



First Nations  
Technology Council

# INDIGENOUS LEADERSHIP IN TECHNOLOGY:

Understanding Access  
and Opportunities in  
British Columbia.

MARCH 1, 2022



*The views and opinions expressed in this report are those of its author(s) and not the official policy or position of the Government of British Columbia.*

*Note: Report information including statistics are accurate as of March 1, 2022*

## About the Research Team:

The First Nations Technology Council is an Indigenous-led not-for-profit working to ensure that Indigenous Peoples have the tools, education, and support to thrive in the digital age. The Technology Council is mandated by Indigenous Peoples in British Columbia to advance digital and connected technologies.

The Information and Communications Technology Council (ICTC) is a not-for-profit, national centre of expertise for strengthening Canada's digital advantage in the global economy. Through trusted research, practical policy advice, and creative capacity-building programs, ICTC fosters globally competitive Canadian industries enabled by innovative and diverse digital talent. In partnership with an expansive network of industry leaders, academic partners, and policy-makers from across Canada, ICTC has empowered a robust and inclusive digital economy for over 25 years.

Reciprocal Consulting is an award-winning and leading Indigenous-run consulting firm specializing in program evaluation and research.

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## About the Art:

The graphic artwork seen throughout this document was created by Jamin Zuroski, an award-winning artist, teacher, and consultant residing in Victoria B.C. Jamin holds mixed ancestry from Ukrainian and Polish on his father's side and Namgis First Nation on his mother's side. For the past 26 years, Jamin has practiced and worked with a variety of artists, community members, organizations, businesses, schools, Friendship Centres and government on a variety of projects, initiatives, workshops, events and conferences.

## Content Warning:

The following report covers topics including but not limited to colonial violence and workplace discrimination. The information and material presented here may trigger unpleasant feelings or thoughts. This content warning applies to the whole report, especially to the section on **Workplace Cultural Safety and Inclusive Hiring Practices**. The KUU-US Crisis Line Society provides a First Nations- and Indigenous-specific crisis line available 24 hours a day, seven days a week, toll-free anywhere in BC at 1-800-588-8717.

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Participants in this project included both Indigenous and non-Indigenous people, the latter working in education, economic development, recruitment, research, and other roles supporting Indigenous leadership in technology in BC. The former included respondents from the following communities listed below, as well as several Indigenous people who came from territories outside of what is currently known as British Columbia but now live in the province. Participation from each of the following communities, Nations, and language groups made this report possible:

Anishinaabe	Lyackson First Nation	Splatsin First Nation
Anspayaxw	Lytton First Nation	Spuzzum First Nation
Batchewana First Nation	Malahat	Squamish Nation
Beaver Lake Cree Nation	Mamalilikulla First Nation	St'át'imc
Bigstone Cree Nation	Manitoba Métis Federation	STÁUTW (Tsawout)
Binche Whut'en	McLeod Lake Indian Band	Stellat'en First Nation
Chawathil First Nation	Métis (Red River Settlement)	Stl'alt'imx
Coldwater Indian Band	Métis Nation British Columbia	Stó:lō
Cook's Ferry Indian Band	Metlakatla First Nation	Stswecem'c Xgat'tem First Nation
Cowessess First Nation	Miawpukek	Sumas First Nation
Cowichan Tribes	N'Quatqua First Nations	Syilx Okanagan
Cree	Nadleh Whut'en First Nation	T'éxel'c (Williams Lake Indian Band)
Dakota	Nak'azdli Whut'en	T'it'q'et
Ditidaht First Nation	'N̓amgis First Nation	T'Sou-ke Nation
Driftpile Cree Nation	Nee-Tahi-Buhn Indian Band	Takla Nation
Dzawada'enuxw First Nation	Nisga'a	Taku River Tlingit First Nation
Eabametoong First Nation	Nlaka'pamux	Tanana (Alaska)
Ehattesaht First Nation	Nle?kepmx	The Key First Nation
Esk'etemc First Nation	Nooaitch Indian Band	Tk'emlúps (Kamloops Indian Band)
Fort Nelson First Nation	North Fraser Métis Association	Tl'azt'en Nation



Gitanmaax	Nuchatlaht First Nation	Tl'etingox
Gitwangak	Nuu-chah-nulth	Tla'amin First Nation
Gitxsan	Nuxalk First Nation	Tla-o-qui-aht First Nation
Haida	Ojibwe	Tletingox
Haisla Nation	Okanagan Indian Band	Toquaht Nation
Halalt First Nation	Old Massett Village Council	Ts'kw'aylaxw First Nation
Halfway River First Nation	Onion Lake Cree Nation	Tsal'alh First Nation
Heiltsuk	Opaskwayak Cree Nation	Tseshah First Nation
Homalco First Nation	Peguis	Tsi Deldel
Hupacasath First Nation	Pelltiq't (Whispering Pines / Clinton)	Tsilhqot'in
Huu-ay-aht First Nation	Penelakut Tribe	Tsimshian
Inuvialuit	Penticton Indian Band	Tsleil-Waututh Nation
James Smith Cree Nation	Peter Ballantyne Cree Nation	Tsq'escen (Canim Lake Band)
K'omoks First Nation	Red Pheasant	Tzeachten First Nation
Ka:'yu:'k't'h'/Che:k:tes7et'h' First Nation	Saik'uz First Nation	Ucluelet
Katzie First Nation	Samahquam Nation	Ulkatcho First Nation
Kenpésq't (Shuswap Indian Band)	Saulteau First Nations	Upper Nicola Band
Kitasoo / Xai'xais (Klemtu)	Scowlitz First Nation	Wei Wai Kai First Nation
Kitselas First Nation	Seabird Island Band	Wei Wai Kum First Nation
Klahoose First Nation	Secwepemc & St'at'imc	West Moberly First Nations
Ktunaxa	Simpco First Nation	Westbank First Nation
Kwakiutl Band Council	Sioux	Wet'suwet'en Nation
Kwakwaka'wakw	Siska Indian Band	Williams Lake First Nation
Kwaw-kwaw-apilt First Nation	Skidegate Band Council	Witset First Nation
Lake Babine Nation	Skwah First Nation	W̱SIḴEM (Tseycum)
Lake St. Martin	Skwlax (Little Shuswap Lake)	Wuikinuxv Nation (Rivers Inlet)
ławit'sis (Tlowitsis) Nation	Sna'naw'as/Nanoose First Nation	Xats'ull First Nations (Soda Creek)
Lax Kw'alaams Band	Snuneymuxw First Nation	Xaxli'p
Leq'a:mel First Nation	Songhees Nation	Xeni Gwet'in
Lheidli-T'enneh First Nation	Soowahlie First Nation	Xwisten (Bridge River Indian Band)
Líl'wat Nation	Southern Tutchone Tribal Council	x <sup>w</sup> məθk <sup>w</sup> əyəm (Musqueam)
Long Lake No.58 First Nation		Yellow Quill First Nation
Lower Nicola Indian Band		Yunesit'in
		Yuulū?i?ath (Ucluelet First Nation)
		?akisq̱nuk (Akisq̱nuk First Nation)
		?Esdilagh



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# EXECUTIVE SUMMARY

## The Purpose of This Report

While the digital economy in Canada is quickly expanding, accelerated by the COVID-19 pandemic and increased reliance on digital technology, there are few labour market intelligence (LMI) tools that meet the needs of Indigenous communities. This report fills that gap by implementing data collection tools relevant to Indigenous communities and producing information to enable access to opportunities in technology.

The purpose of the Indigenous Leadership in Technology (ILIT) report was to explore the key priorities related to technological capacity-building in Indigenous communities across British Columbia. Key priorities came from the perspective of BC employers and current representation of Indigenous Peoples in technology in British Columbia when discussing barriers and enablers for including Indigenous people in the technology sector workforce. Findings related to underlying factors that perpetuate the under-representation of Indigenous people in technology sector jobs were explored along with opportunities for Indigenous leadership in technology through workplace cultural safety and hiring practices, Indigenous-led education, entrepreneurship and procurement, community–industry partnerships, and telecommunications infrastructure.

## Methods

Data within this project comes from two surveys (one with Indigenous Peoples in British Columbia and one with BC employers), along with 39 interviews, 11 virtual engagement sessions, and extensive secondary data.

**Key terms: Indigenous** is an all-encompassing term that is often used on a global level to include the Indigenous Peoples that are living in what is now known as Canada as well as other countries. Within the context of this report, the terms **Indigenous** and **Indigenous Peoples** are used to represent all First Nations, Inuit, and Métis Peoples inclusively, but it should also be noted that due to the research design, the majority of participants who contributed to this report self-identified as First Nations. When specific in reference, First Nations, Inuit, and Métis are used. Further, the authors recognize that because language is living, it can change over time. Indigenous Peoples may not choose to identify using the terms, language, or definitions that were identified and used within this report.

# Understanding the Landscape

## *Literature Review*

To understand the landscape of Indigenous leadership in technology, a literature review was conducted as a way to prioritize the perspectives of First Nations people, families, communities, and Nations within the context of their past and their visions for their future. This literature review explored the crucial components of contextualizing inequity, racism, and settler-colonialism to ensure responsible storytelling is being situated in this report. The importance of conducting research through the lens of supporting self-determination and self-governance through the knowledges, perspectives, worldviews, and approaches of First Nations participants in regard to the use of digital technology to realize a more ethical future was also of note. Additionally, this literature review further explored digital inequity—the most prominent form of inequity—and the need for comprehensive, collaborative, and coherent action to shift governance, leadership, legislation and policy, education, and practice.

## *The BC Tech Sector at a Glance*

The BC tech sector ranks third highest in performance in Canada, behind only Ontario and Quebec, employing many people in the province and growing in exports and gross domestic product (GDP) contributions. However, British Columbia's tech companies overwhelmingly are small and entrepreneurial. The development of more large firms would play an important role in increasing maturity within the technology ecosystem.

As part of this project, employers were surveyed in two phases; the first phase occurred in January 2021, and the second in August 2021. Business outlook was more optimistic in August ("Phase II"), with a significantly larger fraction of businesses planning to increase hiring. This was more likely to be the case for larger firms (50 or more employees). Larger firms were also more likely than smaller companies to consider a flexible, remote-friendly work environment. Similarly, larger businesses were more likely to be looking for a wider variety of in-demand technology roles, with over half requiring dedicated information technology (IT) staff as well as more specialized positions such as cybersecurity professionals, data analysts, and full-stack developers.

In both survey phases, surveyed employers listed "IT support" as the most in-demand role, and the hardest to fill. This was consistent across all regions of British Columbia. IT support, however, may refer to different skills and capabilities in urban and rural regions, with urban businesses typically requiring a variety of specialists and rural areas requiring generalists. In all regions, skills considered to be "non-technical," including the ability to learn on one's own and keep up with industry trends, are also of value to employers.



## Regional Profile Overview

For each of the economic regions in British Columbia, the overall BC labour market outlook is compared with a five-year forecast of key technology-related occupations at the region level and for key municipalities within the region. The forecast takes into account both employment growth and replacement (job openings due to retirement). In addition, the top technology-related job titles posted in the region throughout 2021 are shown. For some regions, such as the North Coast and Nechako, Cariboo, and Kootenay, technology jobs are scarce at the National Occupation Classification (NOC) aggregation level but can be seen in job board aggregations, particularly for roles that are technology-related but serve sectors other than information and communications technologies (ICT) (for example, project management, business analysis, and laboratory technician work). In the Mainland/Southwest, Vancouver Island/Coast, and Thompson/Okanagan regions, a greater number of highly specialized core technology and ICT-sector jobs are visible, with variation between what is offered in the major cities of Vancouver, Victoria, and Kelowna and what is offered across the rest of the region. Importantly, the prevalence of particular occupations is not necessarily related to *how hard they are to fill*: as seen in the employer survey, many employers struggle to fill core technology jobs even if they are not posting very many of them. For example, cybersecurity roles are rare but difficult to fill once posted. Accordingly, regions like the North Coast and Nechako may face a core talent challenge because technology roles are posted infrequently. People with those skill sets may move to other areas to look for opportunity, leaving employers in the region with a greater challenge in filling technology-related roles. This is the case for many of the lower-populated regions in the province.



# Findings

## Confronting Digital Inequity

**Key terms:** Within this report, **digital inequity** reflects the fact that the inequalities that are experienced by Indigenous Peoples in British Columbia are the result of systemic construction due to Canada’s historic reality as a settler-colonial state.

**Digital equity** is both a state and a process. As a process, it calls for system-wide transformation through the implementation of policies, practices, procedures, and relations that are responsive to the realities of the impacts of settler colonization and to the distinct and unique historic, geographic, and cultural needs and circumstances of Indigenous Peoples.

The First Nations Technology Council defines the state of digital equity as a reality in which every Indigenous person, community, and Nation is fully equipped to access and effectively use technology to contribute, thrive, and succeed in today’s digital society while preserving their right to self-determination.

*The **digital divide** is widely understood as the gap between those who have access to the internet and those who do not. It also encapsulates other forms of digital inequality, including, but not limited to, affordability, reliability, adoption, quality, relevance, digital skills and literacy, and representation in the technology sector. The concept of the digital divide points to the existence of inequalities, but it neglects to recognize the conditions that have led to their development or persistence.*

*The term **2SLGBTQQIA+**—Two-Spirit, lesbian, gay, bisexual, trans, queer, questioning, intersex, asexual—is utilized in this report. To be inclusive and to honour and celebrate how language continues to expand and evolve, the “+” denotes the diversity of identities that are not represented in the acronym and creates space for individuals to choose to self-identify in ways that best represent themselves.*

Findings related to confronting digital inequity were explored, particularly around Canada lagging behind when it comes to infrastructure access, digital literacy amongst equity-deserving groups, understandings around security and privacy risk, and the funding required to access needs. Further explored is how digital inequity specifically affects Indigenous Peoples, particularly Indigenous women and those living in rural communities. Bridging these inequality gaps requires a holistic understanding of lived experience and systemic issues that prevent equity from becoming a reality. In addition, a discussion around how the COVID-19 pandemic is amplifying digital inequity is explored.



## 4.1 Connectivity and Infrastructure

**Key terms:** The *“First Mile”* broadband development approach prioritizes communities by placing them at the centre of connectivity planning, sustainability, and evaluation. This facilitates the development of solutions to inequitable access and use of broadband systems in ways that support community-based involvement, control, and ownership of infrastructure planning and deployment.

*“Last-mile”* broadband development approaches are most commonly employed and are typically designed by corporate telecommunications providers to connect unserved and underserved communities as a last stage of upgrading their existing infrastructures that are found in urban centres. These last-mile connections—from major telecommunications infrastructure to individual communities and homes—are numerous, the hardest to update/upgrade, and are, therefore, expensive and incredibly slow to be built. Switching to a *“First Mile”* mindset that reframes these connections as the most important connections to be made can help reprioritize this part of connectivity infrastructure.

Given the increasing ubiquity of internet use in our daily lives—in terms of where and how we work, consume, play, connect with others, and access services—broadband infrastructure is crucial for all citizens to be full and active participants in today’s digital society and to benefit from the opportunities provided by the digital economy. Yet, according to the International Telecommunication Union’s ICT Development Index, Canada lags behind all but one of its G7 peers in areas including overall infrastructure, access “in remote and rural areas,” digital literacy among marginalized groups, understanding around security and privacy risks, and funding to address these needs. The COVID-19 pandemic has only exacerbated the impact of inequitable access to the internet. Research participants identified it as a key barrier—if not *the* key barrier—to advancing the prospects of Indigenous people in British Columbia’s digital economy.



Poor connectivity also has negative impacts on economic development and the economy as a whole. Small and medium enterprises (SMEs)—which are typically the only enterprises in rural communities—are burdened by high costs and low quality of internet, limiting economic development at a community level. Communities can remain stuck in a harmful feedback loop, as poverty and a lack of economic development also contribute to limiting connectivity. Less-affluent communities are less-appealing markets for internet service providers (ISPs), meaning that infrastructure development is less likely. Poor connectivity also has a drastic influence on one's access to and experiences of work, affecting the ability to access employment supports, apply for jobs and find work, perform workplace tasks, and work remotely (or even work in their community). Even for people who are employed, poor connectivity influences the tasks that they are able to perform and interferes with daily responsibilities. ILIT survey respondents sharing internet with five or more people were less likely to be able to use the internet to work remotely compared to those sharing the internet with two or fewer people.

Previous research by the First Nations Technology Council and ICTC investigated internet speeds in First Nations' band offices, finding that a significant proportion were below the Canadian Radio-television and Telecommunications Commission's (CRTC) targets. This is especially notable given that many communities only have one physical internet access point. This is reflected in our research, which identified that 40% of survey respondents living in remote areas access the internet at their band office, compared to only 12% of those in urban areas. Similarly, Elders and those living on-reserve were more likely to use internet at their band office than younger people and those living off-reserve. Overall, survey respondents in remote communities and even rural and suburban communities were far less satisfied with their internet than those in urban communities.

Broadband infrastructure is limited because of market failures and limited competition. This is further compounded by the tendency to consider Indigenous Peoples "stakeholders" instead of "rightsholders" in matters of telecommunications.

The structural barriers are related to the systemic racism embedded in society, resulting in the normalization of a lack of political will to respect and actualize Indigenous rights. Indigenous-led responses could provide unique solutions to broadband infrastructure. Government funding has been proposed to solve this market failure. There remains a question, however, about what specifically that funding should target, including private incentives and a First Mile approach led by the community. An analysis of existing funding going to broadband projects for Indigenous people in British Columbia, including the Connected Coast project, the Universal Broadband Fund, Connecting BC, and Connect to Innovate have made important changes for many communities. However, they may still favour more densely populated communities with better administrative capacity to apply for grants and construct last-mile infrastructure. Technological advances may improve or worsen the digital divide (e.g., satellite services may still be expensive, and 5G may raise the level of broadband that services require, thus penalizing lower-connectivity regions).

### *Physical Access to Opportunities: The Urban–Rural Divide*

Living on-reserve or in remote areas can lead to vastly different experiences, circumstances, and perspectives. First, those living on-reserve are more likely to report a range of barriers to getting to the nearest town or city. These included weather and road conditions (61% of on-reserve respondents versus 34% of those off-reserve), access to transportation (61% versus 40%), cost of travel or accommodation (61% versus 46%), lack of childcare (43% versus 25%), and fear of racism in towns or cities (59% versus 43%). Additionally, those living in remote or rural areas were less likely to be able to use their internet connection for most purposes, compared to those in urban areas. The same applied for those living on-reserve relative to those living off-reserve.

## 4.2 Skills Development

### *Education and Training to Support Indigenous Leadership in Technology*

There are persistent and well-documented gaps in the educational outcomes between Indigenous and non-Indigenous students in British Columbia. Yet, financial challenges remain one of the most significant barriers preventing Indigenous youth from pursuing technology-related training. A second key challenge is awareness of and physical and digital access to technology training programs. For example, 76% of remote Indigenous survey participants said they saw no technology training opportunities in their community (the same was true for 73.5% of on-reserve participants). Education is essential to fostering Indigenous leadership in technology, but it must be designed and implemented in a good way.

### *Indigenous-Led Education*

Many interviewees working for or with educational institutions emphasized the importance of ongoing engagement with Indigenous partners in priority areas of the project, curriculum design, and other important educational programming decisions. Interviewees saw this as important to self-determination, student retention, and developing programming that better considers the life experiences and culture of participants.

### *Easing the Transition from Secondary to Post-Secondary Education*

Ongoing inequities in K–12 education (including access to educational services and telecommunications infrastructure) meant that Indigenous people pursuing a career in tech do not always follow a linear path through formal education. Post-secondary's focus on youth, as well as the financial and time commitment involved in upgrading, can create significant barriers to entry for Indigenous people. Some post-secondary institutions are implementing "upgrading years" or semesters that allow Indigenous students to be on campus, immersed in a post-secondary community, rather than pursuing the necessary credits independently. Still other institutions were aware that Indigenous applicants might be tacitly streamed out of required classes for science, technology, engineering, and mathematics (STEM) programs but were struggling with "decredentalizing"<sup>1</sup> their system.

<sup>1</sup> Decredentalizing is the process of removing barriers to access opportunities including higher levels of learning by acknowledging that lived experiences and knowledge are of equal value to western/academic credentials.

### *Recruitment and Building Awareness of Technology Programs*

Large educational institutions who had strong commitments to Indigenous inclusion in their programs pursued active, relational outreach strategies. Smaller organizations attempted to do the same, but some had to include it in grant funding applications or struggled with the funding to pursue direct community outreach. However, there was widespread recognition that pursuing Indigenous recruitment as a small technology training organization meant building long-term, trusting relationships; using accessible technology-related language; and working in tandem with community priorities and employment-related workers within Nations.

### *Remote Education*

Despite telecommunications infrastructure issues, many interviewees found that remote or blended education had significantly improved their access to post-secondary and other training opportunities. It allowed some adult students to balance family and professional obligations with new learning.

### *Internships and Work-Integrated Learning*

Many participants commented on the value of short, workforce-integrated training programs in developing skills and raising awareness of potential technology careers. Such training opportunities came with fast, practical learning and often salaries for the students involved, thus minimizing barriers to entry.





## 4.3 Employment and Business Development

### *Representation of Indigenous People in Technology-related Roles in British Columbia*

From all lenses, diversity in leadership is crucial to the future of the digital economy. Currently, industries such as health care, social assistance, construction, public administration, and manufacturing employ the highest number of Indigenous people in Canada. Just over 1% of Indigenous people in Canada held technical jobs in the information and communications technology (ICT) sector in 2018; however, the share of Indigenous people employed in the digital economy has been steadily increasing. In 2016, the unemployment rate among Indigenous ICT professionals was around 2.8%, considerably lower than the unemployment rate for Indigenous people in the overall economy (12.3%). Despite progress, Indigenous people remain under-represented compared to non-Indigenous people in ICT professions and the ICT sector.

### *Company Size, Indigenous Personnel, and Inclusivity*

early half of surveyed BC employers had at least one Indigenous person on their team; this was more likely to be the case for larger businesses and those in the North Coast and Nechako region, the Cariboo region, and Vancouver Island/Coast regions. Employers' barriers preventing them from hiring Indigenous staff primarily centred around education, skills and experience, and availability of applicants. In comparison, Indigenous survey participants' major barriers to accessing tech-related opportunities were financial access to education and awareness of technology-related roles, and the COVID-19 pandemic. This suggests that the major barrier to improved Indigenous participation in technology is systemic and related to access to education. This includes awareness of the tech sector and availability of jobs in participants' regions (including a lack of remote education and work availability during the COVID-19 pandemic). In the ILIT survey, "living in a place with few work opportunities" was a much larger barrier for people on-reserve (67.3% versus 40.1% off-reserve) and in remote areas (the group with 90 or more minutes of travel time to the nearest town or city), with 78% of respondents agreeing versus 61.1% in suburban and rural areas, and 35.9% for those in urban areas.

### *Gender and Intersectional Identity: Experiences in Science, Technology, Engineering, and Mathematics (STEM)*

Indigenous women and 2SLGBTQQIA+ people are under-represented in STEM fields and may face additional challenges in the workplace. While many Indigenous women are starting their own businesses and working in fields that may intersect with technology, such as health or language, they are less likely to hold or be interested in natural sciences and ICT roles. Interviewees suggested that improved diversity and access to role models from a young age might help solve this gender-based inequity.

### *Occupations and Skills: Interest in Technology*

When asked what jobs, skills, and career pathways they are interested in, Indigenous men were significantly more likely to both hold and be interested in natural and applied sciences and related occupations. Indigenous women reported significantly more interest in occupations in education, law, social, community, and governance roles (many of which were related to social work), as well as business, finance, and administration occupations. About one in five (19%) of all Indigenous survey respondents were interested in moving into the ICT sector, and again, men were more likely to select this option than women. On-reserve respondents were more likely to report interest in construction and utilities, forestry, and agriculture.

While most Indigenous survey participants did not work in technology, nearly all had technology-related skills that they had used for personal projects, to support family and friends, or in the workplace. There were also gender differences in technology skills, with 43% of men reporting skills in IT support compared to 25% of women. Meanwhile, respondents under age 30 were most likely to have digital marketing skills, while respondents classified as “remote” (those with more than 90 minutes of travel time to the nearest city or town) were most likely to be interested in developing many of the technical skills listed above. In some cases, this reflects a lower number of respondents who have those skills, possibly due to less opportunity, infrastructure, and exposure. Remoteness was a stronger predictor of wanting to develop these skills rather than being on- or off-reserve, where differences can be seen but without statistical significance.

### *Workplace Cultural Safety and Inclusive Hiring*

**Key terms:** *Disaggregated demographic information in the workplace is collected by some human resources departments to understand trends in hiring, promotion, and pay, by variables such as gender and ethnicity.*

A lack of Indigenous representation in the technology sector begins with broad systemic barriers to Indigenous access to and participation in tech employment and education, which is discussed throughout this report. However, there are other barriers that are more directly related to workplace inclusion, hiring, and employer actions. The employer response to a lack of inclusion encompasses a broad range of strategies and actions related to workplace cultural safety and inclusive hiring.

Many employers who interacted with the project struggled with knowing how to respectfully and effectively hire Indigenous staff. Many were afraid of “doing the wrong thing,” weren’t sure why their typical hiring processes weren’t working, or found it difficult to know what resources to ask for and what networks to go to for assistance. In the employer survey, most respondents fell into the group of being unsure of who to ask for help. A smaller subset voiced overtly or covertly discriminatory responses.

In the employer survey, the most commonly identified support needed was knowing where to find Indigenous talent, and that they would benefit from having Indigenous contacts or access to dedicated recruitment websites. In regional sessions held with industry, participants noted that they would appreciate a range of supports for hiring, including lists of graduates for organizations that are hiring; lists (and explanations) of programs that train employers on equity, diversity, and inclusion (EDI); and information on individuals to reach out to at a band level and relationships with bands.

ILIT survey participants and BC employers may be using different places to look for and post job opportunities. Compared to employers, nearly twice as many job seekers use social media (56% versus 29%), and more than four times as many job seekers use <https://firstnationsbc.ca> a platform that fosters the sharing of resources and facilitates networking amongst First Nations individuals, communities and organizations (26% versus 6%). Employers, meanwhile, were about four times as likely to use a recruiting company than job seekers were (23% versus 6%).

Industry research participants and Indigenous workforce specialists commented that employers could do more to show in job postings that they had considered cultural safety in their workplace. Furthermore, one large organization avoided automated HR processes that might screen out Indigenous people in application stages due to mismatched education requirements or keywords.

In building an inclusive environment, companies may seek external advice. Importantly, inclusivity means considering quality and seniority of roles, including Indigenous leadership, and avoiding tokenism. Currently, employer survey respondents' priorities for recruitment and retention of Indigenous employees are often policies or strategies that do not require active inclusion of Indigenous people (e.g., equality of treatment, an accepting work environment, and pay equity). Employers that already had at least one Indigenous employee and employers who tracked demographic data were more likely to have recruitment and retention strategies. Demographic data collection also went along with feelings of being better equipped to hire Indigenous staff: 83% of employers that track data felt well informed in this regard. An organization's relationship with data collection—and more generally, relationship with EDI—can depend on its size. Smaller organizations have more difficulty making data anonymous and making decisions based on small sample sizes. However, they have greater agility and are less constrained by bureaucracy than larger organizations. Larger organizations, especially ones operating internationally, may be ill-equipped to adapt quickly and support local or regional needs. Still, there are signs that data collection is becoming more common among organizations of all sizes.



## 4.4 Technology and Innovation Leadership

### Indigenous Entrepreneurship

Indigenous-owned businesses are an important component of improving Indigenous access to technology-related opportunities in the province. According to this team's analysis of the Indigenous Business and Investment Council's Directory, 23% of Indigenous-owned businesses in British Columbia are technology-sector-focused. British Columbia's strongest regions for Indigenous-owned tech businesses are the Mainland/Southwest (39%) and Vancouver Island/Coast (30%), since 69% of tech businesses are located in those two regions. Of the businesses that included their number of employees, 80% of Indigenous-owned tech businesses employ under 10 workers. As the number of Indigenous-owned businesses in British Columbia grows, so too will their ability to employ First Nations, Métis, and Inuit workers.

#### *Experiences of Indigenous Entrepreneurs in British Columbia*

One Indigenous entrepreneur had experienced discriminatory lending practices and significant challenges in attracting capital. These challenges are embedded in a context of structural racism, where historical and ongoing normalization of racism by governments and institutions supports interpersonal racism experienced in business relationships. Interviewees mentioned a small number of private financing organizations that had developed specific programs and capacity to be able to respectfully and collaboratively work with Indigenous entrepreneurs. Furthermore, several Nations and regional organizations offer seed funding programs specifically for Indigenous people and members.

In addition to access to capital, having a successful tech business often relies on having a strong network and time to fail and restart. This can pose difficulties for Indigenous entrepreneurs in rural and remote areas, and/or those without the financial security to iterate. Indigenous-led business and entrepreneurship training programs seek to address the challenge of networking, familiarity with the ecosystem, and financial stability by providing community, orientation, resources, and pathway guidance.

#### *Supporting Indigenous Entrepreneurs through Public Procurement*

Public procurement, or the process that a government takes to obtain goods and services, can allow a government to support its values by supporting particular types of businesses by introducing environmental, social, and governance (ESG) requirements to its contracts, or scoring proponents based in part on inclusive and diverse hiring, among other mechanisms. To do this effectively, public organizations must improve the accessibility to public procurement platforms and approved vendor lists for Indigenous entrepreneurs and improve the quality of Indigenous vendor lists for procurers.

## 4.5 Governance and Self-Determination

### *Community–Industry Partnerships*

**Key terms:** *Proponents are corporations, individuals, organizations, or government agencies proposing a project that requires permits, authorities, authorizations, or approvals from the federal or provincial government.*

*Impact benefit agreements (IBAs) in British Columbia are between First Nations and proponents with existing or planned projects on First Nations lands. They may include parameters around the number of jobs that must be offered to communities, and/or financial and other parameters.*

Community–industry partnerships can take a variety of forms across the province. Indigenous Peoples pre-existed contact. As such, each Nation has inherent rights including laws, jurisdiction, and legal orders that continue to exist and are distinct and separate from the rights of others. As result, the duty to consult and, where required, accommodate is a constitutional duty owed solely to BC First Nations whenever a decision or activity has the potential to impact treaty rights or asserted or established Aboriginal rights and/or title claims. The government may delegate the procedural aspects of consultation to industry proponents, and although this typically occurs with natural resource companies, every sector increasingly has some technology-related roles available. Furthermore, some companies in urban areas have sought to prioritize Indigenous communities through impact hiring, procurement, or service delivery. Finally, community economic development officers or Nation-owned businesses may form strategic partnerships with non-Indigenous businesses. Each of these cases has the potential to improve opportunities for Indigenous participation and leadership in technology, but also come with potential challenges.

Ensuring that IBAs and community–industry partnerships in general offer high-quality, sustainable roles, when possible, with training attached, is a key challenge and opportunity raised by economic development officers and others who hold related roles that participated in this project. Similarly, promoting local economic diversification and growth is an important way to ensure that Indigenous people have access to technology-related roles without being forced to leave their communities, should they choose to stay. Economic diversification and development mean that some Nations are creating their own community-based demand for tech-related roles.

### *The Technology Sector in First Nations Communities*

Several interviewees discussed a trend where businesses had identified an opportunity to access funding from First Nations communities in exchange for a product or service that would inadvertently lock them into a long-term financial agreement. Interviewees working in public policy or related areas commented that the lack of a duty to consult for tech companies (operating in the “intangible” space rather than in a way that intersects with land-based First Nations rights) meant that tech partnerships with communities were more “opportunistic or tactical.” From the company perspective, several technology sector start-ups that engaged with the project team voiced interest in reaching out to communities to see what products or services would be useful. Many voiced a desire to offer roles or skills training to community members but felt that they did not have the finances or scale to fund high-quality, sustained engagement.

### *Summarizing Baseline and Future Priorities: Digital Equity in Indigenous Communities*

Research participants also discussed using technology for land management; mapping, food, and energy security; and culture and language resurgence. Finally, Indigenous-owned businesses and platforms have the potential to shape the technology sector in new ways.

Indigenous participants articulated their priorities for technology. In part due to a lack of internet coverage and affordable access, Indigenous Peoples, along with seniors, new Canadians, and others, have been excluded from digital literacy and learning. Despite the fact that this trend is causing



isolation and making it harder for these individuals to access critical online services and opportunities, there remains starkly little action addressing it. Tellingly, the most common priority identified by this report's participants for "opportunities for technology in your community" was improving tech literacy, awareness, and access. Respondents over 60 were more likely to raise this issue than those under 30. Digital literacy is seen as essential to employment, education, and intergenerational connection. The second-most common priority was access to internet and improving telecommunications infrastructure. Other baseline priorities included improving opportunities for remote work and education, access to essential services, health care, and safety.

### ***What Opportunities Do Indigenous People See for Technology in Their Communities?***

Improving access to technology-related opportunities for Indigenous people is an issue of equity, economic opportunity, and self-determination. Indigenous Peoples and communities have a wealth of wisdom to offer the ICT sector given their technological innovations and advances since time immemorial. However, colonialism has disrupted these pathways and muted their voices.

**Appendix A** provides a regional overview of technology-sector demand in key occupations, including an economic forecast for each region of British Columbia.

**Appendix B** provides a discussion of demand for technology-related hiring during COVID-19 in British Columbia, including two phases of an employer survey, as well as findings on automation and digitization.

**Appendix C** provides a glossary of terms.

**Appendix D** provides examples of research tools used in this study.

## Wise Practices Emerging from This Work

Through the knowledge passed on to us through the work on the *Indigenous Leadership in Technology: Understanding Access and Opportunity in British Columbia* project, we were able to discern several wise practices. To us, these wise practices need to be situated within the colonial context in which we live and, therefore, we have structured these practices in a past (context), present (what is happening now), and future (what needs to happen according to those who contributed to this report) lens. In other words, we are attempting to tell a story with the wise practices we are recommending. Our intention is for the reader to understand each wise practice and that this will help facilitate support in realizing digital equity in British Columbia—and across what is now known as Canada. As a baseline, equitable access to the internet has become essential to participate in today's digitized world and to contribute toward shaping our collective digital future. At a foundational level, achieving digital equity necessitates that Indigenous Peoples have affordable, reliable, high-bandwidth internet; the hardware, devices, and supportive services that are required to use and maintain it; and basic digital literacy and skills education. Both infrastructure projects and education must be responsive to community needs and be self-determined by Indigenous communities. In this report, achieving digital equity means realizing a state in which every Indigenous person, community, and Nation is fully equipped to access and effectively use technology to contribute, thrive, and succeed in today's digital society while preserving self-determination.

### Wise Practice #1 – Indigenous communities must be able to self-determine the priorities and opportunities for technology (including education, services, and infrastructure)

**The past (context):** Through this report, we found that improving access to opportunities in technology (education, services, and infrastructure) for Indigenous Peoples should be led by Indigenous Peoples. This self-determined process should not be limited to economic understandings of labour market demand as it has been in the past. For example, technologies that support self-determination (like geographic information systems, drones, and technologies to support language revitalization) are important to communities even when they are not paired with clear labour market needs. This can sometimes present a disconnect between technology providers and the Indigenous communities they intend to serve.

**The present (what is happening now):** The contributions made by Indigenous people in this report clearly indicated that there is a gap between the technology-related skills that Indigenous people **have** and those they **want to acquire**. In other words, the technology opportunities have not always been self-determined and/or led by Indigenous Peoples, and the consequence of that is a gap in skills. This was evident in our findings because many participants' knowledge of the different types of technological careers was low. Findings also suggested further intersectionality with gender, as Indigenous women were less likely to report interest in professional and scientific roles (and much less likely to already hold them) but were still typically interested in developing technology-related skills. This discrepancy may suggest that the barrier to involvement in technology is less about interest in particular competencies and more about perceptions or awareness of potential careers. In addition, remote participants were very interested in the information and communications technology (ICT) sector and in a wide variety of technology-related skills but were also least likely to be aware of technology-related training opportunities both in and outside of their communities. Again, this report suggests that participants see opportunity in technology but may not be aware of specific pathways to follow to act on their interest.

**The future (what needs to happen):** Indigenous organizations and communities should determine which opportunities for technology training are provided and how. Training should also be paired with communication about what types of roles are available in the technology field, and whether skill sets are transferable across different roles. Nation-led projects should shape the "demand" for skills to avoid "gaps" in the future rather than relying on outside organizations that look only at the economics of

the labour market. It is also suggested that there are significant opportunities to provide community-determined funding and training in key areas. In other words, more work needs to be done to build awareness of and access to technology training opportunities for Indigenous youth and women, including in rural and remote areas. Within these opportunities, it is vital to make sure that trainees are equipped and feel free to pursue their pathway of choice.

**Wise Practice #2 – Facilitating digital equity in Indigenous communities will benefit everyone, as Indigenous Peoples across the province are poised to offer strong leadership and fill a major labour demand in the field (remote work).**

**The past (context):** The types of in-demand technology-related roles vary significantly depending on the region in British Columbia. In lower-population regions, the opportunities in technology are either not in ICT industries, or are found in rare, highly specialized ICT roles (which are rarely posted and hard to fill). Across BC, larger businesses are looking for a wider variety of technology-related roles, and many smaller businesses are looking for IT-related support. For workers, this means that the skills needed for different types of roles may vary by region. In some areas of British Columbia, this has created an environment where digital literacy and transferrable technology skills are essential because IT support workers are expected to handle a variety of situations on a day-to-day basis. In Vancouver, Victoria, and Kelowna, there are a wide variety of highly specialized technology-related jobs. In several other cities on the rise (Prince George, Nelson), more specialized roles are emerging.

**The present (what is happening now):** Employers in British Columbia with technology-related roles are increasingly open to remote-work options and allowing their employees to choose what type of work environment they are interested in (likely helped along by the COVID-19 pandemic). Broadly, this means that there are employment opportunities for a small number of people in those roles, a larger number of people in tech-related roles in other industries, and an even larger number of people if they could work remotely for employers in other regions. For those living in rural, remote, and Indigenous communities, this provides a clear opportunity to work in the field and stay in their communities. However, as outlined in Wise Practice #1, self-determined infrastructure and training access must be in place to make this a possibility for Indigenous people living in community. If these jobs could be brought to other regions through the infrastructure to work from home, it would open up significant opportunities across the province. Otherwise, only industry change, diversification, and economic development are likely to bring more tech opportunities to all of British Columbia.

**The future (what needs to happen):** Flexible work arrangements have become more acceptable and encouraged amongst BC employers, opening up a key opportunity for Indigenous people across the province. This means that digital equity (self-determined priorities and opportunities in technology) is an essential foundation that will allow Indigenous people across British Columbia to access technology-related jobs and allow the industry to further thrive by accessing a population of highly skilled individuals.

**Wise Practice #3 – Encourage Indigenous Peoples to sustainably participate in the technology field by addressing the systemic, workplace, and interpersonal barriers currently faced (including digital inequity).**

**The past (context):** Colonial systems and thinking purposefully exclude Indigenous Peoples from pursuing training, opportunities, and careers in the technology field. Gaps in technological infrastructure (e.g., access to high-speed internet) further reinforced this exclusion and resulted in lower participation in the field. The findings of this report suggest that digital equity would be one way to address the ongoing effects of colonization within the technology sector.

**The present (what is happening now):** Though a significant amount of work, self-reflection, and reform still needs to be done, governments, the education system, and the technology sector have begun to acknowledge the ways in which they contribute to the ongoing exclusion in the technology sector. A focus on developing high-quality infrastructure in rural, remote, and Indigenous communities continues to progress and gain the attention of service providers and governments. In addition, many recognize the significant benefit that greater Indigenous participation in the technology sector can bring.

**The future (what needs to happen):** Private (tech and adjacent) and public (government) sectors must act as allies and active partners and support Indigenous-led plans to address systemic, workplace, and interpersonal barriers. Within this, respectful relationships, cultural relevance, and trauma-informed approaches should be at the forefront. Based on the findings of this report, this can be concretely done in several ways, including:

- **Connectivity and infrastructure.** Across British Columbia, telecommunications projects should give more focus to the “First Mile” mindset. For example, there should be more efforts to provide funding to communities and community-led initiatives to drive their own connectivity decisions, as opposed to funding for the major telecommunications providers. However, grant-funded initiatives that require separate communities to apply may disadvantage under-resourced Nations. Accordingly, it is important to make these programs more accessible and open to collective action. Furthermore, high wholesale rates for broadband infrastructure, set by the CRTC, can restrict competition and limit the success of small, local internet service providers (ISPs) in communities that would benefit significantly from improved connectivity. Future decisions regarding wholesale rates should be made with consideration to the impacts on rural, remote, and Indigenous communities, and there is potential to provide preferential support to Indigenous ISPs. Overall, connectivity is an enabler: talent, economic development, and business potential will not go very far if they cannot be harnessed by way of the internet. Still, connectivity is not a fix-all, and all the other priorities discussed in this report are important components of digital equity.
- **Skills development.** In addition to what has already been outlined around digital equity, many Indigenous-led training programs for technology or entrepreneurship exist or are in development and should be supported sustainably. Within education, it is important to remove friction in student pathways (e.g., upgrading requirements, scholarships that require a university degree, co-op programs limited to post-secondary students). One way to do this is by offering flexible programs so people can choose to study remotely, in-person, or—when possible—in community. Opportunities for digital skills and literacy education should also start earlier in the K–12 system.
- **Employment and business development.** There is an opportunity to support more Indigenous-led technology businesses, but the infrastructure around this is currently limited, particularly with regard to procurement. For example, procurement officers may not have access to a complete list of Indigenous tech entrepreneurs, and Indigenous entrepreneurs may have trouble competing with approved vendors listings or struggle to dedicate time to request-for-proposal (RFP) submissions. Furthermore, because rural and remote British Columbia is generally a difficult place to start a technology business, it is important to provide entrepreneurship programs with funding for wrap-around supports that people can access after they have left a program, including cohorts, mentors, access to networks for capital, and further capacity development.
- **Technology and innovation leadership.** Employers who wish to hire Indigenous people must pay attention to and improve workplace cultural safety and representation of Indigenous people in their organization. Good intentions do not always translate into real change. Further, efforts to increase inclusion should not be limited to a western understanding but be representative of Indigenous knowledge. One additional avenue of facilitating a safe workplace would be the introduction of anti-racism training. Moreover, employers should be prepared to directly engage with Indigenous communities to recruit employees (e.g., direct engagement, post their jobs in different locations, and work more actively alongside communities to recruit staff).



