Title: Co-developing digital inclusion policy and programming with Indigenous partners: Interventions from Canada

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Abstract:

Diverse rural Indigenous communities in Canada, like those in many regions of the world, are facing a variety of challenges and opportunities associated with the development, deployment, and adoption of rapidly emerging digital technologies. These include supply-side challenges (such as availability and cost) and demand-side challenges (such as appropriate digital literacy programmes). This article discusses two examples of digital inclusion co-developed with Indigenous peoples in Canada: a supply-side intervention focused on digital inclusion policy, and a demand-side intervention focused on digital adoption.

Keywords: Indigenous peoples, Community informatics; Digital policy; Digital literacy.

Introduction: Indigenous-led supply-side and demand-side interventions to support digital inclusion

Diverse Indigenous peoples are facing challenges and opportunities associated with the development, deployment, and adoption of rapidly emerging digital information and communication technologies (ICTs). Digital ICTs can support cultural resurgence and self-determined development (Alia, 2010; Bredin, 2001; Dyson & Grant, 2006; Salazar, 2007). For example, community data centres house digitized cultural resources; mobile phones connect people to emergency services while they are on the land; videoconferencing units link doctors and patients across distances; and mobile language apps are used by people of all ages (Duarte, 2017; O'Donnell et al., 2016; Sandvig, 2012). But along with potentially positive outcomes, digital ICTs also introduce challenges, including digital access divides, ongoing maintenance and upgrade costs of technologies and infrastructures, and problematic online content (Beaton & Campbell, 2014; Iseke-Barnes & Danard, 2007). While governments, companies, and civil society organizations are all paying increased attention to the potential of digital inclusion, gaps remain with respect to the specific needs and concerns of these under-served populations. In this context it is essential that Indigenous groups are substantively engaged in decisions regarding the planning and implementation of policy and programming (Hudson, 2014).

This article discusses two examples of digital inclusion co-developed with Indigenous communities in Canada. Recent public policy and funding supports that aim to bridge digital divides target rural and remote Indigenous communities to connect to high-speed digital infrastructure (Government of Canada, 2019). In many of these regions connectivity remains limited and unreliable, with high prices charged for services and data overage (CRTC 2018, Office of the Auditor General of Canada, 2018). At the same time, the diverse peoples who reside in these regions have a long history of community-driven technology innovation (McMahon, Hudson & Fabian, 2017). Countering the top-down approach of technology transfer,

members of Indigenous communities have led local and regional community networking initiatives since the early days of the internet (see, for example, Carpenter, 2010; Roth, 2013; Savard, 1998). These projects range from Fort Severn's networks in the Ontario to complex regional networks such as Tamaani Internet in Nunavik (FMCC, 2018; Gibson et al., 2012). They demonstrate infrastructure deployment in expensive to serve areas while retaining community ownership and control of networks, services, and applications. The deployment, operations, and sustainability of these digital resources requires a complex balance between local innovation, regional cooperation, supportive policy and regulatory conditions, and individual and organizational capacity.

There are several approaches that residents of Indigenous communities use to access and adopt digital ICTs. These include supply-side dynamics (such as availability and cost) and demand-side dynamics (such as appropriate forms of digital literacy). Supply-side dynamics include efforts to address digital divides – for example, Indigenous peoples setting up and managing broadband infrastructures to address the access inequalities their communities face (McMahon, Gurstein et al., 2014; Philpot, Beaton, & Whiteduck, 2014; Whiteduck, J., 2008). In industry-driven telecommunications projects, these communities are typically framed as the "last mile" of development. In Canada, Indigenous technology advocates have worked hard to reform policy and regulatory frameworks to counter this "last mile" discourse, proposing an approach to supply-side digital inclusion policy that focuses on the "First Mile" of community-driven development. The term "First Mile" frames community-owned and operated broadband infrastructure and services as an alternative to the "last mile" link from service providers to subscribers (Paisley & Richardson, 1998; Strover, 2000).

