

# The CARE Principles and the Reuse, Sharing, and Curation of Indigenous Data in Canadian Archaeology

Neha Gupta , Andrew Martindale, Kisha Supernant, and Michael Elvidge

## ABSTRACT

Reuse and sharing of archaeological data are tied to ethics in data practice, research design, and the rights of Indigenous peoples in decision-making about their heritage. In this article, the authors discuss how the CARE (Collective benefit, Authority to control, Responsibility, and Ethics) principles and Indigenous data governance create intellectual space for archaeological research. We show how archaeologists can use this framework to highlight hidden costs and labor associated with the “data ecosystem,” which are often borne by Indigenous nations and communities. The CARE framework gives voice to Indigenous peoples’ concerns around data sharing, curation, and reuse; ways we can redress these issues; and strategies that facilitate Indigenous nations and communities in deriving collective benefit from research. In archaeology, these efforts include greater work on heritage legislation and policy, repositioning Indigenous peoples as active stewards of their data, and building capacity in digital methods and ethical data practice. Each Indigenous nation and community has its own interests, values, and protocols, and we suggest paths to bring data practice into alignment with the CARE framework.

**Keywords:** CARE, Indigenous data, ethics, data practice, digital heritage, Canadian archaeology

La reutilización y el intercambio de datos arqueológicos están vinculados a la ética en la práctica de datos, el diseño de la investigación y los derechos de los pueblos indígenas en la toma de decisiones sobre su patrimonio. En este artículo, los autores discuten cómo los principios CARE (Por sus sigla en inglés: beneficio Colectivo, Autoridad para controlar, Responsabilidad y Ética) y la gobernanza de datos indígenas crean un espacio intelectual para la investigación arqueológica. Mostramos cómo los arqueólogos pueden usar este marco para resaltar los costos ocultos y el trabajo asociado con el “ecosistema de datos” que a menudo corre a cargo de las naciones y comunidades indígenas. El marco de CARE da voz a las preocupaciones de los pueblos indígenas sobre el intercambio, la conservación y la reutilización de datos, cómo podemos solucionar estos problemas y las estrategias que facilitan que las naciones y comunidades indígenas obtengan un beneficio colectivo de la investigación. En arqueología, estos esfuerzos incluyen un mayor trabajo en legislación y políticas de patrimonio, el re posicionamiento de los pueblos indígenas como administradores activos de sus datos y el desarrollo de capacidades en métodos digitales y práctica ética de datos. Cada Nación y comunidad Indígena tiene sus propios intereses, valores y protocolos, y sugerimos caminos para alinear la práctica de datos con el marco de CARE.

**Palabras clave:** CARE, datos indígenas, ética, práctica de datos, patrimonio digital, arqueología canadiense

Reuse of data, data sharing, and curation and preservation of heritage are long-standing interests in the field of archaeology, yet until recently, archaeologists have lacked ethical and appropriate standards of practice to share data. Archaeologists have engaged in “gatekeeping” data from other scholars and in “safeguarding” data even from the communities to whom the data relate. Archaeology is also extractive, a practice that has historically benefited dominant groups and distanced Indigenous, Black, and other racialized communities from their heritage. In this context, web-based tools that promote active participation, creation, and sharing of digital content have markedly affected how archaeologists can interact with and share digital data, as well how data are

shared and with whom (Kansa et al. 2011). The availability of new tools, methods, and data, alongside growing costs and complexities associated with field research, has renewed scholarly interest in data reuse and ethics in data practice.

Web technologies are often coupled with open science, which promotes knowledge sharing and synthesis across disciplines and openness in the research life cycle (e.g., open data, open methods, open access publication). Open science seeks to enhance reproducibility and data reuse with minimal or no restrictions (Burgelman et al. 2019; Marwick et al. 2017). Data governance principles such as FAIR (Findable, Accessible, Interoperable, and

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Reusable; Wilkinson et al. 2016, 2019) that facilitate making and maintaining machine-readable digital resources for the present and the future have gained currency in sustaining open science. Yet, FAIR and “open” are not interchangeable and synonymous terms. As Carroll and colleagues (2021:4) remark, “Both open and non-open datasets can be FAIR,” suggesting that reuse of digital sources, their preservation, and their curation are not restricted to the open science framework. More fundamentally, the open science framework underestimates the influence of colonialism, power, and structural inequalities in the practice of science.

Scholars from the Global South question the emancipatory narrative of open science (de Oliveira et al. 2021; Dutta et al. 2021). “Global South” broadly refers to geopolitical power relations and intellectual production emerging from regions in Latin America, Asia, Africa, the Caribbean, and Oceania (Dados and Connell 2012). Scholars highlight the political nature of the shift in research expectations in light of governments in the Global North tying funding programs to open science practice (Directorate-General for Research and Innovation [European Commission] 2021; Government of Canada 2022). In this context, scholars draw critical attention to contemporary extractive science practice including “helicopter” research design (Haelewaters et al. 2021), inequities in data sharing benefits (Abebe et al. 2021), an inequitable for-profit open access publishing ecosystem (Meagher 2021; Sengupta 2021; Smith et al. 2021), and predominance of Anglophone scholarship in science (Berger 2021; Kwon 2022).

Critiques of open science resonate in the field of archaeology. Franklin and colleagues (2020) demonstrate that archaeologists are influenced by and often work in alignment with broader social and political movements. The Black Lives Matter movement has renewed scholarly attention to persistent structural inequalities in access to strategic material, social, and ideological resources, and it has centered restorative social justice in archaeology (Brunache et al. 2021; Flewellen et al. 2021; Franklin and Paynter 2010; Luluk et al. 2022; Smith et al. 2019). News coverage on unmarked graves of missing Indigenous children at the former Kamloops Indian Residential School and at other similar institutions across Canada is reorienting the role of archaeologists and the relationship between archaeology and Canadian society, and it is pulling public attention to the rights of Indigenous peoples and their experience of racism in Canadian institutions (Harris et al. 2017; Maass 2018; Point 2022; Simmons et al. 2020; Steeves 2021; Supernant 2018; Yellowhorn 1997, 2015).