- **Governance and self-determination.** IBAs should be adjusted to help communities gain transferable technology-related skills, not just manual labour skills. Similarly, some First Nations economic development officers are finding opportunities to diversify projects on Nations' territory, and it is important to support this financially. Compared to natural resource businesses, which may have a duty to consult, the technology sector does not currently have a similar incentive to enter into responsible partnerships with First Nations communities. Well-meaning actors in this space may struggle with knowing how to enter into a valuable partnership. Companies should pursue upfront, in-person engagement with communities before offering services or embarking on joint projects; this is important to avoid inadvertent paternalism or partnerships that do not convey benefits back to communities. Engagement is often hard to finance for small businesses and non-profits; grant funding for this may be merited.







## 1.0 INTRODUCTION

*"[Technology] is part of what will be history in a few generations, and I think so long as we incorporate our culture and values into all aspects and components, we will see in and relate to technology. What can we put into technology that will harness and sustain our identity? I think if we can think in this way, we can invite more of our people into these roles and will see them staying there, so long as they can see themselves in it." – [Community session participant]*

The theme of this report is Indigenous leadership in technology, with a focus on access and opportunity in what is now known as British Columbia (BC). Each of these terms requires some explanation. Firstly, *Indigenous* is a broad term that is used in this paper to refer to the 204 distinct First Nations, whose traditional territories are located across the province, as well as Inuit and Métis Peoples who live here at present day. As the 2020 position paper on Indigenous Protocol and Artificial Intelligence notes:

"Indigenous ways of knowing are rooted in distinct, sovereign territories across the planet. These extremely diverse landscapes and histories have influenced different communities and their discrete cultural protocols over time. A single 'Indigenous perspective' does not exist, as epistemologies are motivated and shaped by the grounding of specific communities in particular territories. Historically, scholarly traditions that homogenize diverse Indigenous cultural practices have resulted in ontological and epistemological violence, and a flattening of the rich texture and variability of Indigenous thought. Our aim is to articulate a multiplicity of Indigenous knowledge systems and technological practices."<sup>2</sup>

Secondly, *technology* has many definitions; in this project, participants were encouraged to interpret it using their own perspectives, and aside from later labour-market-related definitions of technology-related work, the word is used however research participants felt appropriate. Third, *access* refers to the goal of the research to understand the myriad structural and systemic barriers that Indigenous people in British Columbia may face, including internet infrastructure. Fourthly, *opportunity* is broadly defined in terms of entrepreneurship, employment, education, and pathways not constrained to the labour market, while *leadership* means that this project is about both individual and community priorities for technology. As the quotation above suggests, Indigenous leadership in technology must include Indigenous-led design of education, skill-building, and career pathways. While priorities for self-determination may be informed by the broader economy and opportunities within it, the pathways that Indigenous people take to pursue technology-related skills, careers, and creative projects need not be limited to opportunities offered by settler states and industries. Finally, *Indigenous data sovereignty* is another important, overarching concept for this report.

<sup>2</sup> Jason Edward Lewis et al., "Indigenous Protocol and Artificial Intelligence Position Paper," 2020, <https://spectrum.library.concordia.ca/id/eprint/986506/>



A research guide from the University of Toronto defines Indigenous data sovereignty as:

“The ability for Indigenous people, communities, and Nations to participate, steward and control data that is created with or about themselves. The term sovereignty refers to the fact that Indigenous Nations are sovereign in their governance and that extends to their data and Knowledges as well. It recognizes that Indigenous people are the ultimate authority in their data and Knowledges and aims to redefine Indigenous Peoples’ relationship to research from being participant or subjects to being meaningful partners and co-researchers.”<sup>3</sup>

Accordingly, *Indigenous Leadership in Technology: Understanding Access and Opportunities in British Columbia* seeks to understand the following:

- Priorities for technology in community and life pathways as articulated by Indigenous people in British Columbia.
- Priorities for technology skill sets and jobs articulated by BC employers and the current representation of Indigenous people in technology in British Columbia.
- The barriers driving under-representation along with opportunities for improving Indigenous leadership in technology through:
  - workplace cultural safety and hiring practices;
  - Indigenous-led education;
  - entrepreneurship and procurement;
  - community–industry partnerships; and
  - telecommunications infrastructure.

## 1.1 Section 35, Truth and Reconciliation, UNDRIP, and Nation Rebuilding: Calls to Action for Indigenous Leadership in Technology

### Section 35: Rightsholders, Not Stakeholders

Prior to the arrival of Europeans, Indigenous Peoples were organized as sovereign nations with their own distinct cultures, economies, governments, and laws and lived on territories over which they fully exercised governance, authority, and decision-making control.

In what is now known as British Columbia, First Nations leaders fought tirelessly for the recognition of their Nations’ rights and title, including their laws, legal systems, and jurisdictions that were exercised prior to contact and which continue to exist today. It is important to understand that in British Columbia, First Nations are recognized as rightsholders, not stakeholders. They have constitutionally protected Aboriginal rights and title, as recognized and affirmed under section 35 of the *Constitution Act*. This arises from the sovereignty their Nations exercised prior to contact and from their occupation and use of the lands as sovereign Nations.

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<sup>3</sup> University of Toronto, “Research Guides: Indigenous Data Sovereignty,” May 12, 2022, <https://guides.library.utoronto.ca/indigenousstudies/datasovereignty>.

## Truth and Reconciliation Commission

As noted by the BC Assembly of First Nations (BCAFN), reconciliation requires investments in self-determination that are “grounded in fundamental principles such as do no harm, respect the Indigenous rights and title holders, prevent environmental damage, and respect fundamental human rights.”<sup>4</sup> Indigenous rights and values are central to the path toward self-determination for governments, companies, leaders, and community.

The ninety-four calls to action on the course to reconciliation published by the Truth and Reconciliation Commission (TRC) emphasize the importance of:

- recognizing Indigenous rights and implementing the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP);
- building meaningful relationships;
- pursuing sustainable economic development projects; and
- investing in education and cultural competency training.

Some of the relevant Calls to Action include:

#7. We call upon the federal government to develop with Aboriginal groups a joint strategy to eliminate educational and employment gaps between Aboriginal and non-Aboriginal Canadians.

#8. We call upon the federal government to eliminate the discrepancy in federal education funding for First Nations children being educated on reserves and those First Nations children being educated off reserves.

#9. We call upon the federal government to prepare and publish annual reports comparing funding for the education of First Nations children on and off reserves, as well as educational and income attainment of Aboriginal Peoples in Canada compared to non-Aboriginal people.

#10. We call on the federal government to draft new Aboriginal education legislation with the full participation and informed consent of Aboriginal Peoples. The new legislation would include a commitment to sufficient funding and would incorporate the following principles:

- i. Providing sufficient funding to close identified educational achievement gaps within one generation.
- ii. Improving education attainment levels and success rates.
- iii. Developing culturally appropriate curricula.
- iv. Protecting the right to Aboriginal languages; including the teaching of Aboriginal languages as credit courses.
- v. Enabling parental and community responsibility, control, and accountability, similar to what parents enjoy in public school systems.
- vi. Enabling parents to fully participate in the education of their children
- vii. Respecting and honouring Treaty relationships.

#11. We call upon the federal government to provide adequate funding to end the backlog of First Nations students seeking a post-secondary education.

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4 BC Assembly of First Nations, “Honouring our Ancestors: Free Prior and Informed Consent in Business,” n.d., [https://www.bcafn.ca/sites/default/files/docs/reports-presentations/FNA\\_Doc\\_V2\\_It11\\_pages.pdf](https://www.bcafn.ca/sites/default/files/docs/reports-presentations/FNA_Doc_V2_It11_pages.pdf).

#92. We call upon the corporate sector in Canada to adopt the UNDRIP as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous Peoples and their lands and resources. This would include, but not be limited to, the following:

- i. Commit to meaningful consultation, building respectful relationships, and obtaining the free, prior, and informed consent of Indigenous Peoples before proceeding with economic development projects.
- ii. Ensure that Aboriginal Peoples have equitable access to jobs, training, and education opportunities in the corporate sector, and that Aboriginal communities gain long-term sustainable benefits from economic development projects.<sup>5</sup>

Also, it is important to note that the Truth and Reconciliation Commission's *Calls to Action* identified the UN declaration as "the framework for reconciliation":

#43 We call upon federal, provincial, territorial, and municipal governments to fully adopt and implement the United Nations Declaration on the Rights of Indigenous Peoples as the framework for reconciliation.

#44 We call upon the Government of Canada to develop a national action plan, strategies, and other concrete measures to achieve the goals of the United Nations Declaration on the Rights of Indigenous Peoples.

## United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP)

The United Nations Declaration on the Rights of Indigenous Peoples outlines the minimum standards for the survival, dignity, and well-being of Indigenous Peoples. In November 2019, the BC government passed the Declaration on the Rights of Indigenous Peoples Act (DRIPA), and the federal government has also committed to pass legislation to implement the UN declaration.

While some Indigenous leaders have noted that the declaration's implementation has been "incremental,"<sup>6</sup> others have welcomed the legislation as a "helpful tool for Indigenous communities" and await its full impact.<sup>7</sup> British Columbia's implementation of UNDRIP was brought up by several participants in this research as a promising sign for Indigenous leadership in technology in the province, largely in a symbolic capacity. It is important to note that as rightsholders, Indigenous Peoples have the right to self-determination—to determine their own destinies. UNDRIP reflects this right with the following supportive articles:

*Article 5: Indigenous Peoples have the right to maintain and strengthen their distinct political, legal, economic, social and cultural institutions, while retaining their right to participate fully, if they so choose, in the political, economic, social and cultural life of the State.*

*Article 20(1): Indigenous Peoples have the right to maintain and develop their political, economic and social systems or institutions, to be secure in the enjoyment of their own means of subsistence and development, and to engage freely in all their traditional and other economic activities.*

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5 Truth and Reconciliation Commission of Canada, "Calls to Action," 2015, [https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/indigenous-people/aboriginal-peoples-documents/calls\\_to\\_action\\_english2.pdf](https://www2.gov.bc.ca/assets/gov/british-columbians-our-governments/indigenous-people/aboriginal-peoples-documents/calls_to_action_english2.pdf).

6 <https://www.thestar.com/news/canada/2021/11/19/new-bc-bills-welcomed-but-undrip-implementation-moving-at-a-snails-pace.html>

7 John Borrows, Gray, C., Lindberg, D., Pasternak, S. and Judith Sayers, "The UN Declaration on the Rights of Indigenous Peoples in Canada: Lessons from B.C.," Yellowhead Institute, November 2019, <https://yellowheadinstitute.org/bc-undrip/>.

*Article 21(1): Indigenous Peoples have the right, without discrimination, to the improvement of their economic and social conditions, including, inter alia, in the areas of education, employment, vocational training and retraining, housing, sanitation, health and social security.*

*Article 23: Indigenous Peoples have the right to determine and develop priorities and strategies for exercising their right to development. In particular, indigenous Peoples have the right to be actively involved in developing and determining health, housing and other economic and social programmes affecting them and, as far as possible, to administer such programmes through their own institutions.*

*Article 34: Indigenous Peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices and, in the cases where they exist, juridical systems or customs, in accordance with international human rights standards.*

## Reconciliation and Rebuilding Indigenous Nations and Governments

Canada's legacy of land dispossession and economic exclusion of Indigenous Peoples is important context for contemporary reconciliation efforts. A central component of reconciliation is ensuring Indigenous Peoples lead the work of rebuilding governance on their terms, through the guidance of their distinct legal orders, traditions, and cultures. In British Columbia, many First Nations are undertaking efforts to rebuild their Nations, institutions, laws, and governments through both sectoral and comprehensive governance initiatives. Indigenous scholars including former Minister Jody Wilson-Raybould have called for capacity-building, economic strength, and education to support the development of Indigenous governance.<sup>8</sup> As part of economic development, education, and capacity-building, technology presents an important opportunity for Indigenous communities to lead within a growing sector, use new strategies to preserve culture and language for new generations, and defend rights and title with new tools.

### 1.2 Project Background

#### Why Technology?

Technology is increasingly vital to social life and connection, access to essential services, and resilience in an era of rapid change. Throughout this project, participants' jobs were pushed online, First Nations' governance meetings moved to Zoom, and families needed access to technology to stay connected and access health services during lockdowns. Beyond the baseline of basic access to work and essential services, First Nations communities are using technology to defend land-based rights, start technology-enabled businesses, and move languages and cultures into new media. Each of these themes is explored in greater depth in this report. From an economic perspective, the digital economy is a rapidly growing component of Canada's general economy and has remained a strong employer despite instability during the COVID-19 pandemic lockdowns. In 2018, Canada's ICT sector alone generated a total GDP of nearly \$89 billion<sup>9</sup> and represented over 4.5% of Canada's total economic output.<sup>10</sup> By the second quarter (Q2) of 2021, the ICT sector had grown to a historic high of \$101.8 in GDP, despite declining for two quarters around the start of the pandemic.<sup>11</sup>

<sup>8</sup> Jody Wilson-Raybould, *From Where I Stand*, (UBC Press; Vancouver, 2019).

<sup>9</sup> Statistics Canada. "Table 36-10-0434-01: Gross domestic product (GDP) at basic prices, by industry, monthly", Statistics Canada, September 1, 2019. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610043401>. Statistic found in Alexandra Cutean et al., "Canada's Growth Currency Digital Talent Outlook 2023" (Ottawa, ON: Information and Communications Technology Council (ICTC), November 2019), <https://www.digitalthinktankictc.com/reports/canadas-growth-currency>. p. 8.

<sup>10</sup> Ibid. This is an increase from 2017, where it represented a \$72.61 billion dollar per year industry, See further: "Table 36-10-0434-01: Gross domestic product (GDP) at basic prices, by industry, monthly," Statistics Canada, September 1, 2019, <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3610043401>.

<sup>11</sup> Chris Herron, "Quarterly Report of Canada's ICT Labour Market: 2021 Q2," (Ottawa, ON: Information and Communications Technology Council (ICTC): 2021), [https://www.ictc-ctic.ca/wp-content/uploads/2021/12/ICTC\\_Quarterly-Monitor\\_2021\\_Q2\\_ENG-MI-PS.pdf](https://www.ictc-ctic.ca/wp-content/uploads/2021/12/ICTC_Quarterly-Monitor_2021_Q2_ENG-MI-PS.pdf).

From the turn of the century to today, employment in ICT has increased consistently. In 2018, the employment of ICT professionals in recent years consistently outpaced total employment across the economy at a rate of six to one.<sup>12</sup> From 2001 to 2017, more than 333,200 new ICT jobs were created in Canada.<sup>13</sup> Overall, between 2012 and 2017, an annual average of 36,560 new ICT jobs were created in Canada every year, presenting the highest average annual employment growth rate of all industries in Canada (5%).<sup>14</sup> In 2019, there were over 1.5 million people employed in ICT occupations across all sectors in Canada.<sup>15</sup> By the second quarter of 2021, there were nearly 1.7 million employed in ICT occupations.<sup>16</sup>

These trends remain true within the province of British Columbia. When defined as economic activity and employment related to 32 key occupations,<sup>17</sup> the BC tech sector is responsible for 7% of the economy. In 2018, the technology sector in British Columbia, defined by Statistics Canada, was the third-highest economic driver of ICT output in Canada. It contributed \$11 billion to total Canadian ICT economic output, behind only Ontario (\$40.2 billion) and Quebec (\$18.4 billion).<sup>18</sup> By 2020, British Columbia's ICT sector had grown to \$12.1 billion.<sup>19,20</sup>

In its 2018 BC Tech Report Card, KPMG identified more than 10,000 companies in British Columbia's tech sector grouped into five key subsectors recognized by the BC Tech Association.<sup>21</sup> Altogether, the technology sector produced over \$17 billion in GDP, nearly 90% of which was in services, and provided over 100,000 jobs (specifically, 106,430 jobs), with an average of \$1,690 weekly earnings.<sup>22</sup> The sector saw more than \$6 billion in exports.<sup>23</sup> Since 2016, the tech sector has attracted \$343 million in venture capital investment, \$45 million in angel investment, and \$3 billion in research and development (R&D) investment to date.<sup>24</sup> In its 2020 BC Tech Report Card, KPMG found that British Columbia's technology sector had grown to employ over 123,000 people, attracted \$4 billion in R&D investment, and provided an average of \$1,740 in weekly earnings.<sup>25</sup>

## Why Research? Behind the Data on Indigenous Representation in Technology

Historically, participation in wider Canadian society, including the labour force, has harmed Indigenous Peoples, and the same can be said for participation in research. Understanding Indigenous representation in a particular sector, such as technology, is complicated by historical and contemporary issues of finding data that is both high-quality and collected in a good way. The 2019 edition of the British Columbia Labour Market Outlook report from WorkBC noted the limitation of existing data

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12 Alexandra Cutean and Maryna Ivus, "The Digital Talent Dividend: Shifting Gears in a Changing Economy," (Ottawa, ON: Information and Communications Technology Council (ICTC): December 2018), [https://www.ictcctc.ca/wp-content/uploads/2018/01/ICTC-Report\\_The-Digital-Talent-Dividend-FINAL-ENGLISH-1.30.18.pdf](https://www.ictcctc.ca/wp-content/uploads/2018/01/ICTC-Report_The-Digital-Talent-Dividend-FINAL-ENGLISH-1.30.18.pdf)

13 Ibid., p. 2.

14 Ibid., p. 2

15 Statistics Canada Labour Force Survey 2019 (January to December 2019).

16 Chris Herron, "Quarterly Report of Canada's ICT Labour Market: 2021 Q2," (Ottawa, ON: Information and Communications Technology Council (ICTC): 2021), [https://www.ictc-ctic.ca/wp-content/uploads/2021/12/ICTC\\_Quarterly-Monitor\\_2021\\_Q2\\_ENG-MI-PS.pdf](https://www.ictc-ctic.ca/wp-content/uploads/2021/12/ICTC_Quarterly-Monitor_2021_Q2_ENG-MI-PS.pdf)

17 BC Tech Association, "TechTalentBC Report," 2016, [https://www.workbc.ca/getmedia/8d38ac6f-82d4-4db1-b0bf-ac0f77d78af5/2016\\_TechTalentBC\\_Report.pdf.aspx](https://www.workbc.ca/getmedia/8d38ac6f-82d4-4db1-b0bf-ac0f77d78af5/2016_TechTalentBC_Report.pdf.aspx).

18 Data is from 2018.

19 "Digital Economy Annual Review 2020," (Ottawa, ON: Information and Communications Technology Council (ICTC): 2020) <https://www.ictc-ctic.ca/wp-content/uploads/2021/07/ICTC-Annual-Review-2020-EN.pdf>

20 [https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/industry/tech\\_profile\\_report.pdf](https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/industry/tech_profile_report.pdf)

21 KPMG, "2018 BC Tech Report Card," 2018, <https://assets.kpmg/content/dam/kpmg/ca/pdf/2018/12/BC-technology-report-card-fy18.pdf>. These include "interactive and digital media, clean technology, life sciences, information and communication technology, and IT and engineering services."

22 Ibid.

23 Ibid, p. 9.

24 Ibid, p.9

25 KPMG, "2020 BC Tech Report Card," 2020, <https://assets.kpmg/content/dam/kpmg/ca/pdf/2020/11/bc-technology-report-card-en.pdf>



collection tools. Firstly, the report notes that one of the main tools used, the Labour Force Survey, “does not collect adequate, quality Indigenous community data [and] does not cover on-reserve populations.” In addition, it notes that the national census, conducted every five years by Statistics Canada, “offers generally good basic data” but that “for some Indigenous communities there are low Census participation rates.” The report concludes that existing data collection approaches “have not been designed nor delivered with enough input and participation from Indigenous communities.”<sup>26</sup>

Another problem may be the western economic definition of what constitutes “work.” As noted in the same report, “Indigenous communities value a wide range of activities that are often not considered part of official definitions on work,” such as “harvesting, fishing and/or hunting food during specific seasons,” as well as “[undertaking] duties contributing to community, ceremonial, and cultural events.” As such, part of the story of Indigenous Peoples’ low labour force participation may be a narrow definition of work itself imposed by a colonial system.<sup>27</sup> This disconnect highlights the different worldviews operating simultaneously within the broader discourse, and, likewise, reflected in this report. For example, on the one hand, the report speaks to things like gross domestic product (GDP), and on the other hand, it also speaks to different Indigenous understandings of work. In this way, the report moves between these different worldviews, as though speaking two languages.

To develop labour market intelligence (LMI) tools that meet the needs of Indigenous communities, the Ministry of Advanced Education and Skills Training’s Sector Labour Market Partnerships Program is in the early stages of building partnerships with Indigenous Nations and Organizations to explore collaborative and Indigenous-led approaches to LMI. The province has identified the need for Indigenous data sovereignty, in alignment with the Truth and Reconciliation Commission’s Calls to Action and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), as well as the First Nations Information Governance Centre’s Principles of Ownership, Control, Access, and Possession (OCAP®). The Sector Labour Market Partnerships Program is an important resource being used to support Indigenous communities to develop LMI.<sup>28</sup>

At present, all existing data suggests that Indigenous people remain under-represented in the digital economy across Canada, including in British Columbia. The HR Tech Group reported in 2020 that Indigenous people represented 0.7% of the BC tech workforce.<sup>29</sup> This is much lower than the share of British Columbia’s total population that Indigenous people represent—5.9%, according to the 2016 Canadian census.<sup>30</sup>

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26 Work BC, “BC Labour Market Outlook,” 2019, [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

27 Ibid.

28 Ibid.

29 HR Tech Group, “2021 Diversity in Tech Dashboard,” 2020. <https://silkstart.s3.amazonaws.com/a6fdfe0c-86ca-426b-ac27-d92d914e4843.pdf>

30 Statistics Canada, 2016 Census, <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/index-Eng.cfm>.

In recent years, there has been a growing awareness of settler policies that contribute to education and infrastructure deficits within Indigenous communities. Many of these are relevant to the digital economy. For example, mathematics and science courses are not always readily available for many Indigenous students living on-reserve, in rural and/or remote communities.<sup>31</sup> This is reminiscent of the restrictions on economic development imposed on First Nations people through the Indian Act: being confined to the reserves with day passes, not being able to trade or sell, and having to work within specific roles. Furthermore, the lack of investment in high-speed and reliable internet has contributed to the digital inequity that exists between Indigenous and non-Indigenous populations.<sup>32</sup> It is an opportune time for Indigenous-led research and development of education, infrastructure, and other tools to address gaps and systemic inequities in technology access.



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31 “Digital Directions: Towards skills development and inclusion of Indigenous Peoples in the new economy,” TATA Consulting services and Canadian Council of Aboriginal Business, (Toronto, ON: 2019), [https://www.ccab.com/wp-content/uploads/2019/02/Digital-Directions-TCS-Report-Digital-Full-Report\\_AA-FINAL.pdf](https://www.ccab.com/wp-content/uploads/2019/02/Digital-Directions-TCS-Report-Digital-Full-Report_AA-FINAL.pdf).

32 “Digital Differences: The impact of automation on the Indigenous economy in Canada,” Ted Rogers School of Management, Diversity Institute, Canadian Council for Aboriginal Business, and Future Skills, (July 2020), <https://fsc-ccf.ca/research/digital-differences-the-impact-of-automation-on-the-indigenous-economy-in-canada/>.



## 2.0 METHODOLOGY

### 2.1 Project Purpose and Scope

The purpose of this project is to fill an important gap: while the digital economy in Canada is quickly expanding, accelerated by COVID-19 and trends in digital adoption, there are few labour market intelligence (LMI) tools that meet the needs of Indigenous communities. For example, an important component of Indigenous self-determination in British Columbia is that “access and opportunities” in technology should not be narrowly defined in terms of employment. Instead, we should seek to understand the ways in which Indigenous people and communities shape the economy through Nation-owned businesses, First Nations land-based rights, entrepreneurship, and priorities that lay outside of roles typically captured by labour market studies.

### 2.2 Research Approach

This research project was conducted with attention to the First Nation Technology Council’s research methodology and core principles of respect, control, community focus, collaboration, partnership, sharing, and social return. Furthermore, the research team consulted the Ownership, Control, Access, and Possession (OCAP®)<sup>33</sup> framework and attempted to follow these protocols by keeping all data collected within a First Nations-led organization, offering participants continued updates and report-back. Three organizations contributed to this research: the First Nations Technology Council provided guidance on all aspects of research, project management, outreach and engagement, and knowledge translation work throughout the project. The Technology Council’s Regional Coordinators were instrumental in providing research guidance and sharing participation opportunities to community members. Reciprocal Consulting led the development and dissemination of the Indigenous Leadership in Technology (ILIT) survey, along with the community-oriented virtual engagement sessions. The Information and Communications Technology Council (ICTC) led secondary data collection, the Survey of BC Employers, semi-structured interviews, industry engagement sessions, and data analysis and writing. The collaboration between these three organizations, each with distinct expertise and networks in the province of British Columbia, was instrumental to the success of this project. The team was provided expert guidance by the Steering Committee, a network of leaders in British Columbia within technology and research. Each committee member has a clear passion for supporting Indigenous leadership in technology. In addition, the generous participation in this research by approximately 800 research participants—including the ILIT and employer survey respondents, regional session participants, and interviewees—during a trying year made this project possible.

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33 OCAP® is a registered trademark of the First Nations Information Governance Centre (FNIGC) <https://fnigc.ca/ocap-training/>



## Steering Committee

A Steering Committee was established in spring 2020 to provide strategic advice to support the Technology Council and research teams in meeting the objectives of this project. The Steering Committee comprised 13 members, including leaders from British Columbia's tech and tech-enabled industries, Indigenous communities, entrepreneurs, and skills training and employment organizations. The composition of the committee ensured that regional representation and gender diversity were also upheld.

The Steering Committee met four times throughout this phase of the ILIT project to discuss project objectives and offer recommendations on various topics and questions pertaining to the research and approach including, but not limited to:

- best practices in virtual engagement;
- key questions to consider for industry-focused sessions, including topics around EDI policies, recruitment strategies, and the impacts of connectivity on hiring for roles across British Columbia; and
- strategies to maximize the impact of research findings, including methods for effective research dissemination and knowledge mobilization.

Steering Committee members also played an important role in recommending individuals to participate as key informant interviewees and supported the First Nations Technology Council in its outreach efforts to promote engagement opportunities with their networks.

## Regional Coordinators Network

The Regional Coordinators Network was established to support information sharing between the First Nations Technology Council and First Nations communities across British Columbia. More specifically, the Regional Coordinators Network supports information sharing, conducts outreach and engagement, and fosters participation to move this work forward. The network consists of individuals who are responsible for eight regions of British Columbia and who have established connections within the communities they serve.

Since their orientation to the project in late November 2020, the Regional Coordinators have:

- Provided input and shared regional considerations for conducting outreach and engagement.
- Shared observations and learnings for conducting effective virtual outreach and engagement.
- Collected publicly available, role-based community contact information for individuals within their region. This resulted in a comprehensive list that was used to invite individuals to virtual engagement sessions.
- Contributed to the design of the data collection tools, including virtual engagement session questions.
- Participated in and provided support during community-focused virtual engagement sessions.
- Supported the outreach and distribution of the Indigenous Leadership in Technology survey.
- Engaged with and contributed to guiding the analysis process.
- Reviewed and provided input on the draft report.

The Regional Coordinators played a critical role in this project by bringing regional and Indigenous community perspectives to inform the entire research process, including the research design and implementation, and the outcomes.

## 2.3 Data Collection Methods

This section describes the data collection methods that were used in the course of this project. Both primary and secondary data sources were utilized. Secondary data sources included an environmental scan, a review of existing data on Indigenous representation in tech, job board data, and labour demand projections. Primary data sources include the Indigenous Leadership in Technology (ILIT) survey (see Appendix A for the data collection tool), the Survey of BC Employers, key informant interviews, and virtual engagement sessions. Given the diversity of data collection methods used, an overview of participants is embedded throughout as it pertains to that particular method.

### Secondary Research

Secondary research included an environmental scan and review of existing data on Indigenous representation in technology education, employment, and entrepreneurship in British Columbia and Canada. This review was initially conducted in January 2020, with an update on key figures in November 2021. Importantly, the review and update were conducted at a time when figures from the 2021 Canadian census had not yet been released.

Section 4.4 (Technology and Innovation Leadership) contains a subsection on Indigenous entrepreneurship, which includes data from the BC Indigenous Business Listings dataset. ICTC researchers analyzed the business descriptions of the 1,259 included companies to create a subset of “technology” companies. First, companies were sorted by keywords sourced from ICTC’s job market information<sup>34</sup> and lists of keywords associated with information and communications technology. The key terms used are as follows: tech, “analys,” record, media, mechanic, production, graphic, “operat,” broadcast, “e-,” design, edit, graphic, video, fabrication, assembly, industrial, fiber, systems, electric, coder, developer, network, telecommunications, “manufactur,” operator, data, sensor, internet, virtual, digital, engine, “comput,” cyber, information, hardware, software. Next, ICTC researchers analyzed the business descriptions of the remaining 400 companies. ICTC included companies in the dataset if 1) the company’s central service offering is developing, supporting and maintaining, or selling technology, or 2) if technology is key to delivering the company’s services (e.g., the online booking system of Aboriginal Journeys Wildlife Viewing & Adventure Tours). Companies were excluded if technology was included in their company description but not central to the business’ offering (e.g., Cariboo Chilcotin Jetboat Adventures participating in sturgeon tagging and data collection programs), or if the technological service in question was not evident from the business name or description. ICT-adjacent industries such as construction and energy were included if they 1) mentioned ICT technology (e.g., GIS or computer numerical control) or 2) mentioned engineers or explicitly noted roles included in ICTC’s job market information list.<sup>35</sup>

### Job Board Data

Two segments of web scraping were undertaken in this project. Separate processes were used for Vancouver and Victoria compared with the other regional municipalities. This was due to data organization on the national job boards and the prevalence of digital economy jobs in the Vancouver and Victoria markets.

### Digital Economy Jobs: Vancouver and Victoria Methodology

In-demand jobs in BC’s digital economy were identified via an initial literature review and scan of hiring organizations in British Columbia during the first portion of this project. The initial list of jobs (used from

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34 eTalent Canada, “Job Market Information,” Information and Communications Technology Council, accessed January 2020, <https://www.etalentcanada.ca/job-market-information/index.php>.

35 Ibid.



January 2020 to June 2020) consists of the following: backend developer, full-stack developer, software engineer, machine learning engineer, devops engineer, data engineer, QA tester/engineer, data analyst/scientist, business analyst, cybersecurity specialist, UI developer, CAD technician, industrial designer, database administrator, IT support, digital marketer, and technical sales specialist.

In June 2020, ICTC completed another environmental scan to understand top digital economy jobs in these two locations, while the primary research methodology was being developed and approved. Numerous other jobs were added to the list as a result, including more digital jobs in some “non-traditional” areas of the digital economy like agriculture, energy, and automotive. After June 2020, the following occupations were tracked for Vancouver and Victoria (British Columbia’s most robust digital economy regions): backend developer, full-stack developer, software engineer, machine learning engineer, devops engineer, data engineer, QA tester, QA engineer, data analyst, data scientist, business analyst, cybersecurity specialist, UI developer, CAD technician, industrial designer, database administrator, IT support, digital marketer, technical sales specialist, agricultural service technician, agronomist, AI architect, AR/VR artist, AR/VR designer, AR/VR director, automotive service technician, computer technician, crop sales specialist, cultivation technician, mechanical engineering technician, network administrator, network technician, quantum researcher, blockchain developer, cloud administrator, cloud architect, cloud engineer, digital marketer, game developer, GIS technician, site reliability engineer, and systems security technician.

### **Broad Job Posting Scrape: Whole Province Methodology**

Data from the first employer survey was received for analysis by ICTC in February. Initial analysis of the survey data shows that employers across the regions expect digital technology to impact their sectors, and for numerous technician roles to continue to proliferate and see increasing demand. In an investigation of other regions, ICTC found some hits for the digital economy jobs identified in Vancouver and Victoria but noted that different regions showed very different trends. Therefore, ICTC performed broad municipality-based job searches to understand unique in-demand roles—tech and non-tech—in each region of British Columbia. Subsequently, the team classified tech and non-tech roles guided by National Occupation Classifications (NOCs) and O\*Net taxonomies.

## Labour Demand Projections

Five-year projections for employment demand for core technology occupations in each of the seven economic regions of British Columbia were made using data from Statistics Canada, WorkBC, and Emsi. These core technology occupations were chosen as the most frequently occurring NOCs corresponding to the list of job postings analyzed as part of the web scraping component of this project. The 10 NOCs chosen were:

#0213	Computer and information systems managers
#1123	Professional occupations in advertising, marketing and public relations
#2171	Information systems analysts and consultants
#2172	Database analysts and data administrators
#2173	Software engineers and designers
#2174	Computer programmers and interactive media developers
#2175	Web designers and developers
#2281	Computer network technicians
#2282	User support technicians
#5241	Graphic designers and illustrators

Projections for job openings in these core tech occupations in each of the regions (and in a corresponding tech hub in each region) over the next five years were built by estimating two main components: expansion demand, which is based on the projected growth of various industries, and replacement demand, which relates to demographics and the need to replenish those jobs lost due to retirement or death.

Expansion demand was estimated using industry growth rate projections fitted from Statistics Canada data for each of the economic regions of British Columbia and imputed estimates of the industry composition of each of the NOCs in each of the geographical regions, using census and Labour Force Survey data from Statistics Canada, along with other labour market data from WorkBC and Emsi. The optimistic and pessimistic scenarios were constructed based on potential growth paths for various industries in British Columbia over the next five years, as the BC economy looks to move on from the shocks of the COVID-19 pandemic.

Replacement demand for each of the occupations was estimated using demographic data from the census labour force profiles of the relevant economic regions and metropolitan areas and using labour force data from WorkBC's 2019 British Columbia Labour Market Outlook report.

## Primary Research

### Indigenous Leadership in Technology (ILIT) Survey

The ILIT survey was designed by Reciprocal Consulting in partnership with the First Nations Technology Council's Regional Coordinators Network. It was reviewed by the Technology Council and ICTC teams. Reciprocal Consulting approaches research from a commitment to lift up the work of Indigenous communities and holistically support the self-determination of Indigenous Peoples. Their approach is strengths-based, grounded in Indigenous worldviews, collaborative, and based on participatory methods to ensure the work is appropriate and relevant to the needs of the ILIT project. The work of Reciprocal Consulting is grounded in the following:

- › *An Indigenous worldview*
- › *Strengths-based*
- › *Participatory methods*
- › *Culturally relevant and responsive*
- › *Developmental*
- › *Social justice*



Together, the Regional Coordinators and the Reciprocal Consulting team designed the survey and engagement sessions to be as culturally safe as possible.

The ILIT survey was distributed from August through November 2021, using the platform Simple Survey. It was shared to Indigenous people living in British Columbia via email, social media, mailout, radio, phone, and other means. Overall, 404 responses from Indigenous respondents were collected for analysis, along with 19 responses from non-Indigenous participants who were working for or representing an Indigenous community (discussed separately throughout this paper). Of the 404 responses, 390 participants identified as First Nations, 14 as Métis, one as Inuit, and five preferred to self-describe.<sup>36</sup>

Reciprocal Consulting designed a codebook for ILIT survey analysis, and ICTC completed the data cleaning and analysis. Cleaning removed bots and responses that ended after the first survey question.

Discussion of survey findings throughout this report refer to the people who generously gave their time to complete the survey but cannot be generalized to refer to all Indigenous Peoples in the province. The ILIT survey group has many interesting characteristics that can help contextualize the responses of those surveyed.

First, the survey was predominantly completed by women: nearly three-quarters (74%) of respondents identified as women. About one in five (20%) identified as men, while 11 people identified as Two-Spirit, five as non-binary, and six preferred not to specify.

The survey was completed by people from a range of age groups, as shown in the chart below. Respondents also came from all regions of British Columbia.<sup>37</sup>

Age of ILIT survey respondents	n	%
Younger than 30	52	13%
30–39	86	21%
40–49	118	29%
50–59	100	25%
60 and older	42	10%
(blank)	6	1%
<b>Total</b>	<b>404</b>	<b>100</b>

Table 1. Age of ILIT survey respondents.

Respondents were nearly evenly split between off-reserve and on-reserve locations,<sup>38</sup> and when asked about the travel distance to the nearest city or town, 39% were urban (< 15 minutes of travel time), 41% were rural (15–90 minutes of travel time), and 17% were “remote” (> 90 minutes of travel time).<sup>39</sup>

36 Identity questions were non-exclusive (i.e., “Select all that apply.”)

37 Note: responses were not weighted by region.

38 Off-reserve n = 203, on-reserve n = 189, other -> Treaty Nation land = 5. (Note: while these responses have been left as participants self-identified, some persons living in Nations with modern treaties selected “on-reserve” while others chose to specify).

39 A further 11 responses were blank.

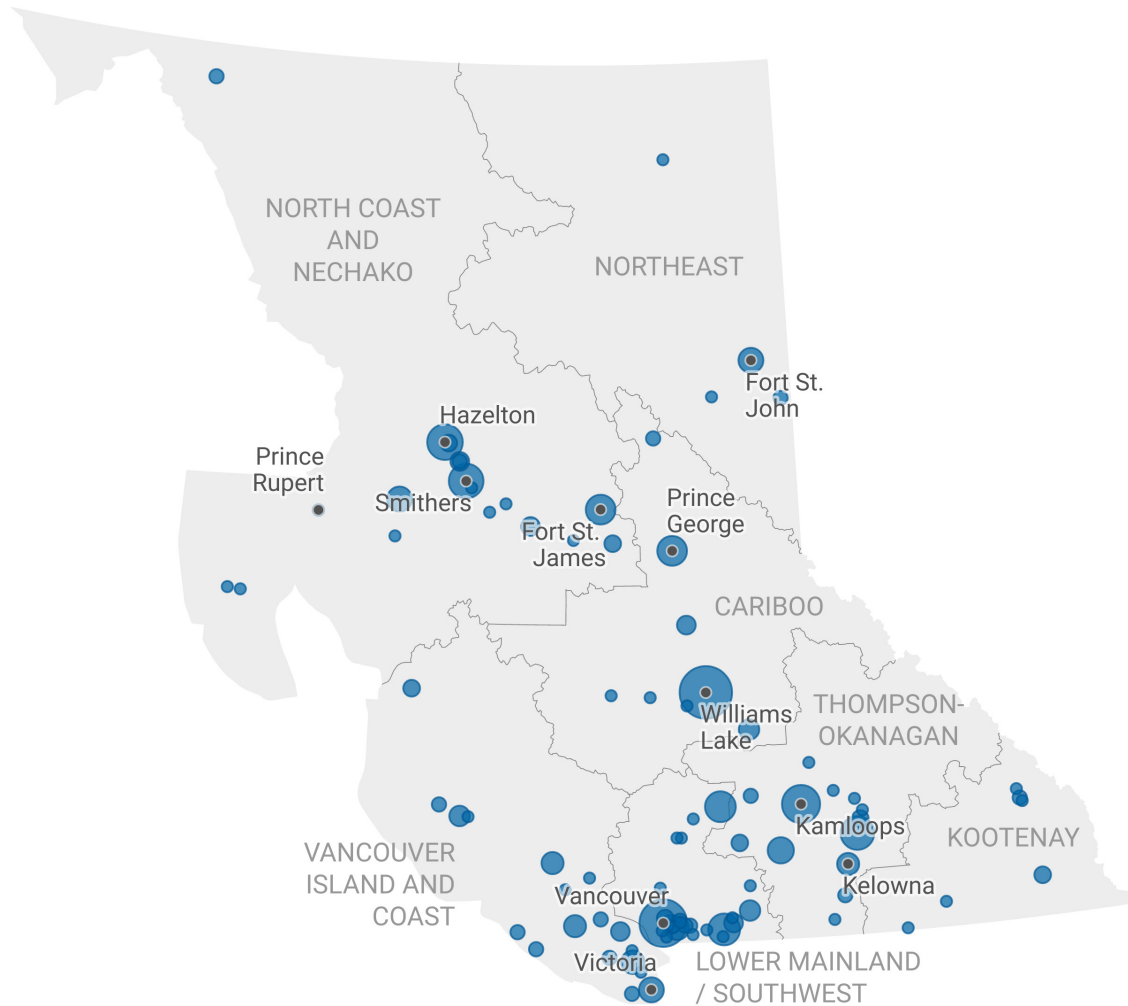


Figure 1. ILIT survey participants by “nearest city or town” to respondent.

As will be explored in subsequent sections, most respondents had internet access, and many had office-related jobs. Accordingly, it is likely that survey distribution mostly reached people with good access to internet and missed persons who were working seasonally and/or in trades, equipment operation, and natural resource-based occupations.<sup>40</sup> This should be considered when reading and interpreting the survey findings discussed below. Importantly, other research engagement tools, including virtual regional sessions and one-on-one interviews, have been used where possible to speak to experiences not fully captured by the ILIT survey.

40 ILIT respondents who were employed selected occupations in trades, transport, and equipment operations, as well as natural resources, agriculture, and related, the least frequently (each 0.5% of survey respondents, or one response). See methodology for a full discussion of survey distribution techniques and limitations.



**\*\*Trigger Warning:** the following section contains a reference to events that some Indigenous people may find triggering.

## The Survey of BC Employers

The Survey of BC Employers was designed by ICTC and reviewed by the First Nations Technology Council and Reciprocal Consulting, Inc. Leger Research was contracted as the survey vendor and they distributed the survey through email and by phone. The survey was conducted in two phases, with one phase of completions from December 2020 to January 2021 (n = 258) and the other in August 2021 (n = 266) to obtain time-series data pertinent to hiring trends during the COVID-19 pandemic. A subsample of respondents (n = 116) responded to both survey phases. This sub-sample is used for several distinct analyses. During Phase I, pandemic lockdowns were still in force in British Columbia. During Phase II, the province had reopened travel and services in nearly all regions and sectors. Phase II occurred immediately before implementation of a provincial vaccine passport system.

Other important events also lend significant context to these survey phases. In the first half of 2021, the Tk'emlúps te Secwépemc First Nation uncovered the graves of children buried at the former Kamloops Indian Residential School. Subsequently, various Nations across Canada have uncovered over a thousand similarly unmarked graves at former school sites.<sup>41</sup> Bringing these horrifying events to light was a process that rightly occupied significant media attention in British Columbia in 2021. This may have impacted employer perspectives between the two survey phases.

The employer survey was directed at anyone responsible for hiring technology-related roles in British Columbia. Respondents had titles such as "owner," "manager," "director," "CEO," or "HR manager." Demographically, of the employer respondents:

1. About half identified as women (I: 44%, II: 48%) and under 1% as non-binary in both phases.
2. About 10% identified as Indigenous, including First Nations (I: 5%, II: 6%), Métis (I: 4%, II: 3%), and Inuit (I: 2%, II: 1%).<sup>42</sup>

In September 2021, interim findings from both surveys were presented to the Regional Coordinators Network by Reciprocal Consulting, Inc. and ICTC during a full-day "data party." In this session, the Regional Coordinators offered questions of interest to them and their regions, suggested variables for crosstab analysis, and helped shape the agenda and questionnaire for the upcoming virtual engagement sessions based on early findings.