In this article we focus on a case study describing how Indigenous organizations collaborated with university-based researchers to shape regulatory and policy frameworks to reflect First Mile principles. We discuss the efforts of the First Mile Connectivity Consortium (FMCC), a national association of First Nations technology organizations that has intervened in a number of policy

proceedings, including during 2012 hearings on Northwestel's Modernization Plan, a 2014 inquiry on satellite services, and the 2015-2017 review of the "Basic Service Objective" for telecommunications in Canada (McMahon, Hudson & Fabian, 2014). Through this work the FMCC developed a model for supply-side digital inclusion that puts communities at the centre and the start of any digital network development process (McMahon et al., 2011). This First Mile model stresses the importance of identifying development goals through structured planning and dialogue: leaders from affected regions substantively engage in policy decisions regarding how digital connectivity is built, setup, owned, paid for, distributed, managed, and used in and across their communities. This process involves researchers working with Indigenous technology organizations to develop arguments and evidence to present to policy-makers in formal proceedings.

Along with building and operating digital infrastructure and services, people living in rural and remote Indigenous communities are utilizing digital applications in creative ways (O'Donnell et al, 2016). Broadband-enabled digital applications are developed and used in various service contexts: for example, in remote regions students can attend online high schools and patients can access a range of medical specialists without having to leave their communities. Economic development initiatives also derive benefits from digital connectivity, with entrepreneurs setting up local businesses. A strong desire to document and share Indigenous cultures and languages reflects an interest in exploring how newly available digital tools support such work.

The second case study we describe in this paper illustrates how demand-side digital adoption programmes tied to these activities might support the cultural resilience and sustainability of diverse Indigenous communities. Indigenous peoples recognize the limited services, high costs of services, and potential changes that may come as a result of increased access to digital ICTs and the internet. They are interested in digital literacy resources that will help them monitor speed and quality of service, ensure that pricing practices are fair, and protect their families and communities from online risks. As well, they note that while rapidly expanding digital

connectivity can support the delivery of a host of public services, economic development opportunities, and social and cultural benefits, it also brings challenges, including to language and cultural practices. Therefore, it is important to learn from Indigenous peoples about how best to tailor digital literacy programmes to mitigate these risks and harness the potential of digital ICTs.

In this article we document a digital literacy intervention that frames appropriate forms of digital literacy as grounded in cultural revitalization activities, while supporting technical understanding and skills acquisition. This approach combines digital literacy with efforts to document the rich cultural teachings of Elders from the Piikani Blackfoot Nation in southern Alberta. In Piikani Nation, a strong desire to document and share culture and language using newly available digital ICTs is tempered by limited internet access, high costs of services, and concern over the negative impacts that can accompany increased adoption of digital ICTs. We discuss an ongoing participatory action research project involves Piikani Elders and facilitators working with university-based researchers to collaboratively shape digital literacy workshops and associated learning resources that support their cultural revitalization goals.

This article's two case studies of digital inclusion is inspired by scholars who are highlighting the many ways that Indigenous communities thrive despite the challenges of settler colonialism (Borrows, 2010; Irlbacher-Fox, 2009; Kovach, 2009; Tuck, 2009). Indigenous theorists of resurgence illustrate how daily practices contribute to the continual renewal of Indigenous communities (Alfred & Corntassel, 2005; Simpson, 2011; Tuhiwai Smith, 1999). For example, Corntassel (2012) writes about the links between Indigenous resurgence, relationships, and responsibilities, arguing that "If colonization is a disconnecting force, then resurgence is about reconnecting with homelands, cultures, and communities" (p. 97). But despite strong research in the development and adoption of digital technologies by Indigenous groups, a knowledge gap exists with regards to how digital inclusion policies and programmes might best enable such outcomes. As O'Donnell et al. (2016) explain, "new services, information and data can not only

give community members more choices for beneficial new opportunities but also support them to continue to live traditional lifestyles in a more sustainable, safe, secure and healthy manner" (p. 3). In this context we argue that digital inclusion policy and programming requires more than a "one size fits all" approach; it must engage and reflect cultural practices that will drive effective use in diverse and situated settings.