In this article, we discuss how the CARE (Collective benefit, Authority to control, Responsibility, Ethics) principles can provide an ethical framework for developing digital methods and data practices appropriate for archaeology in the twenty-first century. Indigenous data governance principles have not yet gained traction in the field of archaeology for several reasons, including heritage legislation and policy. CARE principles draw on a human rights framework based in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP; United Nations 2007). Since 2007, nation-states in the Global North—including the United States, Canada, Australia, and New Zealand—have reversed their opposition to the declaration and now fully endorse the supranational legal document that reaffirms the inherent and inalienable rights of Indigenous peoples and that recognizes injustices they experienced as a result of colonization and dis-possession of their lands, territories, and resources. Article 11.1 in

the declaration recognizes the rights of Indigenous peoples when it comes to exercising their interests in revitalizing, using, developing, and transmitting their cultural traditions and customs—including maintaining, protecting, and developing archaeological and historical sites, artifacts, designs, ceremonies, technologies, and visual and performing arts and literature. The CARE framework can guide archaeologists in redressing problematic practices that distance Indigenous peoples from the entire “data life cycle”—that is, in the collection, interpretation, preservation, curation, circulation, and reuse of archaeological and other heritage data.

We start with a brief overview of issues in digital archaeology research and discuss the CARE principles. We argue that CARE principles provide a clear ethical framework that explicitly foregrounds the rights of Indigenous peoples and collective benefits for the community. This, in turn, can create social and intellectual space for building capacity in digital methods, data practices, and purposeful leadership of Indigenous and racialized scholars in digital archaeology research. Drawing from the Canadian context, we suggest ways to bring archaeology into alignment with the CARE data governance principles, and we present ongoing work that seeks to reposition Indigenous peoples’ rights in archaeology and digital heritage. We conceptualize and examine these issues as university-based researchers in the Canadian context, with focus on the western province of British Columbia. However, the strategies we propose have broader application in other contexts.

## A FEW ISSUES IN ARCHAEOLOGY AND DIGITAL HERITAGE

Until recently, there was minimal scholarly attention to ownership of digital archaeological data (Gupta, Nicholas, and Blair 2022; Gupta et al. 2020; Kansa 2016). Scholarship in closely related fields such as museums and archives suggest critical awareness of the perspectives, knowledges, and rights of Indigenous, Black, and other racialized communities when it comes to heritage (Anderson and Christen 2013; Boast and Enoté 2013; Brown and Nicholas 2012; Milun 2001; Montenegro 2019; Odumosu 2020; Rowley 2013). Yet, interests in ownership of the past are not new.

Since at least the 1960s, Indigenous, Black, and other racialized communities have challenged Eurocentric views and interpretations of the past (Ascher and Fairbanks 1971; Johnston 1976). They have long recognized that holding institutions and government agencies assert ownership of tangible cultural heritage through dominant law, which has superseded customary law in settler states (Jackson 1989). As a result, Indigenous and descendant communities do not have either access to or ownership and possession of their material heritage (Bell et al. 2008; Bowrey and Anderson 2009). Indigenous communities have demanded for the return of cultural heritage and the remains of their ancestors housed in different holding institutions (Atalay 2006). These communities have pushed back against colonial practices that distance them from their heritage through Indigenous epistemologies, methodologies, and practice (Kovach 2009; Smith 1999) and through international instruments and national legal systems (Battiste and Henderson 2000; Bell and Paterson 2009; Echo-Hawk 2012; Riding In et al. 2004). As Anderson and Montenegro (2017:438) remark, digital heritage creates “new negotiations

around access, care and ownership,” leading non-Indigenous stakeholders and Indigenous communities to have “new expectations and social engagements.” The rise of digital archaeology highlights questions about whose archaeological heritage is collected and digitized, who decides what information is stored and where, what is shareable and shared, with whom digital data are shared, how they are cared for, and how they are curated for future use.

Recent efforts in critical archaeology focus on data futures and data sustainability (Garstki 2022:2) as reflected in the growth of digital data repositories (e.g., Archaeology Data Service [ADS], the Digital Archaeological Record [tDAR], Digital Archaeological Archive of Comparative Slavery [DAACS], Canadian Archaeological Radiocarbon Database [CARD], Advanced Research Infrastructure for Archaeological Dataset Networking in Europe [ARIADNE], Data Archiving and Networked Services [DANS], and others) and data publishing (e.g., Open Context). FAIR principles can offer guidance in creating persistent digital sources with rich metadata when archaeological data are compiled into a centrally maintained digital database (Nicholson et al. 2023). Reusability, for example, pulls attention to data quality issues such as the reliability of the processed data, how data were collected and transformed, and which tools and technologies were used in data collection and data processing (Gupta 2020).

In a data governance framework, one must further consider the system of decision rights and responsibilities associated with data (Smith et al. 2011). They include the following:

- What are conditions of use and circulation?
- Who makes decisions about which data?
- Which methods are appropriate for processing and transformation?
- Where is information available about the digital database?
- Under what permissions were data collected and compiled?
- What protocols are in place to minimize misuse of the database?

Good data documentation practice and metadata tools facilitate ethical care of digital sources by keeping connection with “data creators,” regardless of the size of organization, the volume of data, or whether data are used internally by an organization or shared externally with others, with or without restrictions. This is critical because archaeological data typically comprise heritage of local communities and can influence decisions that have real-world impacts on Indigenous peoples and descendant communities across the globe, and especially in settler states such as the United States and Canada. Yet, data-centric principles such as FAIR overlook the impact of colonialism and power imbalances in the practice of science. When operationalized in the absence of a clear ethical framework, these initiatives will be problematic to adopt in archaeology, and they will likely create an uneven patchwork of data practice (Nicholson et al. 2023) that reinforces existing inequities.

A growing number of archaeologists remark on unequal access to infrastructure for sharing, storing, analysis, and presentation of digital archaeological data, noting that these disparities will not fix themselves through time (Kansa 2016; Richardson 2013; Sayre 2016). Scholars highlight barriers to maintaining, creating, and innovating in digital spaces such as dependence on a

“monocultural stack” of hardware configurations and software protocols that embody the dominant culture’s expectations of what constitute data, appropriate processing of data, and validity of results (Lewis 2019:219). Huggett (2015) raises concern about uncritical technological “fetishism,” whereas Rabinowitz (2016) draws attention to the digital means to produce archaeological documentation that reliably preserves into the future. In an ecosystem of digital tools, Caraher (2016:435) remarks on “de-skilling” or privileging of particular skills, and Gupta and colleagues (Gupta, Nicholas, and Blair 2022) highlight the silencing of the voices, perspectives, and knowledges of Indigenous and racialized women, a situation reinforced by limited training opportunities for them in this specialization.

