmologies). IDSov is rooted in the roles and responsibilities for caretaking the systems of knowledge that Indigenous Peoples have relied on since time immemorial as they have lived in relation to Land.

**22** "Fisheries and Oceans Canada Species at Risk Act Listing Policy and Directive for 'Do Not List' Advice," Fisheries and Oceans Canada, 2013, https://waves-vagues.dfo-mpo.gc.ca/library-bibliotheque/365882.pdf.

**23** Stephanie Russo Carroll, Edit Herzcog, Maui Hudso, Keith Russell, and Shelley Stall, "Operationalizing the CARE and FAIR Principles for Indigenous Data Futures," *Scientific Data 8*, no. 1 (April 2021): 108, https://doi.org/10.1038/s41597-021-00892-0; Marisa Elena Duarte, "Native and Indigenous Women's Cyber-Defense of Lands and Peoples," in *Networked Feminisms: Activist Assemblies and Digital Practices*, eds. Shana MacDonald, Brianna I. Wiens, Michelle MacArthur, and Milena Radzikowska (London: Lexington Books, 2022); *CARE Principles for Indigenous Data Governance* The Global Indigenous Data Alliance, accessed May 5, 2023, https://www.gida-global.org/care.

As such, IDSov is place-based and Nation-specific, rather than universal and amenable to standardization. For example, rules within the Pueblos of New Mexico prohibit taking and disseminating photos or videos of ceremonies and events. This rule is designed to uphold group privacy in a state that profits from a romanticized image of Pueblo Indigeneity. But other Indigenous Peoples do not have this rule. Another example includes the commitment of the nonprofit Village Earth to generate many data dashboards that summarize data about Indigenous Peoples and Lands through their intertribal Native Land Information System.[24] Approaches vary across the Indigenous pluriverse, especially as differently positioned Indigenous Peoples either do not have the same type of data or caution against sharing it openly.[25]

IDSov approaches can also vary by academic discipline and field. For example, due to the nature of consent over human tissues, Indigenous genomics researchers assert a "DNA on loan" standard instead of "gifting" tissues for precision medicine research because the disciplinary standard of individual consent conflicts with IDSov principles of collective control.[26]

Indigenous legal scholars assert sovereign rights to regulate airspace and airwaves for sciences dependent on data from satellites, drones, spectrum, and wide area networks that can access Indigenous Land without setting foot on it.[27] Health researchers often work with accumulated datasets of many people, making it difficult to identify a single governing council who can supervise IDSov principles of reciprocity and accountability. In one case, health researchers report the practical limitations of ownership, control, access, and possession (OCAP) standards for studies indexing end-of-life care among an urban Indigenous patient group in Canada, and thus developed an alternative standard for a regional palliative care provider.[28]

**24** "Native Land Information System," Native Land Information System, accessed May 5, 2023, https://nativeland.info/.

**25** Walter et al., "Indigenous Data Sovereignty."; Kimberly A. Christen, "Does Information Really Want to Be Free? Indigenous Knowledge Systems and the Question of Openness," *International Journal of Communication* 6 (November 2012): 24.

**26** Krystal S. Tsosie, Joseph M Yracheta, Jessica A. Kolopenuk, and Janis Geary, "We Have 'Gifted' Enough: Indigenous Genomic Data Sovereignty in Precision Medicine," *The American Journal of Bioethics* 21, no. 4 (April 2021): 72–75, https://doi.org/10.1080/15265161.2021.1891347.

**27** Haney, "Protecting Tribal Skies"; M.L. Cornette and B.L. Smith, "Electronic Smoke Signals: Native American Radio in the United States," *Cultural Survival Quarterly* 22 (1998): 28–31.

**28** Sarah Funnell, Peter Tanuseputro, Angeline Letendre, Lisa Bourque Bearskin, and Jennifer Walker, "'Nothing About Us, Without Us.' How Community-Based Participatory Research Methods Were Adapted in an Indigenous End-of-Life Study Using Previously Collected Data," *Canadian Journal on Aging* 39, no. 2 (June 2020): 145–55, https://doi.org/10.1017/S0714980819000291.

Understanding how IDSov varies in practice and theory across disciplines and fields demonstrates the mutability of data practices and the ethical limits of scientific disciplines as they approach the territorial, sovereignty, and autonomy concerns of diverse Indigenous Peoples.