Section 1: Supply-side intervention -- First Mile Connectivity Consortium shaping digital access policy

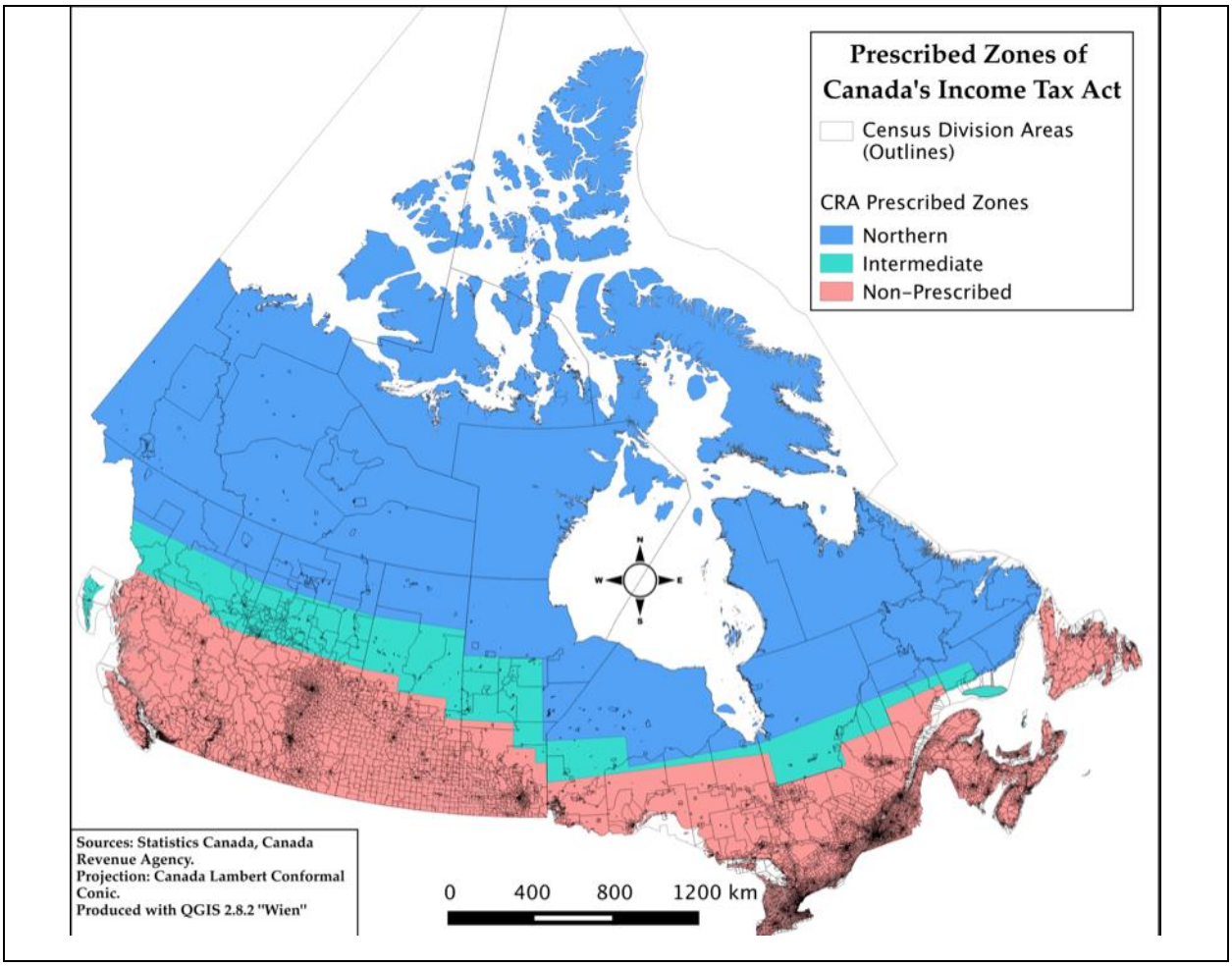
In his 2014 book *Contradictions of Media Power*, Des Freedman argues that media reform initiatives emerge in a variety of forms, including those which require engagement with official structures like formal regulatory processes. He notes that this is often not the preferred route for media activists, who are more likely to be engaged in producing alternative content or setting up new organizations than in lobbying existing institutions to change (p.132). Nonetheless, he argues that institutional reforms provide important contributions to more equitable, democratic media systems (p.139). This tension between reforming existing institutional structures and establishing new ones also occurs in the area of telecommunications policy (Lentz, 2013), which is the focus of this case study. The work of telecommunications policy reformers has a dual focus: to both engage with policy as it is currently constituted, and to propose reforms about how they would like it to be.