## Key Informant Interviews

ICTC conducted 38 interviews with 39 participants (one double interview). Interviews were semi-structured and confidential, observing an oral consent process. Each interview was between 30 minutes and one hour long, with a single ICTC analyst. Interviews were transcribed manually and/or using the transcription tool [Trint.com](https://trint.com). Thematic analysis was performed using QSR NVivo.

Interviews were designed to hear from the experiences of economic and workforce development organizations, relevant recruitment organizations, training organizations with an Indigenous and/or technology focus, and Indigenous technology entrepreneurs. In addition to meeting this objective, interviews were conducted in every region of British Columbia, achieved gender parity, and approached parity of participants who identified as Indigenous (17 of 39 chose to identify as First Nations or Métis).

41 Rachel Gilmore, "Mapping the missing: Former residential school sites in Canada and the search for unmarked graves," Global News, Sept 15, 2021, <https://globalnews.ca/news/8074453/indigenous-residential-schools-canada-graves-map/>.

42 In comparison, the 2016 census notes that in British Columbia, 3.8% of the population identified as First Nations, 2% as Métis, and <1% as Inuit. Statistics Canada, "Focus on Geography Series, 2016 Census," 2017 <https://www12.statcan.gc.ca/census-recensement/2016/as-sa/fogs-spg/Facts-PR-Eng.cfm?TOPIC=9&LANG=Eng&GK=PR&GC=59>.

## Virtual Engagement Sessions

### Regional Sessions: Industry

Three engagement sessions were held with industry representatives between September 29 and October 5, 2021. Sessions opened with a presentation of approximately 20 minutes by the Technology Council on preliminary findings. Using a combination of an interactive Google Jamboard and verbal prompts, industry groups were then asked discussion questions for the remaining hour and ten minutes of their time (for a one-and-a-half-hour-long session in total). Discussion questions pertained to:

- Reflections or questions from the presentation.
- Status of Indigenous personnel at their company: were there any, at what level of seniority, comfort with collecting demographic data, comfort with speaking to intersectionality (e.g., representation of Indigenous women).
- Challenges or successes in recruitment and retention strategies.
- Opportunities for more inclusive workplaces.
- Needs as employers, related to resources or policy initiatives that would help them recruit and retain more Indigenous people, needs related to in-demand roles in general, and needs for remote workplaces.

### Regional Sessions: Community

Eleven virtual engagement sessions were planned with community representatives. Of these sessions, seven were designed as regional sessions and one as an “all-regions” session for anyone unable to participate at the designated date and time for their respective regional session. An education-focused session was also designed and developed along with two additional sessions that were open to all Indigenous Peoples in British Columbia. All sessions were facilitated by Reciprocal Consulting. Discussion questions pertained to:

- Reflections or questions from the presentation.
- Opportunities for technology in one’s community.
- Community experience with technology.
- Accessing technology opportunities.
- Technology skills and supporting others.
- Remote work and working within communities.

## 2.4 Research Limitations

While the data collection process was happening, Indigenous community members who participated were faced with many challenges and crises. Many of the participants were directly affected by the news about unmarked gravesites with the resurfacing of intergenerational trauma and grief, the shifting COVID-19 pandemic restrictions, the opioid crisis, and the climate crises (including forest fires, flooding, and the heat dome). These experiences shaped the way data was collected and the content of the data. It is important to acknowledge the landscape of the context within which the information was gathered.

First and foremost, this research was limited by the necessity of shifting to remote participation during the COVID-19 pandemic. This was an unfortunate but necessary turn in the design of the research, particularly because of the importance of in-person connection and relationship building in Indigenous contexts. Originally designed to include on-the-ground regional engagement sessions across the province, which would include dissemination of the ILIT survey to participants who may not ordinarily have computer access, the shift to virtual engagement almost certainly reconvened the sample of who were able to participate in this project, both through the ILIT survey and regional sessions. This limitation can be seen most clearly in the ILIT survey sample, which does not fully represent the experiences of seasonal and natural resources workers, showing more clearly the experiences of Indigenous people working in social and health positions, government and administrative work, and students. In addition, the surveys were completed almost exclusively online, which is a limitation, especially when interpreting the findings around satisfaction with internet access. This potentially is also indicative that the findings are not representative of the known and common challenges with internet access for rural and remote Indigenous communities.

Second, the impact of climate change on British Columbia also limited participation. Throughout 2021 and the primary data collection period, several participants cancelled due to fires and floods.

Third, the ILIT survey also represents few Métis respondents. The project team believes that this may be a combination of the research design focusing on First Nations participants, the tool (questions designed more clearly around the First Nations' experience), and dissemination tactics and outreach approaches.

A fourth, related limitation is regional representation. In each research tool, certain regions of British Columbia are over- or under-represented. This is most clearly seen in the virtual regional engagement sessions for employers, where respondents across all parts of the BC Interior proved difficult to recruit. In the future, the research team would set aside more dedicated time to pursue outreach to relevant employers in these regions. For the surveys, the BC Survey of Employers responds to regional differences through proportional weighting by population of economic region. Conversely, the ILIT survey remains unweighted to avoid over-representing a particular Nation's responses within economic regions as these borders are not relevant to cultural and linguistic differences and experiences for communities across the province.

Finally, there is a lack of 2SLGBTQQIA+ participation and representation. In future research, the research team would plan to better engage these demographics since there isn't significant research or understanding of their needs and experiences. This gap in understanding affects the impacts of services, programs, and funding is important, as current efforts may not be responsive to 2SLGBTQQIA+ persons' needs.



## 3.0 UNDERSTANDING THE LANDSCAPE: CONTEXT, INDUSTRY SNAPSHOT, AND REGIONAL PROFILE OVERVIEW

### 3.1 The Importance of Context

Key terms: **Inherent** means something that is built in, permanent or essential. **Indigenous Rights**, also known as **Aboriginal Rights**, are inherent rights that are rooted in the original occupation of land in what is now known as Canada. Indigenous Rights have always existed as they have not been created by, or given to, Indigenous Peoples by anyone else. These rights are protected, affirmed, and recognized by Canada's Constitution and *Charter of Rights and Freedoms* under section 35.

**Indigenous Title** is a collective right to the exclusive use and occupation of land that is held by an Indigenous Nation. It is based on the traditional territories that have been occupied by their ancestors. First Nations are diverse and distinct and their respective Indigenous rights vary in reflection of their distinctions. Although this report both addresses and considers the structural barriers, obstacles, and socio-economic, political, and environmental inequities Indigenous Peoples face in British Columbia, the authors feel it is important to emphasize that Indigenous Peoples are far more than this information might suggest in isolation. They are not defined by their experiences of settler-colonialism; the information contained in this report represents real people with hopes, dreams, aspirations, talents, and gifts. They are much more than the harms and trauma that the colonial government has subjected them to. When rooted in Indigenous ways of being and knowing, information can be used to tell comprehensive stories that are simultaneously responsive to and reflective of Indigenous Peoples' lived experiences. This report seeks to honour Indigenous wisdom and knowledge by reporting research and data in a respectful and reciprocal way. This approach prioritizes the authors' responsibility to situate the information about the socio-economic, political, and environmental well-being of Indigenous people, families, communities, and Nations within the context of their past and their visions of their futures.

### Indigenous Futures

This research was undertaken with the intention of supporting Indigenous self-determination and self-government and the dismantling of systems and structures that impede the realization of digital equity. In today's world, digital equity is a prerequisite to ensure full, equal, and just participation of Indigenous Peoples in all aspects of economic, social, cultural, and political life. As constitutionally protected rights holders in British Columbia, First Nations Peoples have the sovereign right to determine their digital destinies in alignment with their distinct worldviews, priorities, and self-identified needs.

The future is imagined into existence and Indigenous Nations hold powerful knowledges, perspectives, worldviews, and approaches that can be employed to ethically innovate technology and the technology sector. Since time immemorial, Indigenous knowledge, philosophies, protocols, and innovations have allowed them to live on their lands without destroying, polluting, or overexploiting the lands, waters, or other inhabitants. While predominant colonial perspectives have denied this rich history and have actively sought to prevent Indigenous Nations from employing their scientific approaches and technological innovations, Indigenous Peoples have continued to demonstrate through their adaptations of technology

that their cultures are dynamic, further demonstrating that their traditions, protocols, and worldviews can ensure the transmission of their values through the application of new forms of technology.

Digital technology can be enabled to support self-determination and self-government, and to realize a more ethical future. However, First Nations in British Columbia must be respected and recognized as equal partners and leaders in the development of policies, practices, and laws concerning digital technology. In addition, First Nations must be able to equitably contribute to the development, evolution, application, and advancement of digital technologies, and must have leadership roles within the technology sector.





## Responsible Storytelling and Providing Context

It is important to situate Indigenous stories and research findings within a framework of clear understandings of inequity, racism, and the historical and contemporary context of First Nations Peoples in British Columbia. Throughout Canada, mainstream narratives of Indigenous Peoples' lived experiences are often presented without the vital context that is necessary to appropriately make sense of the information that is provided. Oftentimes, information is gathered, interpreted, presented, and reported without the inclusion of context that directly links the historic and present-day impacts of settler-colonialism on the lived experiences of Indigenous people.

Decontextualized information can perpetrate harm by implicitly framing the socio-economic, political, and environmental disparity gaps that are experienced by Indigenous people as inevitable and unavoidable. As an additional consequence, this can simultaneously risk fueling the replication of abhorrent colonial narratives and racist stereotypes.<sup>43</sup> Further still, information devoid of context can also be used to inform decision-making where it can lead to the development of biased policies, approaches, and programs that inevitably fail to meet the self-identified needs of Indigenous Nations, communities, families, and individuals.<sup>44</sup>

Neglecting to include factual information about the realities of settler-colonialism risks allowing racist assumptions to endure about the causes of social, economic, and political inequity.<sup>45</sup> Indigenous people do not experience inequity because they are inherently or by some natural, cultural, or biological circumstance "vulnerable" or "marginalized." Settler-colonialism is the cause and driver of the inequities that they experience. It can never be assumed that Canadians will automatically understand the context within which Indigenous experiences of inequity have been created. This is largely due to public education systems, media, and government communications consistently failing to expose the public to a distinctions-based range of Indigenous voices, cultures, histories, worldviews, and present-day realities, or to comprehensive information about the effects of settler-colonialism.

Removing Indigenous information from Canada's historic reality as a settler-colonial state erases and fictionalizes Indigenous Peoples and serves the colonial agenda by masking the violence, erasure, and genocide that was committed in order to impose settler-colonial sovereignty over Indigenous lands. Omission of this context facilitates the continued reproduction of colonial violence and allows the Canadian government to avoid the costs of accountability for its actions. For these reasons and others, this section of the report aims to provide a more fulsome and grounded understanding of Indigenous experiences of inequity within the broader context of settler-colonialism.

## Inequity, Racism, and Settler-Colonialism

Inequity refers to the lack of equity, which means "fairness" or "justice." When inequity is experienced within a society, it indicates that injustice, unfairness, and bias are being systemically perpetuated through the unequal allocation of power and resources across lines of race, gender, class, sexual orientation, gender expression, and other dimensions of individual or group identity. Substantive inequity is the root cause of the socio-economic, political, and environmental disparity gaps that are disproportionately experienced by Indigenous Peoples. This is so because these inequalities are preventable, avoidable, and the direct result of discriminatory beliefs, behaviours, practices, and policies that were enacted to actively oppress, exclude, and dehumanize Indigenous Peoples in an effort to deny their inherent rights.

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43 John D O'Neil, Jeffrey Reading, and Audrey Leader, "Changing the relations of surveillance: The development of a discourse of resistance in Aboriginal epidemiology," *Human Organization* 57, no. 2, (1998): 230-7; Sarah de Leeuw, Margo Greenwood, Emilie Cameron, "Deviant Constructions: How Governments Preserve Colonial Narratives of Addictions and Poor Mental Health to Intervene into the Lives of Indigenous Children and Families in Canada," *International Journal of Mental Health and Addiction* 8, (2010): 282-295, doi:10.1007/s11469-009-9225-1.

44 Eve Tuck, "Suspending Damage: A Letter to Communities," *Harvard Educational Review* 79, no. 3 (2009): 415.

45 Maggie Walter and Chris Andersen, *Indigenous Statistics: A Quantitative Research Methodology* (New York: Routledge, 2013), 16.

Within Canadian society, there is a direct link between the history and experiences of settler-colonialism and Indigenous experiences of racism and inequity that continues to persist today. Of significant importance is the need to understand that settler-colonialism is a structure and not a historical event. It is entirely different from other forms of colonialism since settler-colonizers arrived with the explicit purpose of making a new home on Indigenous lands—which led to the violent imposition of settler-colonial sovereignty over their new self-declared domain.

Inevitably, racism and settler-colonialism are intimately intertwined. It was the Crown’s racist beliefs about Indigenous Peoples that justified the enactment of institutions, policies, and laws—including, but not limited to, residential schools, the child welfare system, Indian hospitals, and the Indian Act—which were employed to segregate, assimilate, and govern all aspects of the lives of First Nations Peoples in British Columbia to expropriate their lands for the Crown’s economic prosperity. As result, these beliefs have been embedded into every level of Canadian policy and law and continue to permeate across all spheres of the lives of Indigenous people. This is systemic racism, wherein acceptance of these discriminatory and prejudicial practices has become normalized throughout society and across generations. Its impacts can be readily observed in both the public and private sector and in many, if not most, associated services and institutions.

Systemic racism continues to compound and contribute to contemporary effects of settler-colonialism including, but not limited to, the obstruction of BC First Nations’ inherent rights to self-governance and self-determination, the lack of equitable access to resources and services, and the over-surveillance by both the criminal justice and child welfare systems.<sup>46</sup> Colonization, racism, social exclusion, and the lack of self-determination directly contribute to First Nations’ experiences of inequity in health care, housing, education, employment, food security, income, community infrastructure, environmental stewardship, cultural continuity—and digital technology.<sup>47</sup>

### **Understanding Digital Inequity**

Digital inequity has emerged as one of the most prominent forms of inequity today due to its ability to shape the futures of individuals, communities, and Nations in profound ways. From education to labour market success to entrepreneurship and health services, individuals, communities, and Nations that are best able to influence, navigate, and participate freely within the digital realm enjoy significant advantages over those who have been digitally excluded.<sup>48</sup>

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46 Charlotte Loppie Reading and Fred Wien, Health inequalities and social determinants of Aboriginal Peoples’ Health, Prince George: National Collaborating Centre For Aboriginal Health, 2009, [http://www.nccah-ccnsa.ca/docs/social%20determinates/NCCAH-loppie-Wien\\_report.pdf](http://www.nccah-ccnsa.ca/docs/social%20determinates/NCCAH-loppie-Wien_report.pdf); Francis Mitrou et al, “Gaps in Indigenous disadvantage not closing: a census cohort study of social determinants of health in Australia, Canada, and New Zealand from 1981–2006,” BMC Public Health 14, no. 1 (2014):1–9. doi:10.1186/1471-2458-14-201; Ken Coates, “The Indian Act and the future of Aboriginal governance in Canada: Research paper for the National Centre for First Nations Governance,” May 2008. Available: [http://fngovernance.org/ncfng\\_research/coates.pdf](http://fngovernance.org/ncfng_research/coates.pdf)

47 Charlotte Loppie Reading and Fred Wien, Health inequalities and social determinants of Aboriginal Peoples’ Health, Prince George: National Collaborating Centre For Aboriginal Health, 2009, [http://www.nccah-ccnsa.ca/docs/social%20determinates/NCCAH-loppie-Wien\\_report.pdf](http://www.nccah-ccnsa.ca/docs/social%20determinates/NCCAH-loppie-Wien_report.pdf)

48 Michael Gibbons, Digital Access Disparities: Policy and Practice Overview. Panel Discussion, Digital Skills and Connectivity as Social Determinants of Health; Sheon, A Conference Report: Digital Skills: A Hidden “Super” Social Determinant of Health: Interdisciplinary Association for Population Health Science, 2018.

The factors that contribute to First Nations' experiences of digital inequity are diverse, complex, evolving, and interdependent. Similar to the other forms of inequity, the fundamental cause is directly attributable to the long legacy of colonial practices and policies that fail to recognize and respect First Nations' rights to self-determination and self-governance. Digital inequity is the inevitable result of the Crown's failure to dismantle systemic racism and to eliminate the socio-economic, political, and environmental inequities that have been created by settler-colonialism. The denial of First Nations' right to equitably access, influence, and engage with digital technology through their exclusion from participating in the digital technology sector and from contributing to important policy conversations concerning the future of technology is a modern manifestation of Canada's legacy of settler-colonial policies, practices, approaches, and beliefs.

Systemic problems require systemic solutions, and digital inequity requires comprehensive, collaborative, and coherent action to shift governance, leadership, legislation and policy, education, and practice. First Nations-led solutions are needed to meaningfully address and ensure accountability to the unique and distinct needs and goals of First Nations people, families, communities, and Nations.



## 3.2 The BC Tech Sector at a Glance

### Demand for Tech across British Columbia

Understanding both Indigenous priorities for technology and the industries and economic priorities for each region of British Columbia is important for identifying alignment and opportunities to capitalize on those areas where the two meet through education, training, and other mechanisms.

This report uses several tools to assess demand for technology-related jobs in British Columbia, including a survey of relevant employers, job board data, and secondary data. Findings are examined from each of these data sources, first for the province as a whole, and in the next section for each economic region of British Columbia, before concluding with an economic forecast and discussion of trends in automation in the province. Detailed information on demand for technology-related jobs over the last two years in the BC technology sector, including trends of digitization and automation, is contained in **Appendix B**.

### British Columbia's Tech Sector

Technology in British Columbia offers a significant opportunity for well-paying jobs now, and into the future, for BC residents interested in the field. This is illustrated in many ways, including through the BC tech sector's performance relative to other provinces (it ranks third highest in performance in Canada, behind only Ontario and Quebec).<sup>49</sup> Furthermore, the BC tech sector has the highest five-year compound annual growth rate in the country at 8.1%, more than double the nationwide average of 3.3%, suggesting that its prevalence will only continue to grow.<sup>50</sup> In 2018, BC's tech sector contained nearly 10,000 companies and provided more than 123,000 jobs, and per-capita employment in this sector had increased by 17% from 2013, double the rate of Ontario and Quebec.<sup>51</sup>

The prevalence of technology-related work has also increased in British Columbia relative to other industries in the province, and in terms of salary. Between 2003 and 2018, BC's tech sector experienced a 70% growth of employment, ahead of eight other major sectors in the province and surpassed only by the construction sector.<sup>52</sup> In British Columbia, as is the case almost everywhere in Canada, tech jobs pay substantially more than the regional industrial average. In 2018, the wage premium for those in technological work in British Columbia was 79.4%, growing rapidly from 53.2% in 2008.<sup>53</sup> Weekly wages in BC's tech sector grew at a faster pace than the national average from 2008 to 2018.<sup>54</sup> In 2008, average weekly wages in British Columbia's tech sector were just above the Canadian average and below Ontario. However, the province's average tech wages are now well ahead of Ontario and are nearly tied with Alberta, which has the highest salaries in the country.<sup>55</sup>

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49 "2020 BC Tech Report Card," KPMG, November 2020, <https://assets.kpmg/content/dam/kpmg/ca/pdf/2020/11/bc-technology-report-card-en.pdf>.

50 Ibid.

51 Ibid.

52 Ibid, p. 22.

53 Ibid, p. 26

54 Ibid, p. 26

55 Ibid, p. 26

British Columbia's technology sector exhibits many other signs of vibrancy and growth. The economic output of its tech GDP grew at an average of 4.6% per year between 2013 and 2018, the highest of the province's 11 major sectors. Technology is the fourth-largest of the 11 major sectors of British Columbia's economy. Between 2008 and 2018, BC's technology sector went from being considerably less export-focused than the rest of Canada to nearly on par. Exports in 2018 constituted an all-time high of 43% of BC's tech sector GDP.<sup>56,57</sup>



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56 Ibid.

57 Dan Schrier, "Profile of the British Columbia Technology Sector: 2020 Edition," BC Stats, March 2021, [https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/industry/tech\\_profile\\_report.pdf](https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/industry/tech_profile_report.pdf).



British Columbia's technology companies overwhelmingly lean small—the threshold to be one of the largest 10% of companies in the province is 50 employees, compared to 100 for Canada as a whole or 500 for California (which has a population of just a few million more than Canada). Of over the 11,000-plus total companies in British Columbia's tech sector, only 22 (0.2% of total companies) meet the cut-off for "large business" in employing at least 500 people.<sup>58</sup> However, these statistics may say less about the tech sector's maturity than the fact that Canadian businesses in general lean small, particularly in tech. Only 0.2% of all businesses across all sectors in Canada employ at least 500 people.<sup>59</sup> While the tech sector has been growing rapidly despite a stagnation in the growth of large firms, KPMG noted that:

"An increase in the share of larger companies (anchor companies) would be more favorable as they are considered to play an important role in the development of a tech ecosystem. It is important to encourage the further growth and scaling of tech sector companies through the combined efforts of both private and public stakeholders."

### 3.3 Regional Profile Overview

Demand for technology-related roles is outlined for each economic region of British Columbia. Importantly, each of the seven economic regions analyzed includes a diverse range of Indigenous communities, institutions, and economies, as illustrated by the comparison between the economic regions and Indigenous language families below. Scholars have suggested that mapping Indigenous traditional territory produces "a very different spatiality than do the social relations and resource management."<sup>60</sup> Furthermore, the act of parceling regions and territories can be inherently colonial. While the regional profiles will utilize the economic regions of British Columbia to highlight talent-demand data, it is important to consider that Indigenous priorities for technology in communities across the province may not align with the borders used in this section.

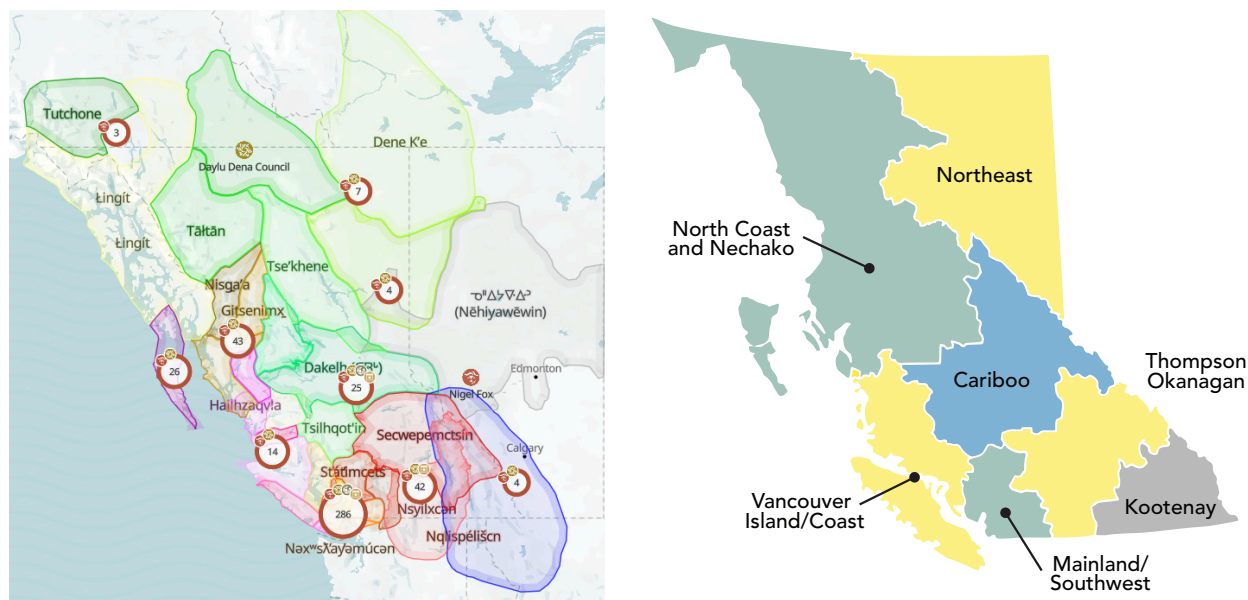


Figure 2. The 34 language families in what is now known as British Columbia (<https://maps.fpcc.ca/>) and the seven economic regions of British Columbia (<https://www.workbc.ca/labour-market-industry/regional-profiles.aspx>).

58 "2020 BC Tech Report Card," KPMG, November 2020, <https://assets.kpmg/content/dam/kpmg/ca/pdf/2020/11/bc-technology-report-card-en.pdf>.

59 "Key Small Business Statistics – 2020," Innovation, Science, and Economic Development Canada, 2020, [https://www.ic.gc.ca/eic/site/061.nsf/eng/h\\_03126.html#how-SME](https://www.ic.gc.ca/eic/site/061.nsf/eng/h_03126.html#how-SME).

60 Robin Roth, "The Challenges of mapping complex Indigenous spatiality: from abstract space to dwelling space," *Cultural Geographies*, 16, 2009: 207-227.

The seven regions of British Columbia are used by the BC government to map employment and project employment growth, summarized by the table below. In each of the following regional profiles, BC government labour market intelligence and job board data gathered by this project team are compared, alongside an economic forecast for job openings for key tech jobs in each region. This project's economic forecast includes both job openings due to **economic expansion** and openings due to **replacement of retirees** (see the two types illustrated in the table below). Even in regions with a low projected 10-year employment growth rate, many jobs will need to be filled as their current occupants retire. For most of the regions within British Columbia, the BC labour market outlook illustrates that the primary hiring industries are *not* the technology sector. Zooming in to examine job postings and then using those postings to guide a job opening forecast based on related occupations shows that while technology occupations comprise small portions of much of British Columbia, there are significant opportunities in particular areas of the province. Trends of economic diversification and change (to be addressed in subsequent sections) along with improved telecommunications infrastructure for remote workers could broaden access to in-demand technology jobs in particular areas of British Columbia while generating greater density of opportunities in others.

Region	Employment	10-year Employment Growth Rate Projection	Job Openings (2019–2029)		
	2019	2019–2029	Job Openings due to Economic Expansion	Job Openings due to Replacement of Retirees	Total Job Openings
Vancouver Island/Coast	402,000	0.9%	37,600	106,200	143,800
Mainland/Southwest	1,623,000	1.0%	177,300	371,300	548,600
Thompson-Okanagan	260,000	1.0%	27,300	68,300	95,600
Kootenay	72,000	0.7%	4,900	19,000	23,900
Cariboo	82,000	0.7%	5,200	16,200	21,400
Northeast	39,000	2.1%	9,500	8,400	18,000
North Coast and Nechako	44,000	0.3%	1,100	8,800	9,900
<b>British Columbia</b>	<b>2,521,000</b>	<b>1.0%</b>	<b>263,000</b>	<b>598,000</b>	<b>861,000</b>

Table 2: Labour market projections summary for the seven economic regions of British Columbia ([https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)).

Detailed profiles for each region can be found in **Appendix A**.



## 4.0 FINDINGS

The following section of this report outlines key findings from the research that have been organized into strategic areas of work required to achieve digital equity. Each strategic area begins with the First Nations Technology Council outlining how each of these areas is defined and understood by our organization, followed by a summary of related ILIT findings.

### 4.1 Connectivity and Infrastructure

*“We also are a fully remote company, so as long as you can get an internet connection, which I know, that’s also some issues around that. But if you do have an internet connection, you basically can live anywhere if you want to stay at home in your community to support your community, still have a great career living where you want to live.” – [Interviewee]*

#### Strategic Area Overview

Broadband connectivity, and the applications and services that it makes possible, has made connectivity a key determinant of the social, cultural, economic, and political well-being of Indigenous Peoples. In a world that is increasingly mediated by digital technologies, the lack of reliable, affordable, high-bandwidth internet denies Indigenous Peoples the ability to fully exercise their human rights and impedes the implementation of their inherent rights to self-governance and self-determination.

In 2020, the world embraced digital transformation at an unprecedented pace, highlighting technology’s critical role in how we live, work, and learn. While the COVID-19 pandemic rapidly illuminated the importance of equitable access to the internet, well before the pandemic’s onset access had already become widely acknowledged as an essential right. Recognizing the many ways in which the internet had become intertwined with culture, policy, law, and economics, the United Nations General Assembly passed a non-binding resolution in 2016 that called on states to adopt policies that provide universal access. From freedom of information to the right to education, personal development, adequate medical care, peaceful assembly, and the right to work, it is apparent that the internet has become one of the principal means by which individuals exercise many fundamental rights and freedoms.

Although Canadian law has begun to shift toward specifically recognizing Indigenous rights, the implementation of these rights has fallen well behind the pace of other human rights norms. As inherent rights and title holders in British Columbia, First Nations are in diverse states of nation-building and are engaged in efforts to rebuild their systems of governance, including their social, political, and economic institutions. When we consider the many ways in which individuals, families, communities, businesses, and governments depend on the internet on a daily basis, it quickly becomes apparent that connectivity has become a prerequisite for the translation of Indigenous sovereignty into effective governance in today’s digital world.



The internet enables societies to access and disseminate information, provide education, protect freedom of speech, maintain food supply chains, maintain social and cultural connections, create and share art, practice language and culture, create employment opportunities and support economic development, protect and maintain land borders, and engage in land stewardship practices. Indigenous experiences of inequitable access to the internet are further evidence of how the legacies of colonialism continue to be reproduced through discriminatory systems that fail to uphold their inherent rights.

Inequitable access to the internet and the infrastructure, hardware, devices, and supportive services that are needed to maintain it are the modern manifestations of the ongoing struggle for the recognition and implementation of Indigenous rights. The connectivity gap has become a critical impediment for the ability of BC First Nations to fully exercise their own laws and jurisdiction. There is an urgent need to implement a comprehensive, coordinated, and First Nations-led approach to accelerate progress towards ensuring connectivity for First Nations that supports self-determination and self-governance.

## Connectivity

Given the increasing ubiquity of internet use in Canadians' lives, in terms of where they work, consume, play, connect with others, and access services, broadband infrastructure is crucial for all Canadians to be full, active participants in the digital economy.<sup>61</sup> Yet, according to the International Telecommunication Union's ICT Development Index, Canada lags behind all but one of its G7 peers in areas including overall infrastructure, access "in remote and rural areas and funding to address these needs."<sup>62</sup> These digital inequities have significant implications for Indigenous people's access to technology opportunities in British Columbia, and therefore impact sections of the findings. However, they also influence many issues beyond the scope of this research.

While Canada has made progress towards universal access to broadband internet, there remain significant gaps and challenges for some people, particularly in terms of equality of access and infrastructure.<sup>63</sup> This has resulted in observable inequality gaps in the opportunities for individuals'—and communities'—"access to information and communication technologies (ICTs), and to their use of the Internet."<sup>64</sup> Simply put, many individuals cannot afford internet, or find that the internet they can afford features insufficient "quality, speed and size."<sup>65</sup> These gaps in access are intersectional as well. For example, the population in Canada that is most affected by unequal access to information and communication technologies is Indigenous women.<sup>66</sup>

In British Columbia, 94% of BC households have access to broadband speeds of 50/10 Mbps, the provincial target for internet speed. Despite this, only 40% of rural communities and 38% of rural Indigenous communities have access to the same broadband speeds.<sup>67</sup> One interviewee commented that "the process for advancing the [United Declaration on the Rights of Indigenous Peoples] is slowed as a result of the connectivity divide as Indigenous communities are disproportionately underserved

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61 Canadian Internet Registration Authority, "The gap between us: Perspectives on building a better online Canada," 2018 <https://cira.ca/resources/state-internet/report/gap-between-us-perspectives-building-a-better-online-canada>

62 Ibid.

63 Ibid.

64 "Digital Divide," OECD, n.d., <https://stats.oecd.org/glossary/detail.asp?ID=4719>

65 Canadian Internet Registration Authority, "The gap between us: Perspectives on building a better online Canada," 2018 <https://cira.ca/resources/state-internet/report/gap-between-us-perspectives-building-a-better-online-canada>

66 Ibid.

67 "Connectivity in BC," Government of British Columbia, n.d., <https://www2.gov.bc.ca/gov/content/governments/connectivity-in-bc>. While this data quickly confirms and points to the existence of the connectivity gap, it unfortunately does not provide a fulsome understanding of the full scope and scale of this inequity. There is a profound lack of disaggregated, equity-focused, and rights-based connectivity research, and current approaches to data collection and mapping fail to adequately account for the diverse lived experiences of First Nations people in British Columbia. While existing connectivity data is often perceived as being objective, universal, and accurate, there is serious cause for concern that existing measurement and mapping approaches oversimplify or misrepresent information related to First Nations experiences of connectivity.

from a connectivity perspective.” This suggests that although digital equity is not only about human rights, it is central to rights implementation. While Commitment 4.36 of the Declaration Act Action Plan commits the government to connecting all First Nations to high-speed internet services by 2027, government implementation of UNDRIP itself is failing by not ensuring digital equity as understood from an Indigenous perspective.

Digital inequity, already considered a pressing concern in Canada, gained further attention as a result of the COVID-19 pandemic, when education, health care, work, and even relationships took on a significant online dimension. Interviewees explained that the pandemic had reinforced attention to—and need for—improved connectivity: “This is something we hear about in just about every project we do is the lack of broadband as being a real barrier. And the pandemic has made this top of mind for everybody.”

Throughout our research, participants consistently returned to the topic of connectivity. The following sections detail how connectivity has significant implications for local economic development, limits employment opportunities and remote work for Indigenous people, and exacerbates digital inequity by disproportionately harming rural and remote communities. These problems are partly a result of market failures. While significant funding has been put towards improving connectivity across British Columbia, there remains room for improvement and more Indigenous-led connectivity initiatives.

Digital inequity, and specifically connectivity and broadband infrastructure, was repeatedly identified by interviewees, virtual session participants, and survey respondents as a key barrier—if not *the* key barrier—to advancing the prospects for Indigenous people in British Columbia’s digital economy:

*“Really, infrastructure is the biggest hurdle. It doesn’t even have to be that remote, right? There are plenty of areas across BC where the connectivity infrastructure is simply not there.” – [Interviewee]*

*“The number one would be internet connectivity. One hundred percent.”  
– [Interviewee]*

*“I see limited opportunities for technology due to the remote location of where we live. I have been working to get connectivity to my community for about a year.”  
– [ILIT survey respondent]*





Even when poor broadband infrastructure was not described by a participant as the most significant issue they could think of, it was regularly a source of frustration:

*“My band office often loses power because infrastructure is bad. We have been looking at moving to different power structures like solar power, other options, [but we have a] distinct issue in infrastructure and power.”*  
– [Community session participant]

*“You can’t believe how frustrating it is. You have a storm and you all of a sudden you lose Netflix or you lose the ability to actually use your cell phone for a period of time. It’s just super frustrating.”* – [Interviewee]

### **Connectivity is a key need for local economic development, but it is not the only way to combat digital inequity.**

Improved broadband penetration has been shown to directly improve a region’s economic growth.<sup>68</sup> Conversely, poor connectivity has negative impacts on the economy. The Federation of Canadian Municipalities notes that small and medium enterprises—which are typically the only enterprises in rural communities—are burdened by high costs and low quality of internet, limiting economic development at a community level.<sup>69</sup> Communities can remain stuck in a harmful feedback loop, as poverty and a lack of economic development also contribute to limiting connectivity. Less-affluent communities are not as appealing for ISPs, meaning that infrastructure development is less likely. As one interviewee noted, although broadband infrastructure is critical, it is just one among several pressing issues for many communities, including basic rights, poverty, and colonialism:

*“As far as connectivity and broadband, lots of communities aren’t connected, but . . . if water is not a priority, is broadband going to be a priority?”* – [Interviewee]

*“So, imagine that you and I can just wave a magic wand and now everyone’s got connectivity. Is that now going to solve the connectivity divide for Indigenous communities? Now we’re going to see a groundswell of students in computer science-like programs? I don’t think so.”* – [Interviewee]

68 Nina Czernich et al., “Broadband Infrastructure and economic growth,” *The Economic Journal* 121, no. 552, (2011): 505-532. <https://www.jstor.org/stable/41236989>

69 Deloitte, “Broadband for all: charting a path to economic growth,” 2021, <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/process-and-operations/us-broadband-for-all-economic-growth.pdf>

70 Federation of Canadian Municipalities “Broadband Access in Rural Canada: The role of connectivity in building vibrant communities,” 2014, <https://fcm.ca/sites/default/files/documents/resources/report/broadband-access-rural-canada.pdf>



Nonetheless, others suggested that broadband should be a priority as it has outsized impacts on a variety of community needs, from generating an emergency response in a crisis situation to day-to-day needs. In the words of project participants:

*“It’s absolutely essential. And you know, from an economic viability, sustainable resilience of our communities, public safety, communication . . . From every aspect, it’s absolutely essential.” – [Interviewee]*

*“In some First Nations communities who are remote or semi-remote do not have good WIFI connections and they need this for food, employment, health appointments and transportation.” – [ILIT survey respondent]*

When asked what opportunities they saw for technology in their community, about 16% of respondents (and 21% of rural respondents) suggested opportunities related to improving telecommunications infrastructure—the second-most-common response after only education related to technology. In part, the focus on infrastructure is because it is necessary across a range of community needs, such as health care, education, social services, and work—and because it is necessary across industries.

Some interviewees highlighted industries that depend on connectivity despite not being stereotypical tech industries:

*"[In the farming industry, there's] a system using technology and tracking cows and their breeding programs, things that are important to the ranching community. But you need connectivity to do it. And you need good connectivity, so you don't have that. Even the sale of animals, the sale of hay, the products that they produce, if they have connectivity, good connectivity out there, it just makes them so much more resilient." – [Interviewee]*

*"We run a sophisticated operation. So, we've got computers, we've got big software programs that we rely on technology to do. We're using technology all the time in forestry and tourism." – [Interviewee]*

Unequal access to the internet continues to hamper the ability of many to participate, producing gaps in terms of equality of access, infrastructure, and digital literacy.<sup>71</sup>

### **Improved connectivity could support Indigenous communities in finding and performing work and working remotely.**

Poor connectivity has a drastic influence on an individual's access to and experiences of work, thus impacting their ability to access employment supports, apply for jobs and find work, perform workplace tasks, and work remotely (or even work in their community). For example, when asked what technological advances had supported them or other members of their community in securing employment opportunities, about 41% of respondents suggested opportunities related to use or accessibility of the internet. Survey respondents in remote areas were less likely than urban respondents to be able to use the internet to apply for jobs (89% versus 95%<sup>72</sup>), as were respondents living on-reserve compared to those off-reserve (85% versus 96%<sup>73</sup>). Those living in remote communities were more likely to agree that their internet access is a barrier to accessing work (22% compared to 14% in urban areas) and developing tech skills (30% versus 14%).

71 Canadian Internet Registration Authority, "The gap between us: Perspectives on building a better online Canada," 2018, <https://cira.ca/resources/state-internet/report/gap-between-us-perspectives-building-a-better-online-canada>

72 95% confidence

73 95% confidence

Open-ended survey responses provided further detail:

*“Just the fact that our community has conferencing capability and zoom and Microsoft office capability helps our people connect more personally with employers.” – [ILIT survey respondent]*

*“One of the more useful services I’ve found is free public access to the internet. Normally I would go to the library for this, although that hasn’t been the most reliable the past couple years, plus they have a time limit. Having access to use a computer has been necessary for my resume building and job applications. I happened to get a job earlier this year, a portion of which requires some computer work. I had to spend money on a new laptop for this job. Another technological advance that’s crucial in securing employment is having reliable access to communication services, such as a cell phone or email.” – [ILIT survey respondent]*

*“Having access to internet to further my education so I can obtain a better job to support my family. Technology allows for me to see what potential jobs are available out there in our community and allows us to complete any of the necessary training to secure the jobs.” – [ILIT survey respondent]*

Similarly, survey respondents and interviewees suggested that a lack of internet access was a barrier to Indigenous students accessing education. Survey respondents sharing the internet with five or more people were less likely to be able to use the internet to participate in online education compared to those sharing the internet with two or less people (74% versus 88%<sup>74</sup>), as were respondents living on-reserve compared to those off-reserve (77% versus 84%<sup>75</sup>). Participants gave countless examples of how connectivity can support communities:

*“I am an Education Coordinator representing [a Nation]. Opportunities for technology would include better access to basic internet services for all community members so that they can more easily access education and training opportunities.” – [ILIT survey respondent]*

*“We’re so used to just put up the laptop and off we go, right? Living in a more populated centre. So I have any training I want at my fingertips whenever I want, any time of the day. Not all the communities, Indigenous and non-Indigenous, have that luxury where they can just dial in and have, you know, self-directed online training available or even pursuing opportunities to upgrade the current skill set...” – [Interviewee]*

Even for people who are employed, poor connectivity influences the tasks that they can perform and interferes with daily responsibilities. Survey respondents sharing internet with five or more people were less likely to be able to use the internet to work remotely compared to those sharing the internet

74 The number of people sharing internet acts as a proxy for quality of internet in a household. 95% confidence.

75 Less than 95% confidence.

with two or less people (70% versus 87%<sup>76</sup>). Previous research by the First Nations Technology and ICTC investigated internet speeds in First Nation’s band offices, finding that a significant proportion were below CRTC targets (see Figure 3). This is especially notable given that many communities only have a single physical internet access point available, which is reflected in the research findings. It was found that 40% of survey respondents living in remote areas access the internet at their band office, compared to only 12% of those in urban areas, while those in more remote areas typically also have less reliable service.<sup>77</sup>

Similarly, Elders and those living on-reserve were more likely to use internet at their band office than younger people and those living off-reserve.