A responsibility to Land is what distinguishes IDSov approaches to data and information sharing (including concepts like digital bundles) from other justice-oriented data efforts such as open access, digitization for the public good, digital archiving, digital storytelling, and individual consent.[29] Even merely being an Indigenous person gathering data does not alone address IDSov because of what Indigenous sovereignty means: our right to exercise our collective responsibilities to Land through governance.

## IDSov Is Related to Indigenous Knowledge Work

IDSov overlaps with IKs and traditional ecological knowledge (TEK) work, but they are not synonymous. In the 1980s, Indigenous scholars began seeking a term to reflect Indigenous ways of knowing. They began adapting "Indigenous Knowledge" — an anthropological term — toward the goals of Indigenous intellectual autonomy. TEK was similarly debated and developed.[30] From an Indigenous perspective, IKs are intergenerational ancestral systems of knowledge that reflect "Indigenous informed epistemologies" through place-based dimensions of tradition, empiricism, and revelation or insight.[31] Due to the social positions of Indigenous Peoples, IKs are inherently decolonial or anti-colonial.

Indigenous systems of knowledge are not data, but rather a system of relations over time. Indigenous systems of knowledge are safeguarded by sanctioned Indigenous Peoples who sustain them through self-governance, philosophy, language, medicine, science, and ceremony. As such, IK cannot

**29** Christen, "Does Information Really Want to be Free?"; Wemigwans, *A Digital Bundle*.

**30** Charles Kamau Maina, "Power Relations in the Traditional Knowledge Debate: A Critical Analysis of Forums," *International Journal of Cultural Property* 18, no. 2 (2011): 143–78, https://doi.org/10.1017/S0940739111000130; Laurence Helfer and Graeme Austin, "Indigenous Peoples' Rights and Intellectual Property," in *Human Rights and Intellectual Property: Mapping the Global Interface*, eds. Laurence Helfer and Graeme W. Austin (Cambridge: Cambridge University Press, 2011), 432–502.

**31** George J. Sefa Dei, "Rethinking the Role of Indigenous Knowledges in the Academy," *International Journal of Inclusive Education* 4, no. 2 (April 2000): 111–32, https://doi.org/10.1080/136031100284849.

be divorced from knowledge holders, community, protocol, and obligation. Indeed, IK gains both meaning and applicability precisely through the ancestral community-esteemed protocols of sharing governing its practice, even when such sharing occurs via digital bundles in online spaces.[32] This is why, at its basis, IDSov work, originating in Indigenous systems of knowledge and multiplying legal protections for IK and TEK, occurs through Nation-to-Nation agreements regarding Indigenous Peoples and institutions.

Most importantly, IK does not and cannot fit in a spreadsheet, even though IK-centered methods can produce spreadsheets in technique.[33] Divorcing IK from the knowledge-keepers, landscapes, languages, telling, aurality, and philosophies of its emergence is to designify the knowing, thus committing scientific extraction.[34] Indigenous Peoples often face well-intentioned inclusion models that insist on IK without people, archives without protocol, and storytelling without obligation.[35] This is and can only be expropriation, if not appropriation. In these cases, inclusion opposes the principles of IDSov.

There have been many calls and efforts to include IKs and TEK in studies conducted by non-Indigenous researchers. Yet without a real-world understanding of Land relations, including what Leanne Betasamosake Simpson (Anishinaabe) calls "constellations of coresistance," no amount of or care for Indigenous data, information, or stories in research can support an Indigenous way of knowing or observation.[36] Moreover, positioning IK and TEK as data, information, or anecdotes ripens fragments of knowledge for exploitation. This point is maintained by many Indigenous TEK practitioners, including Tribal historic preservation officers who must often, on behalf of their Tribal government, satisfy Western scientific demands through translating Tribal ways of knowing and decision-making into datafied Western structures.

**32** Wemigwans, *A Digital Bundle*.

**33** Maggie Walter and Chris Andersen, *Indigenous Statistics: A Quantitative Research Methodology* (Walnut Creek: Left Coast Press, 2013).

**34** Dylan Robinson, *Hungry Listening: Resonant Theory for Indigenous Sound Studies* (Minneapolis: University of Minnesota Press, 2020); Julie Cruikshank, *Do Glaciers Listen?: Local Knowledge, Colonial Encounters, and Social Imagination* (Vancouver: UBC Press, 2010).

**35** Sandra Littletree, Miranda Belarde-Lewis, and Marisa Duarte, "Centering Relationality: A Conceptual Model to Advance Indigenous Knowledge Organization Practices," *Knowledge Organization* 47, no. 5 (November 2020): 410–426, https://digital.lib.washington.edu:443/researchworks/handle/1773/46601; Ricardo L. Punzalan and Michelle Caswell, "Critical Directions for Archival Approaches to Social Justice," *The Library Quarterly* 86, no. 1 (January 2016): 25–42, https://doi.org/10.1086/684145.