Focusing on supply-side interventions in digital inclusion policy and programming, this section provides a case study of the First Mile Connectivity Consortium (FMCC), a national non-profit association established in 2012 by regional technology organizations that represent and are governed by groups of Indigenous communities (Carpenter, 2010; O'Donnell, Perley, Walmark, Burton, Beaton & Sark, 2009). FMCC's membership and board of directors consists of staff

from First Nations technology organizations serving remote and rural areas across Canada, as well as university-based researchers. It emerged from a 10-year participatory action research project called First Nations Innovation, and is informed by the Assembly of First Nations 'e-Community Strategy' (FMCC, 2018; Whiteduck, J., 2010). While member organizations are spread over geographic areas and come from different organizational, cultural and political backgrounds, they share common goals in reforming digital policy and regulation to better support community and economic development, highlight local innovation, and overcome digital divides. It is important to note that Indigenous peoples in Canada have a long history of setting up organizations to secure access to and control of emerging ICTs in a range of contexts, from community radio networks to digital archives (see for example Fiser & Clement, 2012; Hudson, 2013; Whiteduck, Beaton, Burton & O'Donnell, 2012). Desire for increased autonomy in the administration and delivery of economic development and public services – along with self-determination more broadly – has been a primary driver of this activity (Valaskakis, 1992).

One of FMCC's digital inclusion efforts proposed reforms to broadband funding mechanisms targeted to address digital access divides in Indigenous regions of Canada. In these areas connectivity services are very limited – particularly in comparison to high standards available in more populated and urban areas (CRTC, 2016a; Fiser & Jeffrey, 2013; Office of the Auditor General of Canada, 2018). Users in organizations and households share limited bandwidth capacity that is often congested, and if a connection goes down and no local technician is available to fix it, they can wait weeks for repairs. Further, many of these communities are served by satellite, which adds problems of latency to efforts to deliver services such as telehealth and distance education (Hudson, 2015; CRTC, 2014). Finally, the limited broadband available in these areas is expensive, especially when data caps are taken into consideration. Figure 1 illustrates these regions in blue.

Figure 1: Northern, rural and remote regions



"Market forces" have failed to drive incumbent private sector telecommunications companies to develop broadband infrastructure and services in these regions, with the result that various government agencies have established subsidy programmes to encourage deployment (CRTC, 2015; McNally, Rathi, Evaniew & Wu, 2017). Rejabuan and Middleton (2013) parse these programmes into two main types: urban-rural cross-subsidies drawn from the revenues of telecommunications providers and managed by the national telecommunications regulator, the Canadian Radio-Television and Telecommunications Commission (CRTC); and budgetary contributions established through government funding initiatives. In this case study we focus on the first form of subsidy, tracing how the FMCC intervened in a series of formal regulatory proceedings in an attempt to influence its manifestation in broadband funding programmes.

To contribute an effective intervention, it is important for reformers to learn the discourse, structure, and process employed in formal regulatory hearings (Shepherd, Taylor & Middleton, 2014). Community-based technology organizations have few opportunities to influence the policies and regulations that shape the conditions they operate in. Despite the on-the-ground work they do in building and operating digital services, these parties often lack the financial, technical, institutional, and human resources that might support their intervention activities, given the technical language and formal procedures associated with regulatory hearings. At the same time, these groups can build relationships with state institutions so they become recognized and accepted as reputable sources. Further, as Hintz (2009) argues, such attempts to influence policy from the 'inside' require certain conditions in order to be effective. These include a political opportunity structure that will allow for change, strong alliances, weak (or fragmented) opponents, and the ability to effectively frame and communicate policy objectives to a target audience. Actors with expert knowledge in the area under consideration can provide valuable supports to policy deliberations. However, participation in formal proceedings that do not provide effective space for critical and open discussion, or in cases where decisions are pre-determined before a pubic proceeding has occurred, risks legitimizing an inequitable and unfair process. Interventions such as the ones described in this case study are only possible because the policy-making environment represented in the CRTC's regulatory hearings included positive conditions for civil society participation. It could not have been successful in the face of a less open process, a pre-determined outcome, or unreceptive policymakers.