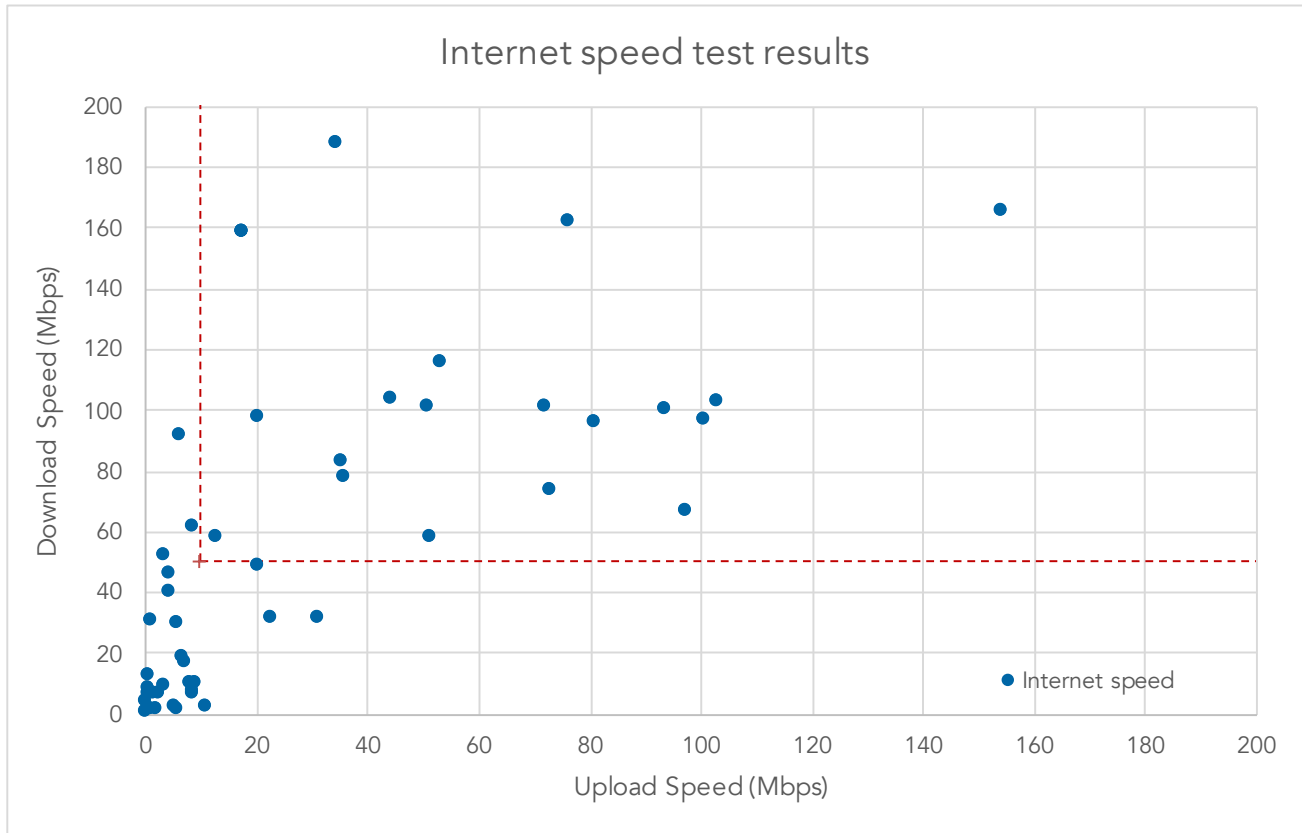


Figure 3. Results of internet speed tests in band offices in BC (BC BSDW Survey 2020, n = 50).

76 99% confidence.

77 99% confidence interval.

Interviewees expressed many challenges associated with working in regions with poor (or non-existent) connectivity, explaining that some work simply cannot be completed without connectivity:

*“I could be an expert web developer. I could be the best web developer in the country. But if I refresh a page on Google and it takes six minutes to load, I will never be able to accomplish what I could if I had access to the internet in a real way.”*  
– [Interviewee]

*“It would be nice if one day we have cell service here. When I’m working from home, and work calls come to my cellphone, I need to go into town to get messages, text messages, voicemails, calls. Having cell service would be amazing.”*  
– [Indigenous education session participant]

As a result of COVID-19, remote work has become far more common, with an estimated one-third of Canadians working remotely at the beginning of 2021.<sup>78</sup> While the increasing commonality of remote work has potentially significant benefits for many Indigenous communities, it cannot be capitalized on if connectivity infrastructure is inadequate. In the words of one employer:

*“We do have listed on our criteria of our job description that you have to have access to the internet. Yeah, because without it, you can’t work.”* – [Interviewee]

Before the COVID-19 pandemic, 80% of employed survey participants worked mostly in-person. During the pandemic, this number dropped to 44%, with 48% of employed participants working from home. However, most people (59%) felt that they would likely go back to work in person after COVID-19 was over, with 21% unsure.

**Rural and Indigenous communities suffer the most from a lack of connectivity even though it has the potential to strengthen them significantly.**

Poor connectivity is more common in rural, northern communities and/or Indigenous communities—all areas where there is less incentive for internet service providers to develop infrastructure that supports connectivity. As a result, unequal access to the internet takes on a geographic form. One interviewee outlined the issue clearly:

*“A lot of the northern communities are really not given the priority that they need to be given. I think, you know, even just thinking about resources in schools, kids are so behind because they don’t have the connectivity that they need, they don’t have the hardware as well, that they need to keep up at the pace that, say, the kids in Vancouver are being given.”* – [Interviewee]

78 Tahsin Mehdi and Rene Morissette, “Working from home: Productivity and preferences,” Statistics Canada, 2021, <https://www150.statcan.gc.ca/n1/pub/45-28-0001/2021001/article/00012-eng.htm>



Overall, survey respondents in remote communities and even rural and suburban communities were far less satisfied with their internet than those in urban communities (see Figure 4). **Recalling the associated research limitation of conducting the survey primarily through an online format due to the limitations of COVID-19, we, therefore, should recognize that the findings may not be representative of the experiences of all rural and remote Indigenous communities and their ability to access the internet.**

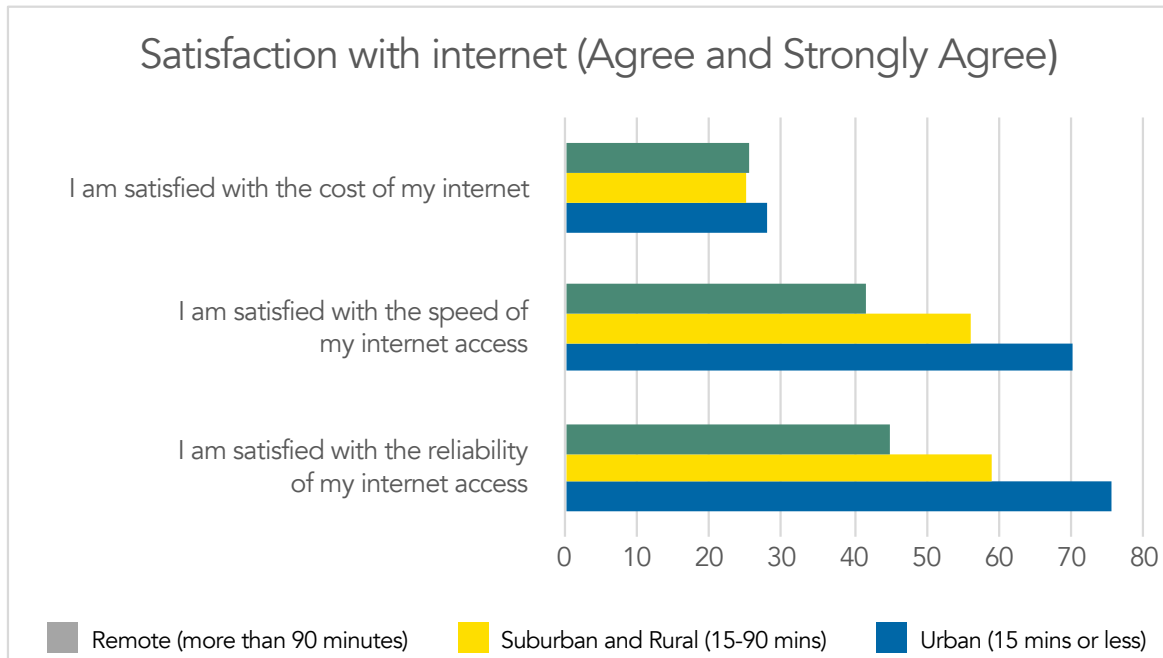


Figure 4. ILIT survey respondent internet satisfaction.

A lack of connectivity can also lead to less community interest in tech, and thus less demand for improved connectivity. As one interviewee put it, “Tech is not a huge thing in the rural communities because first of all, a lot of them have very poor connectivity. So, they’re not even able to organically, you know, absorb the cyber world.” Nonetheless, many rural communities have a strong desire for connectivity. Many interviewees were excited about the potential for connectivity (and remote work) to strengthen local ties, maintain connection with community members outside of the region, and even keep people from leaving the community to seek work.

*“I have noticed with some job descriptions that there’s more flexibility now working from home or working remotely. Which is really positive for some of our Indigenous communities that have to take a ferry to come to work or to travel 30 to 45 minutes in the town.” – [Interviewee]*

*“One of the things about a lot of the more remote communities: they don’t want to leave their community; they want to be actually trained for jobs that they can actually do in the community. And I think that’s where the tech sector actually has a great opportunity to be able to train people that can actually work remotely.” – [Interviewee]*

*“The availability of growing technology has supported urban membership to connect with our home communities. The technology still needs a lot of work and the reserve still needs better access to Wi-Fi, but it is a start with so much room to grow.” – [ILIT survey respondent]*

*“Internet has been a basic living need for our youth and elders, creating an opportunity to connect the two groups, along with providing access to learning culture and for work development skills.” – [ILIT survey respondent]*

With the increase in remote work opportunities due to the COVID-19 pandemic, many ILIT participants (12%) saw an opportunity for remote work in-community and on-reserve. However, for some, internet access was still a barrier. For others, remote work was possible, but most noted that better awareness, infrastructure, and partnerships between Nations and business would help communities and individuals take full advantage of the potential for remote work.

*“I see economic opportunities created if there is technology for my community. Jobs that can be done remotely. Online businesses and connecting with the world via technology.” – [ILIT survey respondent]*

### **Rural and Indigenous-led responses to limited broadband infrastructure offer potential.**

Broadband infrastructure is limited because of a lack of investment in Indigenous communities,<sup>79</sup> market failures, and limited competition, but Indigenous-led responses could provide unique solutions. As one research participant noted, broadband infrastructure is further limited by framing Indigenous Peoples as “stakeholders” rather than “rightsholders.” Organizations like the Digital Justice for BC Working Group contend that Indigenous sovereignty under UNDRIP includes “spectrum sovereignty,” or Indigenous leadership “in decisions related to Internet infrastructure both on and off-reserve.”<sup>80</sup>

In rural communities, the need for broadband infrastructure and the mechanics of supplying it are no different from larger communities. Unfortunately, the economics are more complicated. In Canada, developing connectivity infrastructure is primarily the domain of private business—one that is typically performed by large internet service providers (ISPs). For these companies, the cost of infrastructure development is not worth the profit it would generate, simply because rural communities do not have enough people paying for internet services. As such, a market failure occurs. People want a service, yet ISPs cannot make a profit by providing it. As one interviewee described:

*“The service providers are not in the service provision business. They’re in the stakeholder return business. We’re mistaking that; we’re looking at Telus or Rogers or Bell and we’re like, ‘Well, they’re the service providers, they should come in and provide service.’ Well, that’s the accident by which they’re providing their stakeholders the return. If there was a better return in selling bananas, they would get into the banana-selling business.” – [Interviewee]*

79 Emma Greenfield, “Digital Equity for Indigenous Communities,” Samuel Centre for Social Connectedness, July 7, 2020, <https://www.socialconnectedness.org/digital-equity-for-indigenous-communities/>.

80 Kate Murray, “Digital Equity in Access to Justice: A Review of Literature,” May 2021. <https://legalaid.bc.ca/sites/default/files/2021-07/KMurray%202021%20ADE%20Literature%20Review-Full%20Report-FINAL.pdf>, p. 84.

Furthermore, Canadian ISPs face minimal competition, especially in rural communities.<sup>81</sup> This means that if they do provide services, they can easily charge high fees and provide low-quality internet without losing business. When the larger companies do not provide services in rural communities, what often happens is that smaller, local ISPs pay “wholesale rates” to the larger ones to access their networks.<sup>82</sup> Then, they resell that access to consumers. Either way, limited competition has consolidated further in recent years, and was furthered when the CRTC—the agency that regulates ISPs—reversed a decision to reduce wholesale rates.<sup>83</sup> Interviewees highlighted concerns about reduced competition:

*“We would like to see some other partners come to the table in terms of provision of those services. That’s not been the experience. In fact, the number of players that play in this particular field is actually trying actively to reduce. So, the one small company that did offer services in much of rural British Columbia, ABC Communications, was bought by Telus a few months ago, maybe a year ago. And then, of course, there’s the Rogers and Shaw deal that’s kind of floating around that’s going to further restrict.” – [Interviewee]*

*“Because of the poverty in the area, there aren’t actually a lot of folks who could feasibly pay for internet. So there is one single provider and that single provider gouges because they’re the only option.” – [Interviewee]*

Government funding has been proposed to solve this market failure. There remains a question, however, about what specifically that funding should target. Some suggest that it could be used to incentivize the major telecommunications companies to provide rural services:

*“There’s a lot of incentives that could be used by government to get companies like Telus and CityWest to actually go into these areas that I think are missing some opportunities as well, too, right? There are some ways that you could incentivize the private corporations to actually help out more than what they’re doing. And that’s not being done.” – [Interviewee]*

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81 Canadian Radio-television and Telecommunications Commission, “Communications Monitoring Report 2019,” 2019, <https://crtc.gc.ca/eng/publications/reports/policymonitoring/2019/cmr2.htm#a4.2>

82 CRTC recently decided not to lower these rates. <https://nationalpost.com/news/politics/crtc-flip-flop-on-wholesale-internet-rates-could-mean-higher-prices-for-consumers-critics>

83 David Paddon, “CRTC scraps plan to mandate lower wholesale internet rates,” CBC, 2021, <https://www.cbc.ca/news/business/crtc-fibre-internet-1.6043109>

Others suggest that communities themselves should receive that funding, that preferential access could be provided to Indigenous ISPs, or that smaller ISPs should have fewer barriers to participation in spectrum auctions (in which ISPs bid for access to finite wireless frequencies). Local initiatives to provide connectivity would offer an element of self-determination and autonomy for some Indigenous communities. Rob McMahon et al. describe the First Mile approach to broadband connectivity, which “argues that first and foremost, decision-making about broadband development must be grounded in and emerge from the specific needs of local communities.”<sup>84</sup> Local service providers may also receive support from the community:

*“I’m not sure that the big telcos are ever going to have a business case to do anything out in those rural areas. And if there were local solutions, I think people would probably welcome that as long as it was reliable and reasonable . . . the First Nations have a pretty good opportunity, in my view, to provide that service in a subregional way. That would be the one change I would like to see.” – [Interviewee]*

### **Existing funding, projects, and developments related to connectivity are significant but still leave room for improvement.**

Several initiatives exist to improve connectivity in rural and Indigenous communities. The Connecting British Columbia program has provided approximately \$190 million since 2015 to fund connectivity infrastructure development in rural British Columbia, while the program is administered by the Northern Development Initiative Trust.<sup>85, 86</sup> At the same time, the CRTC has developed the Universal Broadband Fund, supported by \$750 million over the course of five years, “to build or upgrade access and transport infrastructure to provide fixed and mobile wireless broadband Internet access services in eligible underserved areas of Canada.”<sup>87</sup> The Rural and Northern Communities (RNC) Program, funded by the provincial and federal governments, provided up to \$95 million to infrastructure projects in the province, including for broadband infrastructure.<sup>88</sup> In total, funding already committed to rural broadband projects in British Columbia is greater than \$212 million (see Figure 5). Despite the funding, not everyone feels that it is sufficient:

*“Most of the Indigenous communities, especially the ones up north, they don’t control the economic factors that they have. So it isn’t within their control, it’s within Indigenous Affairs . . . and they have not provided and directed enough money into actually putting the infrastructure in that’s needed for good and strong connectivity.” – [Interviewee]*

84 Rob McMahon et al., “Digital Divides and the ‘First Mile’: Framing First Nations Broadband Development in Canada,” *The International Indigenous Policy Journal* 2, no. 2, 2021 <https://ojs.lib.uwo.ca/index.php/iipj/article/view/7346/5990>

85 Northern Development BC, “Connecting British Columbia,” 2021, <https://www.northerndevelopment.bc.ca/funding-programs/partner-programs/connecting-british-columbia/>

86 “Report at a Glance: Update on the Connecting British Columbia Program,” Office of the Auditor General of BC, [https://www.bcauditor.com/sites/default/files/publications/report-at-a-glance/OAGBC\\_Connecting-British-Columbia-Program\\_RAAG.pdf](https://www.bcauditor.com/sites/default/files/publications/report-at-a-glance/OAGBC_Connecting-British-Columbia-Program_RAAG.pdf)

87 Canadian Radio-television and Telecommunications Commission. “Broadband Fund: Closing the digital divide in Canada.” <https://crtc.gc.ca/eng/internet/internet.htm>

88 The funding recipients and exact proportion of funds allocated to broadband projects was not available. “Investing in Canada Infrastructure Program - British Columbia - Rural and Northern Communities Infrastructure,” Government of British Columbia, accessed October 2021, <https://www2.gov.bc.ca/gov/content/transportation/funding-engagement-permits/funding-grants/investing-in-canada-infrastructure-program/rural-northern-communities>

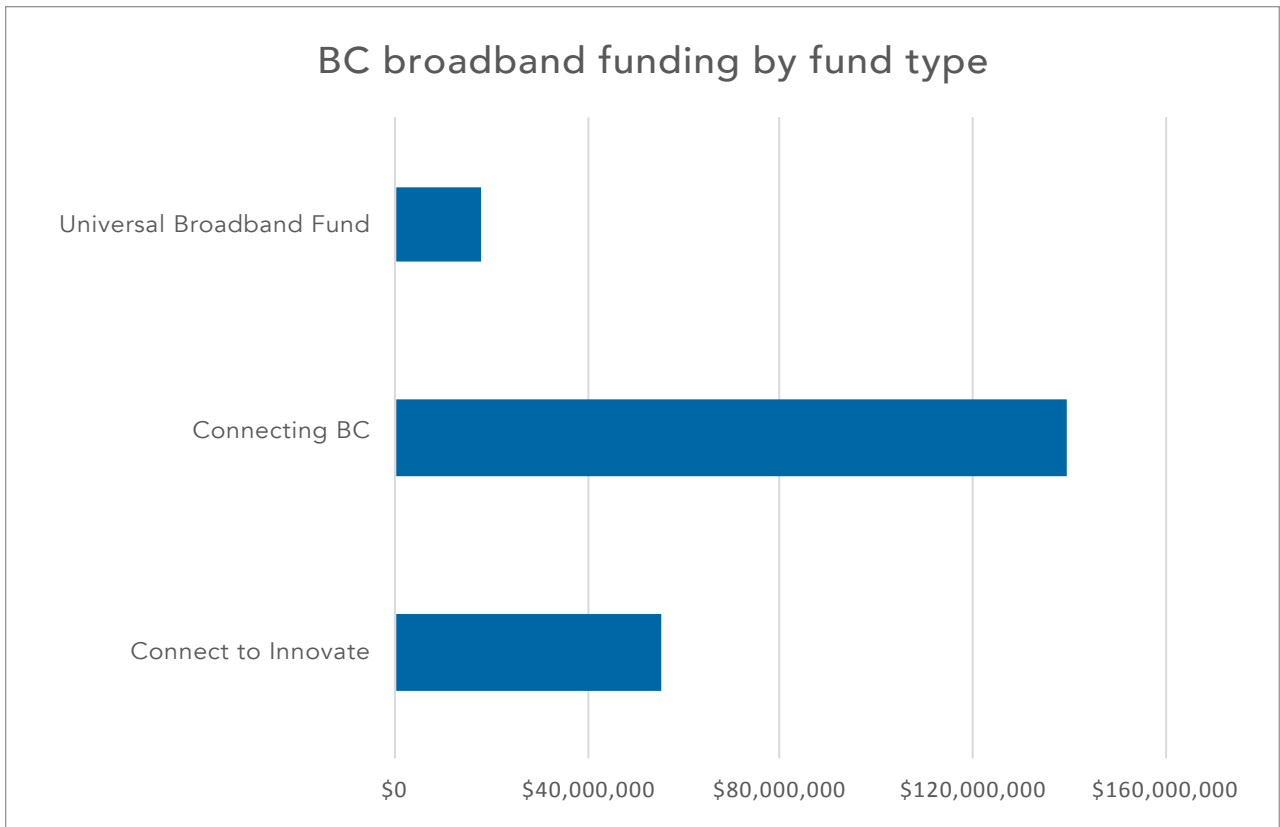


Figure 5. BC broadband funding.

There are also questions regarding whether this type of spending is the most effective way to improve rural infrastructure. As one interviewee suggests:

*“Grant programs tend to be a poor intervention mechanism . . . as applicants need to have the administrative capacity and capability to craft proposals to compete for limited funding. This competition inherently favours more densely populated communities, which have more resources and administrative capacity to compete for grants.” – [Interviewee]*

While the CRTC notes that the Universal Broadband Fund is provided by Canada’s largest telecommunications companies instead of tax dollars, the entirety of the \$17.6 million it has distributed in British Columbia thus far has gone to either Telus or Rogers. Approximately half of all three major connectivity funds (\$105 million) has been allocated to the province’s three biggest ISPs: Telus, Shaw, and Rogers (see Figure 6).

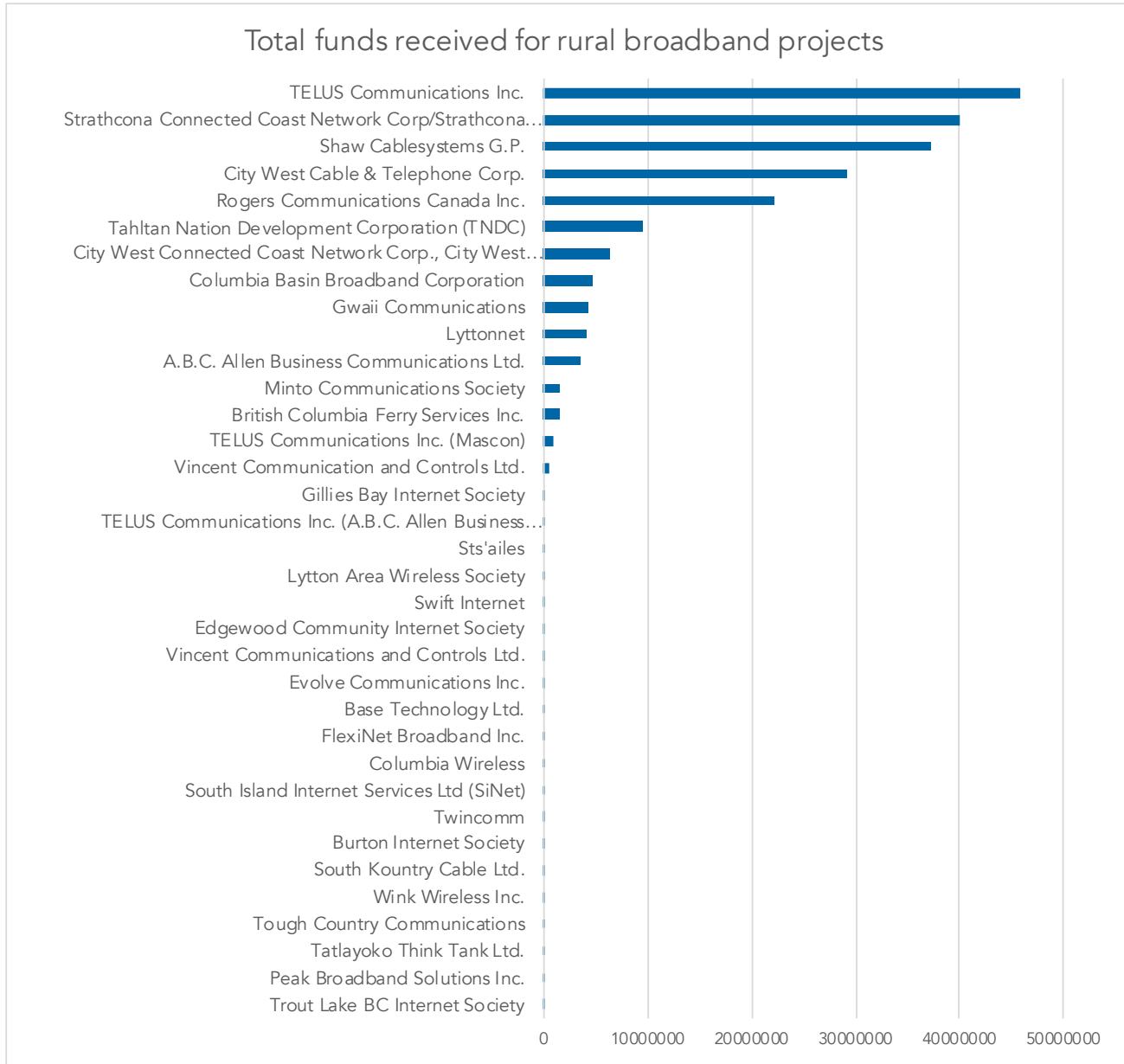


Figure 6. Total funds received for broadband projects, BC.



A portion of this funding has supported larger regional projects led by communities or coalitions of smaller organizations, more in line with what Rob McMahon et al. call the First Mile approach. Initiatives of this type serve to confront what some see as the most significant barrier to improving connectivity: coordination challenges, whereby rural connectivity advocates have no shared forum or movement to advance their efforts. Most prominently, the Connected Coast project aims to bring “high-speed Internet accessibility to rural [and] remote communities along coastal BC, Haida Gwaii [and] Vancouver Island,”<sup>89</sup> including for 48 First Nations communities. The project will use underwater fiber-optic cable, but will not provide “last-mile” connectivity infrastructure connecting particular communities to the main route. It is being carried out by CityWest and the Strathcona Regional District, supported by \$45 million from the federal government’s Connect to Innovate program, Indigenous Services Canada, and BC’s Connecting British Columbia program.<sup>90</sup> The project was described by one interviewee as “a hugely significant project and a hugely significant opportunity for Indigenous communities along the coast.”

Additionally, the Pathways to Technology project (managed by the All Nations Trust Company and funded by the provincial and federal governments) also works to connect First Nations communities with high-speed internet. To date, they have supported the provision of broadband infrastructure in 73 communities.<sup>91</sup> One survey respondent described the program’s impacts:

*“Simply having high speed internet access helps tremendously, and this was only possible in recent years with the Pathways to Technology grant that allowed us to upgrade our internet infrastructure. This allows us to quickly inform members with social media and email lists, as well as assist members with applying for jobs online.” – [ILIT survey respondent]*

In addition to funding and community-led initiatives, one potential way to improve connectivity is through technological development. Many interviewees and survey respondents raised the possibility of various technologies to influence connectivity. While several survey respondents highlighted hopes for 5G infrastructure, one interviewee was pessimistic about its impact, stating: “5G is not the solution. No matter what the fanfare says, it’s an urban phenomenon, not a rural thing. It’s going to increase the divide.” A number of research participants had purchased or were planning on purchasing Starlink, which is owned by SpaceX; it provides connectivity by way of satellites and does not require traditional broadband infrastructure. If new technologies facilitate inexpensive, high-quality connectivity, the digital divide could be shrunk. As of yet, there are no guarantees that the technology (or low prices) is enough.

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89 Connected Coast, “Bringing high-speed Internet accessibility to rural & remote communities along coastal BC, Haida Gwaii & Vancouver Island.” <https://connectedcoast.ca/>

90 Ibid.

91 Pathways to Technology, “About,” n.d., <https://www.pathwaystotechnology.ca/about>

## Physical Access to Opportunities: The Urban–Rural Divide

The urban Indigenous population in British Columbia (which refers to Indigenous people living off-reserve) represents “well over 60% of the province’s Indigenous population.”<sup>92</sup> BC has the second largest off-reserve Indigenous population of any province in Canada, and the urban Indigenous community consists of a vast cultural and linguistic mix of Canada’s 612 different First Nations, Inuit, and Métis Peoples. The diversity of the off-reserve Indigenous population differs from on-reserve First Nations communities, which are often more homogeneous and typically consist of one Nation.<sup>93</sup> Moreover, urban migration has “continued with groups of Indigenous people moving into urban areas for various reasons including education, career, personal or social opportunities.” For example, in 2006, the Indigenous population in Vancouver had increased by 132% within the last 20 years, while over the same time period the Indigenous population in Canada as a whole had only increased by approximately 22%.<sup>94</sup> One respondent commented on the challenges of connectivity in an urban environment during the pandemic:

*“In Vancouver growing up, not an issue in terms of strength, it was the cost. Something that came up in pandemic, one family member got COVID and wasn’t able to work and not able to apply for coverage for bills and his [contact] tracer called him so often that he no longer had cell phone service because [he] ran out of minutes. Ran out internet, no phone minutes and quarantined, and we found out and dropped groceries off and could help him out but [it] was a stressful situation. Brought to light how lucky we are to be able to pay month to month. A good reminder that [this] might be affecting more people and affecting people in the inner city. The cost of this is not a leisure bill, a strict requirement that we all have. That’s a concern too.” [Community session participant]*

The off-reserve demographic throughout British Columbia is only projected to increase, as the Indigenous population remains the fastest-growing population group in the province.<sup>95</sup> Nonetheless, it is worth noting that there remains a significant overlap between those living in remote areas and those living on-reserve: nearly two-thirds (64%) of ILIT survey respondents living in remote areas live on-reserve.

Living on-reserve or in remote areas can lead to vastly different experiences, circumstances, and perspectives, some of which were hinted at in survey responses. Survey respondents in remote areas or on reserves were more likely to report facing travel barriers, difficulty accessing tech, and a range of employment barriers. In the words of one interviewee:

*“The economic and infrastructure disadvantage for anybody north of Prince George is huge, and it’s the same for anyone whose community is on an island.”  
– [Interviewee]*

92 Statistics Canada, “2006 Aboriginal Population Profile for BC,” 2006, <http://www12.statcan.gc.ca/censusrecensement/2006/dp-pd/prof/92-594/details/page.cfm>, in BC Association of Aboriginal Friendship Centres, 2010 Indigenizing Outcomes Measurement: A Review of the Literature and Methodological Considerations, 2010, [https://thesummerinstitute.ca/wp-content/uploads/indigenous\\_measurement\\_lit\\_review.pdf](https://thesummerinstitute.ca/wp-content/uploads/indigenous_measurement_lit_review.pdf). P. 4

93 Lynn Lavallée, “Practical application of an Indigenous research framework and two qualitative Indigenous research methods: Sharing circles and Anishnaabe symbol-based reflection,” *International Journal of Qualitative Methods* 8, no. 1: 2009:21-40.

94 BC Association of Aboriginal Friendship Centres, “Executive Summary: Discussion paper on Aboriginal people in urban areas,” 2007. Available from BCAAFC, #200–7725 Tetayut Road, Saanichton, BC V8M 2E4.

95 Statistics Canada, “Projections of the Aboriginal populations, Canada, provinces and territories 2001 to 2017,” in BC Association of Aboriginal Friendship Centres, “Indigenizing Outcomes Measurement: A Review of the Literature and Methodological Considerations,” 2010, [https://thesummerinstitute.ca/wp-content/uploads/indigenous\\_measurement\\_lit\\_review.pdf](https://thesummerinstitute.ca/wp-content/uploads/indigenous_measurement_lit_review.pdf). P. 4.

First, those living on-reserve are more likely to report a range of barriers to getting to the nearest town or city. This included weather and road conditions (61% of on-reserve respondents versus 34% of those off-reserve), access to transportation (61% versus 40%), cost of travel or accommodation (61% versus 46%), lack of childcare (43% versus 25%), and fear of racism in towns or cities (59% versus 43%).<sup>96</sup> Barriers were more significant for those in remote areas than those in suburban and rural areas, and far more significant than for those in urban areas (see Figure 7).

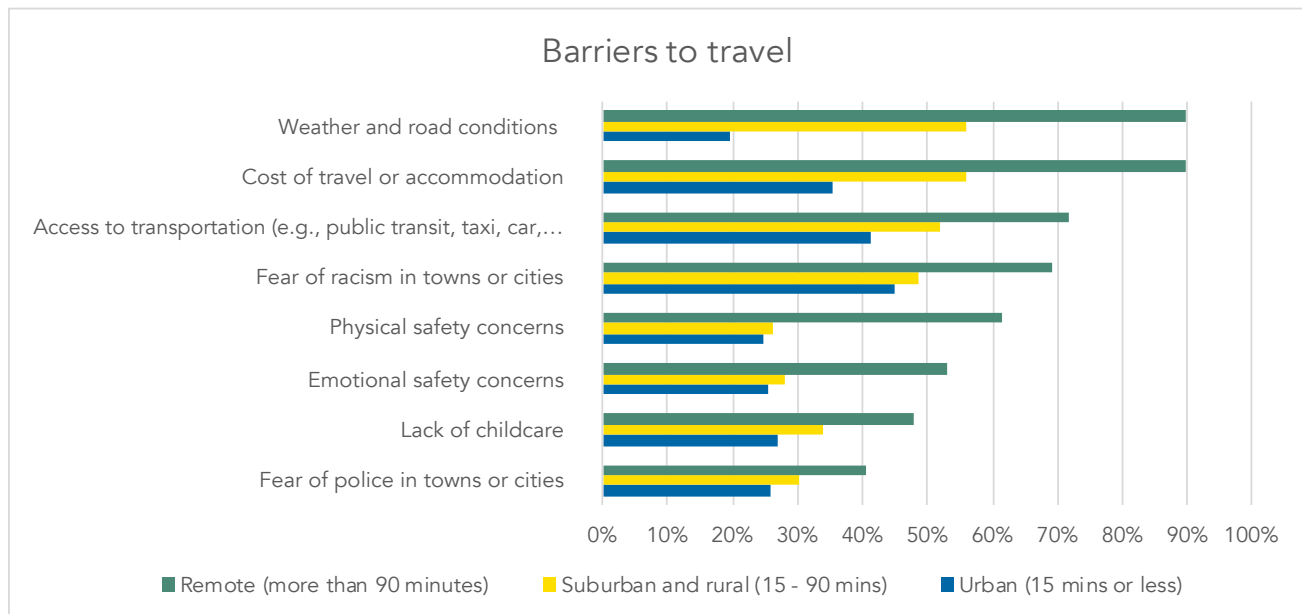


Figure 7. Barriers to travel, ILIT survey.

Additionally, those living in remote or rural areas were less likely to be able to use their internet connection for most purposes, compared to those in urban areas. The same was found for those living on-reserve, relative to those living off-reserve. Respondents in remote or rural areas were also less satisfied with the reliability, speed, and cost of their internet compared to those in urban areas. As respondents indicated, limited technological connectivity had wide-reaching influences:

*“Near [region name], only couple options for us for internet. I think there is two companies and very expensive and your WiFi is not that great and not cheap. And same, in which does happen, does happen when power goes out and if the power goes out most people there has no phones, because everyone has plug-in cordless. Power out, no communication in most of the homes.” – [Community session participant]*

*“The problem with that, though, especially far-out communities is sometimes no internet for a week or hydro or electricity coming through for three days because a windstorm. The downfall in community is being able to keep community going and bandwidth for everyone who needs it and even having electricity to be able to do your job. My daughter comes home to visit and there are times where I cringe. I want her to come home more often, because she works virtually; I just don’t know if we can offer that to her so she can spend a week at home and still do her job. Different in north than in Vancouver area or wherever else. But yeah, it’s challenging.” – [Community session participant]*

96 All 99% confidence.

*“For where I work, we’ve been pushed into communication through Zoom so it’s an expectation that even to get together for a board meeting, but on the other end, people don’t have access to a laptop to connect so there’s a barrier there. They have to have a good laptop to connect to our meeting. Like right now, I have a good laptop and I’m connected to you guys. And if we have a room for a board meeting, we need a great big screen for everyone to see so we have that barrier that we are working towards to be better. To host an AGM. That’s been a real challenge for us. So, I think we need a computer in-house tech—we have 40-plus employees. Funding is another barrier—where do you get funding? So it’s equipment and the learning curve to be on the other end. The pandemic has forced us to communicate by Zoom. We like it but there’s barriers.” – [Community session participant]*

Remote or reserve status also influenced experiences related to employment and training. For example, individuals living on-reserve were more likely to be working in-person during the COVID-19 pandemic (54% versus 34% of off-reserve respondents), and more likely to be doing so after the pandemic (71% versus 48%).<sup>97</sup> Remote respondents were less likely to report having tech skills in nearly all 13 areas (such as data analytics and GIS technology) compared to suburban and urban respondents, but they were also more often interested in developing skills in those areas. Notably, more than one-third (35%) of remote respondents said they would like to work in the field of ICT products and services, compared to only 13% of urban respondents.<sup>98</sup>

Those in remote areas were less aware of training or tech opportunities (76% versus 61% of urban respondents).<sup>99</sup> They were also more likely to experience employment barriers including: living in a place with few work opportunities (78% versus 36% of urban respondents), having limited access to transportation (47% versus 20% of urban respondents), and having no adequate place to work from (41% versus 22% of urban respondents).<sup>100</sup> Those living on-reserve were also more likely than those off-reserve to face these barriers. Those in remote areas were also slightly more likely than those in urban areas to report employment barriers related to racism.

## Access to Hardware and Devices

*“I’ve taken a few courses because they were funded and because remote access was accessible. As well as support for having access to the hardware I needed. I personally didn’t need that in that moment, but they were making sure I had a computer in order to access it. Those two or three things were pretty key.”  
– [Community session participant]*

97 99% confidence.

98 99% confidence.

99 99% confidence.

100 All 99% confidence.



Alongside access to connectivity and infrastructure, it is important to discuss access to the hardware and devices needed to make use of the digital world. Trends were seen with different types of hardware across age. While access to desktops, laptops, and tablets increased with age (i.e., 77.1% of respondents under 30 had access to a laptop compared to 91.7% of those over 60), people 60 and over were most likely to report lowered access to a smart phone (i.e., 10.3% of respondents over 60 did not have access to a smart phone compared to 2.0% of those under 30 reporting no access to a smart phone).

- 68.9% of ILIT respondents had a tablet at home, though youth under 30 were less likely to have access to a tablet. Respondents 50 and over were more likely to have access to a tablet.
- 96.7% of ILIT respondents had access to a smart phone, though 10.3% of respondents over 60 did not have access to a smart phone.

Some respondents spoke about the impact of having access to hardware and devices on their learning, training or education programs, and job search:

*"A good start for me was when I received a free laptop but didn't have WiFi, just started going through everything I could without WiFi. You learn everything ins and outs to do that." – [Interviewee]*

*"I received a Chromebook from my Band and it has helped me keep up to date with not only school but also job search and resume building. The social development department uses computers, social media, and phone calls to help community members find work. Chromebooks we're distributed as part of covid relief during lockdown. Families received free Chromebooks in order to keep up with online learning. These are a few off the top of my head but I'm sure there's more." – [ILIT survey respondent]*

*"I know that a couple programs that I know of, so one of them being a VR program, requires a computer or a laptop that has the capability of being able to handle the data that can handle VR. So, one of the things they've done is purchase the laptops and lend them out because they know that it is one of the barriers. So, people can learn something new but they have the ability to ship it back when they're done." – [Community session participant]*



## 4.2 Skills Development

### Strategic Area Overview

The rapid and continuous development of digital technology has become a major driving force behind the growth and development of the modern economy. Technology's impacts, however, extend well beyond the labour market. This has made digital skills development essential to protecting and upholding the human rights of Indigenous Peoples and to futureproofing the implementation of their inherent rights. In today's digital world, individuals, communities, and Nations are put at an immediate disadvantage when they lack access to and/or are unable to provide high-quality education and training that supports the development and maintenance of digital skills and literacy.

Digital skills and digital literacy are widely recognized as key determinants of socio-economic well-being and community development. The penetration of digital technology into every area of human endeavor has left individuals with little to no choice in the adoption of technology for their personal empowerment. Digital skills and literacy have become basic requirements for every person so that they may participate fully in a rapidly digitizing global society. From work to school, health care, and political engagement, the widespread adoption of digital society discriminates against those who lack the skills that are needed to access information, programs, supports, and vital services that are often exclusively accessible online. While the benefits of digital technology can be harnessed in every sphere of socio-economic development, including education, employment, health, and environment, a lack of digital skills and literacy effectively denies Indigenous people their ability to exercise their human rights. However, it should be noted that this lack of skill is systemic: it is intricately connected to the historic and contemporary impacts of colonization and is a continuation of the long legacy of discriminatory educational policies, practices, and approaches.

Digital skills and literacy also have direct implications for Indigenous self-determination and self-governance, which are critical for the survival, health, and well-being of Indigenous people. In British Columbia, many First Nations are undertaking efforts to rebuild their Nations, institutions, laws, and governments through both sectoral and comprehensive governance initiatives. As a part of this Nation-rebuilding process, their communities need digital skills and digital literacy training opportunities to support their Nation's governance capacities and realize their communities' self-identified goals. Without a resilient, local talent pool, First Nations also risk missing out on supporting upcoming generations of potential leaders that could assist in shaping and innovating novel technology-supported approaches to good governance.

Access to digital technology without the digital skills and literacy to adopt them, influence them, or create them will fail to meaningfully address the digital inequities that Indigenous people experience. There is a need for relevant high-quality digital skills training, internships, and education that is grounded in Indigenous worldviews, knowledge, and perspectives that support lifelong learning. There is no opportunity to circumvent digital technology anymore, and the issues of systemic inequality and exclusion that are inherent to Canada's modern social fabric are bound up in it. Digital skills and literacy are essential to lifelong learning, and access to digital skills and digital literacy education should be understood as a cornerstone of the right to education.

### Education and Training to Support Indigenous Leadership in Technology

Education is essential to fostering Indigenous leadership in technology, but it must be designed and implemented in a good way. This section begins by examining data on Indigenous representation in the BC school system, as well as findings from the ILIT survey, before turning to a discussion of Indigenous-led and in-community technology education projects.



## Indigenous Representation in BC Education

BC First Nations have been seeking recognition of their inherent right to exercise control over their education for decades. The Truth and Reconciliation Commission of Canada, which examined the “education” policy and legacy of the Indian residential school program, identified the gap in educational outcomes between First Nations and non-First Nations students as a persisting legacy of colonialism.<sup>101</sup> Recent provincial data demonstrates that these disparities, and the systemic racism that underpins them, continue in BC public schools.

The 2015 Office of the Auditor General’s Report, *An Audit of the Education of Aboriginal [Indigenous] Students in the BC Public School System*, highlighted the impact of the “racism of low expectations” toward Indigenous students in BC public schools. The racism of low expectations manifests when educators and school district staff have lower expectations for students based on “preconceptions or biases stemming from social attitudes.” For example, the Auditor General report found that Indigenous students were significantly more likely to receive the Evergreen School Completion Certificate, which are intended to recognize the work of students with significant special needs who could not be expected to graduate from high school (even when Indigenous students did not have a special needs designation).