**36** Leanne Betasamosake Simpson, "Constellations of Coresistance," in *As We Have Always Done: Indigenous Freedom Through Radical Resistance*, ed. Leanne Betasamosake Simpson (Minneapolis: University of Minnesota Press, 2017).

Yet data and information are not the opposite of IK. Indigenous practitioners of informatics — including data scientists, computer scientists, social scientists, library and information scientists, geneticists, and environmental scientists — foreground Indigenous relationships with each other and with Indigenous Lands in their own concepts and creation of data, information, and knowledge, thereby developing methodologies and advancing Indigenous sciences.[37] For instance, some Indigenous statisticians are using Indigenous community priorities, ethics, cosmologies, and numeracy traditions to guide their interpretation of data.[38] IDSov and Indigenous data regulation offer means to ethically create, protect, and control datasets that are outcomes of IK and TEK.

## Frameworks and Principles

In the 2010s, Indigenous researchers (mostly empiricists) from Canada, New Zealand/Aotearoa, the United States, and Australia (CANZUS) developed the overarching principles of IDSov. These researchers bear strong commitments to the principles of Indigenous science and self-determination. Many Indigenous Peoples of the CANZUS countries bear treaty or other sovereign recognition relationships with the dominant settler nation-state. Country-level discussions about IDSov are often coordinated through hubs in each country, including the First Nations Information Governance Center (FNIGC) in Canada, the Te Mana Rauranga Māori Data Sovereignty Network in Aeoteroa, the US Indigenous Data Sovereignty Network, and Maiamnayri Wingara Aboriginal and Torres Strait Islander Data Sovereignty Network.[39]

**37** Littletree et al., "Centering Relationality"; Jessie Loyer, "Collections Are Our Relatives Disrupting the Singular, White Man's Joy That Shaped Collections," in *The Collector and the Collected: Decolonizing Area Studies Librarianship*, eds. Megan Browndorf, Erin Pappas, and Anna Arays (Sacramento: Library Juice Press, 2021); Liboiron, *Pollution is Capitalism*.

**38** Walter and Andersen, *Indigenous Statistics;* Ella Henry and C. Crothers, *Exploring Papakāinga: A Kaupapa Māori Quantitative Methodology* (Porirua: National Science Challenges Building Better Homes, Towns and Cities Ko ngā wā kāinga hei whakamāhorahora, 2019).

**39** Ray Lovett, Vanessa Lee, Tahu Kukutai, Stephanie Carroll Rainie, Jennifer Walker, "Good Data Practices for Indigenous Data Sovereignty," in *Good Data*, eds. Angela Daly, Kate Devitt, and Monique Mann (Amsterdam: Institute of Network Cultures, 2019).

OCAP was developed in 2009 through Canada's Assembly of First Nations Chiefs-in-Assembly, which subsequently became FNIGC. FNIGC trademarked the framework in 2015 to "assert that First Nations have control over data collection processes, and that they own and control how this information can be used."[40] Seeking trademark protection emerged from the need to enforce the accuracy and purpose of the framework, especially as non-Indigenous researchers began distorting the acronym and its terms, and to leverage an array of protections for research datasets and information bearing specifically First Nations access and use rights. While inspiring to others, OCAP is specifically for First Nations contexts. The OCAP framework[41] includes the following principles:

- "Ownership refers to the relationship of First Nations to their cultural knowledge, data, and information. This principle states that a community or group owns information collectively in the same way that an individual owns his or her personal information.
- "Control affirms that First Nations, their communities, and representative bodies are within their rights to seek control over all aspects of research and information management processes that impact them. First Nations control of research can include all stages of a particular research project-from start to finish. The principle extends to the control of resources and review processes, the planning process, management of the information and so on.
- "Access refers to the fact that First Nations must have access to information and data about themselves and their communities regardless of where it is held. The principle of access also refers to the right of First Nations' communities and organizations to manage and make decisions regarding access to their collective information."

**40** "The First Nations Principles of OCAP," First Nations Information Governance Centre, accessed February 24, 2023, https://fnigc.ca/ocap-training/.

**41** "The First Nations Principles of OCAP," First Nations Information Governance Centre.

This may be achieved, in practice, through standardized, formal protocols.