FMCC began contributing to telecommunications regulatory proceedings in 2012, during a review of Northwestel's proposed Modernization Plan (CRTC 2012-669) that concerned services provided by the incumbent telecommunications carrier in the three northern territories. Mobilizing a panel of academic experts and staff from Indigenous technology organizations, FMCC pointed out that northern residents are providers as well as consumers of telecommunications services, and argued that subsidies to upgrade and operate facilities in the

North should therefore not be limited to the incumbent. This process involved extensive planning, which included building a common discourse among participants situated in different cultural, political, economic and geographic contexts, as well as conducting research that was then adapted to meet the Commission's requirements. Through this experience, the FMCC also learned the norms and rules of regulatory hearings, the kinds of evidence and argument allowed, and the format and structure of written filings and in-person presentations. The FMCC documented its experiences during this intervention, making process notes and written filings available to other groups interested in taking similar actions (McMahon, Hudson & Fabian, 2014).

This experience informed FMCC's subsequent regulatory activities. In its decision, the CRTC recognized that broadband Internet access has become an important means of communication for northern Canadians, needed to achieve many social, economic, and cultural objectives (CRTC, 2013). Its findings recognized the special conditions and challenges in the Canadian North, and that market forces alone were not addressing them. However, rather than mandating any new or expanded subsidies, the Commission deferred the funding issue to a subsequent proceeding, to be held in 2015-2016. Through these decisions, the FMCC learned how the CRTC operates when ruling on regulatory proceedings; and importantly, that interventions should address the policy framework and questions under consideration in a specific hearing.

The next phase of the FMCC's regulatory journey began in April 2015, when the CRTC announced a new proceeding "to conduct a comprehensive review of its policies regarding basic telecommunications services in Canada" (CRTC, 2015). The Commission's notice included an examination of how these services are used to access "essential services", their costs, and which areas are unserved or underserved. Importantly, the proceeding would also address whether a funding mechanism was required in the region of the incumbent telecommunications provider serving Canada's northern territories (Yukon, Northwest Territories, and Nunavut), and adjacent

regions. The opening notice provided a clear indication the Commission was considering a review of the structure and focus of the broadband funding ecosystem, which FMCC took as an opportunity to contribute evidence on the public record of the shortcomings of existing funding initiatives, as well as to propose specific reforms.

As the hearings progressed, FMCC advanced proposals for reforms to existing funding mechanisms – focusing on those that the Commission had control over. FMCC noted that the CRTC could play a coordinating role in the broadband funding ecosystem, as an administrative tribunal with unique technical expertise and insight into the Canadian communications environment (FMCC, 2016a). FMCC also proposed a new subsidy scheme managed by the Commission. Indigenous organizations faced challenges in securing available funding programmes, and lacked access to the existing CRTC-managed subsidy available only to major incumbents with an obligation to serve (the National Contribution Fund, or NCF). To enable more equitable access to funding, FMCC proposed that organizations already providing telecommunications services in these areas become eligible for CRTC subsidy, and proposed an updated funding mechanism, termed the Northern Infrastructure and Services Fund (NISF). FMCC envisioned the administration of this Fund through an independent entity licensed by the Commission and governed by representatives with strong ties to rural, remote and northern regions. The NISF was not designed to replace, consolidate or reduce existing federal funding programmes, but rather to complement them by supporting community-based providers, as well as traditional commercial providers, through a new subsidy drawn from industry revenues. This proposal clearly fell within the scope of the hearing, and particularly the focus to "examine whether a mechanism is required in Northwestel's operating territory to support the provision of modern telecommunications services in rural and remote areas in Canada" (CRTC, 2015, para 34). Since the proposal fell within the CRTC's mandate and jurisdiction, it could therefore be acted upon.

In April 2016, the FMCC presented the NISF proposal to the Commissioners during an in-person hearing in Gatineau, QC. The public hearings included testimony from other Indigenous and consumer groups, as well as from major telecom providers. The FMCC's presentation, which included representatives of Indigenous technology organizations and university-based researchers, was received with interest by the Commissioners, who engaged the team in over an hour of discussion (See Figure 2).