In their 2019 Progress Audit, the Auditor General found that while there had been improvements in the educational outcomes for Indigenous students since the 2015 report, “the system is still not supporting Indigenous students to have the same success that non-Indigenous students enjoy.” Further, data from British Columbia’s annual province-wide Student Learning Survey (SLS) has consistently shown that Indigenous students are more likely than non-Indigenous students to report being bullied, teased, or picked on at school. For example, in 2019–2020, 16% of Indigenous Grade Four Student Learning Survey respondents reported being bullied, teased, or picked on all of the time or many times, compared to 11% of their non-Indigenous counterparts.

There are well-documented and reported statistics around Indigenous representation in BC education; however, this data collection, interpretation, and presentation is problematic.<sup>102</sup> Additionally, comparisons on the number of Indigenous and non-Indigenous learners do little to contribute to our collective understanding of changes or improvements in the education system itself and/or the degree of participation by Indigenous peoples. While education attainment rates are an important factor to consider in understanding access to tech-based opportunities for Indigenous people in British Columbia, it is critical that strategies designed to increase access do not ignore historic and ongoing colonial policy and impacts. Additionally, use of this information must consider the ways in which the Eurocentric education system uses outcomes as a marker for “success” that are only defined in colonial understanding. This can contribute to further erasure and assimilation.

We recognize the role post-secondary education plays in accessing meaningful opportunities in technology, but also that strategies designed to increase access must consider this broader context.

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101 Kathryn Marlow, “Several First Nations in BC set to take full control over education on their lands,” CBC News, Jan 11, 2022, <https://www.cbc.ca/news/canada/british-columbia/bc-first-nations-full-control-education-1.6311022>; Truth and Reconciliation Commission of Canada, “Canada’s Residential Schools: The Legacy, Volume 5,” pp. 69-71, [https://ehprnh2mwo3.exactdn.com/wp-content/uploads/2021/01/Volume\\_5\\_Legacy\\_English\\_Web.pdf](https://ehprnh2mwo3.exactdn.com/wp-content/uploads/2021/01/Volume_5_Legacy_English_Web.pdf).

102 Office of the Auditor General of British Columbia, “Progress Audit: The Education of Aboriginal Students in the BC Public School System,” [https://www.bcauditor.com/sites/default/files/publications/reports/OAGBC\\_Ab-Ed-Progress\\_RPT.pdf](https://www.bcauditor.com/sites/default/files/publications/reports/OAGBC_Ab-Ed-Progress_RPT.pdf), pp. 25-27.

For this report, ILIT survey respondents had achieved high levels of education. When asked what best represented the highest level of education they had attained, 12.5% had a graduate degree, 21.1% a bachelor's degree, 27.1% trade school or college, and 24.9% high school or lower.<sup>103</sup> For those who had pursued education beyond high school (the following is not mutually exclusive):

- 20.2% had pursued business or finance.
- 18.5% had pursued social work, counselling, and wellness training.
- 18.5% had pursued a STEM field (notably more men than women, 33.3% versus 14%).
- 15.7% had pursued humanities or social sciences.
- 13.5% had pursued Indigenous studies, or a First Nations language or cultural education program.
- Many had studied administration, education, arts, trades (again notably more men than women, 12.1% versus 2.9%), and other roles.

Through other research sources, financial challenges are consistently shown to be one of the more significant barriers preventing Indigenous youth from pursuing further education and training.<sup>104</sup> Indeed, data from the ILIT survey question on barriers to accessing tech-related opportunities highlights the same issue.

As part of the federal government's treaty relationship with First Nations and Inuit people, it provides some funding to First Nations and Inuit Nations/governments for their students to attend post-secondary schools through the Post-Secondary Student Support Program (PSSSP). However, demand is much higher than the available funds in the programs. As a result, this limits any First Nation's capacity to fund all students who wish to pursue and attend post-secondary education. Alternative sources of funding, provided by organizations such as *Indspire*, are key to providing additional financial support that students need. Another barrier here is the inherently racist myth that Indigenous people get free education, which may prevent other funding opportunities or private sector support. Further, there are no programs like the PSSSP for "non-status Indigenous peoples."<sup>105</sup> Given that Métis People comprise nearly half of the population of Indigenous youth as well as Indigenous ICT professionals in Canada, this marks a substantial segment of the population without support.



103 The final 4.4% had pursued some other specialized program, such as a certificate.

104 Statistics Canada, Aboriginal Peoples Survey, 2012, *Public use microdata*: 89-653-X2015005

105 TD Economics, "Debunking Myths Surrounding Canada's Aboriginal Population," June 18, 2012, <https://www.ccab.com/wp-content/uploads/2016/11/Debunking-Myths-Surrounding-Canadas-Aboriginal-Population.pdf>

A second key barrier is location, access, and awareness. When asked, “What tech training opportunities do you see currently available to you?” on-reserve, rural, and remote respondents reported much lower availability and knowledge of tech training opportunities. Shown in two ways below, each division illustrates a clear challenge in terms of availability of tech-related programming and awareness of programming outside of urban areas.

ILIT respondents' location	On-reserve	Off-reserve	Urban (<15 min travel time to nearest city)	Suburban and rural (15–90 min travel time to city)	Remote (> 90 min travel time to city)
% of ILIT respondents who could not name any training opportunities <b>in their community</b>	73.5%*	59.1%	54.1%	73.9%**	76.0%**
% of ILIT respondents who could not name any training opportunities <b>outside of their community</b>	19.4%	25.8%	12.1%	28.7%**	31.9%**

\*significantly higher than off-reserve, 95% confidence

\*\*significantly higher than urban, 99% confidence

Table 3. On-reserve, off-reserve; urban, suburban, rural, and remote awareness of technology opportunities: ILIT Survey

One virtual session group participant elaborated:

*“The main thing coming up for me is the empowerment to use it. For me, that’s looking at having access, one, to education, but I think just knowing what the possibilities are. Large part of it, not knowing what we don’t know. That is the main point for me at this point.” – [Community session participant]*



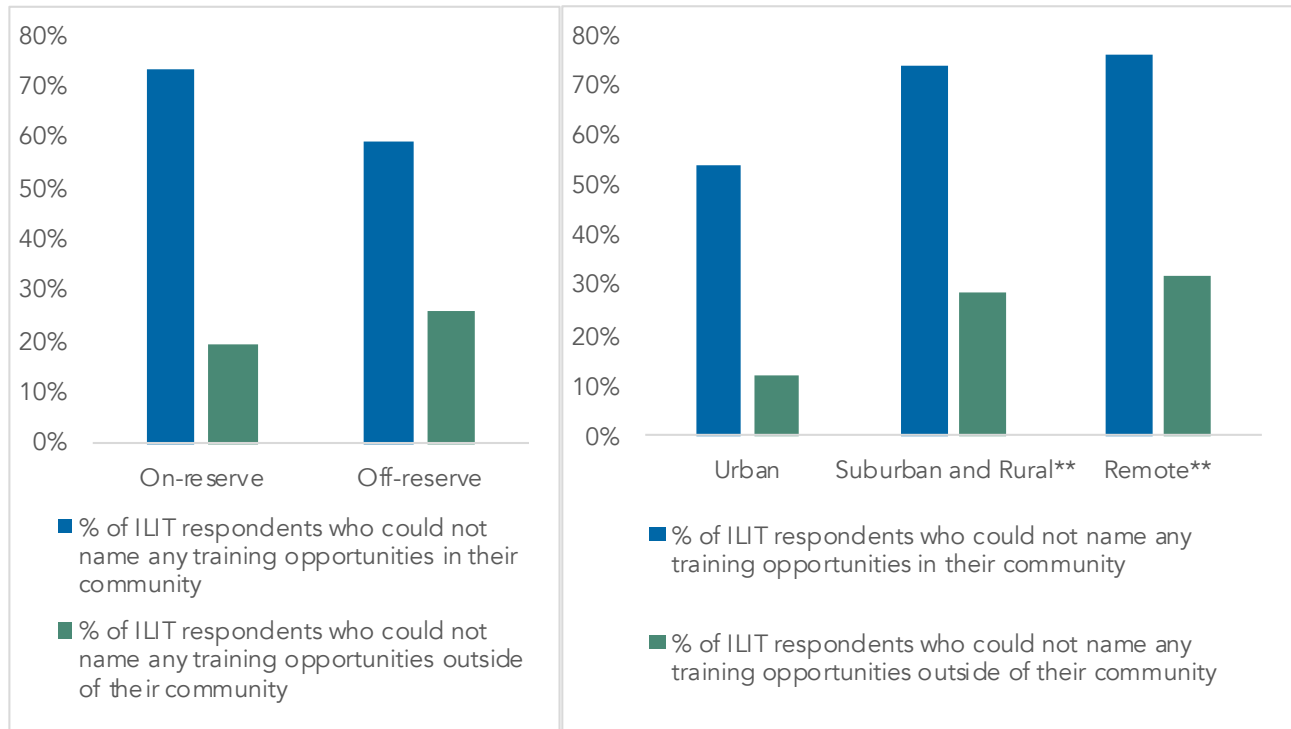


Figure 8. Comparison of ILIT survey respondents who could not name any training opportunities within or outside of their community.

Accordingly, Indigenous people looking for technology training at any level face a variety of challenges, including inequitable secondary education success, financial cost of training, awareness, and location and the need to travel, to name only a few. In what follows, attempts to remove these barriers from educators who participated in this project are explored.

## Easing the Transition from Secondary to Post-Secondary Education

Ongoing inequities in K–12 education, including access to educational services and telecommunications infrastructure, have meant that Indigenous people pursuing a career in tech do not always follow a linear path through formal education. Several interviewees discussed their own educational careers and how difficult it was to restart education after dropping out of high school, pursue lengthy upgrading as a young adult, and work towards a goal without a clear Indigenous role model. These participants commented on how important it was for educational institutions to design programs with this in mind, considering alternate pathways into post-secondary and the needs of different age groups:

*“It’s quite often there’s too strong a focus on youth under 29 years of age, which isn’t appropriate for our communities . . . Indigenous people often pursue their education later in life.” – [Interviewee]*

*“Up here in [area], there isn’t much available in tech. If there is, you need a lot of qualifications and education and stuff. I didn’t even know why I couldn’t go to school for years; I tried for years and walked out for years, then it dawned on me it was because of residential school. I couldn’t cope in the classroom. I worked in the school district and helped kids and youth but when it was time for me to be a student, I couldn’t do it, I would walk out. I was encouraged by teachers because I was smart enough. Didn’t realize for a long time and then, ‘Oh, that’s why it is.’ Then worked in residential school org and realized. I also have family that have top-notch education and no problem for them. I do well in school, but I have a track record for not succeeding so the band won’t sponsor me. I’m not the same person I was years ago. I’m a lot more confident and just looking for opportunities.” – [Community session participant]*

Indigenous people—and Indigenous women in particular—“may not experience stages of life at the same age” or “in the same order as the non-Indigenous population,”<sup>106</sup> and therefore dismantling age-related barriers could increase overall participation.

*“It’s important to have [role models] talk about not only their successes, but their failures along the way. Not everyone’s at the stage where they can admit them. But for me, the most impactful story was a young Indigenous man that came into our school and talked about, you know, ‘I dropped out in the second year and I dropped out in third year, and I had to come back. And this is where I am today. I am working in a job I really enjoy.’” – [Interviewee]*

The same interviewee had encountered community colleges that had offered an “upgrading year” that included students in the campus, college services such as the library, and social events like frosh week. This helps students feel like they are not pursuing endless secondary education before being able to start their degrees. They felt that upgrading—including in circumstances where Indigenous students had been tacitly streamed into lower levels of mathematics and science—introduced significant psychological and financial friction for people trying to pursue careers in STEM. Many participants suggested that challenges such as these could be avoided with more support for younger Indigenous students throughout secondary and even primary education:

*“It’s very frustrating to see nothing changing. What is the plan for the community and kids in high school? Have they [educators and leadership] been working with them from Grade 8, instead of letting them go through 8–12 and then making them do upgrading?” – [Community session participant]*

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106 Native Women’s Association of Canada, “Strengthening Aboriginal Girl’s and Women’s Success,” 2009 <https://www.nwac.ca/wp-content/uploads/2015/05/2009-NWAC-Strengthening-Aboriginal-Girls-and-Womens-Success-Submission.pdf>.

*"[It would be helpful to] get Indigenous youth earlier in their journey towards their career. We offer coding workshops with Indigenous kids as young as 10. If we're in a room with 50 Indigenous youth, maybe just one of them can get bit by that technology bug." – [Interviewee]*

*"I think it would be very healthy for First Nations to move down the age group of tech training, targeting some logical thought training and basic programming in very early years. I think that by teaching logic and programming to younger students, you can build inspiration and aspirations for children and youth." – [Interviewee]*

*"But would be nice to send one of your reps out to the classroom and give [a] brief presentation to the class, incorporate something into curriculum; they might be too young to know about project management, but management in general would be a good thing to teach at a young age." – [Community session participant]*

One interviewee mentioned that they viewed free upgrading as very important for students coming through their program. Others commented on the importance of having Elders, Indigenous-specific events, and supports on campus; programs for inclusivity such as flexible learning arrangements or blended or distance learning options; and academic support. Post-secondary pathways that consider the importance of social support systems, such as friends, family, and community commitments, also contributed to overall student enrolment and retention in the eyes of research participants. One post-secondary institution commented that they recognized the importance of "decredentalizing" their system but weren't at that stage yet because of the wider post-secondary system and systemic challenges related to ensuring credential recognition in other institutions around the province: "We're really struggling with some of the old practices which are really core to what post-secondary education has been" (Interviewee).

## Recruitment and Building Awareness and Understanding of Technology Programs

Educational institutions who had strong commitments to Indigenous representation in their programs pursued active, relational outreach strategies. Representatives from larger educational institutions discussed working directly with community, consulting with local leadership, attending important meetings such as the Assembly of First Nations, and integrating community feedback in curriculum design. Likewise, institutions that committed to strategies involving direct community outreach, integrated marketing efforts such as social media and traditional media marketing, site visits, and public recruitment events had also successfully improved their recruitment outcomes. For smaller organizations, pursuing this level of outreach was essential but financially costly. Many recommended building it into their grant applications and funding arrangements. However, there was widespread recognition that pursuing Indigenous recruitment as a small technology training organization meant building long-term, trusting relationships, using accessible technology-related language, and working in tandem with community priorities and employment-related staff within bands.



*“We use the website, mailout, newsletters, in person, phone outreach. You do what you can, and you are aware that it is a long game. You can’t just start engagement and have buy-in; you have to do it over years and create a relationship. You also have to do some education about what tech is, foundational skills. You have so many barriers to overcome that require time and money and effort. The splash-in-the-pan approach won’t work.” – [Interviewee]*

*“We do community contacting, calling communities directly, talking to leadership in each community, seeing what they want and need. Once we set up a training program, the band education department helps us recruit the clients. There are also EAS workers who help, and we do a lot of promoting on Facebook, our website, advertising through local radio. We’re starting to try to do more videos. We do site visits. Sometimes it’s just cold calling. I think we’ve tried it all—you try everything to make sure that you get that recruitment. For us, the community engagement is a big thing because that’s who we work for, that’s who we’ve got to get.” – [Interviewee]*

*“There is no easy way to [recruit for training programs]. It’s knocking doors, building confidence in people, and making phone calls, visiting, calling on the people you know can make things happen. It’s on-the-ground work. And it’s one thing to recruit people; it’s another thing to make it so accessible every step of the way that they want to stay and they get it, and they go home and say, ‘This wasn’t so bad.’” – [Interviewee]*

Some interviewees working for educational institutions offered particular programs designed to reduce barriers to female participants, acknowledging women’s frequent role as caregivers. These organizations offered housing subsidies to women and their families who were required to travel to attend school, which reduced the financial strain of childcare and encouraged overall family well-being.

## Indigenous-Led Education

*“One thing that we don’t celebrate enough is the success stories of our people in the ICT field, or the success stories of our role models. I think we need more of that.” – [Interviewee]*

Acknowledging the ways Eurocentric education inflicted extensive and intergenerational harm and trauma on Indigenous Peoples, one participant commented:

*“Just because you have an M.Ed doesn’t mean you’re the right person to be teaching in Indigenous circles. You should be informed by that information, but not carrying that into the space . . . the last thing we should be doing is weaponizing that in any way.” – [Interviewee]*

Many interviewees working for or with educational institutions emphasized the importance of ongoing engagement with Indigenous partners in priority areas of study, curriculum design, and other important educational programming decisions. Interviewees saw this as important to self-determination, student retention, and creation of programming that better considered the life experiences of participants. For example, some Indigenous-led programs resulted in partnerships between communities and post-secondary institutions that could be held on-site in Nations (typically pre-COVID) or had a land-based, blended remote and in-person approach.

*“It’s really important to avoid this white saviour mentality of, ‘You are so lucky we are here; we’ve come to educate you.’ It really needs to be in partnership with the communities. And if it is an Indigenous-specific role, it must be an Indigenous person holding that role. And if you can’t find somebody who has the qualifications, then you find someone who’s willing to learn and you train them to have the qualifications to hold that role.” – [Interviewee]*

Educators achieve the goal of engagement in a variety of ways. One post-secondary institution in British Columbia had developed an Indigenous-led program advisory committee including both community and industry voices. Another college had invited Indigenous partners from community, academia, industry, and government to identify what needs should be met to respond to regional challenges. This initiative addressed community economic challenges and encouraged a mindful approach to program design and delivery. A third institution offered discrete training programs in partnership with Indigenous project leads, in response to a defined need, though this came with challenges regarding sustainable funding. While there are many important initiatives working towards improving the experience of Indigenous students in post-secondary education, it is still important to acknowledge that Indigenous students continue to regularly experience racism and discrimination in the education system. This can cause further traumas, negatively impact their ability to continue ongoing education, and impede access to future opportunities.

It can also be noted that Indigenous organizations like the First Nations Technology Council are organizing technology trainings outside of the post-secondary context as well.



## Remote Education

*“When I went to the city for the first time, from my community to Burnaby, it was a big thing to be away from friends and family and supports. I had an opportunity with a community college—it was virtual learning back in my community, and I could visit the college to get help if I needed. So for the last part of the associate degree, the online opportunity was there if I wanted it; I could move away or stay home and be remote. Family is necessary when you are first going out; that helps a lot.” – [Community session participant]*

Despite telecommunications infrastructure issues, many interviewees found that remote or blended education had significantly improved their access to post-secondary and other training opportunities. It allowed some adult students to balance family and professional obligations with new learning. Several participants highlighted the importance of having training opportunities available without needing to leave their home community:

*“I think in terms of run programs, what we’re finding is that people who are living in the community want to stay in the community. Even for training, online options and options to do training nearby that’s close where they can go back home at the end of the day is the ideal situation. Because of our location, [town name] is about a four-hour drive on a good day. It can be tough to say, ‘Yeah, I want to work in my community,’ but there’s things that you give up—to, like, run to the store for something—but I think for the most part, I think for us just to run training programs is that we’re finding that people that would rather stay in the community. And that’s the same with jobs—with jobs comes education or experience that you have to have to get it.” – [Community session participant]*

*“I would like to see language design for every community to have basic tech training and to have it in-community because it is too scary and foreign to try and send people from their home into the city and a lot of people just won’t go and needs to be near home.” – [Community session participant]*

Organizations offering remote or blended learning offered a variety of approaches. One campus in the BC Interior offers a blended approach where students have the option to come do their remote courses in a regional campus computer lab. While students may still face a barrier with travel time and weather-dependent road conditions, it permits them to access the infrastructure that will make remote education possible. Another organization offers multimodal support for online students, including resources and a one-on-one service desk that helps students with questions in real time. A third focused on opportunities for cohort connections outside of programming:

*"We've set up a schedule where all the students share a meal with other students once or twice a month. Instead of coming here to meet with each other, we've set aside an hour and provided each student with a meal gift card. That was a real challenge; some of the remote communities obviously didn't have Skip the Dishes so they had to find other ways to give meal cards to students that would work for each one. It was enjoyable, forcing people to step outside of their comfort zones and create community." – [Interviewee]*

Some organizations put great care into making sure that remote education was culturally accessible:

*"We didn't get to do any creative land-based stuff like we were originally thinking, but being able to do ceremony, prayer, vulnerability, and sharing online was still crucial." – [Interviewee]*

*"Things that seem to work better had deeper engagement with the community around the programming choice. And a conversation about the cohort of students that may be attending and a conversation around the supports that they may require for the educational opportunity to be meaningful." – [Interviewee]*

Other respondents did note a lack of remote training opportunities designed to support students with basic technology skills in both K–12 and higher learning spaces. Interviewees suggested issues attributed to the lack of access left many without the required tools to participate. Indigenous students with low to no internet connectivity and limited access to equipment are disproportionately impacted by these challenges, placing them at a distinct disadvantage. One respondent summarized this issue as follows:

*". . . The only place in town where young people can access internet to do homework or anything requiring more than the minimum upload or download speed is at a college's regional location. Every time we went in and out of this tiny building, there were at least four or five teenagers crammed under this tiny little overhang because it was raining. They were trying to access internet to do homework and they didn't even have laptops. They're trying to do their homework on their smart phones, using the internet." – [Interviewee]*

Remote education was crucial for many Indigenous students during the COVID-19 pandemic (though not all had access to it) and many have identified the potential of remote education to open up opportunities that do not force Indigenous people to leave their communities.<sup>107</sup> In the ILIT survey, technology-mediated education was a key opportunity for 8% of respondents.

*“Technology can open up gateways for students and adults to further their careers and enhance their learning. It can open opportunities for those who didn’t think they had any time be able to succeed and make a better life for themselves.”*  
– [ILIT survey respondent]

## Other Strategies to Promote Accessibility

So far, this section has discussed ways to ease the transition from secondary to post-secondary education, recruit and build awareness of technology programs, engage Indigenous voices in curriculum design, and offer remote or blended learning in an appropriate and accessible manner. Interviewees listed several other strategies to promote accessibility in technology training.

The first strategy is to reduce or remove financial barriers from any type of program. Financial barriers to education are the most significant challenge preventing Indigenous survey respondents from accessing tech-related opportunities. Programs that are able offer scholarships or subsidies for tuition, travel, and accommodation for Indigenous students, as well as equipment (particularly for remote learning). As one participant elaborated:

*“One thing we talk about is with moving programming online, who are we leaving behind that don’t have access. With pandemic, people and parents working from home. A lot of assumptions about what is available in homes. Done a few laptop giveaways and its small, don’t have a huge budget and it came up really quickly in conversation, who are we leaving behind. Which Indigenous youth are not able to access anything we have available to offer? People who are working in tech fields, probably had internet at home growing up. Such privilege and we don’t have that across BC. There has been issues with land use and flooding with utilities. So much class and privilege to get to the point of education or personal knowledge around communities. If you grew up with it, you’re much more likely be ahead now.”*  
– [ILIT survey respondent]

107 “Making education accessible without forcing people out of their community respects the relationship between Indigenous people and the land, and provides hope by making the route to change visible to those in the community.” (In “Indigenous peoples and empowerment via technology,” First Peoples Child & Family Review, 2018, <https://ocufa.on.ca/assets/Digital-Divide-Quebec.pdf>, 24.)

The second strategy is to engage industry and the local labour market as secondary voices in curriculum priorities, alongside Indigenous communities. Programs that did this found that they were able to guarantee students that something was waiting for them at the end of their program, an important component of retention. Some programs did this formally:

*"We did an employer survey in [Northern BC.] We collected employer feedback on what they're looking for and what they needed. Most of the oilfield employers said, 'Our guys need to have ATV, compliance, WHMIS, etc.,' and just gave us a list, then we picked the five top skills that employers were asking for and offered what I call a ticket blitz." – [Interviewee]*

Third, creating and supporting basic training programs specifically designed for the elderly and Elders in the community was highlighted as a neglected priority. Older demographics are typically less knowledgeable about technology and unable to afford it:

*"Most senior people I know, they don't know how to turn on a computer, they don't have a laptop, can't afford things like that and wouldn't know how to go into social media, they don't have social media, they don't have that." – [Community session participant]*

Participants also discussed the lost relational connections and lost wisdom when Elders were unable to access, utilize, and connect through technology:

*"Lot of Elders who are illiterate and struggle with English words and lengthy how to explain things. Use Zoom, Facebook, Instagram, Team meetings. Because of that, we lost a lot of connection and sense of community, especially during COVID-19, especially the kids, knowing how to use technology and reach grandparents and just can't. When people say things, like, 'This is user friendly,' they mean digital natives, younger generations, yes, easy, for me, someone who grew up with it, easy for me. Challenging to explain to grandmas and aunties. I do just want, as much as I'm excited to see what world of tech brings us in the future, and ways to connect in figure, and look to past a bit more and how are we going to make sure we are going to bring Elders and Knowledge Keepers into this same space for us." – [Indigenous education session participant]*

*"I would like to see training in community that's really designed for elderly people. I hear so much talk about the quarantine and how difficult it is for people and I have people who live by themselves and we haven't seen for a really long time. I would like to see language training for every community. It's too scary and foreign to send people from their community into a city. I'd like to see basic technology training designed for everyone's language. So, people feel comfortable and they'll understand. My generation lost our language – my mum, my aunt my uncles speak, but there's a lot of words in technology we don't have in our language." – [ILIT survey respondent]*



A fourth strategy is to follow a mentorship model where the training is not just a one-time education session, but includes wrap-around<sup>108</sup> and follow-up support. Participants expressed the importance of the supportive nature of mentors and coaches for enhancing their confidence and the sustainability of learning:

*"[We] also hired coaches at the end. Even after the program had ended, access to coach to 5–10 sessions because I kept on delaying, roadblocks, coach talked me through it, neat integration process, follow-up and support is going to be huge for communities so that it is not just a training sessions. I think that follow-up support is going to be a huge piece." – [Indigenous education session participant]*

*"I had two mentors that worked with me and [we] learned together doing training and that was a huge foundation for my confidence working in technology and with technology." – [Indigenous education session participant]*

Lastly, matters attributed to government funding criteria, availability, and indicators of success create additional accessibility barriers for some programs or students. Several participants noted inconsistent, term, and project-based funding that did not allow them to engage communities early in a process or offer follow-ups and ongoing support. Another discussed a federal funding policy that mandated that students needed an offer of employment before they could access training funds. This was a key issue in a region where employers would usually only offer jobs to workers who could start right away:

*"Funding restrictions state that a person can't just be funded to participate unless they have an employer letter. So if a company wants someone right away, and they have five guys for the job while only three of them have the skills already, do you really think they're going to wait for those other two people to go through a 14-day class to give them a job? [Interviewer: How would you solve this?] Give regional orgs more funding to run their programs. If you feel like someone is going to do improper expenditures, that will show at their year-end and then you can take away that privilege. I'm a little passionate about this. The students who can meet all those criteria are great, but we're dropping the ball on those that can't." – [Interviewee]*

The same interviewee mentioned that they were unable to run classes until they had a particular minimum enrolment number—another barrier that meant that while they were waiting to run a training program, registered students would grow tired of delays and make alternate plans.

A post-secondary interviewee commented that these funding barriers tend to originate when stakeholders are not consulted during the funding ideation stages. When grant dollars become available, parameters are unintentionally made too restrictive, while success is measured by poor or irrelevant proxies.

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<sup>108</sup> We define wrap-around supports as a set of learner-centred services and tools that are needed in order for learners to feel supported in all aspects of their learning journey. Examples of wrap-around supports include: guidance, resources, and advice at every stage of the learning experience.

## Internships and Work Integrated Learning

*"We must create equitable access for Indigenous people, ensuring that our students have everything they need to be able to successfully complete an internship, and the holistic wraparound support services required to be successful."  
– [Interviewee]*

Many participants commented on the value of short, workforce-integrated training programs in developing skills and raising awareness of potential technology careers. Such training opportunities came with fast, practical learning. Often salaries were offered to the students involved, thus minimizing barriers to entry. Interview respondents representing academia believed internships created accessible pathways for Indigenous students to explore industries or skills better suited to their interests. One respondent noted:

*". . . Giving people an opportunity to try out a career in technology before they actually commit to develop a full career for themselves would be a good option . . . If it's possible to do a self-directed path through an online diploma or certificate, students should be encouraged to take a small [internship] program and see if they feel like it's the right fit for them." – [Interviewee]*

Workplace-integrated learning programs face some of the same barriers as other educational programs, namely consistent funding. Another challenge was finding strong placements for Indigenous interns or co-op students with an employer that could offer a culturally safe workplace. Further, such programs typically require interns to be enrolled in post-secondary education, therefore limiting eligibility.



## 4.3 Employment and Business Development

### Strategic Area Overview

Economic development is necessary for generating employment, growing enterprises, supporting entrepreneurship, and improving socio-economic conditions. For Indigenous Peoples, it provides them with the means through which they can meet the needs of their community members, provides a mechanism to generate wealth for future generations, and is vital for their inherent rights to self-determination and self-government.

Indigenous Peoples are faced with deeply rooted and systemic inequality barriers that have become embedded within the broader Canadian economic landscape—most notably, the Indian Act and its oppressive land regime and the systematic exclusion of Indigenous Peoples from economic systems. The TRC's ten Principles of Reconciliation state that "reconciliation requires constructive action on addressing the ongoing legacies of colonialism that have had destructive impacts on Indigenous Peoples economic opportunities and prosperity" and "that reconciliation must create a more equitable and inclusive society by closing the gaps in economic outcomes." In British Columbia, First Nations economic development and equitable participation in the technology sector is fundamental for the realization of economic reconciliation in today's digital world.

Technological innovation is widely recognized as a fundamental driver of long-run economic growth. Jobs, businesses, and economies in every industry across the globe have been transformed by digital technology, and the innovation economy is expected to continue to place increased demand for professions related to science, technology, engineering, and mathematics (STEM). As British Columbia moves towards economic recovery in the aftermath of the COVID-19 pandemic, there is outsized demand for skilled ICT workers, untold entrepreneurial opportunity, and massive untapped potential for Indigenous Peoples to contribute towards addressing both gaps.

### Indigenous Involvement in Tech

#### Representation of Indigenous People in Technology-related Roles in British Columbia: Current Status, Gaps, and Opportunities

Many Indigenous People within British Columbia have articulated clear priorities for improving access to and opportunities within technology. Opportunities in technology are not by any means limited to employment. As we have seen, communities and individuals have also mapped out uses for technology in self-determination and land management, entrepreneurship, and culture and language revitalization. This section takes the narrow lens of examining Indigenous representation in British Columbia's technology workforce, while other parts of the report examine broader themes around equity and opportunity in education, entrepreneurship, and governance.

From an economic lens, diversity in leadership and representation is crucial to the future of Canada's digital economy. Canada's 2016 census confirmed that the country's population is aging rapidly, with seniors (aged 65 and older) making up a bigger portion of the Canadian population than youth (aged 14 and under).<sup>109</sup> The census also found that Indigenous population growth in Canada is four times that of non-Indigenous populations. Accordingly, there is a key opportunity to improve representation of Indigenous Peoples in technology to improve outcomes for both Indigenous Peoples and the future of the digital economy.<sup>110</sup> In short, while improving opportunities for Indigenous Peoples in technology is first and foremost a question of equity, it also offers to bolster a scarce labour force and improve business processes and solutions in a growing sector where diverse hiring is essential to innovation.

109 Cutean et al., "Canada's Growth Currency Digital Talent Outlook 2023."

110 Ibid, p. 13

## Indigenous Employment in Canada: Sectors and Seniority

Indigenous People have often been under-represented in the Canadian economy, due to the innumerable systemic barriers to equity explored elsewhere in this report. Despite this, a range of data sources demonstrate that there are increasing numbers of Indigenous people in the Canadian economy.

According to Statistics Canada, in 2019, the Indigenous<sup>111</sup> labour force participation rate (among those 15 and older, both on- and off-reserve) across Canada was nearly on par with the non-Indigenous labour participation rate (63.9%, compared to 65.7%).<sup>112</sup> This marked an increase from the findings of the 2016 Census Indigenous Population Profile. In total, the 2016 census found that 637,905 Indigenous people were employed across Canada (in all occupations and sectors).<sup>113</sup> It found that “among those aged 15 and older both on and off-reserve,” there was a 61% labour participation rate, a 52% employment rate, and a 15% unemployment rate.<sup>114</sup>

The 2017 Aboriginal Peoples Survey indicates that higher levels of educational achievement has helped to protect Indigenous and non-Indigenous people from certain labour market challenges such as unemployment. For example, the employment rate of Indigenous people who completed post-secondary education was 78.4% in 2015, compared to 42.8% for those with less than high school.”<sup>115</sup> Opportunities to improve equity in access to education are explored in Section 4.2 (Skills Development).

According to the BC Employer Survey, Figure 9 illustrates that respondents’ businesses operated in a variety of industries, and this was roughly equivalent to the distribution of businesses by industry in the province. Nonetheless, when compared to the population,<sup>116</sup> some industries were oversampled (e.g., educational services and professional, scientific, and technical services), while some were under-sampled (e.g., manufacturing and those in “other services”).

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111 Note: while Statistics Canada uses “Aboriginal,” the organization uses it synonymously with “Indigenous,” and this study has chosen to use the latter: [https://www.statcan.gc.ca/en/subjects-start/indigenous\\_peoples](https://www.statcan.gc.ca/en/subjects-start/indigenous_peoples).














































112 Statistics Canada, Table 14-10-0364-01 Labour force characteristics by province, region and Aboriginal group. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410036401>. DOI: <https://doi.org/10.25318/1410036401-eng>

113 Statistics Canada, “Aboriginal Population Profile,” 2016 Census, Statistics Canada Catalogue no. 98-510-X2016001, Released July 18, 2018. <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/abpopprof/index.cfm?Lang=E>.

114 Ibid: “‘Aboriginal identity’ includes persons who are First Nations (North American Indian), Métis or Inuk (Inuit) and/or those who are Registered or Treaty Indians (that is, registered under the Indian Act of Canada) and/or those who have membership in a First Nation or Indian band. Aboriginal peoples of Canada are defined in the Constitution Act, 1982, section 35 (2) as including the Indian, Inuit and Métis peoples of Canada.”

115 Statistics Canada, “Labour Market Experiences of First Nations people living off-reserve: Key findings from the 2017 Aboriginal Peoples Survey,” 2018, <https://www150.statcan.gc.ca/n1/pub/89-653-x/89-653-x2018003-eng.htm>. “Similarly, the unemployment rate of Aboriginal people who completed postsecondary education was 7.9%, compared to 22.0% for those with less than high school.”

116 BC Stats, “Business Location Counts,” March 2020, [https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/number-of-businesses/bus\\_location\\_counts.pdf](https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/number-of-businesses/bus_location_counts.pdf).

Industry	% of Businesses in Employer Survey		% of All Businesses in BC
	Phase 1	Phase 2	
Professional, scientific and technical services	17% 	18% 	11% 
Health care and social assistance	7% 	12% 	9% 
Wholesale and retail trade	11% 	9% 	14% 
Educational services	9% 	9% 	1% 
Finance, insurance, real estate, rental and leasing	10% 	8% 	9% 
Manufacturing	5% 	8% 	13% 
Information and communications technology products and services	3% 	6% 	*
Information, culture and recreation	5% 	5% 	2% 
Construction, utilities	10% 	5% 	13% 
Forestry, fish, mining, quarrying, oil and gas, agriculture	2% 	4% 	4% 
Accommodation and food services	6% 	4% 	6% 
Business, building and other support services	5% 	3% 	*
Transportation and warehousing	3% 	3% 	4% 
Public administration	1% 	2% 	0% 
Non-profit	1% 	2% 	*
Other services	2% 	2% 	8% 

\* No industry comparison was available in the province dataset. Employer Survey industry questions were based off of categories of employment from WorkBC data, which is not a perfect match for the NAICS used by BC Stats.

Figure 9. Employer Survey Phase II: % of respondents in each industry vs. % of registered businesses in province of BC, 2019.

Similarly, the employer survey overrepresents larger businesses. British Columbia has a significant proportion of sole proprietorships, which this survey excluded unless the employer intended to hire and/or could speak to human resources considerations.







































Number of Employees	% of Businesses in Employer Survey		All of BC, 2019	
	Phase 1	Phase 2	including self-employed	excluding self-employed
1 - 4	27% 	20% 	83% 	57% 
Sole proprietor	12% 	10% 	61% 	-
2 - 4	15% 	10% 	22% 	-
5 - 19	23% 	19% 	12% 	31% 
20 - 49	12% 	9% 	2% 	8% 
50+	38% 	51% 	2% 	4% 
50 - 99	12% 	11% 	1% 	3% 
100 - 299	7% 	14% 	<1% 	1% 
300 - 499	7% 	8% 	<1% 	<1% 
500 or more	13% 	18% 	<1% 	<1% 

Figure 10. Employer Survey Phases I and II: Responses by size of company, compared with BC overall.

### Indigenous Employment in the ICT Sector, Canada, and British Columbia

In 2018, around 1.5% of Indigenous people across Canada were employed in the ICT sector.<sup>117</sup> When cutting out non-technical roles in the ICT sector, this figure fell: just over 1% of the population in Indigenous communities held technical jobs in the ICT sector.<sup>118</sup> While this is a low baseline, from 2008 to 2016, the share of Indigenous people employed in Canada’s digital economy increased each year.<sup>119</sup> Employment of Indigenous people in ICT occupations in Canada increased by 30.38% between 2009 and 2016, from 7,900 to 10,300.<sup>120</sup> In 2016, the unemployment rate among Indigenous ICT professionals was around 2.8%, a figure only slightly higher than the overall ICT unemployment rate of 2.6%. This was considerably lower than the unemployment rate for Indigenous people in the overall economy (12.3%).<sup>121</sup>

Despite progress, Indigenous people remain under-represented in ICT professions when compared to non-Indigenous people.<sup>122</sup> This under-representation is found in other STEM occupations including engineering, sciences, and health sciences.<sup>123</sup>

117 Cutean et al., “Canada’s Growth Currency Digital Talent Outlook 2023.” See also: Alicia Cameron, Alexandra Cutean, “Digital Economy Talent Supply: Indigenous Peoples of Canada”, Information and Communications Technology Council, June 2017. [https://www.ictc-ctic.ca/wp-content/uploads/2017/06/Indigenous\\_Supply ICTC\\_FINAL\\_ENG.pdf](https://www.ictc-ctic.ca/wp-content/uploads/2017/06/Indigenous_Supply ICTC_FINAL_ENG.pdf), p. 47.

118 Ibid.

119 Ibid.

120 Ibid.

121 Ibid, p. 8. In detail, in 2016, Indigenous ICT professionals were younger than the non-Indigenous ICT workforce (8.2% of the Indigenous ICT workforce was between 15 to 24 years of age and 29.3% was between 25 to 34 years of age), and women represented around 27% of the Indigenous ICT workforce. Approximately one-third held a university degree (bachelor level), 36.9% held a college or CEGEP diploma, and of all the Indigenous ICT professionals employed in Canada, only 31.4% worked specifically within the ICT sector.

122 Ibid, p. 7.

123 Ibid, p. 7.





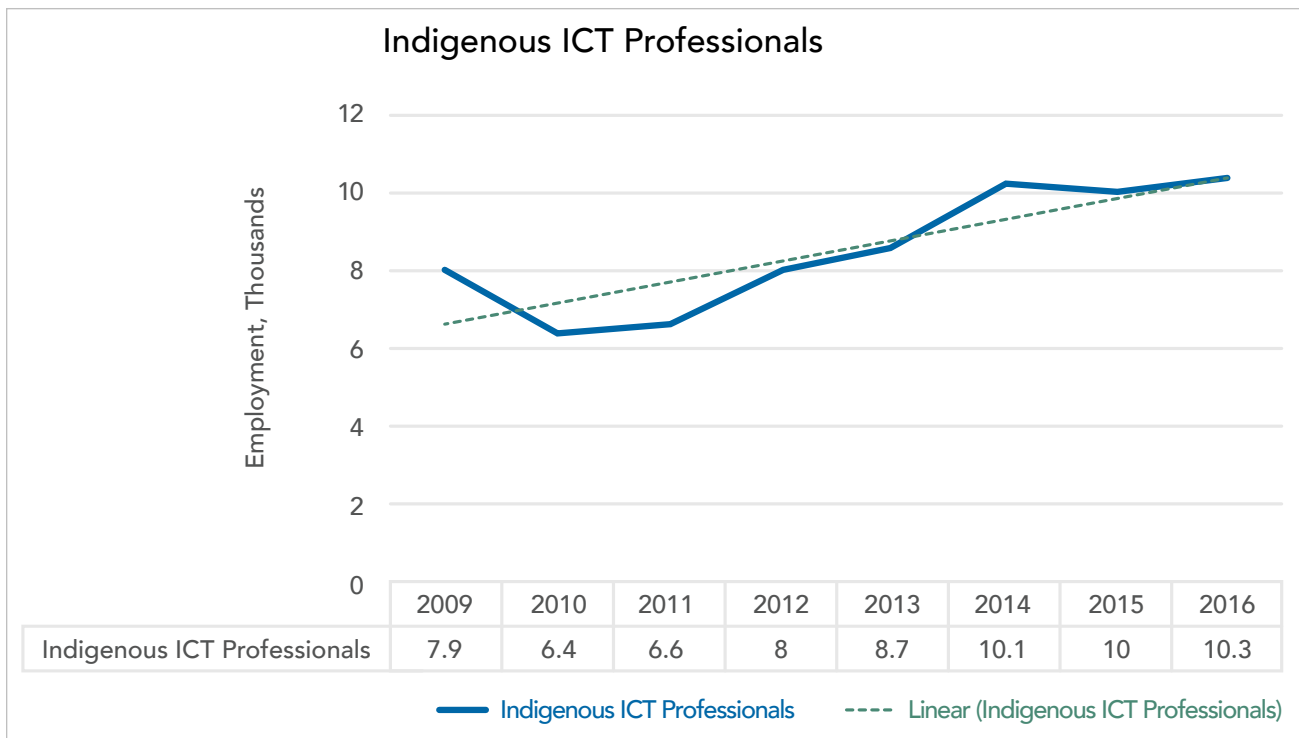


Figure 11. Employment level of Indigenous ICT professionals, 2009 to 2016. Source: Cameron A., Cutean, A. (2017). *Digital Economy Talent Supply: Indigenous Peoples of Canada*, Information and Communications Technology Council. Ottawa, Canada.