Until recently, archaeologists have paid little attention to digital heritage research in Indigenous nations engaged with the regulatory archaeological assessments process (Martindale et al. 2020; Schaepe and McGinity 2020; Supernant 2020). Indigenous peoples in Canada include First Nations, Métis, and Inuit. These groups have inherent Aboriginal Title and Rights, which refers to collective rights to the use of and jurisdiction over ancestral territories. However, provincial and territorial governments create and operationalize heritage legislation, and this situation has led to a lack of consistency in Indigenous engagement. For example, in the province of Alberta, Indigenous governments have little or no participation in archaeological assessments as part of construction projects and other compliance contexts. In British Columbia, however, Indigenous governments are inundated by requests for archaeological permit assessments.

Referrals requests outpace the material resources and person hours that Indigenous governments have for carrying out Canadian regulatory requirements. As a result, Indigenous nations necessarily coordinate with commercial-sector firms through consultation. First Nations governments in British Columbia are expected to handle referrals requests, organize field crews for monitoring, and manage and process data collected from field surveys to inform decision-making. Data created during these processes are spread across a First Nation’s departments and agencies, and they require infrastructure to store, access, and use these data.

First Nations’ governments are also engaged in heritage governance and planning for community interests (Gupta, Bonneau, and Elvidge 2022). In data practice, they enact cultural protocol, which is based on the community’s values and ethics and which is a living, breathing guide to access, privacy, and conditions of use of information. Implementation of cultural protocol in technical standards can minimize misuse of heritage information when it is shared and reused, and we will return to this point in a later section. First Nations’ governments additionally require digital platforms and data governance tools that support these needs and interests (McMahon et al. 2015). Shifting scholarly attention to these concerns and building community capacity in digital methods and data practice can support First Nations in immediate heritage governance efforts and in building a data workforce in the long term.

Although data repositories and data publishing are successful in creating some opportunities for archaeologists in digital methods, information science, and data science practice, these efforts have not explicitly addressed inequalities when it comes to building

capacity for the vast majority of archaeologists, and especially Indigenous and racialized women. The archaeological community could prioritize training for Indigenous scholars and other historically excluded communities in the American and Canadian contexts and in the Global South. The Arizona State University Foundation, for example, has set up the BIPOC and Women in Archaeology Digital Training Fund—a crowdfunding initiative to support training of Black, Indigenous, and People of Color, and women in using tDAR (Arizona State University Foundation 2022). During the COVID-19 pandemic, the DAACS offered free virtual workshops in data collection and training with the R software, with focus on DAACS's digital collections. The Alexandria Archive Institute / Open Context and American Society of Overseas Research (ASOR) Early Career Scholar Committee offered a three-workshop series titled "Digging Up Data" to introduce participants to data literacy, data analysis, and public scholarship. Greater investment and targeted action can begin to narrow the gap between scholars who focus on digitization, data structures, and technical implementation of data standards and scholars who examine the social and political implications of "big data" to redress inequalities. Bringing archaeology in alignment with an Indigenous data governance framework creates space for these conversations, which we discuss in the next section.

## CARE PRINCIPLES IN INDIGENOUS DATA GOVERNANCE

In 2019, the Global Indigenous Data Alliance (GIDA) published the CARE principles to shift attention to governance of data that is people and purpose oriented. The CARE framework recognizes power differentials in data sharing and data reuse in the "data ecosystem," which includes digital infrastructures, analytics, and applications (Carroll et al. 2020:2). Indigenous data sovereignty draws on UNDRIP (United Nations 2007) to re-center Indigenous rights and aspirations in research, policy, and practice. At the heart of Indigenous data sovereignty is awareness that non-Indigenous scholars have long collected information about Indigenous peoples, knowledges, cultural heritage, lands, waters, and resources; misused this information; and brought harm to the community (Kukutai and Taylor 2016). Indigenous data sovereignty raises a range of issues, from "legal and ethical dimensions around data storage, ownership, access and consent, to intellectual property rights and practical considerations about how data are used" (Kukutai and Taylor 2016:4–5). It seeks to reposition inherent Indigenous sovereignty and to reaffirm that Indigenous peoples have "always have been the owners of their cultural property, traditional knowledge and traditional cultural expressions" (Tsosie 2012:243).

Legal scholars Wallace Coffey and Rebecca Tsosie (2001:243–244) remark that "tribal cultural heritage in many ways constitutes the core of inherent sovereignty, and cultural integrity is a fundamental part of indigenous self-determination." This is true both in the evaluation of Aboriginal rights in a Canadian court and in Indigenous legal contexts. Heritage is often synonymous with law and is relevant because different Indigenous nations can share legal frames. This in turn provides paths to resolution of legal conflicts between Indigenous communities. Indigenous data are conceptualized as any data about Indigenous peoples, their lands, water, resources, knowledges, oral histories, cultural sites, and

stories, and they include data created by an Indigenous government, community, or organization, as well as those collected by non-Indigenous governments and institutions, commercial firms, and researchers (First Nations Information Governance Centre 2014; Kukutai and Taylor 2016:2). Moreover, Rainie and colleagues (2017:5) draw attention to the urgency for consistent and relevant data that "meet the needs and visions of Indigenous nations" in decision-making, policy making, and self-determination. These efforts highlight that data are important to Indigenous nations for governance and internal use. Moreover, when external users or intergovernmental agencies are involved, data sharing and future data use must be on the First Nation's terms to minimize harm and enable equitable benefits sharing for the Indigenous community.

In the context of open data and open science, Carroll and colleagues (2020:2) explain that "reclaiming control of data, data ecosystems, data science and data narratives" is a part of exercising Indigenous peoples' rights and interests. Doing so makes Indigenous perspectives seen and voices heard within data ecosystems, and in effect, repositions Indigenous peoples as active innovators, policy makers, practitioners, and contributors rather than subjects of study and data collection. Indigenous data governance principles therefore support ethical stewardship of Indigenous data; center participation of Indigenous peoples in the collection, storage, analysis, use, curation, and future use of data; and facilitate collective benefits derived from them (Carroll et al. 2020:3).