Figure 2: FMCC team at CRTC proceedings

After the FMCC's presentation and halfway through the two-week public hearing phase of the proceedings, the CRTC broadened the proceedings to allow interveners to make proposals for a national broadband strategy for Canada (Dobby, 2016). In response, the FMCC submitted an additional proposal that situated the efforts of Indigenous broadband service providers in the context of decolonization and Indigenous resurgence (FMCC, 2016a). The FMCC stressed the need for broadband as a basic service, and for the CRTC to play a coordinating role in the deployment of that service. This proposal included the specifics of the NISF proposal (noted above) as a permanent subsidy mechanism to support this work.

After more than a year of testimony and deliberation, the CRTC released its decision in December 2016 (CRTC, 2016b). The decision indeed designated broadband a basic service, increasing target speeds to 50 Mbps download / 10 Mbps upload, and requiring providers to offer an 'unlimited' bandwidth option (that is, no data caps). The Commission also announced it was establishing a new infrastructure fund for 'underserved' areas: $750 million (CAD) over five years. The fund, which was sourced from Telecommunication Service Provider revenues, was positioned as an attempt to align with the broader funding ecosystem for broadband. Unlike the previous National Contribution Fund, all qualified service providers – including Indigenous community-based organizations – are eligible to apply for this new fund, which will be managed at arm's length, based on objective criteria determined in a subsequent proceeding (CRTC, 2016b). While the long-term implications of this decision for community-based service providers remain to be seen, it was nonetheless welcomed as a big win by the FMCC and other public and consumer interest groups (FMCC, 2016b; Open Media, 2016; Affordable Access Coalition, 2016).

Since the conclusion of these proceedings the Government of Canada has established additional funding mechanisms for the deployment of broadband infrastructure (Government of Canada, 2019). The FMCC has continued to intervene in regulatory hearings to illustrate its position that

telecommunications policy frameworks should be designed and implemented in ways that enable communities to build, own and operate their own local telecommunications infrastructure and services. In short, FMCC continues to advance a "First Mile" approach to supply-side digital inclusion policy.

Section 2: Demand-side intervention -- Piikani Cultural and Digital Literacy Camp Program

Digital literacy includes efforts to shape and use digital ICTs in ways that emerge from the self-determined needs of communities. This approach adopts the critical framework of community informatics, which foregrounds social practices of community development, capacity building, network formation, and effective use of ICTs as well as technical knowledge and skills (Gurstein, 2003/2012). Community informatics extends ICT adoption beyond an individual's ability to use a computer, software like Microsoft Office, or social media to include planning, managing, shaping, implementing, maintaining, and evaluating digital ICTs to address community-identified desires. This positioning responds to recent developments in the study and teaching of digital literacy that stress the need to encompass social practices as well as technical skills (Gillen & Barton, 2010; Ventimiglia & Pullman, 2016). From this perspective, digital literacy is grounded in local cultures and understandings -- it is sustained by the ways people make meaning through their daily interactions with ICT (Media Smarts, n.d.; Rheingold, 2012).

In the context of Indigenous peoples in Canada, this orientation ties to the Truth and Reconciliation Commission's *Calls to Action* (2015), which stress that contemporary educational activities involving Indigenous peoples must not repeat the failures of the past. Digital literacy affords the opportunity to contribute to models of education more appropriate to Indigenous ways of knowing and teaching (Harding, 1998; McMahon et al., 2017; O'Connor, 2013; Molyneaux et al., 2012). This perspective recognizes the potential of digital literacy to

undermine Indigenous resilience and self-determination by creating new dependencies on ICT infrastructures, applications, services, resources and data, and introducing a wave of English-language content. Emerging ICTs threaten new forms of colonialism, economic dependencies, an influx of 'fake news' and inappropriate content, and increased concerns over privacy and surveillance.