- "Possession: While ownership identifies the relationship between a people and their information in principle, possession or stewardship is more concrete: it refers to the physical control of data. Possession is the mechanism by which ownership can be asserted and protected."

Similarly, in 2015, groups of Māori researchers and technology specialists created the concept for a Māori data sovereignty network during a presentation on IDSov in Canberra, Australia.[42] At gatherings in Aotearoa in 2015 and 2016, they developed an IDSov charter. The Te Mana Rauranga Charter specifies rights within the Treaty of Waitangi and UNDRIP, and bridges technoprogressive ideologies of "data as world of opportunity" with time-tested principles of whanaungatanga, rangatiratanga, and kotahitanga toward governance; and manaakitanga, kaitiakitanga, and whakapapa toward operations. Each principle is carefully considered with regard to technical infrastructures, private industry roles, research praxis, and novel innovations within the information economies in Aotearoa/New Zealand. Understanding the specificity of the regional and state-based frameworks is thus integral for researchers developing reciprocal and responsible data-driven research or industry relationships with specific Indigenous partners. The Te Mana Rauranga Charter[43] includes:

- Whanaungatanga and Whakapapa: "in Māori thinking and philosophy relationships between [humans], Te Ao Turoa (the natural world), and spiritual powers inherent therein, and Taha Wairua (spirit) are everything. Whakapapa evidences those linkages."

**42** "Māori Data Sovereignty Network Charter," Te Mana Raraunga, https://www.temanararaunga.maori.nz/tutohinga.

**43** "Māori Data Sovereignty."

- Rangatiratanga: the "iwi/Māori aspiration for self-determination, to be in control of our own affairs and to influence those taking place within our iwi boundaries … Rangatiratanga can be expressed through leadership and participation."
- Kotahitanga: relationality based on "a collective vision and unity of purpose while recognising the mana of rangatira from individual hapū and iwi."
- Manaakitanga: "the responsibility to provide hospitality and protection to whānau, hapū, iwi, the community, and the environment. The foundations of manaakitanga rely on the ability of Māori to live as Māori, to access quality education, to have good health, to have employment opportunities and to have liveable incomes."
- Kaitiakitanga: being "an effective steward or guardian and relates to actions that ensure a sustainable future for all people."

In 2019 at a conference in Basque territory led by statistician Maggie Walters (Palawa) and demographer Desi Small-Rodriguez (Northern Cheyenne), participants formed the Global Indigenous Data Alliance (GIDA). At that meeting, GIDA members approved relationships and rights discourses for asserting a balance across First Nations principles of ownership, control, access, protection, and reciprocity (OCAP principles) toward broader CARE Principles for Indigenous Data Governance — collective benefit, authority to control, responsibility, and ethics. GIDA members examine how these merge with the FAIR Principles of findability, accessibility, interoperability, and reusability.[44] GIDA has also translated the IDSov discourse

**44** Stephanie Russo Carroll, Ibrahim Garba, Oscar L. Figueroa-Rodríguez, Jarita Holbrook, Raymond Lovett, Simeon Materechera, Mark Parsons, Kay Raseroka, Desi Rodriguez-Lonebear, Robyn Rowe, Rodrigo Sara, Jennifer D. Walker, Jane Anderson, and Maui Hudson, "The CARE Principles for Indigenous Data Governance," *Research Data Alliance* 19, (2020), DOI: 10.5334/dsj-2020-043; Stephanie Russo Carroll et al., "Operationalizing the CARE and FAIR Principles"; Neha Gupta, Andrew Martindale, Kisha Supernant, and Michael Elvidge, "The CARE Principles and the Reuse, Sharing, and Curation of Indigenous Data in Canadian Archaeology," *Advances in Archaeological Practice* 11, no. 1 (February 2023): 76–89, https://doi.org/10.1017/aap.2022.33.

into Spanish, Vietnamese, German, and Khmer (it was already born in part through discussions in Te Reo Māori) toward inclusivity.[45] The CARE Principles are:

- "Collective Benefit. Data ecosystems shall be designed and function in ways that enable Indigenous Peoples to derive benefit from the data. C1) For inclusive development and innovation. C2) For improved governance and citizen engagement. C3) For equitable outcomes.
- "Authority to Control. Indigenous Peoples' rights and interests in Indigenous data must be recognized and their authority to control such data respected. A1) Recognizing rights and interests. A2) Data for governance. A3) Governance of data.
- "Responsibility. Those working with Indigenous data have a responsibility to share how those data are used to support Indigenous Peoples' self-determination and collective benefit. R1) For positive relationships. R2) For expanding capability and capacity. R3) For Indigenous languages and worldviews.
- "Ethics. Indigenous Peoples' rights and wellbeing should be the primary concern at all stages of the data life cycle and across the data ecosystem. E1) For minimizing harm and maximizing benefit. E2) For justice. E3) For future use."