Crucially, Carroll and colleagues (2020:3) remark that an aim of the CARE principles is to complement the FAIR principles while "ensuring data sharing on Indigenous terms" to minimize harm and maximize benefits. Data, whether open or not, must support and improve decision-making. When data are ethically used, Indigenous nations can gain better understanding of their communities, peoples, lands, and resources, and shed light on policies that impact the lives and well-being of Indigenous peoples. Indigenous peoples, therefore, must be represented and participate in "assessing benefits, harms and potential future uses based on community values and ethics" (Carroll et al. 2020:6).

The CARE framework shifts focus to "values-based relationships" through which Indigenous peoples exercise their cultures and knowledge systems to their benefit (Carroll et al. 2020:3). Carroll and colleagues (2020) do not explicitly discuss the concept of values-based relationships. The concept is integral to the evaluation of research results through Indigenous epistemologies and knowledge systems. Research results are gauged in terms of their "value to the community, their relationship to traditional cultural knowledge, and their impact on community members now and into the future, out to the seventh generation" (LaFrance et al. 2012:65). The community weighs the potential for harm from research results to evaluate the reliability and validity of research. Community values and ethics form the basis for processes, policies, and technologies in Indigenous self-determination of data.

In many Indigenous legal systems, knowledge is owned. Ownership is determined by its provenance—usually a family, matriline, or other social configuration—and is held in trust by its members. Knowledge may not be shared without permission, and provenance itself is a form of right. For example, "data" for the Tsimshian exist as *adawx* (stories), which are owned by matriline (Marsden 2002; Martindale 2006; Martindale and Marsden 2003; Menzies

2016; Menzies and Martindale 2019). The *adawx* is a narrative and a spiritual connection to Spirit Beings, with whom the ancestors interacted, and with whose permission rights are derived. The Spirit Beings exist today on the land, and the ancestors continue to exist and guide. Consequently, the story is both a connection and, in itself, a spiritual nonhuman person. For this reason, taking knowledge without permission is a form of abduction and violation. Systems of ownership (relationship) are embedded in the land and in living relations, making their taxonomy deeply embedded with culture. Categorizing such complex relationships would be difficult in a machine-readable environment, yet the capability to recognize the Indigenous community's sacred knowledge and its rights should be possible in the data ecosystem.

CARE consists of four primary principles: Collective benefit, Authority to control, Responsibility, Ethics. Each principle is interrelated and has three supporting concepts (Table 1). This high-level framework works with local Indigenous data governance principles in policy, research, and practice. For example, in Aotearoa, the Te Mana Raraunga elaborates Māori data sovereignty and is appropriate for local implementation. The OCAP (Ownership, Control, Access, Possession) principles developed by the First Nations Information Governance Centre (2014) offer a framework for First Nations to assert rights, interests, and policies in research design and practice. These principles are used in the Canadian context (Adelson and Mickelson 2022; Bell and Paterson 2009; First Peoples' Cultural Council 2019; Gupta et al. 2020; Mashford-Pringle and Pavagadhi 2020; Nipising Nation 2022), and they do not supersede or exclude distinct data governance strategies developed by Indigenous nations.

The Łı́ıdlı́ı Kúę First Nation, for example, has developed a research licensing model that explicitly states that "all raw data" are co-owned by the First Nation. Under this model, the First Nation's research review committee asks that a researcher outline specific equipment and infrastructure they plan to install, how often they will travel on Dene lands for data collection, the researcher's "demobilization plan," and how they have prepared themselves in the First Nation's customs and codes of research practice (Pilkington 2022). These data governance strategies complement the CARE principles in shifting research practice from an extractive or consultative relationship to a values-based one, in which the Indigenous community (1) enacts its worldview, values, and interests and (2) has active engagement in and authority over research process and policies (David-Chavez and Gavin 2018). The next section discusses implementation of CARE principles in terms of Indigenous data in non-Indigenous holding institutions.

## Implementation of CARE Principles in Data, Collections, and Holding Institutions

The implementation process for the CARE framework is already under development, with initial work with data repositories, including universities, libraries, and other online databases that compile and hold large volumes of Indigenous data and collections (Carroll et al. 2021). To bring digital sources about and related to Indigenous data into alignment with CARE data practice, institutions and data repository managers need guidance and supporting workflows (Carroll et al. 2022). Of particular focus are practical mechanisms such as cultural metadata, which include three components: provenance, permissions, and protocols (Anderson and Hudson 2021; Table 2). Cultural metadata can be

attached as permanent machine-readable components to digital sources to inform on authority, consent, and conditions of use of Indigenous data throughout the data life cycle.

Digital tags or markers such as Notices and Traditional Knowledge (TK) and Biocultural (BC) Labels can support implementation of the CARE principles in machine-readable environments for digital heritage, as well as biological and genetic sequence information (Liggins et al. 2021; Figure 1). Local Contexts, developed in 2010 by Jane Anderson and Kimberley Christen, aims to enhance Indigenous governance of historical, contemporary, and future collections of cultural heritage and Indigenous data. It has been developing workflows and training material to support practical application of TK and BC Labels in data managed by institutions and communities (Anderson and Hudson 2021). The Sq'ewlets website project is one community implementation of TK Labels (Lyons et al. 2016). Notably, communities develop TK and BC Labels through collective decision-making, and these conversations can assist in defining community expectations and consent about appropriate use of its data. These activities facilitate development of a First Nation's and a community's protocols and processes for data, and they directly support building a data workforce where community members are active contributors, stewards, innovators, and policy makers.

Institutions can implement Notices (e.g., placeholders while a community develops its Labels), and this can facilitate use of TK and BC Labels as a permanent component in digital sources. These efforts build relationships based on respect and trust with Indigenous communities and keep cultural institutions accountable to the communities to whom the data relate. In the next section, we discuss Indigenous data in Canadian archaeology and implementation of the CARE principles in the field of archaeology.

## INDIGENOUS DATA IN CANADIAN ARCHAEOLOGY

The Canadian legal system recognizes Aboriginal Title, yet dominant law limits the scope of these rights and infringes upon Indigenous peoples' rights through the Indian Act (RSC 1985, c 1-5, <https://canlii.ca/t/5439p>), which is active in Canadian society. Through this paternalistic and discriminatory federal law, Canadian governments have the authority to regulate matters about who qualifies for "Indian status," recognition of bands, and administration of reserves. In addition to these legal and structural barriers associated with Indigenous peoples' rights, there are Indigenous nations that do not have Title, and still others that Canadian governments do not formally recognize. Some Indigenous nations have established self-government agreements to exercise their governance, legal systems, and self-determination. Archaeologists, therefore, work in plural and complex governance and legal contexts in which Indigenous communities and non-Indigenous stakeholders may have differing interests and goals.