In this case study we discuss a project that aims to counter the negative implications of digital ICT adoption by organizing digital literacy learning around Indigenous cultural revitalization. *Ii na kaa sii na ku pi tsi nii kii*, the Piikani Cultural and Digital Literacy Camp Program, explores ways to emphasize Blackfoot cultural knowledge and modes of learning through digital skills development. Through exploring and developing appropriate forms of Blackfoot (Piikani) digital literacy, this intervention builds on the important work done by Blackfoot educators to develop land-based teachings (Enlivened Learning, 2015) and use digital tools to document language (see: http://blackfoot.atlas-ling.ca/).

Indigenous peoples are diverse in their approaches to and understandings of digital literacy. This diversity requires a flexible approach to education planning that is grounded in specific interests, desires, and protocols (Blood, 2005). In this intervention, students, facilitators, and administrators from Piikani First Nation in Southern Alberta collaborate with university-based researchers to investigate, adapt, test, and refine digital literacy practices and resources. An ongoing planning and evaluation cycle supports continuous improvement, as the team revises project scope, curriculum, and activities on an annual basis. Through focus groups, surveys and interviews, the team engages in ongoing reflections about the implications of digital ICT on Piikani culture and language, and on digital inclusion more broadly. This considers appropriate ways of teaching digital literacy to youth, as well as how digital literacy learning might support community-building and resurgence.

The Piikani Cultural and Digital Literacy Camp began in summer 2017, when the project team piloted this approach with support from local Elders and the Peigan Board of Education (PBOE). This early work involved assembling a project team (including community facilitators), creating learning materials (student workbook and facilitator handbook), and generating logistics planning and budgeting. The project has since evolved into a three-part digital literacy Camp Program for students from Piikani Nation Secondary School, during which students receive Career & Technology Studies (CTS) course credits. Ongoing collaborative research and evaluation has led to the emergence of a suite of eight modules that cover a range of digital skill-building activities, including video production, community-based data management, and analysis of cultural appropriation/appreciation. Students learn about digital literacy topics like online safety and data stewardship through classroom activities. They also attend a three-day/two-night camp where they are exposed to Piikani culture and document their experience on the land using digital ICTs. The hands-on aspects of the Camp have evolved into a structured means for students to learn about the culture and language revitalization activities taking place in Piikani. Students are trained to film Piikani Elders showcasing local history and knowledge, including building sweat lodges and assembling tipis (see Figure 3). As digital stewards, students are guided to transfer these recordings to local institutions that will manage and preserve these materials, including the PBOE and Piikani Traditional Knowledge Services. Following data sovereignty principles (Rodriguez-Lonebear, 2016; Schnarch, 2004) students are introduced to data ownership and sharing protocols (Wemigwans, 2016) that can be used to support community management of digital data (videos, photos and audio recordings).

Figure 3: Piikani digital literacy camp program

Piikani community members drive all aspects of the digital literacy programme; they are co-developers of research and evaluation design, administration, format, and learning resources. Project governance follows traditional protocols and Western partnership agreements, and is endorsed by both Western (PBoE) and traditional (Elder's Council) leadership. An important part of this initiative is combing traditional protocols with Western planning documents, a method proposed by the participating Elders to support project sustainability and address Piikani protocol (Bastien, 2004; Conaty, 2015). These activities are facilitated by the community liaison (Elder Herman Many Guns), who led protocol to name the project and guide its development in October 2017.

Follow-up evaluations conducted through focus groups, surveys and interviews with camp participants have indicated strong interest in the program, and ideas about how to expand on existing local knowledge and capacities. An iterative, collaborative planning framework ensures the project involves community partners in knowledge generation and research/learning development, helps build capacity in partner organizations, and supports students and facilitators on an ongoing basis. With respect to digital inclusion, regular, ongoing in-person interactions among project staff identify local needs and interests, support the co-construction of knowledge, and fulfill project goals regarding how best to integrate appropriate forms of digital literacy in community contexts.

Conclusion: Supporting an enabling environment for digital inclusion

At present, digital inclusion policy and programming is open to new forms of engagement made possible by a combination of political will, citizen participation in decision-making, and the affordances of still-evolving digital infrastructures and technologies. The two case studies described here, as well as a host of other interventions, are outcomes of participatory opportunities made possible through regulatory proceedings, flexible proposals for digital literacy programming, and collaborations involving a diverse array of like-minded organizations and individuals. Several internal factors also supported this work: targeted research linked to the issues under deliberation, the capacity to formulate proposals in the manner required by regulatory and educational institutions, and the competence of staff from participating organizations and communities who effectively communicated the intricacies of ICT development, adoption, and use -- and, importantly, what they meant for the present and future of their communities.