In 2017, the top ICT occupations in Canada for Indigenous people were: information systems analysts and consultants (employing 18.3% of total Indigenous tech employees), user support technicians (13.1%), and computer network technicians (12.5%).<sup>124</sup>

### Geographical Distribution of Indigenous ICT Professionals in Canada

In 2017, ICTC found that the highest proportion of Indigenous ICT professionals were located in Ontario (around 33.6%), Quebec (15%), British Columbia (13.4%), Alberta (13.3%), and Manitoba (9.9%).<sup>125</sup> The city with the highest number of Indigenous ICT professionals was Ottawa, followed by Toronto, Winnipeg, and Vancouver.<sup>126</sup> The affiliations of Indigenous groups in each province widely mirrored provincial patterns. For example, in Ontario, British Columbia, and New Brunswick, almost half of Indigenous ICT professionals were First Nations.<sup>127</sup> In contrast, in Manitoba, Saskatchewan, and Alberta, the majority of Indigenous ICT professionals were Métis. Inuit ICT professionals were overwhelmingly found in the Territories, Newfoundland and Labrador, and Quebec.<sup>128</sup>

124 Ibid., p. 7.  
 125 Ibid, pp. 9-10.  
 126 Ibid, pp. 9-10.  
 127 Ibid, pp. 9-10.  
 128 Ibid, pp. 9-10.

## Indigenous Representation in BC Tech

Under-representation of Indigenous people in technology in British Columbia is a known problem. While figures vary depending on how research organizations define the “tech sector,” the most important lesson to take from them is that they are consistently much lower than the proportion of Indigenous Peoples in British Columbia. For example, the HR Tech Group reported in 2020 that Indigenous people represented 0.7% of the BC Tech workforce.<sup>129</sup>

This report helps shine further light on the under-representation of Indigenous Peoples in technology through new data, including its surveys, two of which focused on employers, while another focused on Indigenous Peoples in the province. This section examines this new data on Indigenous representation in BC tech before moving to the opportunities and challenges in moving the dial on Indigenous representation.

### Company Size, Indigenous Personnel, and Inclusivity

BC employers were asked to report on how many people in their organization identified as Indigenous to the best of their knowledge. While nearly half (45%) of respondents in Phase I had no Indigenous staff, this figure improved in Phase II.



Figure 12. Employer Survey phases one and two: Proportion of businesses with Indigenous staff.

129 “2021 Diversity in Tech Dashboard,” HR Tech Group, 2020. <https://silkstart.s3.amazonaws.com/a6fdfe0c-86ca-426b-ac27-d92d914e4843.pdf>

**Small businesses are much less likely to have Indigenous staff than larger businesses.** This was true for both phases: organizations with between one and 19 personnel were far less likely to have Indigenous representation than businesses with at least 20 employees. Large businesses were also more likely to hire more technology-related personnel and were largely located in the Mainland/Southwest region.

**Regional differences may contribute to the likelihood of having Indigenous staff.** While the number of respondents in smaller regions in this group was not high enough for significance testing, regional variations in the number of Indigenous personnel exhibited some patterns that would require more data to verify. In both phases, respondents in the Northeast were most likely to have Indigenous personnel, followed by the North Coast and Nechako region (73% in Phase I, 66% in Phase II). In both phases, over half of respondents in the Cariboo region (I: 56%, II: 63%) and Vancouver Island/Coast (I: 55%, II: 58%) had at least one Indigenous staff member. Fewer than half of the businesses in the Mainland/Southwest (I: 38%, II: 43%) had at least one Indigenous staff person. Businesses in the Thompson-Okanagan and Kootenay regions exhibited significant variation between the two phases.

### Barriers to Improving Indigenous Representation in Technology: Perspectives from Indigenous People and Employers

**Employers' perceived barriers to hiring Indigenous staff primarily centred around education, skills and experience, and availability of applicants.** In an open-ended question about hiring Indigenous employees, 18% of respondents in Phase I and 25% in Phase II commented on a lack of necessary education requirements, training, and experience. In Phase I, 15% felt that a lack of applicants was the biggest barrier, while in Phase II only 10% did. Interestingly, a large number of employers (I: 44%, II: 38%) did not feel comfortable answering the question or did not know. These responses, along with other responses to this question, are discussed under the section "Workplace Cultural Safety and Inclusive Hiring Practices."

Importantly, ILIT survey respondents self-identified barriers to accessing tech-related opportunities that illustrate some of the same gaps. **Financial access to education** and **awareness of technology-related roles** were among the top responses. Financial access to education was a key issue for many groups of people, including the employed:

*"Because I work full-time, accessing funding for training is harder because I have a job. So it kind of makes people stuck where they are at, with little to no hopes of expansion." – [ILIT survey respondent]*

Furthermore, awareness was an endemic issue. Familiarity with the tech sector and personal networks was an important element of awareness.

*"Employers or companies hiring family or friends when myself and others are [also] qualified. [Indigenous People] do not have connections like many others do, it's so important. This is also a huge issue with housing or renting as well." – [ILIT survey respondent]*

Other important elements of awareness participants discussed included knowing about resources and opportunities available:

*"I have no idea what resources are available and there doesn't seem to be any easy way to access [them]." – [ILIT survey respondent]*

*"I'd like to see more awareness of jobs that can still be done in community. Even though I have a remote job, a lot of people don't do that here because they aren't aware it's a possibility. Internet is also not that great here."  
– [Community session participant]*

*"Tech is never really, tech career has never been on my list, 'IT guy, fix this please,' 'Thank you.' So yeah. 'IT guy, my computer is not working,' that is my relationship with tech. I don't want to learn how to do that. Social media, stuff like that, queen at social media, good at that stuff. But yeah, I think the basic usage for computer and for work but anything above that doesn't interest me. Employment in training coordinator for many years and working with client access BC, not really interest in tech from Indigenous people because not clear on opportunity or options or money there. When Indigenous folks [are] looking for careers, [it's] 'How does this benefit me and what are the steps to take to get here and where I need to be?' Lots of unknown and unanswered questions. That is my input on that."  
– [Community session participant]*

Additional barriers included the COVID-19 pandemic, familiarity and experience with the tech sector, a shortage of local opportunities to work in tech, poor workplace cultural safety, and personal factors such as confidence, commitments to family and community, and motivation. It is important to consider possible root causes of low confidence and motivation, which could include trauma related to education or settler society's negative perception of Indigenous people and their contributions and abilities. It is equally important to understand that such factors, while often framed as individual barriers, in fact need to be understood as barriers constructed by colonialism and capitalism for the intentional suppression of Indigenous life, culture, and futures. The exclusion of Indigenous people from the tech sector is, at its root, due to systemic oppression and racist policies that continue to prevent Indigenous people from flourishing.

One participant described their barriers as follows:

*"My barriers are systemic racism and discrimination and would take uprooting the entire system for me to feel comfortable to continue working in the technology sector. I have been pushed to the fringe but, have worked hard to build a career within my niche while relying on my non-tech skills to pick up the slack. With that being said, I am in a privileged position because I have no dependents. A family or single-parent would have an extremely hard time making a living in the same situation. The only actionable suggestion I can make is to build a community network for individuals in the same position so that we may support each other." [ILIT survey respondent]*

The table below lists the barriers to accessing tech opportunities listed from ILIT survey participants from most to least common, and colour codes them by broader theme.

LEGEND: Table 4 Broad Themes	COLOUR CODE
Barriers to accessing education	
COVID-19	
Tech-sector familiarity: awareness, experience, and networks	
Local opportunity, physical access to work	
Workplace cultural safety	
Personal barriers	

Barriers to accessing tech opportunities	% of ILIT participants who have experienced barrier
Not enough financial support to go to training or education (e.g., income to support family while being in training)	69.6%
Affordability of accessing opportunities	68.0%
Not aware of training and tech opportunities	64.1%
COVID-19 related concerns (e.g., protecting the health of myself or my family, isolating)	64.1%
Lack of access to training programs to expand my skills	62.9%
Limited time because of having to work to support myself and family	59.9%
Not knowing other people in tech	59.7%
Fear of the COVID-19 pandemic	57.0%
Limited experience in tech	53.8%
Time it takes to develop new skills	53.5%
Living in a place with few work opportunities	53.1%
Limited time because of family and community commitments	51.2%
Lack of access to tutors and education support	49.7%
Level of personal confidence	49.4%
Specific learning needs or style (e.g., hands-on versus theoretical)	49.3%
Low level of support from the leadership of my Nation	48.4%
Ability to find work that aligns with my values	45.7%

Level of personal motivation	44.7%
Personal health and wellbeing concerns (e.g., wellness concerns including physical health, mental health, and addictions)	42.7%
Lack of cultural understanding in workplace (e.g., cultural obligations after a death)	42.2%
Experiencing or knowing that I may experience racism at work	42.2%
Employers are biased and less likely to hire Indigenous people	41.9%
Not sure how to connect to potential employers	41.7%
Not knowing how to communicate what I have to offer	41.3%
Living with Elderly or people who are immune-compromised and not wanting to risk their health	40.5%
Level of personal interest in tech	39.9%
Not feeling welcome at workplaces	37.5%
Not able to travel	32.3%
Having limited access to transportation to access urban areas	31.7%
No adequate place to work from (work from home or office)	31.2%
Fear of success or accomplishment	25.7%
Fear of school or training because of my or my family's experience with residential schools, day schools, and/or the education system	23.4%
Learning disability and lack of support	20.9%
Childcare not available	19.5%
Fear of online learning or training	18.3%
Not having access to technology: computer, tablet, or smart phone	14.2%

Table 4. Barriers to accessing tech opportunities.

Much of the research on barriers to accessing employment for Indigenous Peoples centres around similar themes. For example, according to the respondents of the 2017 Aboriginal Peoples Survey (APS), the most helpful policies for improving access to work were identified as more jobs/work available (22%); more skills training, such as computer, language, writing, technical skills, etc. (14%); more education (13%); better transportation (10%); more work experience (9%); and more contacts/networking and childcare assistance.<sup>130</sup>

130 Statistics Canada, "Labour Market Experiences of First Nations people living off-reserve: Key findings from the 2017 Aboriginal Peoples Survey," November 26 2018, <https://www150.statcan.gc.ca/n1/pub/89-653-x/89-653-x2018003-eng.htm>



In both the APS and the ILIT survey, responses to what would help most in finding a job differed both among and between men and women.

- In the ILIT survey, men were less likely to list “not knowing other people in tech” as a barrier (50.7% versus 62.5% of women).
- In the ILIT survey, women were also less sure about their level of personal interest in tech. 58.8% of women were either not interested or not sure of their interest in technology, compared with only 39.2% of men.
- In the APS, men were more likely to cite the need for skills training (17% versus 10%), whereas it appeared equally important for men and women in the ILIT survey.
- In the ILIT survey, people under 30 were significantly more likely to list “level of personal motivation as a barrier” (65% versus 44.7% of full sample) as well as “level of personal confidence” (62.5% versus 49.4% of full sample) and “not knowing how to communicate what I have to offer” (55% versus 41.3% of full sample).

Responses also showed urban–rural divides. In the APS, in rural areas, the need for “more jobs” was repeatedly cited, with over one-third (35%) of respondents reporting “that more jobs would help them most to find work,” compared with only 20% of those in large population centres and 20% in small population centres.<sup>131</sup>

In the ILIT survey, “living in a place with few work opportunities” was a much larger barrier for people on-reserve (67.3% versus 40.1% off-reserve) and in “remote” areas (78% versus 61.1% for suburban and rural and 35.9% for urban).

When asked to identify solutions to the barriers listed above, ILIT survey participants described improved opportunities for training (29.9%), better information and awareness of tech opportunities (8.8%), infrastructure and technology access (6.3%), and improved hiring and business practices (5.7%), among other suggestions.

## Gender and Intersectional Identity: Experiences in STEM

Key terms: **2SLGBTQIA+** – *Two-Spirit, lesbian, gay, bisexual, trans, queer, questioning, intersex, asexual.* In order to be inclusive and to honour and celebrate how language continues to expand and evolve, the “+” denotes the diversity of identities that are not represented in the acronym and creates space for individuals to choose to self-identify in ways that best represent themselves.

**Two-Spirit** refers to Indigenous people who do not identify with colonial concepts of gender as a duality. The Provincial Health Services Authority outlines “Two-Spirit” as:

“A term used within some Indigenous communities, encompassing cultural, spiritual, sexual, and gender identity. The term reflects complex Indigenous understandings of gender roles, spirituality and the long history of sexual and gender diversity in Indigenous cultures. Individual terms and roles for Two-Spirit people are specific to each nation. The word “Two-Spirit” was created in the early 1990s, by a group of Two-Spirit community members and leaders. Due to its cultural, spiritual, and historical context, the concept of “Two-Spirit” is to be used only by Indigenous People. However, not all Indigenous People who hold diverse sexual and gender identities consider themselves Two-Spirit, many identify themselves as LGBTQ+.”<sup>132</sup>

131 Ibid.

132 “Two-Spirit,” Trans Care BC: Provincial Health Services Authority, n.d., <http://www.phsa.ca/transcarebc/gender-basics-education/terms-concepts/two-spirit>.

How someone expresses their gender, particularly those identifying as a woman or 2SLGBTQQIA+ person, influences their experience in STEM contexts in an intersectional way.<sup>133</sup>

*“My main barrier [to accessing technology-related opportunity] is supporting my educational aspirations and to my family (2 children). Our family live off-reserve 1,100kms away from family to create positive social change for my family. I don’t have support with my children beyond my husband who is currently engaged in training.” – [ILIT survey respondent]*

*“I have faced misogamy [misogyny] as an Indigenous woman in tech. I believe that all women in male-dominated fields of work have a tremendous burden to be the best and I do believe we are some of the best in the field. We are hard working and skilled. The few men and women I know in IT I greatly admire and respect. Sometimes I have impostor syndrome although I am highly skilled. I think that is normal for many people in this industry because you could line up 7 generations forward and still wouldn’t get to the end of learning it all in any of the Big 5.” – [ILIT survey respondent]*

As this report will illustrate through a discussion of occupations and skills, fewer ILIT participants identifying as women held and were interested in natural and applied sciences occupations, as well as the ICT sector and IT-related skills. This trend follows gendered patterns of study, work, and interest across Canada. In a study conducted by the Natural Sciences and Engineering Research Council of Canada (NSERC) Chairs for Women in Science and Engineering, women were generally under-represented in all STEM fields. The study examined STEM degrees awarded to women and men, and Indigenous and immigrant communities. Women only surpassed their male counterparts in biology, and men were also more likely than women to go on to seek a master’s degree and doctorate in STEM.<sup>134</sup> Compensation for women in STEM was on average lower than for men. In 2016, men earned \$38.11 per hour on average, compared to women, who earned \$31.58 per hour.<sup>135</sup> Indigenous women across STEM fields in Canada made up 34% of degrees awarded compared to Indigenous men, similar to non-Indigenous women (33%). Barriers to entry are cited as the major hurdle for Indigenous women’s participation in STEM fields. Focused education and mentoring programs were viewed as one avenue for improving participation.<sup>136</sup>

Interviewees shared some mixed perceptions of Indigenous women’s participation in tech. Many respondents saw more women in post-secondary programs, more women in leadership roles, and many women starting businesses in areas other than technology. They also saw women going into health and social roles, in part because these roles would allow women to stay in their communities if they were family care providers. Several noted that Indigenous women, as well as 2SLGBTQQIA+ people, seemed to be more present in language revitalization work, which often intersects with technology skills development. Overall, respondents saw a lack of role models and ways for Indigenous women and 2SLGBTQQIA+ people to “see themselves” in the tech industry starting from a young age and in educational experiences.

133 “Intersectional” here refers to Kimberlé Crenshaw’s Intersectionality theory, which she defines in a recent Times interview as follows: “It’s basically a lens, a prism, for seeing the way in which various forms of inequality often operate together and exacerbate each other. We tend to talk about race inequality as separate from inequality based on gender, class, sexuality or immigrant status. What’s often missing is how some people are subject to all of these, and the experience is not just the sum of its parts.” Katy Steinmetz, “She Coined the Term ‘Intersectionality’ Over 30 years Ago,” Time, February 20, 2020, <https://time.com/5786710/kimberle-crenshaw-intersectionality/>.

134 Andrea Perreault, “Analysis of the distribution of gender in STEM fields in Canada,” NSERC Chairs for Women in Science and Engineering, January 29, 2018, [http://wiseatlantic.ca/wp-content/uploads/2018/03/WISEReport2017\\_final.pdf](http://wiseatlantic.ca/wp-content/uploads/2018/03/WISEReport2017_final.pdf).

135 Ibid.

136 Ibid.

*“I can only speak for my own experience, but my understanding of technology-related careers would be that they are based on maths and sciences, and I wasn’t the best in math and science. I’m a social science person. Speaking for myself as an Aboriginal woman, that would have been a barrier for me.” – [Interviewee]*

*“I think when you’re looking at health and social programming in First Nations communities, it’s often women who are at the forefront. We can hold those women up as much as possible, offering services or training for Indigenous women to look after their family, work, and stay in the community around the same time. When you talk about technology, you don’t see a lot of women in ads and pictures, so highlighting how Indigenous women can be a success in those areas going forward.” – [Interviewee]*

Although 2SLGBTQQIA+ participants often form a small sub-population, which prevents researchers from releasing data to protect people’s confidentiality, it is likely that inequities in STEM education and work are also a reality for 2SLGBTQQIA+ persons. In a study conducted by the University of Victoria, 2SLGBTQQIA+ persons in engineering and computer science workplaces faced inequities including microaggressions, and having to either come out multiple times a week or feel the need to “be discrete about their personal lives.”<sup>137</sup> Furthermore, 2SLGBTQQIA+ persons noted having to devalue their work while at the same time, provide “evidence of their competence.”<sup>138</sup> The stress caused by this environment contributed to higher chances of (minor) health problems and depressive symptoms when compared to the cis-gendered workforce.<sup>139</sup>

## What Jobs, Skills, and Career Pathways Are Indigenous People in British Columbia Interested In?

*“I think for opportunities that I see for tech in BC Indigenous communities is to provide more awareness on opportunities, because lots of Indigenous people aren’t aware of all opportunities available to them or careers that would be a good fit. If you ask someone, ‘What is tech?’ maybe two to three actual job profiles come to mind. Lots of careers are available, [but we have to] provide information on what you need to do in those jobs, experience, pay, and what are the options. Some kind of information like that would be a good resource for young people picking those careers for building their future.” – [Community session participant]*

Across this report, participants have emphasized several challenges that currently mitigate Indigenous people’s access to careers in technology. One is awareness. As suggested in the quotation above—and in other findings discussed throughout this paper—many Indigenous students have not been exposed to the possibilities of working in tech, what classes to take to qualify for university programs, or other pathways to make it into the tech industry. This challenge relates to digital infrastructure, education and pathways, and the types of jobs offered to communities by industry.

137 Dana Prymak, “Issues and Challenges Faced by Underrepresented groups in Engineering and Computer Science Industries,” University of Victoria, March 22, 2021, <https://www.uvic.ca/coopandcareer/assets/docs/issues-and-challenged-faced-by-underrepresented-groups.pdf>

138 Ibid.

139 Ibid.

A second consideration is location. While British Columbia as a whole offers many technology-related roles, many high-technology roles are concentrated in particular regions of the province. For those offered in rural and remote regions, high-technology occupations in those sector's regions may require people to have already traveled out of their community to obtain a post-secondary degree. Remote education and work opportunities offer an opportunity to bring training and employment to communities; however, adequate infrastructure, awareness, and mentorship remain important challenges:

*"If anybody's going to be working remotely, they need to be able to have a strong network connection so that they can access the tools that we use to actually communicate to each other. I think that's the number-one piece, but it's also having people kind of see themselves in these roles, because when it comes to technology, a lot of people see that as being a big-city thing that people do. Not smaller towns, even though they're starting to move towards it. I work with a number of incubators and accelerators in BC and, you know, they're popping up in places like Prince George. Revelstoke has a really great one. So smaller and smaller towns are starting to recognize that technology and building out these tech companies, even though every company in the world now is a tech company, it's making a lot more sense to have people do it in these smaller communities all around BC versus it's just Vancouver." – [Interviewee]*

*"Trying to get more people more involved in education in the First Nations communities because it's so expensive to leave the communities—this is going to benefit our people. We have the budgets but we just need the right people. The hardest part about First Nations communities is we only know what we see. If we don't bring a lot of things to our communities, our youth are going to feel like that's as far as they can go. It's a way of education and moving our culture forward. And to be able to give our students the comfort they need." – [Community session participant]*

Through the ILIT survey questions below, Indigenous research participants reported on occupations they held and were interested in, as well as technology skills they had or were interested in developing. These findings offer an important touchpoint for considering what kinds of transferable and tech-related skills are already held across British Columbia, as well as opportunities for education-providers, role models, and mentors to shine a light on the skills and careers that do not appear in this section.

## Occupations

In the Indigenous Leadership in Technology survey, participants were invited to report their employment status in a non-exclusive response set. The majority (60.4%) of respondents were employed, and 9.7% were self-employed. Just over 10% were in secondary, post-secondary, or other training programs. About one in five (22%) respondents were unemployed, and 13% noted that they were "under" employed or looking for further work. About 4% of participants were on medical or injury leave, 2% were retired, and 2% were stay-at-home care providers.<sup>140</sup>

Participants who were employed were asked to describe their current roles, while anyone looking for work or interested in changing jobs was asked what role they would like to go into. These were both open-ended responses, and the chart below represents a manual roll-up into classifications based on Statistics Canada's NOC system.

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140 Importantly, the last three groups of participants self-reported this in the "other" category, so there may be additional respondents who are retired but, for example, selected "unemployed" as the most relevant category.

Participants who identified as men were significantly more likely to hold and be interested in natural and applied sciences and related occupations (23% of men versus 1.5% of women held these roles; 16% of men versus 7% of women were interested in these roles). Women reported significantly more interest in occupations in education, law, and social, community, and governance roles (many of which were related to social work), as well as business, finance, and administration occupations.<sup>141</sup> Older working-age groups were much more likely to hold and be interested in management occupations than those under 30 (35% of those 50–59 versus 0% of those under 30 held these roles).

What role are you...	...currently in?		...interested in?	
	n	%	n	%
Management occupations	45	24.1%	58	19.3%
Business, finance, and administration occupations	28	15.0%	29	9.7%
Natural and applied sciences and related occupations	12	6.4%	26	8.7%
Health occupations	2	1.1%	17	5.7%
Occupations in education, law and social, community, and government services	46	24.6%	63	21.0%
Occupations in art, culture, recreation, and sport	5	2.7%	16	5.3%
Sales and service occupations	11	5.9%	9	3.0%
Trades, transport, and equipment operators and related occupations	1	0.5%	6	2.0%
Natural resources, agriculture, and related production occupations	1	0.5%	0	0.0%
Occupations in manufacturing and utilities	2	1.1%	1	0.3%
Entrepreneur	-	-	11	3.7%
Other	9	4.8%	30	10.0%
Unclear	25	13.4%	27	9.0%
N/A, not seeking work	-	-	7	2.3%
<b>Total</b>	<b>187</b>	<b>100%</b>	<b>300</b>	<b>100%</b>

Table 5. What role are you currently in, interested in, by occupational classification (ILIT Survey, 2021).

141 26% vs. 4.3% of women were interested in education, law, social, community, and governance roles; 11% of women vs. 3% of men were interested in business, finance, and administration.

## Seniority

The same responses as above can be considered in terms of junior or entry-level roles, mid-level roles that require training and experience, or senior roles with executive and management functions. The table below demonstrates (more clearly than the breakdown by occupation) that respondents are interested in moving into roles with more responsibility and expertise.

Interestingly, respondents who identified as men were significantly more likely to be interested in senior roles (39% versus 20% of women), while women were more likely to be interested in mid-level roles (60% versus 46% of men). There was no significant difference in people's already held roles by gender.

What role are you...	...currently in?		...interested in?	
	n	%	n	%
Senior roles	47	25.10%	73	24.30%
Mid-level roles	90	48.10%	172	57.30%
Junior roles	36	19.30%	19	6.30%
N/A	14	7.50%	36	12.00%
<b>Total</b>	<b>187</b>	<b>100%</b>	<b>300</b>	<b>100%</b>

Table 6. What role are you currently in, interested in, by seniority (ILIT Survey, 2021).

## Sectors of Interest

Participants were asked about what fields or sectors most interested them, with a wide variety of responses. Throughout this report, jobs and occupations are held as distinct from industries, sectors, or fields because a person could work in a technology-related role in a non-technology-related field (e.g., an IT support person in health care or a digital marketer for a brick-and-mortar business) or vice-versa (e.g., HR in a tech company).

**Differences in interest in technology.** About one in five (19%) of all respondents were interested in the ICT sector, and 7% were interested in scientific services. Interestingly, men were more likely to select both of these fields than women (28% of men versus 15% of women for ICT, and 13% of men versus 4% of women for scientific services). Remote participants (those who lived 90 minutes or more outside of the nearest city) were more likely than urban, suburban, and rural participants to be interested in the ICT sector (34.5% versus 12.5% and 18%, respectively).

**Other differences in field of interest by gender.** Women were more likely than men to select educational services and social assistance. Meanwhile, men were more likely than women to select construction and utilities, manufacturing, building support services, transportation and warehousing, forestry, fishing, mining, oil and gas, and agriculture.



**Interest in sectors on- and off-reserve.** Respondents on-reserve were more likely to report interest in construction and utilities, forestry, and agriculture, while off-reserve participants were more likely than on-reserve participants to report interest in the non-profit sector.

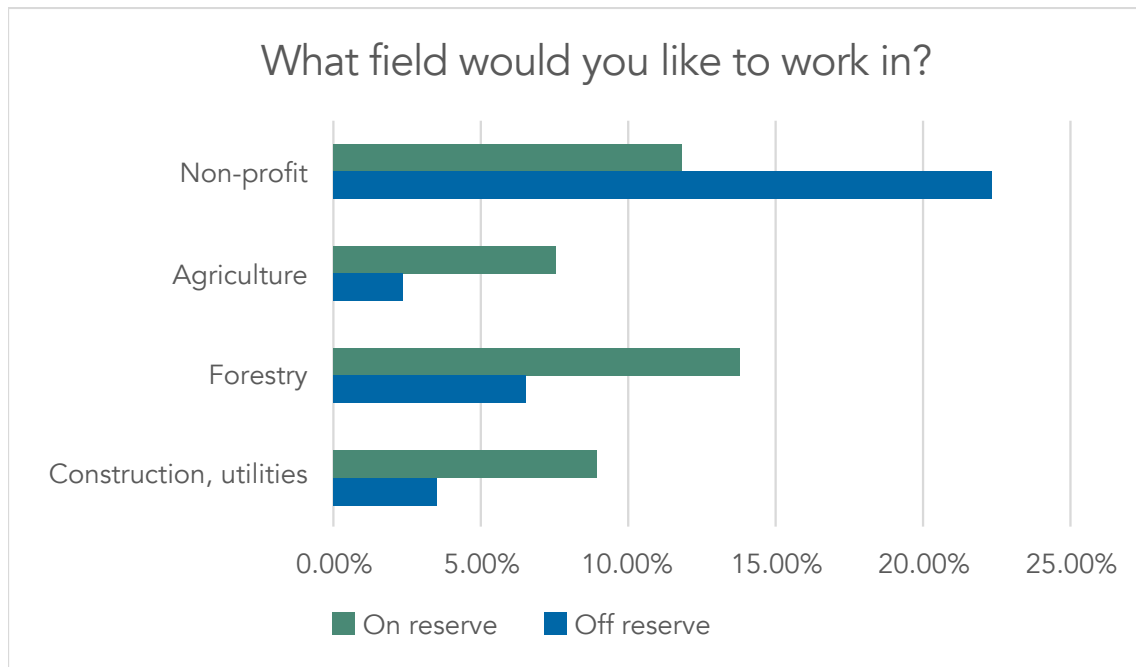


Figure 13. ILIT survey, 2021. This figure only shows sectors for which there were significant differences between respondents on- and off-reserve.

### Regional Variation in Fields of Interest<sup>142</sup>

**North Coast and Nechako** participants were most commonly interested in First Nations community work (though not uniquely so: First Nations community work was the number-one sector of interest across all regions), and also expressed relatively high interest in educational services and health care.

**Cariboo** region participants were more likely to be interested in wholesale and retail trade than some other regions, as well as trades in general (e.g., mining, transportation and warehousing, construction, utilities, and finance and real estate).

Cariboo region participants were also significantly more likely to be interested in business, finance, and administration occupations than all other regions but the Lower Mainland/Southwest. They were also the least likely to be interested in natural and applied sciences occupations (0% of respondents from the Cariboo region selected this as a role they would like to work in).

**Lower Mainland/Southwest** participants were more likely to be interested in social assistance than some other regions, as well as public administration, educational services, and non-profit work.

142 Note: while differences reported are statistically significant at 95% confidence or greater, sample sizes by some regions are small and these findings should be treated with caution. Respondents from the Kootenays and the Northeast region are not included in significance testing for this reason.

**Thompson-Okanagan** participants, like those in the Cariboo region, were more likely to be interested in mining and quarrying than those in the Mainland/Southwest. They were less likely than some regions to be interested in public administration and non-profit work.

**Vancouver Island/Coast** participants were more likely than some regions to be interested in First Nations community work, non-profit work, cultural work, and educational services.

## Technology-Related Skills

While most survey participants did not work in technology, nearly all had technology-related skills that they had used for personal projects, supporting family and friends, or in the workplace. The ILIT survey approached this in a few different ways: first, by asking about what skills they were most proud of; next, by asking about a time they had used tech skills to support others; and finally, by listing particular technology-related skills for a self-assessment.

When asked in an open-ended question, “What tech skills are you most proud of or are most useful to you?” ILIT participants responded with the following themes (listed from most to least frequent):

- 3. Responses around technology literacy (42%).** For example, “basic ability to use technology software,” or “email, researching online.”
- 4. Microsoft Office Suite skills (20%).** More women than men (21.3% versus 10.7%) talked about their MS Office skills. Responses in this category included comments like, “word, excel,” “I use excel a lot,” and “basic knowledge of most word programs, spreadsheets.”
- 5. Other software programs (11.1%)** (where other = other than MS office and graphic design tools). Respondents used a variety of other software, including accounting programs, digital mapping tools, and Tableau.
- 6. Human skills (9%) and technical skills not related to digital technology (7.8%).** In this category, some respondents said “beadwork,” “note-taking,” and “proposal writing,” along with “connecting with people,” “honest and trustworthy,” and other responses related to interpersonal interactions or technical skills not related to digital technology.
- 7. Graphic design and digital media (7.5%).** Respondents under 30 were more likely to report this than respondents over 50 (20.5% of < 30 versus 2.3% 50–59 and 0% 60 and older). In this category, people reported being proud of their skills in “digital media,” “photography,” “self-taught photoshop,” and “vectoring images.”
- 8. Troubleshooting, problem-solving, and security (6.9%).** Men were more likely than women to report these skills (13.3% versus 5%). Responses in this category referred to “quick learning and troubleshooting,” “understanding how to troubleshoot any computer program,” and “I’m good at troubleshooting computers.”
- 9. Programming and data analysis (6.6%).** Men were more likely than women to report these skills (12% versus 4.2%). Responses in this category included “GIS and coding,” “SQL architecture,” “web development,” and “front end web development with [React.js](#).”
- 10. Use of videoconferencing platforms (5.7%).** Women were more likely than men to report these skills (6.7% versus 0%). Responses in this category included, “I have gained much familiarity with online meetings of late, and am able organize meets with all the major platforms. Google, Zoom, Facetime, and Microsoft Teams.”

11. **Hardware-related skills** (4.2%). These included “computer, fax/printer, scanning,” “electrical,” and “fixing network and computer, laptops and cellphones.”
12. **Indigenous language and technology skills, Indigenous data sovereignty, and related skills** (2.2%). An ILIT survey respondent in this category noted, “The most important project I work on is digitization projects. I like to work where culture and technology intersect. I digitize a lot of analog to digital to preserve the language and voices of our elders.”
13. **No tech skills or barriers to having tech skills** (8.4%). This group responded to the question with a desire to learn more, or an articulation of what had prevented them from learning so far. For example, “Need more practice with computer skills,” or “not all that tech savvy.”

In a follow-up question, ILIT survey respondents were also asked to tell us about a time they used their tech skills to support others. Participants described the following types of (not mutually exclusive) stories:

1. **Professional support of colleagues or support offered through their jobs** (35.4%)

*“Always. I am always using my tech skills to support others. I do a lot of web conferencing lately due to the pandemic. I’m also mentoring a young woman in IT (my staff). I’m helping corporations, businesses and first nations governments migrate to SaaS and cloud technology.” – [ILIT survey respondent]*

*“Once my coworker’s personal laptop computer was acting up, found out it was because the part that would hold his hard drive in place was missing and it was wiggling out of it’s connections. I soldered together a makeshift tray for it to sit in and now it works great.” – [ILIT survey respondent]*

2. **Intergenerational support, support of friends and family** (29.2%)

These stories were more likely to come from respondents under 30 (39.5% in this age group offered this response) and those 40–49 (37.2%, possibly a group of people responsible for Elder care). However, participants in each age group had stories like these.

*“My son is good with a lot of technology - but the college registration website is not user friendly. That’s true of government websites as well. They are clunky and confusing and anti-intuitive is tech savvy kids who are used to user friendly websites get super confused when they encounter terrible websites. I helped him apply for college which included getting his transcripts.” – [ILIT survey respondent]*

*“I have helped people apply for their CPP. Life change milestones are where I have found people need assistance. Those graduating high school, turning 19, entering the workforce, pursue education, retiring, first time doing taxes, first homes...” – [ILIT survey respondent]*

*“Daily through training of elders and seniors or underserved residents with limited capacity to understand how to access resources.” [ILIT survey respondent]*

**3. Community-led projects, volunteering or not-for-profit work, activism (9.3%)**

*"Mapping to support our nation and people fight for rights and title."  
– [ILIT survey respondent]*

*"By volunteering with various BIPOC organizations to support others gain access into the industry. To be the mentor I never had." – [ILIT survey respondent]*

*"I created a language learning kit for families that can be borrowed from Vancouver Island Regional Library, it was accompanied by an app that worked with a mobile device that could read the pages on the books and flash cards."  
– [ILIT survey respondent]*

**4. Support for fellow students, support in an educational context (5.6%)**

*"Helped some classmates see what was wrong with their code when an assignment was needed to be done in class." – [ILIT survey respondent]*

Finally, respondents were asked about a list of technical skills and whether they had interest in them or felt they held them. First, 91.5% of respondents reported having basic computer skills (notably, 98.8% of all respondents in the Mainland/Southwest reported this, the highest among the regions and significantly higher than the Cariboo (82.3%) and North Coast and Nechako region (88.1%)).



Participants reported having and being interested in a variety of advanced technical skills, as listed in the chart below from most to least common.

	<b>Interpersonal skills</b> (e.g., communication, conflict resolution, adaptability)		<b>IT support</b> (e.g., technical support, troubleshooting, Windows server, operating systems)		<b>Digital marketing</b> (e.g., social media marketing, SEO, ad serving, Google Analytics, email marketing)		<b>Business analytics</b> (e.g., requirements analysis, data analysis, business process improvement knowledge)		<b>Database administration</b> (e.g., knowledge of databases, Microsoft SQL server, Oracle Database, data modeling, Linux)		<b>Network administration</b> (e.g., Windows server, troubleshooting, active directory, technical support, Cisco systems products)	
	n	%	n	%	n	%	n	%	n	%	n	%
I have skills in:	175	49%	105	*29%	75	21%	65	18%	46	13%	45	13%
I am interested in developing skills in:	138	38%	182	51%	192	54%	198	56%	172	48%	151	43%
Neither/unsure	46	13%	69	19%	88	25%	91	26%	139	39%	159	45%
	<b>GIS technology</b> (e.g., spatial databases, cartography, remote sensing, ArcGIS products, ESRI, QGIS)		<b>Cloud administration</b> (e.g., cloud computing, Windows server, active directory, Linux, VMware)		<b>Data analytics</b> (e.g., Tableau, data science, programming languages: SQL, Python, R)		<b>Back-end web development</b> (e.g., software development, Git, programming languages: JavaScript, HTML, Python, C++)		<b>Cybersecurity-related</b> (e.g., network security, information security, Linux, technical support)		<b>Full-stack development</b> (e.g., web development, programming languages: CSS, JavaScript, SQL, Java, React.js)	
	n	%	n	%	n	%	n	%	n	%	n	%
I have skills in:	35	*10%	33	9%	30	*8%	23	6%	22	6%	16	5%
I am interested in developing skills in:	145	41%	182	51%	171	48%	176	49%	178	50%	169	48%
Neither/unsure	176	49%	140	39%	153	43%	157	44%	153	43%	170	48%

Table 7. Technology-related skills: have, interested in developing skills in, neither/unsure (ILIT Survey, 2021).

There were some differences by gender, age, and other variables in these responses. For any cells with a \*, men were more likely to select this option than women (for example, 43% of men felt they had skills in IT support compared with 25% of women). In addition,

1. Respondents aged 30–39 were most likely to have IT support skills (43.6% versus 29.5% full sample).
2. Respondents under 30 were most likely to have digital marketing skills (36.6% versus 21.1% of full sample) and back-end web development (14.6% versus 6.5% of full sample).
3. Respondents classified as “remote” (more than 90 minutes of travel time to nearest city or town) were most likely to be interested in developing many of the technical skills listed above; in some cases, this reflects a lower number of respondents who have those skills, possibly due to less opportunity, infrastructure, and exposure. Remoteness was a stronger predictor of wanting to develop these skills than being on- or off-reserve, where differences can be seen but without statistical significance.<sup>143</sup>

Overall, there is a noticeable difference between the skills that ILIT participants have and the skills they are interested in developing, which points to a key opportunity for technology training and education. Another way of examining these skills is through the gap between the proportion of people who are interested in them compared with the proportion of people who already have them. In descending order, the skills with the biggest gap between interest and existing competency for ILIT survey respondents were:

1. Cybersecurity-related skills (44% wanted versus had)
2. Full-stack development and back-end web development (43% each)
3. Cloud administration (42%)
4. Data analytics (40%)
5. Business analytics (38%)
6. Database administration (35%)
7. Digital marketing (33%)
8. GIS technology (31%)<sup>144</sup>
9. Network administration (30%)
10. IT support (22% for all, but **29% for women and -1% for men**)
11. Interpersonal skills (-11%—more people had interpersonal skills than were interested in developing them)

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143 Similarly, fewer respondents in the Cariboo region than other regions reported fewer technical skills in network administration and digital marketing.

144 While significantly more men reported having GIS skills, the gap between existing competency and interest was roughly the same for men and women (29% vs. 32%, respectively).



Examined in this way, the data illustrates a clear opportunity to create particular IT training opportunities for Indigenous women. Interestingly, compared with the data on careers and sectors (where women were less likely to be interested in the ICT sector and professional and scientific services careers), women are generally interested in developing ICT skills. This may illustrate a further opportunity to either build greater awareness of ICT careers for Indigenous women, or focus on the transferability of technology-related skills and their broad applicability to careers outside of the “technology sector.” Although possibly challenging, given limited numbers, IT training focused on 2SLGBTQIA+ persons would be an important step towards inclusivity and equity in the field.

## Workplace Cultural Safety and Inclusive Hiring: Gaps and Opportunities

**\*\*Trigger Warning:** *the following section contains information related to employer perspectives that demonstrate racism and bias in the sector. Those that have experienced racism and discrimination may find it triggering.*

The Canadian technology industry has long been criticized for a lack of diversity.<sup>145</sup> One interviewee suggested that this can only last for so long:

*“They should recognize that before too long, non-inclusion is going to come at a cost to them. Tech companies are not special, lovely little snowflakes anymore. There was this grand period of total mysticism associated with what they do. Now they’re here in the real world. We’re all in this together.” – [Interviewee]*

The employer response to a lack of inclusion encompasses a broad range of strategies and actions related to workplace cultural safety and inclusive hiring. These are commonly termed equity, diversity, and inclusion (EDI), and encompass factors such as:

- How employers hire: processes related to job postings, screening, interviews, and onboarding.
- Workplace equity: ensuring people are comfortable and treated fairly in their day-to-day work, and that opportunities for career advancement and success do not discriminate.
- Data collection: if, how, and when employers track demographic-related information of their employees.
- Organizational culture: how employers go about building a workplace that promotes cultural safety and fosters diversity, equity, and inclusion.

Employers, perhaps buoyed by increased public awareness of systemic discrimination, have increasingly begun to develop EDI processes. The following section covers 1) barriers to improving workplace inclusion on the part of employers, and 2) practices to build workplace inclusion for Indigenous people and move beyond inclusion with active reconciliation and Indigenous leadership in the workplace. The discussion includes an overview of hiring practices and demographic data collection.

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145 Matthew Braga, “Canadian tech companies say they value diversity — but what are they doing about it?” CBC, 2017, <https://www.cbc.ca/news/science/canada-tech-companies-diversity-reports-2017-1.4194556>

## Barriers to Inclusion

A lack of Indigenous representation in the technology sector begins with broad systemic barriers to Indigenous access and participation in tech employment and education, discussed throughout this report. However, there are other barriers that are more directly related to workplace inclusion, hiring, and employer actions. In short, this section discusses the ways in which employer behaviour or decisions can limit Indigenous inclusion. Employers surveyed saw a variety of barriers to hiring Indigenous employees, as shown below.<sup>146</sup>

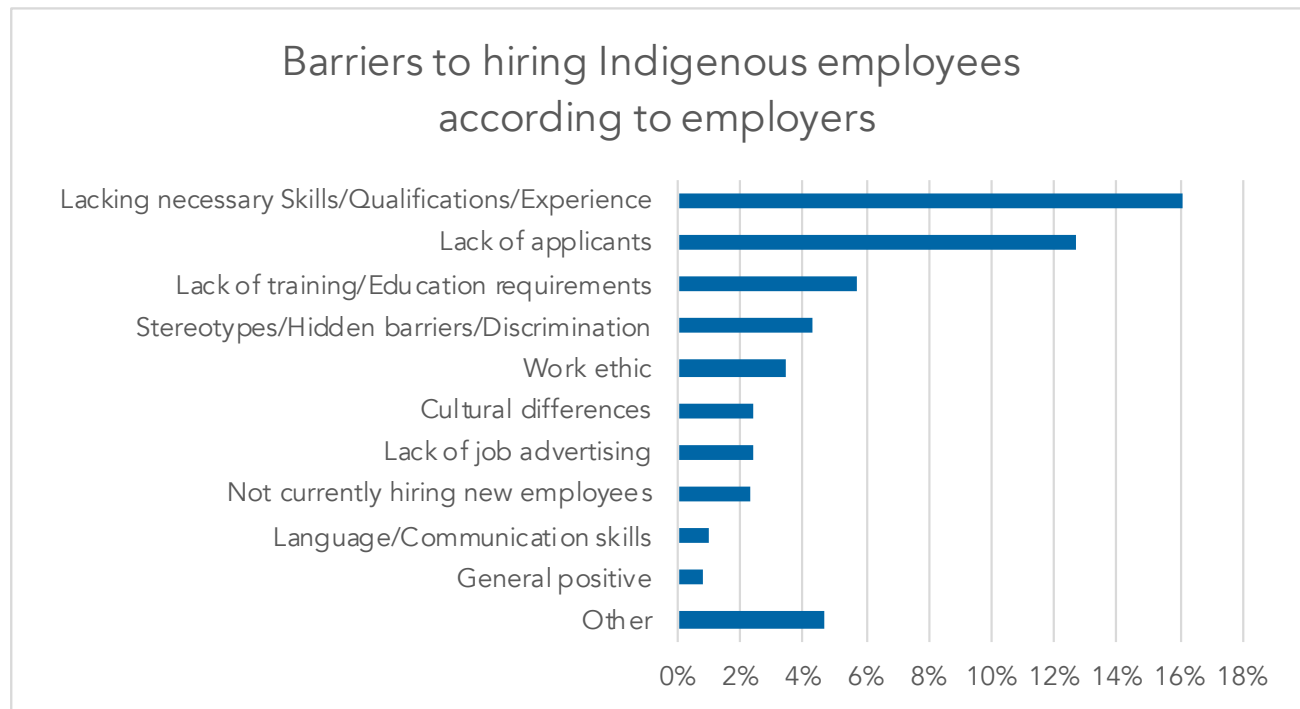


Figure 14. Barriers to hiring Indigenous employees according to employers. Source: Survey of BC Employers.