Archaeology in Canada is regulated through a framework of provincial and territorial heritage legislation, and Canadian law applies to all archaeological activities carried out on Crown lands. Each Canadian province and territory has an agency dedicated to archaeology and heritage preservation, which develops processes and policies related to collection, reporting, permitting, and

**Table 1.** CARE Principles.

<p>Collective benefit</p> <p>Data ecosystems shall be designed and function in ways that enable Indigenous Peoples to derive benefit from the data.</p>
<p>◇ C1: for inclusive development and innovation</p> <p>Governments and institutions must actively support the use and reuse of data by Indigenous nations and communities by <i>facilitating the establishment of the foundations for Indigenous innovation, value generation, and the promotion of local self-determined development processes.</i></p>
<p>◇ C2: for improved governance and citizen engagement</p> <p>Data enrich the <i>planning, implementation, and evaluation processes that support the service and policy needs of Indigenous communities.</i> Data also enable better engagement between citizens, institutions, and governments to improve decision-making. Ethical use of open data has the capacity to improve transparency and decision-making by providing Indigenous nations and communities with a better understanding of their peoples, territories, and resources. It similarly can provide greater insight into third-party policies and programs affecting Indigenous Peoples.</p>
<p>◇ C3: for equitable outcomes</p> <p>Indigenous data are grounded in community values, which extend to society at large. <i>Any value created from Indigenous data should benefit Indigenous communities in an equitable manner and contribute to Indigenous aspirations for well-being.</i></p>
<p>Authority to control</p> <p><i>Indigenous Peoples' rights and interests in Indigenous data must be recognized, and their authority to control such data be empowered.</i> Indigenous data governance enables Indigenous Peoples and governing bodies to determine how Indigenous Peoples—as well as Indigenous lands, territories, resources, knowledges and geographical indicators—are represented and identified within data.</p>
<p>◇ A1: recognizing rights and interests</p> <p>Indigenous Peoples have rights and interests in both Indigenous Knowledge and Indigenous data. <i>Indigenous Peoples have collective and individual rights to free, prior, and informed consent in the collection and use of such data, including the development of data policies and protocols for collection.</i></p>
<p>◇ A2: data for governance</p> <p>Indigenous Peoples have the right to data that are relevant to their worldviews and that empower self-determination and effective self-governance. <i>Indigenous data must be made available and accessible to Indigenous nations and communities in order to support Indigenous governance.</i></p>
<p>◇ A3: governance of data</p> <p>Indigenous Peoples have the <i>right to develop cultural governance protocols for Indigenous data and be active leaders in the stewardship of, and access to, Indigenous data, especially in the context of Indigenous Knowledge.</i></p>
<p>Responsibility</p> <p>Those working with Indigenous data have a <i>responsibility to share how those data are used to support Indigenous Peoples' self-determination and collective benefit. Accountability requires meaningful and openly available evidence of these efforts and the benefits accruing to Indigenous Peoples.</i></p>
<p>◇ R1: for positive relationships</p> <p>Indigenous data use is <i>unviable unless linked to relationships built on respect, reciprocity, trust, and mutual understanding, as defined by the Indigenous Peoples to whom those data relate.</i> Those working with Indigenous data are responsible for ensuring that the creation, interpretation, and use of those data uphold, or are respectful of, the dignity of Indigenous nations and communities.</p>
<p>◇ R2: for expanding capability and capacity</p> <p>Use of Indigenous data invokes a <i>reciprocal responsibility to enhance data literacy within Indigenous communities and to support the development of an Indigenous data workforce and digital infrastructure to enable the creation, collection, management, security, governance, and application of data.</i></p>
<p>◇ R3: for Indigenous languages and worldviews</p> <p><i>Resources must be provided to generate data grounded in the languages, worldviews, and lived experiences (including values and principles) of Indigenous Peoples.</i></p>
<p>Ethics</p> <p>Indigenous Peoples' rights and well-being should be the primary concern at all stages of the data life cycle and across the data ecosystem.</p>

**Table 1.** CARE Principles (continued).

<p>◇ E1: for minimizing harm and maximizing benefit  <i>Ethical data are data that do not stigmatize or portray Indigenous Peoples, cultures, or knowledges in terms of deficit. Ethical data are collected and used in ways that align with Indigenous ethical frameworks and with rights affirmed in UNDRIP. Assessing ethical benefits and harms should be done from the perspective of the Indigenous Peoples, nations, or communities to whom the data relate.</i></p>
<p>◇ E2: for justice  <i>Ethical processes address imbalances in power, resources, and how these affect the expression of Indigenous rights and human rights. Ethical processes must include representation from relevant Indigenous communities.</i></p>
<p>◇ E3: for future use  <i>Data governance should take into account the potential future use and future harm based on ethical frameworks grounded in the values and principles of the relevant Indigenous community. Metadata should acknowledge the provenance and purpose and any limitations or obligations in secondary use inclusive of issues of consent.</i></p>

Notes: Italics are ours, for discussion in article. Adapted from Research Data Alliance International Indigenous Data Sovereignty Interest Group, Global Indigenous Data Alliance (GIDA; 2019).

access to information. These agencies maintain digital databases for archaeological sites inventory, reporting, and permitting (Gupta et al. 2020), and they coordinate with holding institutions for recovered tangible heritage. Because of the way that Canadian heritage legislation codifies ownership of Indigenous belongings (tangible heritage), Indigenous nations and communities experience barriers in reclaiming and repatriating their heritage from non-Indigenous holding institutions.

Additionally, First Nations’ governments experience challenges in accessing archaeological data collected on traditional territory. For example, in British Columbia, a First Nation’s territory includes reserve lands (federally defined), private lands (owned by individuals within traditional territory through preemption), and Crown lands (which were taken without permission from the First Nations’ ancestors and allocated to the provincial government). For coastal communities, there is uncertainty regarding marine territory because the intertidal zone (below high tide) is federally regulated, yet many coastal heritage locations have components that extend into and even below the intertidal zone. The Archaeology Branch in British Columbia maintains databases of archaeology recovered on private and Crown lands. A First Nation, therefore, manages its own data for reserve lands and is dependent on the Branch for access to archaeological data collected elsewhere, whereas data collected in the intertidal zone and below is unregulated. In the next subsection, we provide examples of processes, practice, and data repositories in archaeology that align with CARE principles, and we offer paths for further work with Indigenous nations.