Importantly, the two interventions described in this paper emerged over time through repeated iterations, during which participating organizations and individuals gained experience and understanding of the activities and issues under consideration. This work ties to a development trajectory grounded in Indigenous societies that existed and prospered long before the advent of the digital ICTs available today, and the institutions set up by modern state governments to regulate their development and use. Scholars of Indigenous resurgence stress this recognition of the inalienable and unique legal status of Indigenous peoples and the inherent, group-differentiated rights and responsibilities that flow from that status (Alfred, 2009; Borrows, 2010; Simpson, 2011). This position might be operationalized in digital inclusion policy and programming through an "enabling environment": a concept that links laws and policies to the ideas, values and practices of participatory development (Price & Krug, 2002; Raboy, 2005). Development theorists like Amartya Sen (1999) have argued for policies to better support and account for human agency, encouraging both state governments and civil society organizations to avoid conflating the means of development with its ends. In this framework, enabling environments aim to create the conditions that might support endogenous forms of digital inclusion, such as the interventions described in this paper.

Digital inclusion scholars appropriately question the ability of existing institutions, policies, and programmes to adequately incorporate the voices of marginalized individuals and populations (Alexander, n.d.; Moll & Shade, 2013). Models of participatory development can foreground rhetoric at the expense of material reform, and so become a form of co-optation rather than transformation. Given the presence of intersectional structural inequalities, a range of individuals and populations must gain voice and influence in the formation of the enabling policies and regulations shaping digital inclusion initiatives. As Sen (1999) writes: "capabilities [of persons] can be enhanced by public policy, but also, on the other side, the direction of public policy can be influenced by the effective use of participatory capabilities by the public" (p.35). Put differently, digital inclusion policies and programmes both shape and are shaped by broader

negotiations over self-determination. To support such work, we end by proposing five focus areas to guide digital inclusion interventions:

1. Digital Asset-Mapping to Support Community Development: Community members can identify digital assets that can be shared in learning resources and policy proposals. Assets to be explored might include: existing technology support organizations, broadband capacity, technical expertise, online applications, digital archives, language resources, and data management initiatives.

2. Supporting Community Technology Organizations: Digital inclusion initiatives should document and share business cases, policy supports, regulatory frameworks, and funding initiatives that sustain community-owned and operated digital infrastructure and services. Digital access is important, but it should be accompanied with opportunities for local and regional organizations to secure resources to meet community development goals. This identifies ways that community organizations can engage in development work at the 'First Mile'.

3. Policy and Regulatory Advocacy for Digital Self-Determination: Community members should be empowered to contribute to policy and regulatory decisions associated with appropriate technology development initiatives. Indigenous voices can contribute to decision-making in both public and NGO sectors, and identify barriers to participation. This includes critically interrogating initiatives aimed to address digital divides to ensure they reflect local interests and desires.

4. Building and Sustaining Community Networks: Participants should be empowered to learn digital networking technologies and gain experience setting up and testing broadband networks. This includes hands-on technical activities, such as building wireless mesh networks for on-the-land connectivity. Activities can be taught by local facilitators.

5. Managing Community-Owned Data: Community members already capture, organize, manage, and use a variety of data through digital ICT including photos, videos, and data management systems. Digital inclusion interventions should develop resources showcasing local ownership and control of this digital data, including for digitized Indigenous knowledge and self-government resources such as health and education data (Schnarch, 2004).

6. Develop Appropriate Digital Literacy Resources: Digital inclusion initiatives should aim to facilitate the creation and sharing of digital language and cultural resources by involved community members. Participants can gain hands-on experience using digital ICT such as digital cameras and GIS mapping applications, and complete learning modules to reflect on their relationships between digital ICT and cultural revitalization. Digital media activities can be taught by Indigenous facilitators hired by projects, while curriculum can showcase existing Indigenous learning resources.

We hope that these principles, and our documentation of our experience, is useful to others working on similar initiatives in Canada and beyond.

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