### Uncertainty, Confusion, or Apathy about Inclusive Practices

Many employers who interacted with the project struggled with knowing how to hire Indigenous staff respectfully and effectively. Further, many were afraid of “doing the wrong thing,” were not sure why their typical hiring processes were not working, or found it difficult to know what resources to ask for and what networks to go to for assistance.

Employers also have a range of priorities. They are often simultaneously balancing their goals to grow the organization, support clients, or provide services. They may see EDI as a secondary concern behind these objectives and feel that they are already doing enough. Indeed, 50% of employers surveyed agreed with the statement “Our organization is doing enough to create a more inclusive environment to increase the number of Indigenous employees in our organization.” Yet, the fact that many employers feel they are creating inclusive environments is not necessarily sufficient. As discussed, numerous barriers to technology opportunities persist for Indigenous people. For instance, 42% of ILIT survey respondents reported experiencing a lack of cultural understanding in the workplace, 38% reported not feeling welcome at workplaces, 42% experience or know they may experience racism at

<sup>146</sup> Respondents in the second phase of the survey were more likely to suggest that a barrier to hiring Indigenous employees was that they were lacking skills, qualifications, or experience (21% vs 11%). Otherwise, responses across both phases were relatively similar. All figures in this section take an average of the two survey phases.

the workplace, and 42% feel that employers are biased and less likely to hire Indigenous people. Other employers see the value of EDI, but approach it as a box-checking exercise to ensure that they meet HR requirements or stakeholder demands. As one interviewee described:

*"I was chatting with one of the clients who happens to also be Indigenous, talking about sometimes Indigenous people getting hired under community benefit agreements and then let go. That's to say, they're hired to meet a quota and then not supported." – [Interviewee]*

Some organizations, meanwhile, are simply not engaging with the problem. In the words of one interviewee:

*"We did a survey of corporate Canada. The majority of companies don't even know what the Truth and Reconciliation Commission's corporate Call to Action is, let alone have a response strategy. We've noticed a great engagement gap. These companies are not even engaged to know what their barriers are, to know what their challenges are." – [Interviewee]*

Engagement gaps suggest apathy or an unwillingness to consider the reality of discrimination. About 7% of employer survey respondents suggested that they hire solely based on qualifications or don't consider race when hiring. Responses of this type included colour-blind comments such as, "We don't look at specific races, just if the person can perform the job regardless of any race, gender, age, etc." While this implies unbiased hiring practices, it also suggests that such employers may not be acknowledging the role of structural racism when they hire employees. Many respondents suggested that they hire only based on merit. One employer survey respondent's comment on this practice stood out: "[It's difficult] to effectively deal with the white people who say things like 'this is reverse racism' or 'we should be hiring on merit.' Diversity of experience is merit but sometimes it's hard to convey that to the loud people."

## Discrimination and Stereotyping

Still other organizations actively oppose EDI. Some employer respondents seemed to be frustrated even with suggestions of support for the recruitment of Indigenous employees. Several responses included colour-blind statements, ignorance of the question asked of them, or an unwillingness to abide by "special rules" for certain groups of people.

The clearest obstacle to employers' inclusion of Indigenous people in British Columbia's technology sector is discrimination. While laws typically protect against overt discrimination, it often remains close to the surface. An example of this was provided by an interviewee who described conversations between employers about hiring Indigenous employees:

*"[They'd say that] 'It sounds kind of thorny and prickly and, you know, didn't they put up a barricade at Caledonia? I don't know if I want that here in BC.' That's what people say behind closed doors, and I know because they tell me. I will never say their names, but I've been told these things, this is how people talk and feel. They get behind closed doors and they go, 'A lot of risk with Indigenous stuff. I mean, do we really need to do it? What does it mean to us as a company? Do we really lose any revenue?'" – [Interviewee]*

More subtle, systemic forms of discrimination occur through stereotyping, sometimes even perpetuated by those working closely with Indigenous communities. One non-Indigenous interviewee suggested that Indigenous culture is not technology-oriented, that technological jobs are not a historical or cultural part of Indigenous history. Statements like this may be informed by the perceptions of people working for the interests of Indigenous communities and perpetuate stereotyping that limits perceptions of Indigenous capability.

One interviewee noted that eliminating bias about who “typically” participates in tech is a shared responsibility:

*“One of the issues is there’s a preconceived notion of who works in technology and people don’t see themselves in those roles. It’s hard for them to imagine applying for those jobs. So that’s really a huge hurdle that everyone needs to get over.”*  
– [Interviewee]

Some responses to the question of what barriers exist for Indigenous participation in the digital economy might be categorized as “colour-blind” or covertly racist. For example, many respondents to the employer survey dismissed the existence of barriers to employment. In fact, only 4% of employer survey respondents suggested that stereotypes, hidden barriers, or discrimination were among the biggest barriers to hiring Indigenous people. Numerous responses were blatantly racist or discriminatory, portraying an ignorance to the idea that Indigenous people faced any barriers at all, and making derogatory remarks about their character and background.



## What Are Employers Doing, and What Should They Be Doing, to Develop More Inclusive Practices?

This section examines the essential baseline of workplace cultural safety and offers participants' reflections on best practices for hiring practices, building inclusive work environments, and collecting demographic data in the workplace.

### Employer Perspectives

About half of employers surveyed felt that they were proactive in recruiting and retaining Indigenous employees. Further, nearly two-thirds of employers agreed with the statements "Our organization recognizes that we work on the traditional territory of First Nations and are committed to practicing allyship and anti-racism" (64%) and "Our organization values the unique contributions and perspectives of Indigenous staff" (61%). Figure 16 demonstrates employer responses to these and other statements about inclusive and Indigenous hiring.

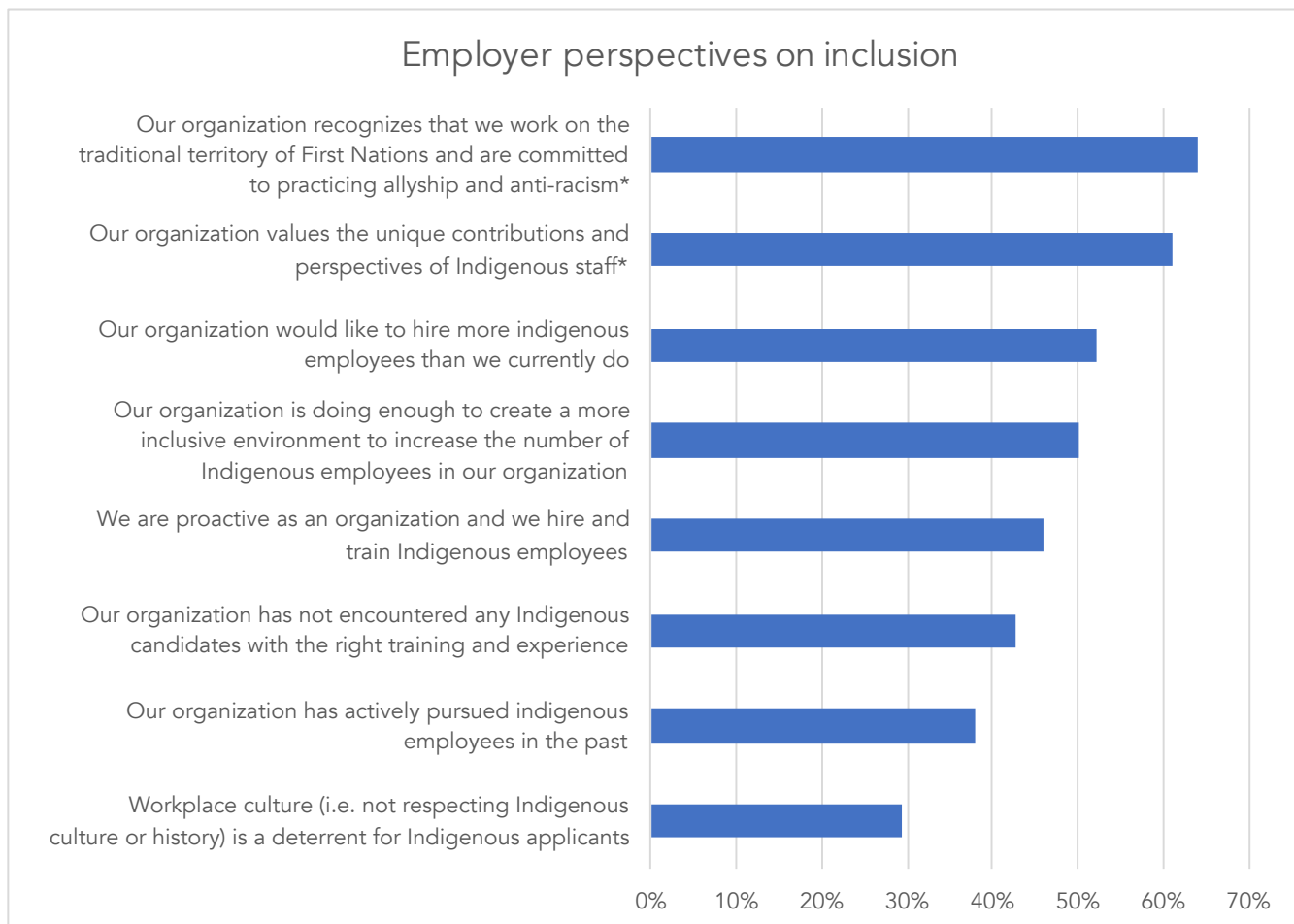


Figure 15. Survey of BC Employers, perspectives on inclusion. \*Indicates questions that were only asked in survey phase II; all other responses are represented as the average of two phases.

Importantly, some of these responses can also be read as conveying several different meanings. For example, in the row "Our organization would like to hire more Indigenous employees than we currently do," low response rates in many regions could be a function of smaller businesses being unable to hire currently. Alternatively, it could signal a higher response rate of organizations that already have many Indigenous personnel on staff. Similarly, low agreement with "Workplace culture is a deterrent for Indigenous applicants" could reflect genuinely positive workplace cultures or, conversely, a lack of awareness.

## Hiring Processes

The first consideration in the hiring process is identifying prospective employees, typically by developing job postings and reaching out to potential hires. About half of employers (52%) said that they would like to hire more Indigenous employees than they currently do, and 67% felt well-informed to do so. About one-third of employers (29%) agreed that workplace culture is a deterrent for Indigenous applicants. However, only 16% of organizations with no Indigenous employees felt this way, compared to 44% of organizations with at least one Indigenous employee.<sup>147</sup> This may suggest that employers that see workplace cultures as deterring Indigenous applicants may also make efforts to hire Indigenous applicants. This may also suggest that Indigenous employees can influence organizational perspectives on Indigenous experiences. One way to include more Indigenous people in the workplace is to have Indigenous people with existing networks and culturally safe practices in hiring roles. At the same time, it is important to concretely acknowledge the additional emotional labour of Indigenous people performing such work.

In sessions held with industry, participants noted that they would appreciate a range of supports for hiring, including:

- lists of graduates for organizations that are hiring;
- lists (and explanations) of programs that train employers on EDI; and
- information on individuals to reach out to at a band level, and relationships with bands.

Only 8.5% of employer survey respondents said that they need no further information or supports to effectively recruit Indigenous employees.<sup>148</sup> For some, this was because they already feel that they effectively recruit Indigenous employees. However, for others, this could be due to a lack of desire to further support the recruitment of Indigenous people. The most commonly identified information or support needed (among 8% of respondents) was in terms of knowing where to find Indigenous talent.<sup>149</sup> Respondents said that things like “[knowing] where to recruit and how to reach and attract [talent]” can be difficult. About 5.5% of respondents said they’d benefit from having Indigenous contacts or access to Indigenous recruitment websites. Others felt limited by the size of the Indigenous labour pool that they could identify. A further 12.5% of employer survey respondents said that a lack of applicants was a major barrier for hiring Indigenous staff, while 43% of employers agreed that they had “not encountered any Indigenous candidates with the right training and experience.” In the words of employers:

*“We want to hire people inside of the province, but there’s already complexity to hiring technical people to Kamloops with labour shortages. If we put another thing in there saying they have to be Indigenous, then we limit our pool further.” – [Interviewee]*

*“Part of the problem with trying to recruit qualified Indigenous employees is that everybody wants them. So, we have to be really cognizant of the type of work that we offer, the benefits, etc. As our people become qualified in various areas, the number of people wanting to hire them grows. Challenges are a lack of personnel. People are out there; it’s just that reaching them is a bit of a problem. We use things like LinkedIn, other job boards, and yeah, people are in high demand for a lot of our Aboriginal-focused kind of positions. It’s difficult to staff because they are in such demand.” – Interviewee*

147 99% confidence.

148 This was the single most common response to the question of “What sort of information or supports would you need to effectively recruit new indigenous employees?” This entailed 11% of respondents in the first phase and 6% in the second phase. Importantly, many employers answered “unsure” or “prefer not to say” to this question as well, perhaps illustrating a discomfort with the topic.

149 11% in Phase I, 5% in Phase II.



One potential reason for employers having difficulty connecting with Indigenous applicants is that they may be searching in the wrong places. Figure 17 compares where employers post jobs and where job seekers look for jobs. Compared to employers, nearly twice as many job seekers use social media (56% versus 29%), and more than four times as many job seekers use fnbc.info (26% versus 6%). Employers, meanwhile, were about four times more likely to use a recruiting company than job seekers were (23% versus 6%).

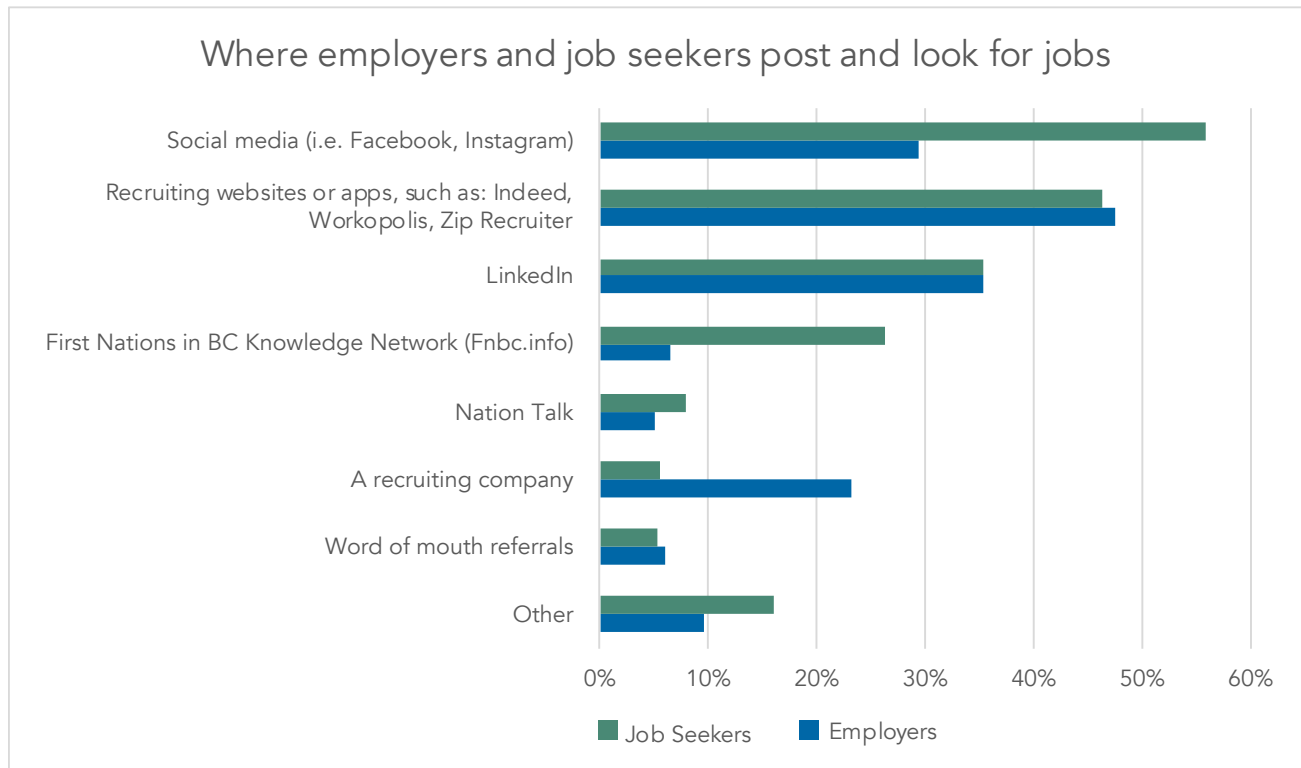


Figure 16. Comparison between ILIT survey and employer survey respondents' use of job boards.

Recruiting methods varied depending on the type of respondent. Only 29% of very small employers used recruiting websites like [Indeed.com](https://www.indeed.com), while 20% used LinkedIn, and 26% used other social media platforms. In this group, 9% used word-of-mouth referrals (closely matched by companies of 5-19, 13% word of mouth), while 26% either “did not know” or used “no” recruitment or advertising strategies. Businesses in the Mainland/Southwest region used different recruitment patterns than respondents in the rest of the province. Job seekers in Mainland/Southwest were significantly more likely to use recruitment websites or apps than the rest of the province (52% of Mainland/Southwest versus 36% of the rest of BC) and LinkedIn (41% of Mainland/Southwest versus 22% of the rest of BC). Employers in the Vancouver Island/Coast (Vancouver Island/Coast) region were slightly more likely to use fnbc.info than businesses in other regions (16% Vancouver Island/Coast versus 4% of the rest of BC).

Effective and inclusive processes when it comes to creating job postings and screening resumes is another key aspect of the hiring process. For example, in an industry engagement session, one employer mentioned that they screen resumes for content that might identify gender or culture (and remove it) to remove biases from the hiring process—a practice that aims to enhance diversity but risks limiting focus on equity. Industry participants spoke of the importance of accessibility in terms of job postings and requirements:

*“[Many employers] don’t include things in their job postings that signal that their workplace has enough knowledge to create a safe environment for the Indigenous person to succeed, and not be harmed.” – [Industry session participant]*

*“I work in Indigenous health and we prioritize hiring Indigenous folks and don’t have the same requirement around education; experience in life far richer. HR was screening out people who did not have education. We don’t even know how many people we lost and it was all a tech thing behind the scenes.”  
– [Community session participant]*

*“We post opportunities online and we have a talent ecosystem manager who works hard to make sure that the open community opportunities are shared on job boards for Indigenous communities, but it’s ad hoc. Our job board today has 104 jobs on it and we’d love to get that in front of more people who are under-represented in tech.”  
– [Interviewee]*

Even when employers are committed to inclusive hiring practices, interviews themselves can often be exclusionary or discriminatory. Interview norms and expectations can vary depending on worldview and culture, and employers sometimes assess “culture fit” in interviews, potentially leading to discriminatory behaviour.<sup>150</sup> Interviews and testing can also be more difficult for people who have caregiving responsibilities, live in rural communities (e.g., they require additional travel time), and who have anxiety. Some interviewees noted the importance of careful and inclusive interview practices:

*“We work through different working groups of assisting hiring managers with indigenizing or being a part of those hiring panels that directly relate to Indigenous people. So I know that we’ve had job descriptions come our way and we’ve been able to kind of reinvent the question around cultural safety. Making it mandatory of having all positions at [health authority] have at least one question around cultural safety.”  
– [Interviewee]*

Finally, an understanding of inclusive hiring is incomplete without some background on what Indigenous job seekers desire. As illustrated previously, many ILIT survey respondents had negative perceptions of workplace cultural safety and hiring in the tech sector; however, this was not the first or most common barrier to accessing tech. Deeper systemic challenges including finances, access to education, and location of work instead took precedence. Indeed, when asked to identify their reasons

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150 Tyler Farmer and Khiran O’Neill, “Settling for More: Matching Newcomers to Alberta’s Tech Sector” (Ottawa: Information and Communications Technology Council, November 2021), <https://www.digitalthinktankictc.com/reports/settling-for-more>.

for accepting or rejecting a job, ILIT survey participants commented on a variety of elements that are the cornerstone of any good employment offer: reasonable pay and benefits, an accessible location, and fulfilling and interesting work (see Figure 18). Corroborating evidence from the survey, the location of work was frequently described by participants as a critical factor for many Indigenous workers, for whom cultural and worldview motivations were sometimes related to location preferences. For example, many individuals do not want to leave communities where they have strong social and family supports:

*"[There are barriers in terms of] what it's like to be away from community and supports and to be kind of thrown into a new reality which may not resonate. It may not feel familiar. Could be hostile even. And that can be problematic for people coming from remote areas." – [Interviewee]*

*"When I went to city for the first time, from community to Burnaby, it was a big thing to be away from friends and family and supports." – [Community session participant]*

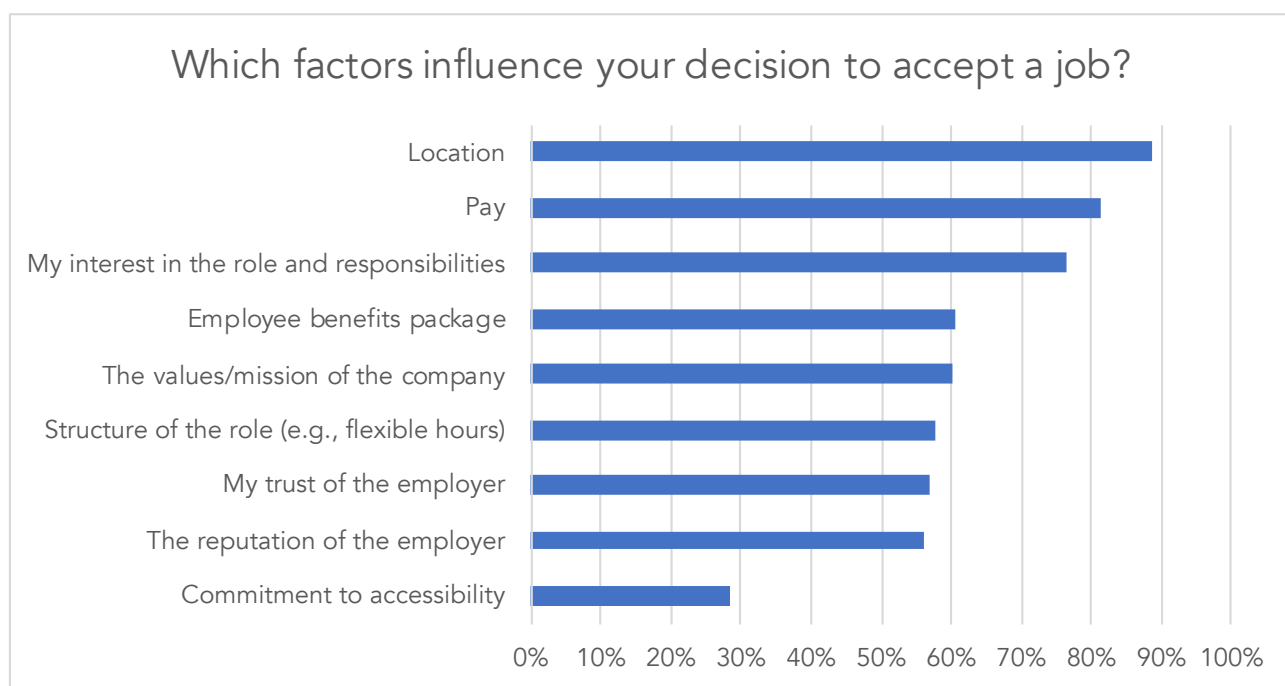


Figure 16. ILIT survey participant perspectives on reasons to accept a job.

## Building an Inclusive Working Environment

Building Indigenous representation in organizations is only one component of EDI. While employers need to know where to recruit Indigenous people from, they also need to actively seek Indigenous and EDI perspectives after their Indigenous employees have been hired. In the words of one respondent, “[We could use] a consultant that has Indigenous links/background to advise/coach us on recruitment strategy and retention.” Interviewees agreed, noting that successful implementation of EDI requires technical expertise.

Further, this expertise must be valued (and compensated) like any other domain expertise that is necessary for organizational success:

*“Companies need expert consulting and coaching advice [for EDI]. This is really no different than any other type of specialized strategy or plan that you would undertake.” – [Interviewee]*

Even if businesses have successfully hired Indigenous employees, many fail to adequately support Indigenous staff in the workplace, and fail to recognize how Indigenous staff may be forced to adapt to a dominant workplace environment. Participants in industry sessions spoke at length about challenges they saw, including those related to seniority and management being poorly equipped to work with Indigenous people:

*“One thing that’s challenging is that when we recruit Indigenous folks, we tend to recruit them into less senior and less manager-level roles, meaning when we do recruit Indigenous talent to other roles, their managers are likely to have zero accountabilities or expectations to understand Indigenous Peoples. They don’t know to make them feel welcomed and may end up harming them accidentally instead.” – [Industry session participant]*

*“People in senior or management roles don’t have the skills, expectations, and the competencies to lead Indigenous staff in their roles.” – [Industry session participant]*

These challenges also relate to Indigenous staff carrying an additional burden: not only are they expected to perform their job, but they are also inappropriately expected to support and educate colleagues and supervisors on Indigeneity and cultural sensitivity. Research by Jennifer Thorpe-Moscon and Joy Ohm finds that “Indigenous Peoples . . . pay an emotional tax at work and experience low levels of psychological safety.”<sup>151</sup> In the words of industry session participants:

*“A lot of barriers exist at the managerial level: we need to include Indigenous-specific competencies in managerial roles, and make them mandatory for all managerial roles, and not just those related to Indigenous Peoples . . . This way, the onus isn’t placed on Indigenous Peoples to teach their managers and everyone around them.” – [Industry session participant]*

The above statement portrays a distinct lack of cultural safety in the workplace and the need for Indigenous people to be supported and for more culturally safe spaces to be cultivated.

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151 Jennifer Thorpe-Moscon and Joy Ohm, “Building inclusion for Indigenous Peoples in Canadian workplaces,” Catalyst, 2021 [https://www.catalyst.org/wp-content/uploads/2020/12/IndigenousPeoplesCanadaReport\\_English\\_final.pdf](https://www.catalyst.org/wp-content/uploads/2020/12/IndigenousPeoplesCanadaReport_English_final.pdf)

Employers, survey respondents, and virtual session participants raised the importance of ensuring that workplace inclusion does not come at the expense of tokenism. This can lead to undermining Indigenous Peoples' "abilities, aptitude, or knowledge" and feelings of loneliness and alienation.<sup>152</sup> An industry session participant explained a common phenomenon:

*"Indigenous people often work in Indigenous positions, particularly when it's a senior role. Unless it's something like Indigenous relations, you're going to see a lot of people who are not Indigenous. It practically has to be in the title."  
– [Industry session participant]*

The context in which an organization develops EDI also matters and must take into account factors such as an organization's history, location, and industry. The Future Skills Centre notes that closing the gap between Indigenous and non-Indigenous talent requires investments in Indigenous-focused learning structures that are distinct to community, geography, and language.<sup>153</sup> Indigenous programming that is broadly targeted towards Indigenous people may fail to acknowledge the very different lived and historic experiences of First Nations, Métis, and Inuit communities, as well as contexts that are unique to different First Nations. One employer described how they value local familiarity in their hiring processes:

*"We really want to focus and look at some of the job duties and requirements and I think of some of the skills and attributes that they ask. We really try to make it as local as possible. So if we are hiring for someone in the South Island, for example, Victoria, we want to make sure that that applicant is familiar with what the city of Victoria or the Lekwungen-speaking people and the cultural families there. We're a huge advocate of having that local Indigenous knowledge and Indigenous ways of being directly on the job description and making sure that you know the fit is going to be good . . . When I'm looking at a resume, I'm looking at how are they engaged with the local community or how are they familiar with some of the organizations [we work with as well as the Nations in the region], those kind of things that we're really advocating for that weren't necessarily on there before." – [Interviewee]*

The following table displays employers' survey responses regarding their priorities for recruitment and retention of Indigenous employees. The most popular priorities are all policies that do not require active strategies to recruit and retain Indigenous people. Employers that already had at least one Indigenous employee were more likely to use any recruitment and retention strategies, for all but one response,<sup>154</sup> as were employers that track data compared to those who do not.<sup>155</sup>

152 Frances Henry et al., *The Equity Myth: Racialization and Indigeneity at Canadian Universities*. (UBC Press: Vancouver, 2017).

153 Andrew Avgerinos, Max Skudra, and Dr. Karen E. McCallum, "Mapping the Landscape: Indigenous Skills Training and Jobs in Canada," Future Skills Centre, 2013, <https://fsc-ccf.ca/research/mapping-the-landscape-indigenous-skills-training-and-jobs-in-canada/>

154 "Support cultural holidays, family commitments, and protocols such as taking time off work to take care of children or to grieve a death," which differed by less than one percentage point.

155 Again, for all but one: "Meaningful work," which also differed by less than one percentage point.

Recruitment and retention strategy	Proportion of employers using this strategy
Equality of treatment	34%
An accepting, respectful, and nonjudgmental work environment	31%
Pay equity	31%
Competitive salary and benefits	30%
Meaningful work (i.e., have purpose at work)	30%
Cultural diversity in the workplace	28%
Opportunities for professional growth and development	27%
Support cultural holidays, family commitments, and protocols, such as taking time off work to take care of children or to grieve a death*	24%
Stability and longevity	24%
Potential for increased responsibility	23%
Provide necessary technology (e.g., laptop) to work*	22%
Organization policy that respects Indigenous culture	21%
Career development plans	20%
Opportunities for non-Indigenous staff to participate in anti-racism and allyship training*	19%
Provide accommodations for people with disabilities*	19%
Mentorship opportunities*	19%
Building relationships with local First Nations communities	18%
Inclusion programs for diverse staff	18%
Publicly supporting truth and reconciliation	17%
Formal diversity and inclusion strategy	16%
Cultural safety training	15%
Promotion of opportunities to Indigenous audience	13%
Partnering with Indigenous employment and training agencies	13%
Formal recognition programs	12%
I don't know	9%
We don't have any strategies in place to retain or recruit Indigenous employees	21%

\* Indicates questions that were only posed in survey phase II.

Table 8. Employers' priorities for recruitment and retention of Indigenous employees.



## Demographic Data Collection

Strong EDI requires that employers have information about the demographics of their staff. As such, collecting employee data is often a key aspect of workplace EDI and also can positively impact hiring. For example, 83% of employers that track data felt well-informed to hire new Indigenous staff, compared to only 59% of those that did not track data.<sup>156</sup> Of employers that track data, only 6% said that they had no strategies in place to retain or recruit Indigenous employees, compared to 30% of employers that do not track data.<sup>157</sup>

In *Disaggregated demographic data collection in British Columbia: The grandmother perspective*, the BC Office of the Human Rights Commissioner (BCOHRC) writes that “by making systemic inequalities in our society visible, data can lead to positive change. The same data, used or collected poorly, can reinforce stigmatization of communities, leading to individual and community harm.”<sup>158</sup> For these reasons, the BCOHRC recommends the use of a framework developed by Gwen Phillips of the Ktunaxa Nation, called “the grandmother perspective”—a framework “of *data governance as caring not controlling* through the provision of practical, concrete methods of data collection, use and disclosure.”<sup>159</sup> Decisions regarding the use and collection of data about Indigenous people has long been made from a controlling, colonial perspective and with limited or no input from Indigenous communities.<sup>160</sup> One interviewee said:

*“First Nations, Métis, and Indigenous data has been collected so badly in the past. For organizations trying to do this, it might be helpful to reach out to the First Nations Information Governance Centre [FNIGC], who does this on a daily basis. It’s just such a sensitive issue because of history.” – [Interviewee]*

The FNIGC promotes OCAP (Ownership, Control, Access, and Possession), a set of principles that “assert that First Nations have control over data collection processes, and that they own and control how this information can be used.”<sup>161</sup> The collection of employee data by non-Indigenous employers may contradict OCAP principles, so employers that wish to track the data of Indigenous employees should seek Indigenous guidance when developing data collection processes.

An organization’s relationship with data collection—and more generally, their relationship with EDI—can depend on its size. As one industry participant noted:

*“You wouldn’t be able to determine things like seniority if you only have four employees, for the sake of maintaining confidentiality.”  
– [Industry session participant]*

156 99% significant.

157 These relationships could be attributed in part to company size: larger companies are more likely to track data and to have inclusive hiring strategies in place.

158 British Columbia’s Office of the Human Rights Commissioner, “Disaggregated demographic data collection in British Columbia: The grandmother perspective,” 2020, [https://bchumanrights.ca/wp-content/uploads/BCOHRC\\_Sept2020\\_Disaggregated-Data-Report\\_FINAL.pdf](https://bchumanrights.ca/wp-content/uploads/BCOHRC_Sept2020_Disaggregated-Data-Report_FINAL.pdf)

159 Italics added for emphasis. Ibid.

160 The First Nations Information Governance Centre, “First Nations data sovereignty in Canada,” Statistical Journal of the IAOS, 2019, <https://content.iospress.com/articles/statistical-journal-of-the-iaos/sji180478>

161 First Nations Information Governance Centre, “The First Nations Principles of OCAP,” n.d., <https://fnigc.ca/ocap-training/>

Smaller organizations have more difficulty anonymizing data and making decisions based on small sample sizes, but have greater agility and are less constrained by bureaucracy than larger organizations. Larger organizations—especially ones operating internationally—may be ill-equipped to adapt quickly and support local or regional needs. Still, there are signs that data collection is becoming more common among organizations of all sizes:

*“Five years or more ago, we were very reluctant to keep track of things like ethnicity or sexual orientation for fear of it being read as discrimination. Now we understand that it will give us a baseline to work better at inclusion.” – [Interviewee]*

*“We did an internal demographic assessment within our HR system . . . Doing this through HR allows us to dig into inclusion, not just representation. This lets us ask, not just ‘Are we hiring diverse employees?’ but ‘How are we hiring people?’ What types of roles, how are we compensating people, average performance rate by identity, if we have biases in their processes that will lose us people in retention . . . Quotas are not the ultimate goal.” – [Interviewee]*

### Inclusive Practices Are Only a Start

While EDI is gaining momentum, it is not a silver bullet. First, it is an umbrella term for a broad array of practices and policies, and there is a need for Indigenous representation to be independent from EDI practices and developed in the framework of reconciliation. Furthermore, employers that are only beginning to develop effective EDI practices must suitably address the specific context of Indigenous communities, cultures, and history, and not solely build broad organizational diversity targets. Currently, EDI falls short of acknowledging Indigenous self-determination and Nationhood in moving towards the changes needed. There are also risks that EDI can be used as a form of public relations or marketing rather than to truly enhance inclusion. There is increasing awareness and acknowledgement that although EDI is being widely taken up by institutions and corporations, in many cases it reinforces the status quo in practice rather than disrupting the oppressive practices and policies that have entrenched inequities for years.<sup>162</sup> Despite growing recognition of the importance of EDI and existing discrimination towards Indigenous Peoples, interviewees noted that discussing either has remained somewhat taboo:

*“The challenge you have whenever you talk about anything Indigenous is just that it instantly makes everyone feel uncomfortable. They don’t want to talk about it. Almost every other group they would rather talk about than Indigeneity . . . And yeah, it’s complicated to unwind.” – [Interviewee]*

Employers that aren’t sure what to do when they struggle to hire Indigenous employees are likely encountering the symptoms of the systemic barriers preventing Indigenous people from accessing the tech sector. These include all-important considerations of access to education, location, and availability of work in remote and on-reserve locations, and awareness of the tech sector. What this means is that employers who wish to build diversity in their workplaces and hire more Indigenous people have an opportunity to actively reduce some of these barriers to access through engaged hiring practices.

<sup>162</sup> Laura Beauline-Stuebing, “Study finds equity, diversity and inclusion policies off to a strong start at research-intensive universities,” University Affairs, March 11, 2020, <https://www.universityaffairs.ca/news/news-article/study-finds-equity-diversity-and-inclusion-policies-off-to-a-strong-start-at-research-intensive-universities/>.

They can offer remote and flexible work, on-the-job training, and initiatives that improve awareness of tech and their businesses. Creating a safe workplace and then waiting for applicants to arrive may not be adequate to address the significant barriers to finding tech work that Indigenous people can face. Finally, workplace inclusion alone cannot undo systemic discrimination. Even employers with excellent EDI practices will need to look beyond things like internal hiring procedures when thinking about their impact on Indigenous people—for example, through their impact on the environment or local small businesses.

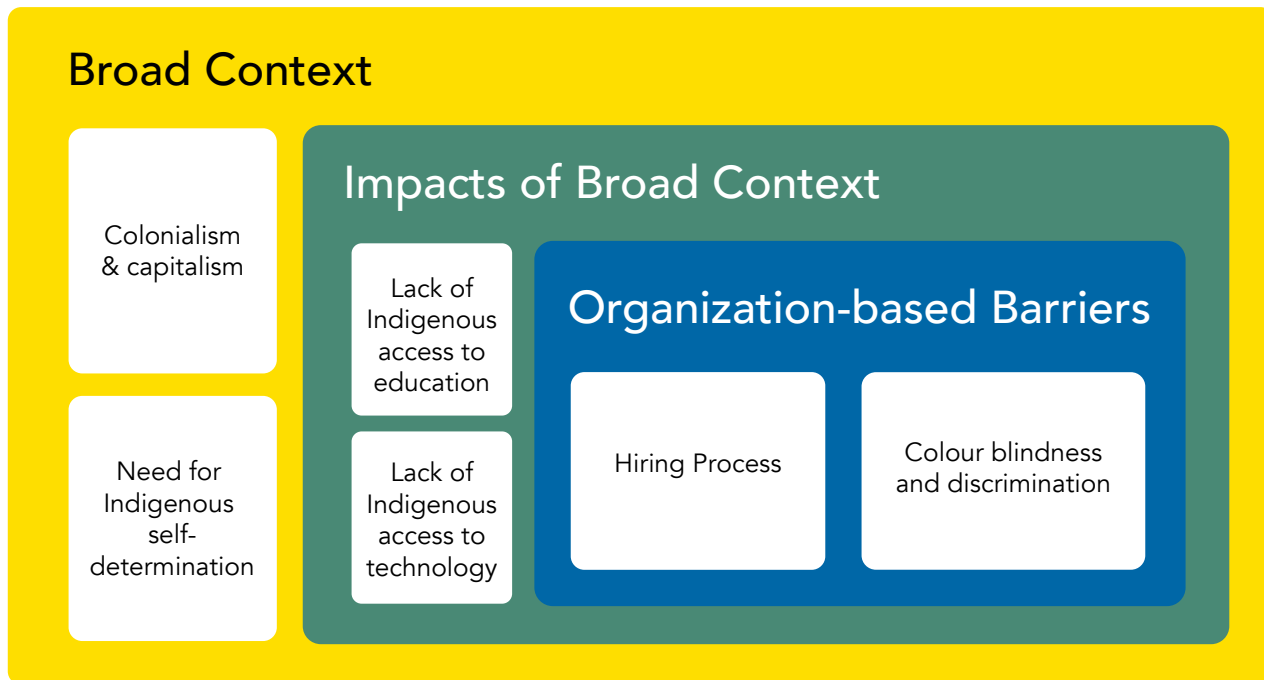


Figure 17. Nested and layered barriers. Source: Reciprocal Consulting.



## 4.4 Technology and Innovation Leadership

### Strategic Area Overview

Digital transformation is rapidly accelerating. While this is creating exciting new opportunities to advance social, economic, and political progress, it also risks further exacerbating existing systemic inequalities (or even worse, creating new ones). Indigenous leadership is critical in conversations concerning innovation and technology, especially since the outcomes and decisions that are made directly impact their communities. Around the world, internet-based societies are being transformed by the adoption of technologies such as artificial intelligence, blockchain, big data, 5G, and cloud computing. Their integration into society is anticipated to lead to a new economic and industrial revolution that has the potential to reshape society and enable the modernization of governance. Within this broader context, it becomes apparent that technology and innovation leadership will continue to serve as a key element for the advancement of Indigenous inherent rights and their work to build, maintain, and strengthen their political, social, and economic institutions. Indigenous leadership in technology and innovation is necessary to ensure that their knowledge is respected and protected and that their distinct self-identified needs, wants, and aspirations are appropriately addressed by the advances of digital technology.

There is a serious need for the development of technology and innovations that are informed and influenced by Indigenous wisdom and priorities concerning the role of technology in society. Indigenous worldviews, knowledges, and perspectives can enhance deliberation about the effects of technology on individuals, societies, the environment, and the economy. This can facilitate more in-depth considerations of potential outcomes and more effective problem-solving. Indigenous Peoples have always been responsible leaders, innovators, scientists, and engineers. Throughout history, they have been responsible for the development of a huge number of technologies and have made substantial contributions to innovation and science. It is only due to colonialism that Indigenous knowledge, innovations, and contributions have been denied, devalued, and written out of Canada's history. In British Columbia, the exclusion of Indigenous leadership in technology and innovation perpetuates the disrespect of their wealth of knowledge and the value of their worldviews and perspectives, and continues the colonial tradition of denying their inherent rights by excluding them from important decision-making processes that affect them.

Many of the most influential planning processes and organizations that are undertaking work to develop technology in Canada lack the meaningful involvement of Indigenous leadership. Without Indigenous-led initiatives that are driven to address their communities' unique self-identified needs, these activities most often fail to address, respond to, or reflect their priorities. A further consequence of the exclusion of Indigenous leadership in innovation and technology is the significant lack of appropriate technology and innovation investments, resources, and supports. At present, this disconnect is wide-reaching and stretches across incubators, accelerators, and entrepreneurship training; technical and digital skills education and training; investment funds; research and development funding; and other technical supports.