### Aligning Archaeology’s Processes, Practice and Data Repositories with CARE Principles

Carroll and colleagues (2021) note that “CARE Full” requires that all principles be activated in the data ecosystem. We expect implementation will take deliberate investment in labor and innovation, and thoughtful action. We encourage all archaeologists and agencies to familiarize themselves with the CARE principles and consider how they can implement the principles into their project or organizational workflow and data ecosystem. We are cognizant that implementation is a long journey that will pose challenges and opportunities, and that will require adjustments in

timetables, budgets, and expectations; in the configuration of partnerships; and in plans. The archaeological community must consider how best to reconnect existing data collections with the communities that the data represent and to which the data relate. In addition to physical heritage, collections might include documentation in the form of images, drawings, maps, 3D models, and field journals that inform the context of an archaeological survey or excavation. Further consideration will be necessary in cases where data come under existing restrictions and limitations outlined in contracts and grants. These efforts can be made on an individual case-by-case basis, yet broader guidance on ethical data practice for all sectors can facilitate greater uptake and consistency while providing benefits to the archaeological community through better use of limited funds. All too often, Indigenous peoples, communities, nations, and scholars are expected to carry the burden of educating non-Indigenous archaeologists and of intervening, advocating for, and changing unethical data processes, policies, and practice in archaeology.

Purposeful effort in aligning archaeological activities with the CARE principles from the start of a project can begin to shift this burden. For example, the CARE framework informs the data management plan, which major funding agencies now require. A possible CARE implementation for archaeological data in data management plans is provided (Supplemental Text 1). Nicholson and colleagues (2023) explain that a data management plan should be developed regardless of the size of the project, and of the nature and volume of data being collected. Archaeologists must carefully consider the future of the data that are collected, the communities to whom the data relate, how these communities will engage in project/research design, and how data will be shared and archived. With clear and transparent responsibilities at the start of archaeological activities, decision-making is better informed, which in turn can deepen the relationship with the community and transform the work being developed.

In Exploring Métis Identity Through Archaeology (EMITA), Métis archaeologist Kisha Supernant develops a digital archive that enacts Métis worldviews and concepts of relationality in data organization and management (Supernant 2020). EMITA enacts the CARE principle of Collective benefit (C3), where the value

**Table 2.** Components of Cultural Metadata, CARE Principle Activated, and Potential Outcomes for Researchers and Institutions.

Component of Cultural Metadata	CARE Principle Activated	Potential Outcomes for Researcher/ Institution
<i>Provenance</i> : signals Indigenous community's collective rights, interests, authority and decision-making in Indigenous data	<i>Ethics (E3)</i> : acknowledge value and principles of relevant Indigenous community (Carroll et al. 2021:4)	Have information on <ul style="list-style-type: none"> <li>• Where data come from</li> <li>• Which community to engage with regarding consent for use and future use</li> <li>• (Re)connecting community with its data, and then it enriches records with its knowledge (Rowley 2020)</li> <li>• Decision-making about data use</li> </ul>
<i>Protocols</i> : give guidance on appropriate access, use, and care of data, and potential harm associated with data based on Indigenous worldviews (Anderson and Hudson 2021)	<i>Authority to control (A3)</i> : support Indigenous community as active steward of its data	Have information to <ul style="list-style-type: none"> <li>• Minimize inappropriate sharing of data</li> <li>• Learn about Indigenous worldviews</li> <li>• Develop data-sharing policies and agreements with relevant Indigenous community</li> </ul>
<i>Permissions</i> : add clarity about Indigenous expectations and intentions of data use and engagement (Anderson and Hudson 2021)	<i>Responsibility (R1)</i> : accountability in data practice; use of data is respectful of dignity of Indigenous nations and communities (Anderson and Hudson 2021)	Have information to <ul style="list-style-type: none"> <li>• Minimize inappropriate use of data throughout data life cycle</li> <li>• Develop data use policies and agreements with relevant Indigenous community</li> <li>• Support equitable research</li> </ul>

Note: Adapted from Anderson and Hudson (2021).

created from data directly benefits Métis communities and enhance their well-being. This work also activates the Responsibility (R3) principle through grounding in Indigenous worldviews and through processes centered in Métis value systems and Métis historical contexts. EMITA brings together Métis historical and archaeological data from disparate sources and combines these data with traditional knowledge and oral history to enhance Métis peoples' understandings of their history and homelands.