It would be impossible for these frameworks to be adopted as-is in other contexts, particularly non-Indigenous movements or struggles. The specificity of the ways Indigenous Peoples defend their rights to data-driven practices relating to their Peoples, Land, governments, and economies is apparent in the range of local protections, from codes and laws integrating the latest IDSov principles to pre-existing research regulations to customary practices

**45** "CARE Principles for Indigenous Data Governance," The Global Indigenous Data Alliance.

**46** Wemigwans, *A Digital Bundle*.

**47** Rodriguez-Lonebear, "Building a Data Revolution in Indian Country."

and structures that restrict expropriation. This is perhaps the most important foundation of IDSov: that particular Indigenous Peoples in various parts of the world have place-based strategies toward data-driven self-defense and continuance. We thus describe these various principles in their own terms; generalizing or synthesizing them without an anchor to their places runs counter to the spirit in which they were created. As such, Indigenous researchers and other data actors working in other nations must be conscientious that they are not importing principles from another context, or misinterpreting principles, in particular as these are deeply rooted in ancestral Indigenous philosophies.

## The Near Future of IDSov

Indigenous intellectualism, Indigenous science, Indigenous ways of knowing, the right to know, and IK/TEK debates have existed for centuries prior to the IDSov movement. As a relatively new movement and discourse fed by many wellsprings, IDSov is emergent. Some aspects of IDSov have yet to be clarified. Some of these relate to the question of privacy, and how Indigenous privacy and security contexts reveal the technical and social erosion of legal privacy worldwide through reliance on third-party information sharing for industrial computation. For example, US Tribes may realize the ways IDSov conflicts with law enforcement data sharing in particular as the Supreme Court challenges sovereign jurisdictions, including surrounding child welfare cases and missing persons cases. IDSov's promise is dependent on the capacity of self-governing Indigenous Peoples to assemble and sustain a data management ecosystem sufficiently robust to keep pace with governments, universities, and industry. IDSov is also dependent on an assumption that the participating Indigenous governments support some kind

of democratic approach to research and data, or, alternatively, do not regulate research toward censoring their own Peoples.

As Indigenous Peoples we must create our own data practices and strategize how — and whether — to work with settler-state data practices and non-Indigenous researchers in ways that promulgate Indigenous goals and priorities. IDSov must emerge through the relationship between Indigenous Peoples and our governments, beginning whenever possible through Indigenous-Nation-to-Indigenous-Nation agreements. This allows online datasets, information, or bodies of knowledge that are intentionally created to be passed on as a matter of tradition in ways that are meant to be interpreted as interconnected, "aspects of long-existing Indigenous Knowledge in new formats and in relation to new contexts," or as Wemigwans has described them, "digital bundles."[46] In this sense, IDSov work is about protecting what is already ours as Indigenous Peoples, even across new formats and emerging sociotechnical relationships. Because of this spirit of resurgence, Rodriguez-Lonebear has characterized IDSov work as a data revolution.[47]

There is another kind of challenge for Indigenous Peoples who agree with IDSov principles, but who, due to absence of legal personhood or rights to sovereignty, lack a means of enforcement. This is the case for many Indigenous Peoples throughout Abiayala and in states throughout the world where there is no legal path to recognition or where corruption is pervasive and persistent. These types of challenges will likely have to be fought via human rights cases through courts that rely on international pressure to right wrongs. As such, a related challenge pertains to the work of transnational learning that could occur through specialists who can compare and translate aspects of other types of data justice movements in other countries and

contexts. Though, due to the differences in legal structures, it is unlikely that there will ever be a supranational set of codes across, say, the European data justice movements and IDSov movements, such discussions nevertheless encourage healthy understanding about the ways data-driven practices intersect with human rights, anti-oppression, healthy economies, digital equity, and technological futures among many peoples worldwide. In such a spirit of conversation, of sharing knowledge and experience, GIDA exemplifies the assertion that while IDSov practices are not universal, they are pluriversal, and align through a common struggle against extractive and weaponized colonial knowledge practices. A key contribution of IDSov is the premise that Indigenous self-determination is a sound means of defense, and on this basis, we light our fires for the strength and flourishing of our Indigenous Peoples, Lands, friends, and accomplices worldwide.