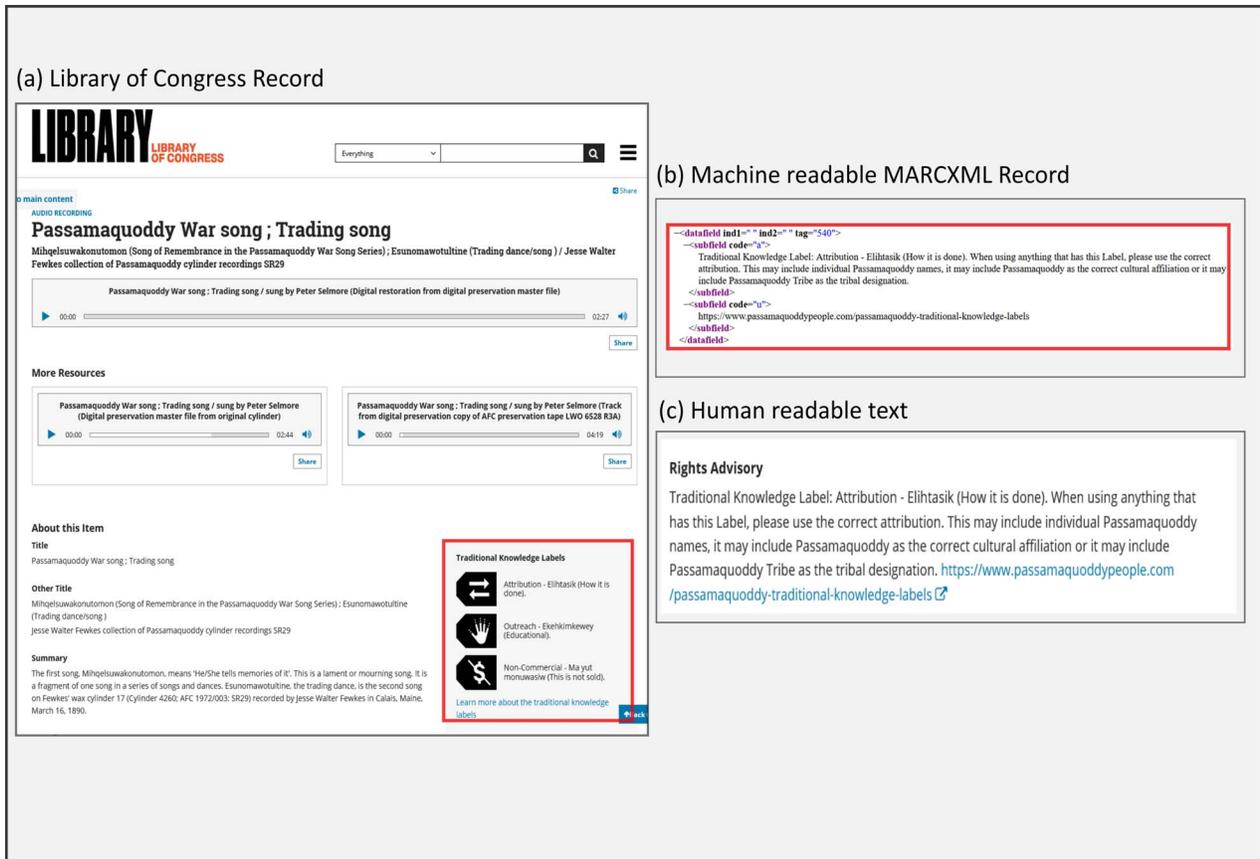
Supernant (2020) activates the Métis concept of *wahkotowin*, which she describes as "law of how to be in the world" and a practice to be in good relation (Wildcat 2018). She conceptualizes Métis relations, mobility, geographies, daily life, and economies as threads that are weaved together to make the Métis sash. To achieve this in the data ecosystem, she organizes data in ways that respect, honor, and reflect Métis views of *wahkotowin* (relationality and interconnectedness of things) while making these data interoperable with other databases and data repositories. The object-oriented archive has two metadata "paths" to map data in different ways. "Archaeological metadata" is based on existing standards such as those used in tDAR to maintain connections with conventional categories and archaeological databases.

Supernant also moves away from conventional database design that delimits categorization of archaeological belongings into function, time, and material of manufacture, because these categories reflect the priorities of non-Indigenous archaeologists. Because Métis archaeological material overlaps significantly with

ethnographic collections made by Métis people, the database will contain both sources within the same portal. Métis Elders and Knowledge Holders are developing "Métis metadata" categories to create linkages meaningful to them, given that community members are the primary audience and users of the digital archive. Community members also determine access to data in the digital archive. The digital archive will have a community-facing portal that Métis communities can intuitively understand and use for their needs and interests. Currently housed at the University of Alberta, Edmonton, the long-term goal is to have the digital archive housed in the Métis Nation itself.

Martindale and Supernant have developed a spatial archive for First Nations communities in British Columbia (Martindale et al. 2020). The spatial archive enacts the primary Responsibility (R) principle by developing processes to share data in support of a First Nation's self-determination and collective benefit. The archive brings together several kinds of data about a First Nation's community, its lands, waters, heritage, knowledges, and resources into a centralized, searchable database so that community members can access their information on one platform. This is important, because a request from a First Nation to the effect of "What do archaeologists know about a specific location?" is a complicated undertaking that necessitates the community devoting labor and resources in seeking permissions to access data about itself held in disparate non-Indigenous repositories.

The Archaeology Branch, for example, maintains three databases (i.e., one for site forms, one for permit reports, and a spatial one



**Figure 1.** An example of Traditional Knowledge (TK) Labels implemented for digital audio of a Passamaquoddy War song in the Library of Congress (LOC) record (<https://www.loc.gov/item/2015655578>): (a) the LOC record with embedded audio file and metadata in human readable format as it shows on loading. Three associated TK Labels and icons at bottom right are highlighted in red outline. They are Attribution–Elihtasik (How it is done), Outreach–Ekehkimkewey (Educational), and Non-Commercial–Ma yut monuwasiw (This is not sold); (b) the LOC record in MARCXML format, with the 540 tag for TK label “Elihtasik (How it is done)” highlighted; (c) the same TK Label description in human readable text under Rights Advisory. For more on practical implementation, see Reijerkerk (2020).

for sites inventory). Permit reports and site forms represent unpublished “gray literature” that are laborious to process. Undergraduate and graduate students often use these unpublished data to produce theses and academic publications, which in turn are deposited in institutional repositories. From the perspective of a First Nation, such publications and data are out of reach, because they require permissions to access and the material resources, technical knowledge, and skill sets for processing them. Archives are a source of historic and ethnographic data related to a First Nation community. Such repositories are neither indexed by the Branch, referenced by academic archaeologists, nor linked for cross-database queries. Consequently, First Nation scholars navigate different infrastructures to fulfil a simple data request before translating the data into historical scholarship.

To support these efforts, Martindale and colleagues (2020) created a bespoke spatial archive hosted on the University of British Columbia servers as a partial solution to the challenges faced by Indigenous communities. The spatial archive runs on a Google Maps platform, which provides geospatial basemaps, satellite images, and location information (longitude and latitude). The

spatial archive enables Indigenous community members in using knowledge of their territory to find data that university archaeologists have compiled for specific places, without familiarity with archaeological taxonomy or the province’s site-naming conventions. Community members can navigate the contents of the digital platform through the map interface or make a query through a folder hierarchy. Access to the database itself is via browser so that community members do not need to download or install specialized software.

Although the spatial archive advances the immediate needs of First Nations in British Columbia, it remains an imperfect and temporary solution. Its current use is limited to Indigenous researchers looking for data about specific places on their lands. Crucially, Indigenous experience in reaffirming data sovereignty highlights the hidden costs and hidden labor when engaging with non-Indigenous holding institutions. Greater efforts at the institutional level are needed to make Indigenous data available and readily useable for the communities to which the data relate and to support their capacity for equitable participation in the data ecosystem. In the absence of such investment, Indigenous

communities will continue to shoulder a disproportionate burden of this work.

Developed before the CARE principles, the Reciprocal Research Network (RRN) enacts the Responsibility principle (R1; R2), which not only enables relationships built on trust, respect, and reciprocity but also enhances capacity and training in digital practice in Indigenous communities. The RRN was created for collaborative museum research, guidance, and perspective on museum processes (Rowley 2013:32). The Musqueam Indian Band, the Stó:lō Nation, the Stó:lō Tribal Council, and the U'mista Cultural Society were codevelopers and decision-makers with one university and 12 museum partners in this digital exploratory tool for Northwest Coast material culture. Launched in 2010, the RRN provides a mechanism for museum partners to make available digital sources relevant to the Northwest Coast. In turn, First Nations and communities in British Columbia can explore these digital sources to learn which data about them are held by which museums.

Each codeveloper First Nation hired Community Liaison Researchers, who worked with youth and Elders groups, tested new features on the RRN, and gave demonstrations at home and across the province. They brought feedback from demonstrations back to the development team through a Community Liaison Researcher coordinator, creating a circle of information flow between developers and communities, and continuously contributing to the development of the RRN (Rowley 2013). Community liaison researchers further developed capacity to support the governance of heritage data. These efforts highlight how equitable participation of Indigenous nations and communities can shape the development of digital research tools, which in turn can support Indigenous peoples' rights to make decisions about their heritage wherever the data are held.

## CONCLUSIONS

Reuse, sharing, and curation of archaeological data are tied to ethics in data practice, research design, and the rights of Indigenous peoples in decision-making about their heritage. The CARE principles for Indigenous data governance provide perspective and an ethical framework for developing digital methods and data practice in archaeology. The principles draw on UNDRIP to re-center Indigenous interests, rights, and aspirations in research, policy, and practice. This human rights framework recognizes power differentials in the data ecosystem that have historically distanced Indigenous peoples in the collection, interpretation, preservation, curation, and circulation of Indigenous heritage. Indigenous data sovereignty asserts that Indigenous peoples have always been owners of their cultural heritage.

Indigenous data refer to any data about Indigenous peoples, their lands, waters, resources and knowledges, and they include data created by an Indigenous government, community, or organization and those collected by non-Indigenous ones. In the context of open science, Indigenous nations and communities are reclaiming control of their data, which is one part of exercising their rights and interests. These efforts create opportunities to reposition Indigenous peoples within digital infrastructures, analytics, and applications as active contributors, practitioners, innovators, and policy makers. Training and building capacity in digital methods and data practice is central in

supporting innovation and community governance of digital heritage.

Indigenous nations and communities require consistent and relevant data for governance, decision-making, and policy making for collective benefits and self-determination. Data-centric FAIR principles that enable consistent and persistent metadata tools can support Indigenous governance of heritage (Nicholson et al. 2023). Implementation of mechanisms such as cultural metadata in archaeology can inform on authority, consent, and conditions of use of data. Cultural metadata with provenance, protocol, and permissions can be included as permanent machine-readable components, which remain with digital sources throughout the data life cycle and inform on ethical use of Indigenous data. With provenance details, for example, data users and repositories have clear information about where data come from and the community to whom the data relate, and and whom to engage with regarding consent and appropriate use of data. Implementation of digital tags such as TK and BC Labels keep data connected with community, and they can further create opportunities for non-Indigenous stakeholders to engage purposefully with Indigenous communities about decision rights on authority, harm associated with data, and development of appropriate use policies and agreements. These efforts position Indigenous peoples as active stewards of their data.

The burden of changing unethical processes, policies, and practice in archaeology often falls on Indigenous peoples, nations, communities, and scholars. Greater efforts must be made in all sectors within the archaeological community to bring data practice into alignment with the CARE principles, which can begin to shift this burden. For example, archaeologists can start by devoting necessary resources for effective data management plans that clarify the future of the data to be collected and its connection with the community to which data relate. A project-by-project approach can work, but a broader, coordinated approach and guidance for all sectors could result in greater benefits across the archaeological community through equitable training opportunities, data that are ready for future use, and ethically sound data practice.

In Canadian archaeology, Indigenous nations and communities experience significant barriers when seeking access to relevant data. Provincial and territorial governments make and operationalize heritage legislation, and there is no consistent process across Canada for engagement with Indigenous nations and communities. Greater work is needed to address heritage legislation that continues to distance Indigenous nations and communities from their belongings and ancestors. Even when heritage information is available in a digital database, Indigenous nations require permissions to access data about themselves, which are often housed in disparate repositories. They navigate different infrastructures, softwares, and applications only to receive data in various formats or data that are not readily useable for community needs and interests. This is "hidden labor" associated with the data ecosystem. Greater investment at the institutional level can bring university and other repositories in line with the CARE principles so that Indigenous nations can derive value from their data and equitable collective benefit.

Training and building capacity in ethical data practice for archaeologists in higher education can begin to shift scholarly expectations and practice around data sustainability. It is also clear

that all sectors in the archaeological community need to be in conversation about ethical data documentation, improvements that are needed in data practice, and development of strategies to operationalize data for both human and machine-readable environments. Moreover, it is clear that when Indigenous peoples have active participation in decision-making, they contribute to and shape the development of the data ecosystem. This, in turn, supports Indigenous peoples' rights and interests, develops capacity in community, and affirms Indigenous self-determination.

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The authors declare no data related to the manuscript are stored online or offline.

## Competing Interests

The authors declare none.

## Supplemental Material

For supplemental material accompanying this article, visit <https://doi.org/10.1017/aap.2022.33>.

Supplemental Text 1. Possible Implementation of CARE into Society for American Archaeology (SAA) Guidance Regarding Archaeological Data Management Plans.

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## AUTHOR INFORMATION

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**Neha Gupta** ■ Community, Culture and Global Studies, University of British Columbia, Okanagan, Kelowna, British Columbia, Canada ([neha.gupta@ubc.ca](mailto:neha.gupta@ubc.ca), corresponding author)

**Andrew Martindale** ■ Department of Anthropology, University of British Columbia, Vancouver, British Columbia, Canada

**Kisha Supernant** ■ Department of Anthropology, University of Alberta, Edmonton, Alberta, Canada

**Michael Elvidge** ■ Interdisciplinary Graduate Studies, College of Graduate Studies, University of British Columbia, Kelowna, British Columbia, Canada