Indigenous entrepreneurs and leaders have plenty to contribute towards the development of critical new ideas, models, and approaches to business and technology that are needed as we re-imagine the innovation economy. To enable Indigenous Peoples' equitable participation in the technology sector, adequate supports such as Indigenous-led and focused incubators, accelerators, and investment funds are needed, as are appropriate access to research and development (R&D) and other forms of technical support.

Achieving digital equity requires Indigenous leadership in innovation and technology. Indigenous leaders need to hold influence and decision-making control in allocating and managing resources; undertaking research and developing strategies, policies, programs, and supports; and developing and adapting technology for their communities' purposes. As inherent rightsholders, Indigenous Peoples

have the right to determine their digital destinies, which can only occur through the active involvement of Indigenous leaders in important policy, legal, and decision-making conversations concerning the present and future of technology and innovation. The technology sector must undergo transformation to become one that is informed and influenced by Indigenous knowledge, values, and worldviews; this can only occur through the active involvement of Indigenous leadership.

## Indigenous Entrepreneurship

*"I think since I started in this industry, a lot of positive things have happened. And more and more Indigenous people are entrepreneurs than have been in the past and there are more programs that service them around the province, and the country, and a natural next step is the international marketplace." – [Interviewee]*

*"Just launch your product or game or app and get it out there and use that as your path to build a company, or your foot in the door to get a job at one of BC's start-ups and scaleups that love to hire people that are entrepreneurial and have built and launched something. If you don't have a great internet connection, if that means you have to drive to the next town and upload your build, you're still self-publishing. And that's a tremendous opportunity I don't think we talk about enough, young people building their portfolios already when they're in their teens." – [Interviewee]*

Indigenous-owned businesses are an important component of improving Indigenous access to technology-related opportunities in the province. According to our research team's analysis of the Indigenous Business and Investment Council's Directory, 23% of Indigenous-owned businesses in British Columbia are technology-sector-focused.<sup>163</sup> Sector representation is useful to form a baseline understanding of industry strength in each region. Similar to non-Indigenous-owned tech businesses,<sup>164</sup> BC's strongest regions for Indigenous-owned tech businesses are the Mainland/Southwest economic regions of British Columbia (39%), as well as the Vancouver Island/Coast region (30%). A total of 69% of tech businesses are located in those two regions (see figure below). Company size can also be used as a proxy for the relative "ability" to employ because larger companies tend to hire more frequently and seek a greater diversity of roles. Of the businesses that included their number of employees, 80% of Indigenous-owned tech businesses employ under 10 workers. Most non-Indigenous-owned tech firms in British Columbia also employ less than 50 workers.<sup>165</sup> As the number of Indigenous-owned businesses in the province grows, so too will their ability to employ First Nations, Métis, and Inuit workers.

163 Dan Schrier, "Profile of the British Columbia Technology Sector: 2020 Edition," Ministry Of Jobs, Economic Recovery And Innovation, March 2021, [https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/industry/tech\\_profile\\_report.pdf](https://www2.gov.bc.ca/assets/gov/data/statistics/business-industry-trade/industry/tech_profile_report.pdf).

164 Ibid.

165 Schrier, "Profile of the British Columbia Technology Sector: 2020 Edition."

The average founding year for Indigenous-owned businesses is 2004, with just under 50% of those businesses formed since 2000.<sup>166</sup>

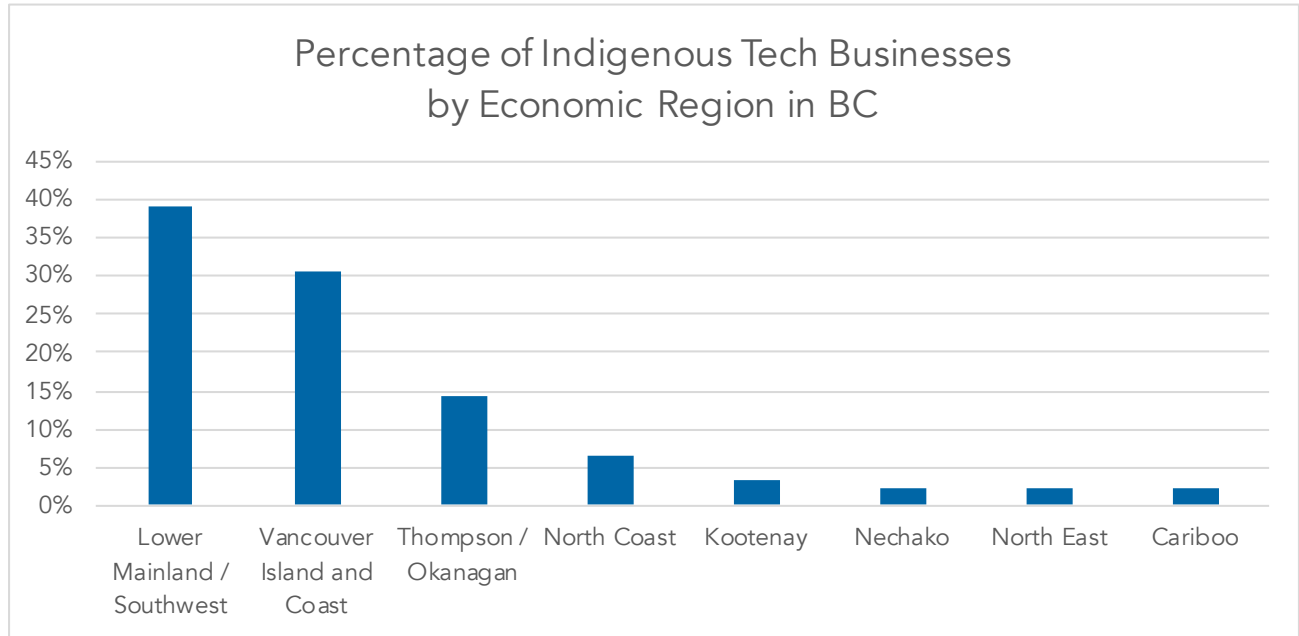


Figure 18. Percentage of Indigenous tech-sector-focused businesses in BC. Source: ICTC analysis of Indigenous Business and Investment Council’s BC Indigenous Business Listings, 2021.

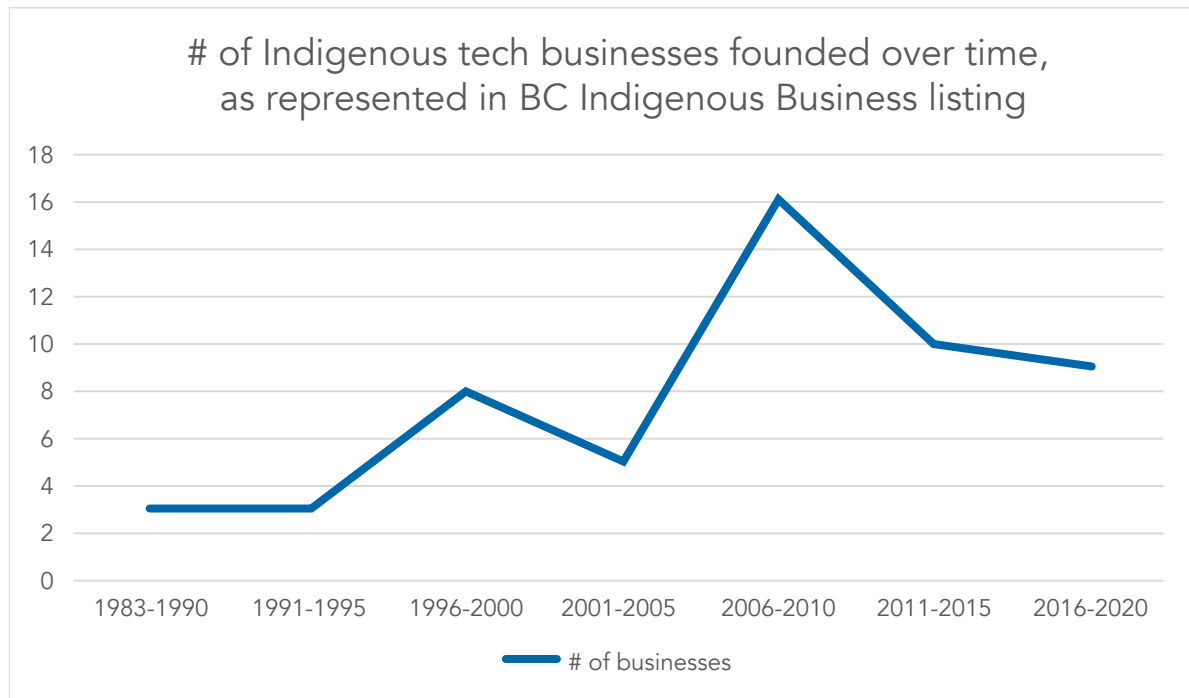


Figure 19. Indigenous tech businesses by year founded. Source: ICTC analysis of Indigenous Business and Investment Council’s BC Indigenous Business Listings, 2021.

166 Only 62% of the Indigenous tech businesses in the dataset included the “year formed” variable (57/92).



Several Indigenous entrepreneurs, business owners, and organizations providing Indigenous business training participated in the project through interviews and virtual sessions. Many of these interviewees were committed to hiring and mentoring more Indigenous people as their companies grew and had the networks and personal experiences to follow up on this commitment. As one CEO commented, “We don’t talk about it, but there’s got to be more Indigenous executives in BC. In my area, there’s always the same four of us in the room all the time” (interviewee). Their experiences and the opportunities and challenges they have encountered throughout their careers are shared in this section.

**Nearly all businesses are technology-related, or use technology for marketing, e-commerce, networking, and fundraising.**

Indigenous people across British Columbia are starting their own businesses, and while many of the technology-sector-focused entrepreneurs who participated were based in the Lower Mainland or Victoria, businesses in all regions use technology for marketing, administration, and e-commerce. Economic development teams and business loan-providing organizations also described providing financial assistance to businesses in their Nations and regions that required internet and hardware access to respond to enquiries, sell their products, and market their work. From fish-and-chips shops to natural beauty products, the vast majority of business owners require an online presence. Skills in marketing, e-commerce, and data analytics are also increasingly important for small business owners.

Furthermore, business development agencies and training organizations highlighted how essential it is to have a strong network as an entrepreneur and business owner—and while business density and networking opportunities may be scarcer in rural and remote areas, normalization of online work and pitching has opened up a new set of opportunities for Indigenous businesses outside of major urban centres. Nevertheless, having access to such opportunities still depends on high-quality internet access.

**Access to capital can be a challenge for Indigenous entrepreneurs, though there are also some dedicated programs that seek to mitigate this issue.**

One Indigenous entrepreneur had experienced discriminatory lending practices and significant challenges in attracting capital. Several participants discussed the role of institutional racism and sexism in access to capital, noting that they had worked with women who remembered not being able to get loans, stating that:

*“If Indigenous entrepreneurs are living on-reserve, they don’t have collateral like a mortgage on their home; they are not able to amass intergenerational wealth or access many services. Getting stuck in that poverty cycle is a real thing.”*  
– [Interviewee]

Another interviewee felt that access to capital had been a challenge simply because she owned a technology business, and that “traditional banks don’t invest in tech; we are considered too ‘high risk’ because we’re tech and we’re not brick and mortar.”

Interviewees mentioned a small number of private financing organizations that had developed specific programs and capacity to be able to work with Indigenous entrepreneurs respectfully and collaboratively. For instance, such an organization might attempt to understand the social and systemic context behind someone’s credit score—“the history behind the numbers,” as one interviewee put it. Overall, participants wanted to see more organizations building similar capacity.

Aside from private finance, Aboriginal financing institutions (AFIs) offer small-business development funds, sometimes alongside capacity-building programming, to First Citizens in their catchment areas. There are 11 AFIs in British Columbia.<sup>167</sup>

Furthermore, several Nations and regional organizations offer seed funding programs specifically for Indigenous people and members. One Nation's business incubator, for example, offers virtual training on business registration and administration, along with a business development fund that offers contributions of up to \$50,000 to member-owned companies, which becomes grant funding if a company is still operational after two years. The Ucluelet Economic Development Corporation offers support for business plans, business connections, and micro-grants for micro-businesses.

One interviewee noted that after attracting start-up financing, many faced the subsequent challenge of scaling up and expanding abroad, noting that Indigenous entrepreneurs who attempted to do so typically required significant capital. She noted that the Business Development Bank of Canada (BDC) had started to offer funds specifically for Indigenous entrepreneurs starting or scaling up, and hoped that others would do the same.

**Having a successful tech business often relies on having a strong network and time to fail and restart. This can pose difficulties for Indigenous entrepreneurs in rural and remote areas, and/or those without the financial security to iterate.**

Launching a successful tech business is often predicated on business density, strong networks, and access to talent. Accordingly, the barriers faced by Indigenous entrepreneurs in rural and remote areas are in part caused by low business density within those regions. A business development organization member shared the challenges of trying to start a successful technology-focused business in the BC Interior:

*“Successful technology businesses [in the Kootenay region] are exceedingly rare because of the lack of capital, the lack of connection, and the lack of [business] community. If you add an additional barrier like being in an Indigenous community, it’s just not going to happen out here without major support for that community, the wider community of tech, or a broader group of people first working for tech companies remotely.” – [Interviewee]*

The same participant commented that most successful tech-sector entrepreneurs were on their third or fourth business attempt—and that the financial freedom to take so many tries at starting a business required privileges that not everyone had. Similarly, a participant from North Vancouver Island described the challenges in creating a sound tech ecosystem outside of large cities:

*“It requires a different approach to launch and scale tech in a smaller region. There have been some tech successes in this region but they’ve been gobbled up [acquired] and they’re gone. There are a few that manage to stay but it’s been very challenging for them. From that basic paradigm, you get the situation that it is more challenging to develop a tech ecosystem in this region.” – [Interviewee]*

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167 National Aboriginal Capital Corporations Association (NACCA), “Aboriginal Financial Institutions,” n.d., <https://nacca.ca/aboriginal-financial-institutions/>.

An Indigenous entrepreneur noted that for someone just starting out in technology sector entrepreneurship, it could be very difficult to sort out which networking opportunities and advice were worth taking:

*“It’s a really busy space. There’s a lot of conferences, events, and there’s so much out there that it gets a little bewildering, quite honestly, to the point where I say, ‘This is a full-time job seeking out what’s going on in the space, and I have to pay my mortgage this month so I can’t spend all this time trying to wade through the disparate resources that are out there.’ And none of them are aligned.”*  
– [Interviewee]

**Indigenous-led business and entrepreneurship training programs seek to address the challenge of networking, familiarity with the ecosystem, and financial stability by providing community, orientation, resources, and pathway guidance.**

One Indigenous business program that works with Indigenous partners to develop curriculum and delivery noted that place-based programming was essential in understanding the unique opportunities and resources in each region, as well as culturally safe and appropriate programming:

*“One Indigenous entrepreneur told me they have to learn twice: new programming and a western lens on running a business. It can be difficult to learn new content and a new way of being at the same time. [In our program,] The entrepreneurs can talk safely about their experiences as Indigenous or women entrepreneurs. In this world, you have to hide parts of yourself to succeed sometimes, so I think the entrepreneurs can develop a shared, relational approach to learning from each other. It’s trying to lift people up and get to what they do best and stand a little taller in themselves and their wisdom because [other settings] don’t value it in the same way.”* – [Interviewee]

Programs that bring Indigenous entrepreneurs together in cohorts also often offer mentors and previous graduate contacts. This helps new businesses build relationships after they exit the program. Mentors and connections support business continuity, might offer access to potential funders, and in general help entrepreneurship program graduates retain crucial peer support networks.

Like other educational programs, those offering supports to entrepreneurs noted the importance of ongoing, sustainable funding for programs with proven successes, rather than project-to-project initiatives.

## Supporting Indigenous Entrepreneurs through Public Procurement

Public procurement, or the process that a government takes to obtain goods and services, can allow a government to support its values by working with particular types of businesses, introducing environmental, social, governance (ESG) requirements to its contracts, or scoring proponents based in part on inclusive and diverse hiring, among other mechanisms.

### Improving Access to Public Procurement

The places where different levels of government in Canada list requests for proposals (RFPs), procurement databases, are currently siloed and sometimes only viewable with a fee. This means that a small technology company without a team dedicated to applying for RFPs must search across each municipality’s bid-and-

tender sites, as well as the provincial federal governments' and other provinces'. This level of time and familiarity may be inaccessible for many new businesses, including Indigenous businesses.

One Indigenous business owner who had successfully won federal contracts commented that she hoped to share her hard-earned familiarity with procurement with other businesses just starting out: she was working to have Indigenous business organizations offer talks, series, and resources

*"On how to actually work with the government. I'd like to encourage new entrepreneurs to reach out for help. You know, you'll get into some [RFP] and open it up and if it's a 40-page document, it's pretty overwhelming. I would like to see it take less time for other people than it did for us." – [Interviewee]*

Another noted that the provincial and federal governments were trying to work towards supporting Indigenous businesses, but that some of the Indigenous procurement initiatives in place weren't very helpful:

*"Truth is, when you speak to them and ask, 'I'm an Indigenous entrepreneur,' they said, 'Yeah great. Here's the website called BC Bid. Good luck.' And that's it. What they're missing is that walking the talk: if you're going to have an Indigenous procurement initiative, make it work or don't have it at all." – [Interviewee]*

Similarly, programs that are designed to mitigate risk in procurement from tech-sector proponents may penalize small and Indigenous businesses.

*"BC Dev Exchange is focused on proving that a tech company can do the work before talking to them, which is smart because otherwise you get stuff like what happened with the federal government and the Phoenix payroll system. Although it's a step in the right direction, it's very costly for anybody to actually respond. RFPs can cost the company anywhere from seven to fifty thousand dollars to respond to, which means only bigger companies can actually do it." – [Interviewee]*

Accordingly, this interviewee raised the example of pilots and other types of public-private partnerships that allow small companies to do small projects with the government, prove their service or product, and work up to bigger arrangements. Not unique to Indigenous companies, this approach has been proposed by many as a way for small and emerging technology companies to access government funding, while still reducing risk in technology for the public sector.<sup>168</sup>

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168 Tyler Farmer, Mairead Matthews, and Faun Rice, "Procurement Office or 'Living Lab?' Experimenting with Procurement and Partnerships for Smart Cities Technologies in Canada" (Ottawa, ON: Information and Communications Technology Council, February 2021), [https://www.ictc-ctic.ca/wp-content/uploads/2021/03/ICTC\\_Report\\_SmartCities\\_ENG.pdf](https://www.ictc-ctic.ca/wp-content/uploads/2021/03/ICTC_Report_SmartCities_ENG.pdf) and/or pursues long-term planning to that end. Smart city projects have been led by numerous actors, including the private sector and community groups, but a large portion of smart city work takes place within the public sector. As such, public procurement has the potential to be a highly strategic tool for building smart cities: it allows municipalities to signal investment intentions, engage in long-term planning, and manifest their values through procurement criteria for sustainability and inclusion. There are many different forms of public procurement, both traditional and novel, in Canada today. The successes and challenges posed by different procurement methods are an important and underserved area of study in smart cities research. Traditional procurement, challenge-based procurement, grant programs, sole-source mechanisms, and innovative pre-procurement (for example, "living labs")

## Improving Quality and Access to Indigenous Vendor Lists

On the opposite end of bid-and-tender sites, governments may work with vendor lists to source solutions from known providers, afford opportunities to local companies, or support other priorities. One challenge is the institutional inertia of approved vendor lists and ensuring that Indigenous businesses have the chance to compete:

*“If your whole procurement mindset is to be able to create procurement ease, dealing with large firms and pre-existing agreements, an Indigenous firm is not going to be able to participate. That’s why in the US they have minority-owned business considerations, but we’ve been yet to see that addressed in a systemic manner within the province.” – [Interviewee]*

One research participant proposed mandating a minimum percent of public spending for BIPOC-owned companies. Accordingly, government departments or private companies that want to support Indigenous entrepreneurs through minimum mandatory procurement proportions or other programs need to be able to find them. Some interviewees commented on the challenge of maintaining inclusive lists. The BC Indigenous Business Listings, for example, relies on companies knowing to list themselves. Despite public outreach, this might mean that certain areas or types of businesses are under-represented. Similarly, government-run lists create an issue for Indigenous data sovereignty. Whether or not public funding will remain stable to sustain, update, and curate Indigenous business listings can also be a challenge.



## 4.5 Governance and Self-Determination

### Strategic Area Overview

In British Columbia, First Nations have a unique Nation-to-Nation relationship with the Crown that is grounded in their Aboriginal title, rights, and treaty rights. The Province of British Columbia has committed to achieving government-to-government relationships based on respect, recognition, and exercise of Aboriginal title and rights and reconciliation of Aboriginal and Crown titles, and jurisdiction. True Nation-to-Nation and government-to-government relationships require that First Nations have all of the resources and capacities that are needed to fully operate as a Nation in the modern context. They have the right to equitably access, own, influence, and engage with digital technology and the technology sector. Digital equity is a prerequisite for social growth, economic development, and the preservation of sovereignty, which, as a consequence, has also made it a prerequisite for First Nations self-determination and self-governance.

First Nations have the right to determine their digital destinies and to hold decision-making control over both their present and future, as manifested and guided by the use of technology. Their success will benefit not just their local communities but will also have far-reaching impacts on the regional, provincial, national, and international communities as well. Technology offers great hope in accelerating the implementation, exercise, and recognition of inherent Indigenous rights. If left unaddressed, digital inequity will increasingly become a critical impediment in the ability of First Nations to fully exercise their rights and to implement their own laws and jurisdiction.

BC First Nations have long-established governments, laws, and ways of life that existed well before Canadian confederation, but their traditional governance structures were undermined by the Indian Act and were replaced with colonial systems that did not exist prior to colonization. The foundation for true reconciliation is through First Nations Peoples rebuilding their governments, grounded in their inherent rights to self-determination and self-governance. In exercising their right to self-determination, many First Nations have accordingly decided to be self-governing. This reflects their deep understanding that it is the quality of governance that most directly determines whether their opportunities and futures are maximized and whether their Nations, communities, and citizens are able to realize their full potential—First Nations know that resilient, strong, and appropriate governance is needed to effectively meet the self-identified needs of their people.

As a part of their work to move away from governance under the Indian Act, BC First Nations are in various stages of rebuilding their institutions and are engaging in diverse approaches to strengthen their systems of self-governance. This includes, but is not limited to, increasing their capacity and forging new relations with other governments. That said, digital inequity is rapidly becoming a significant barrier to First Nations self-determination and self-governance within the context of digitized global society. Technology has become deeply intertwined with law, policy, and economics, which has made digital equity imperative for effective governance. Whether it is application development for language and culture revitalization, maintenance, and reclamation; GIS/GPS and drone technologies for land stewardship; or integrated technology solutions for government administration and service delivery, technology underpins every aspect of Nation-rebuilding and long-term resilience in today's digital world.



## Community Reflections on Technology's Connection to Governance and Self-Determination

Many participants offered robust reflections on the ways that technology interacts with their self-determination as a Nation and the way they self-govern. Participants described the dynamic as follows:

*"Back in pre-colonial days, everybody had a place in community and job that they were to do. We didn't flourish as one, [we] flourished together, and when it comes to technology as well. For us to advance in technology sector, whether engineering or technical worker, somebody who is hands-on or somebody who is virtual and virtual leader, doing coding and developing graphics and websites, we just need to connect and take space. Whether in physical world or digital one. From what I am hearing, digital one is in so many nations and we need to start taking space in this virtual world as well." – [Community session participant]*

*"Last year, my experience in my home community, it was really sad to see they hired some guy to come into the band office for simple things like connecting a printer to a computer. Hired guys to come in and were being ripped off and were taken to the cleaners and they didn't know. I can only imagine how much money they were taking. These guys were laughing. I can set up my own computer, set up my own software, and they didn't believe me and wanted to hire them. We should be able to do that as native people." – [Community session participant]*

*"Anything we can do to get technology in rural Canada, I think should be a priority. Basic training is key to getting the population comfortable with using the internet. I think we need a system set up for those of us who live in rural Canada. Where we can have a centre that we can call for assistance or get direction for simple things. Every single number you call says 'Login to www.' I can only do that if I have the internet." – [Community session participant]*

*"We've had Elders go on Google Earth and identify areas and places, names, and mountains and stuff. That is really cool. Seeing Elders look and this is where we trapped and had our cabin, that was pretty cool." – [Community session participant]*

## Community-Industry Partnerships

There are a variety of forms that community–industry partnerships can take across British Columbia.

*“ . . . As a theme, you know, a lot of [partnerships] bring labour-based opportunities to First Nations, construction work and things like that. I think that one of the major gaps is that jobs that even lead to tech jobs, like planning professions—what would you call, like, an office job, administrative, those things those are often not considered for First Nations? So, this is the funny thing. If we [First Nations economic development officers] write the agreements, they’re much more all-encompassing, and we would certainly encourage some kind of administrative or perhaps tech roles. But 99% of the agreements are drafted by the external partner who’s non-Indigenous, and they come to us and propose labour jobs. If you don’t have somebody at the helm of the economic development who’s able to recognize that and ask for change, it won’t be done. Like, it’s not as though we’re sitting at the table negotiating, ‘Yes, OK, we want all labour jobs.’ Rather, it’s passive in approval.” – [Interviewee]*

Many Nations have land-based rights, creating a duty to consult for industries operating in their regions. While these partnerships are typically with natural resource companies, every sector increasingly has some technology-related roles available. Participants reflected on what technology roles looked like within their context:

*“ . . . All areas of work like the Stewardship, SEAS, water treatment plant, seafoods plant to help record data, daily reports on all activities within the building, boats, water, etc., to help better manage and maintain these areas, and keep scientific data for future generations to use.” – [ILIT survey respondent]*

*“Mapping to support our nation and people fight for rights and title.”  
– [ILIT survey respondent]*

Furthermore, some companies in urban areas have sought to prioritize Indigenous communities through impact hiring, procurement, or service delivery. Finally, community economic development officers or Nation-owned businesses may form strategic partnerships with non-Indigenous businesses. Each of these cases has the potential to improve opportunities for Indigenous participation and leadership in technology, but they also come with potential challenges.

## Negotiating Higher-Quality Labour Agreements

Ensuring that impact benefit agreements (IBAs) and community–industry partnerships in general offer high-quality, sustainable roles with training attached, when possible, is a key challenge and opportunity raised by economic development officers and those who held related roles that participated in this project. Communities working with industries such as mining and liquified natural gas spoke about availability of camp work. While this helped provide economic opportunities for their people, it was seasonal, often excluded women or persons with caretaking responsibilities, and created social issues such as an increase in violence towards Indigenous women, girls, and 2SLGBTQQIA+ people. The Final Report of the National Inquiry into Missing and Murdered Indigenous Women and Girls names this

violence as genocide and establishes a new framework to move forward, which centres relationships, recognizes Indigenous place and power, and outlines Calls for Justice.<sup>169</sup> In November 2021, Chief Mary Quock of Iskut commented on the impact of mining camp work on her community:

*“Because there’s more money coming into our communities, we’re starting to have more social issues like addictions, drug abuse, alcohol, etc. due to increased drug dealing, and people using drugs . . . Every two weeks there’s people who would be coming out of camp, and not everybody does, especially when there’s a party and we have to deal with issues of people drinking and driving into our community or assaults.”<sup>170</sup>*

Furthermore, participants noted that manual labour jobs were less sustainable than jobs that required training and reskilling and involved technology, due to the likelihood of industry change, automation, and shifting to renewable energy. Roles like heavy equipment operation would not create transferable skills for tech or entrepreneurship. Many advocated for economic diversification, particularly in regions that relied heavily on mining, forestry, oil, and gas:

*“It’s good for the community, mining is a big employer here, but it’s coal. It’s yesterday’s technology, and if you don’t see the alarm bells going for the future of these communities, you’re not paying attention.” — [Interviewee]*

*“Forestry has been hanging on by a thread. The changes to the environment, the way forestry happens, the new technology that’s been available has been changing the field dramatically. I used to run a company that designed industrial UAVs for surveying various areas, and technologies like LIDAR have changed the entire game, where a lot of engineers are sent out now just as backups. There are things that can generate a map for hundreds of dollars compared to traditional methods that would have cost tens of thousands.” – [Interviewee]*

Despite this, many research participants saw potential in forming partnerships with natural resource sectors that prioritized roles with transferable and/or technology-related skills. Many saw an increasing presence of technology in all the sectors in their region:

*“[A forestry company in the region] just hired 50 people and they have highly skilled backgrounds; they all have advanced engineering degrees, CNC machinists, etc. Even these extractive industries, they do have tech roles. Every company is now more of a tech company than ever.” – [Interviewee]*

169 National Inquiry into Missing and Murdered Indigenous Women and Girls, “Reclaiming Power and Place,” 2019, [https://www.mmiwg-ffada.ca/wp-content/uploads/2019/06/Executive\\_Summary.pdf](https://www.mmiwg-ffada.ca/wp-content/uploads/2019/06/Executive_Summary.pdf).

170 Binny Paul, “Trapped in lawlessness: BC First Nation’s 20-year fight for an RCMP detachment continues.” Terrace Standard, Nov 9, 2021. <https://www.thestar.com/news/canada/2021/11/09/trapped-in-lawlessness-bc-first-nations-20-year-fight-for-an-rcmp-detachment-continues.html>.

Nevertheless, a significant barrier to working in these roles for local people is education. As one interviewee pointed out, the likelihood of someone leaving their community to obtain an advanced degree (in a region where there are no universities) and then returning to their region to work was unlikely: possible, but rare. As with all the other topics in this report, digital equity and improved education opportunities in remote and rural areas would go some way in addressing this challenge.

### Projects to Improve Existing Negotiations

Many research participants shared ways they were trying to improve the quality of work offered under IBAs or other partnerships in their region. A North Coast Nation's representative had negotiated an agreement for members to have access to a broad variety of roles on a development project, from manual labour and skilled trades roles to IT work. A representative of another northern Nation was working on a career day to highlight higher-paying jobs for youth, so they were aware of their opportunities beyond camp work. One economic development officer working in a community with a modern treaty noted that it had its advantages:

*"Having treaties opens up opportunities into traditional sectors that have changed dramatically. We get offers all the time from companies that [run] hydroponic growth projects to grow lettuce and food security companies, seeing if they can have an opportunity to build on to our lands. Every field has had different kinds of technology influencing them through rapid change." – [Interviewee]*

Reflections from community included the following:

*"Self-governance. Presently Canada (colonial state) decides who benefits, safety and who makes the profit yet it's the sovereign Nations lands, airwaves, and waters. These optic cables are laid on Indigenous Nations lands. The satellite transmissions are occurring on sovereign Indigenous Nations lands. Every sovereign Indigenous Nations needs to know what's going on and decide what they want happening or not happening on their lands which Canada has invaded and occupied. The airwaves are like our trees and waters." – [ILIT survey respondent]*

*"Lots of opportunities in GIS. Maps are always in need to describe the land in a concise and visual way. Being able to quickly, and accurately, communicate where something is critical to inform or make decisions." – [ILIT survey respondent]*

Some IBAs involved capacity-building dollars from industries in the region, but this funding for training was not always flagged for particular qualities of roles. Another participant noted the importance of making sure that employment negotiations involved joint ventures between industry and training teams:

*"Okanagan College used to do programs like that. [Otherwise,] it's like our employment and training programs haven't changed and haven't evolved." [Community session participant]*

Another commented that capacity and skills development from industry was most successful when a trainer came right to their community. On the topic of training, one economic development officer pointed to the disconnect in her community between youth and knowledge of opportunities beyond labour jobs:

*“As a child, you or I were exposed to all kinds of different occupations and opportunities. It’s almost a subconscious mindset from youth and forward that you can or can’t do that. We keep bringing labour jobs to Indigenous communities. That’s the habit, bringing labour jobs. So, if they want to work in construction, fine. If they want to manage the water recycling plant, no problem. We don’t seem to have that mindset within communities as businesses, honestly, to be developing other types of opportunities.” – [Interviewee]*

Importantly, some interviewees noted that the power of economic development teams to leverage land-based rights and require industry consultation varied across the province. They saw creating better surety and consistency in land-based rights as an important prerequisite to stable economic development:

*“Business doesn’t like a mixed-up jurisdictional map. Indigenous people are requesting and demanding a much more even playing field. Having this weird, ‘It sort of applies here more than it applies there,’ doesn’t produce a nice, stable, predictable place for Indigenous people to lift their economic development.” – [Interviewee]*

*“As a chief, we tried to develop tech as a community. Before we can make jobs, though, we first have to argue the legal points of who owns the land. It always comes down to this; it is a really big problem. When you look at Site C, it is always a legal battle before we can try to do anything. A lot of the time, instead of the government working with you, they are making sure you don’t develop your economy. As projects happen, they wait for First Nations to protest it. It shouldn’t be like that; there should be a process to work together.” – [Community session participant]*

Furthermore, one interviewee shared a story about industry “getting around” impact benefit agreements through strategic use of subcontractors, such that they had to hire a separate person for their community to monitor industry compliance with the IBA. Another commented that they had seen natural resource companies inundate First Nations with referrals and applications so that they would not have time to respond before the deadline to provide feedback. All told, some communities reported having challenges with industry partners not negotiating in good faith and having to expend additional time and resources to ensure they do so.

## Projects for First Nations-directed and Regional Economic Diversification and Development

Some research participants saw promoting local economic diversification and growth as an important way to ensure that Indigenous people have access to technology-related roles without being forced to leave their communities, should they choose to stay. Several interviewees framed this as an important step for decolonization, in that the requirement to leave home for access to work re-entrenched disadvantages for Indigenous people in British Columbia. Importantly, other participants felt that technology was best used to serve culture and language revitalization. Accordingly, perspectives on community economic development as illustrated below were not unanimous.

*“You have to be mindful that if you want Indigenous people who live in remote and rural areas to participate in the economy, there has to be an economy that they can participate in, right? When the previous government was going after LNG, they were saying, we’re going to need a million workers, whatever that number was, and you know, ‘The Indigenous communities are our great source of employment.’ And yes, the Indigenous communities that were close to LNG might have been a great source for employment. But the plan called for Indigenous youths from everywhere in the province to go north and work there, and there’s a problem with that.” – [Interviewee]*

*“Folks don’t necessarily want to relocate in order to be able to participate. And if we’re going to champion this economy, we’ve got to lay the groundwork so that it is accessible. And not only because folks want to access it, but in reverse—the economy needs the talent.” – [Interviewee]*

**Tourism.** Two interviewees discussed projects being held in their regions (Haida Gwaii and Vancouver Island) to promote and foster regional tourism hubs that would support local economies and provide new, different jobs for Indigenous people.

**Creative technology.** A Nation on the island is leading the creation of a 100% renewable energy film studio project on Vancouver Island.<sup>171</sup> The community plans for this project to open up significant local opportunity in the creative technology sector and is monitoring training opportunities accordingly.

**Connectivity.** Several interviewees worked for or knew of Nations who had negotiated equity or participation in connectivity projects (such as the Connected Coast project<sup>172</sup>) and extended fiber-optic access to their communities; their equity stake provided a source of income and improved telecommunications infrastructure.

**Investment.** One interviewee noted that diversification could entail investing in projects run by other Nations, in industries not locally available: “Particularly up north, there’s a lot of communities that rely on a single industry like forestry, which may be doing well but is risky.” They followed the practice of diversifying their community’s reliance on particular industries by investing in Nation-run businesses in other sectors.

171 “About,” Malahat Film Studios, accessed Nov 1 2021, <https://malahatfilmstudios.com/about-us/>.

172 Connected Coast, “Schedule,” accessed Nov 1 2021, <https://connectedcoast.ca/schedule/>.



Economic diversification and development means that some Nations are creating their own community-based demand:

*“What would be most helpful for us would be those tech roles that support our economic strategy, including ramping up communications infrastructure and IT. I think it really just feeds the economic development strategy for any Nation that you work with is to support the needs of your own community by having them fulfil those jobs.” – [Interviewee]*

*“Another thing I think would really help would be to train more people on how to use drones . . . A lot of our Elders just can’t get out there anymore. We need them to help guide us into the future but we can’t go into the future without their guidance. Technology is the only way I can see where we can bridge that gap.” – [Community session participant]*

## The Technology Sector in First Nations Communities

While this project focuses in part on community–industry partnerships, primarily examining natural resource companies and industry seeking use of First Nations land, the technology sector also partners with Indigenous communities. Because the technology sector is less likely to be concerned with obtaining land use, the nature of these partnerships differs from the former. For example, some technology companies develop products or services expressly for First Nations governments (such as membership administration software). Such partnerships are sometimes straightforward, but several research participants mentioned that there was opportunity to make technology sector relationships more transparent. For example, several interviewees discussed a trend where businesses had identified an opportunity to access funding from First Nations communities in exchange for a product or service that would inadvertently loop them into a long-term financial agreement:

*“Communities want to engage their kids via phones and technology [to learn their Indigenous language]. So this has created, unfortunately, predatory tech companies who are like, ‘Great, I can charge you an arm and a leg and we’ll build you an app that’ll cost you eighty thousand dollars. And we will update the app, but not provide you with the tools to learn how to maintain and update it yourselves.’ And suddenly all of these opportunities are being outsourced, rather than the community training its own people in app development.” – [Interviewee]*

Interviewees working in public policy or related areas commented that the lack of a duty to consult for tech companies (operating in the “intangible” space rather than in a way that intersects with land-based First Nations rights) meant that tech partnerships with communities were more “opportunistic or tactical.”

From the company perspective, several technology sector start-ups who engaged with the project team voiced interest in reaching out to communities to see what products or services would be useful. Many voiced a desire to offer roles or skills training to community members but felt that they did not have the finances or scale to fund high-quality, sustained engagement.

One participant commented that the tech sector lacked an organization to convene multi-stakeholder collaboration on offering roles or services to Indigenous communities, and that trying to gather all the subject-matter experts interested in this topic was like “herding cats.”

Nevertheless, some technology companies reported successes or revelations that they felt had helped them be strong partners to Indigenous communities—and many of these companies were Indigenous-owned or had Indigenous representation on their senior teams. One, for example, had recently made a policy of coming to Nations with grant funding in place for the community to access their product—a tool for comparing community mapping (e.g., archaeological sites, harvesting locations, migratory pathways)—with industry proponents mapping to flag areas where development should or should not occur (interviewee). Another company had signed a Memorandum of Understanding with First Nations in their region to formalize their offer and retain networks for skills development and employment. A non-Indigenous business development organization “gave [each of the four bands in the region] one hundred and fifty thousand dollars just to say we care because we’re in your space,” to build relationships based on communication and respect, and ideally one day go into business as partners with their local Nation.

*“So, we have hired consultants to help us create the [land use plan] and there attempt to get more community feedback. They had created this website that had [an] interactive map on it where all members had access to it and put different land-use designation in different areas or comments.” – [Community session participant]*

Many companies working in this space noted their prioritization of clear and transparent communication: ensuring that their service offering was well-explained to communities without technical jargon or unnecessarily complex service agreements.



## Industry–Community Engagement

Numerous participants raised the point that industry–community partnerships would always better serve community needs if they were designed with communities through sustained, early, and genuine engagement and consultation. This theme highlights the need for Indigenous self-determination and governance in the process and applies to community-based educational programming, creating hiring networks and consulting on the types of services and products Indigenous communities are interested in. For example, a non-profit on Vancouver Island working in a community–industry bridging role noted that they often saw a lack of sustained engagement creating projects with fewer or shorter-term benefits. Such projects might leave hardware in communities that nobody knows how to use, because the technology contractor did not take the time to engage community members in project development and training for tools. Another organization in the Kootenay region echoed this sentiment and commented that this was in part due to the structure of public funding for such projects, and that public subsidies for technology products and services in Indigenous communities should include consultation and engagement budgets as well as training mandates. A third interviewee working in a public sector community engagement role made the same comment.

*“I would just love people to recognize the value of these ‘made by the people, for the people’ approaches. Far too often, we come from a well-intentioned place of designing and offering programs that are already fully developed. If we were to allow this conversation to bubble up at the community level and allow the Nations to say, ‘This is what I need in my community to support health and wellness,’ that would be so powerful.” – [Interviewee]*

*“If Indigenous voices and thinkers are not at the room at the design stage and they’re only contacted because x number of Indigenous people need to be consulted, if that’s the extent of the involvement, or if they’re just asked to sign on as a partner in order for the applicant to qualify for the funding they’re seeking, then, you know, it’s already in trouble. If the project itself is shaped in collaboration with and by Indigenous knowledge holders, it’s a whole different ballgame.” – [Interviewee]*

As mentioned before, not all companies felt like they had the time and financial resources to conduct high-quality, sustained engagement. Others, however, did not know what to do, or how to approach communities respectfully, voicing concern that they would do something incorrectly. Several Indigenous participants and non-Indigenous participants working for or with First Nations commented that they felt there was too much unwarranted anxiety around the topic of genuine engagement:

*“Everybody knows the difference between a racist and somebody who makes the mistake. Everybody knows the difference between somebody who brings an intentionality of real engagement versus a transactional piece. So don’t be those, just be a normal person. Pick up the phone, drop by, say, ‘Listen, we have a lot going on in the area and we’d like to find ways we can work with you.’” – [Interviewee]*

The 4 Rs of respect, relevance, reciprocity, and responsibility could serve as a helpful framework to support respectful relationships between First Nations, Inuit, and Métis communities and industry partners.<sup>173</sup>

173 Verna Kirkness and Ray Barnhardt, “First Nations and Higher Education: The Four R’s—Respect, Relevance, Reciprocity, Responsibility,” *First Nations & Higher Education*, 2001, Retrieved from <https://uaf.edu/ankn/publications/collective-works-of-ray-b/Four-Rs-2nd-Ed.pdf>.

## Funding Opportunities and Government Grants

Research participants celebrated the following aspects of grant funding for strong community–industry technology partnerships and wanted to see more of them.

### **Funding for long-term engagement**

As already mentioned, many organizations wanted to see more funding for community engagement and long-term training and follow-up. One interviewee noted that the Vancouver Foundation offers initial engagement funding and wanted to see more of that.

*“Government programs are not designed to support Indigenous and rural at the same time; they’re developed for Indigenous or rural but not both, and that tends to make programs like ours [operating in both spaces] at odds. For the applications that are First Nations-oriented, they expect a certain amount of capacity and long engagements, but there’s no money for that engagement in a non-profit. Without more money to do the initial engagement and application, they will just fall flat; they’ll be a solution in search for a problem.” – [Interviewee]*

A program offering training to Indigenous entrepreneurs also struggled with long-term funding, but more for follow-up and ongoing support to graduates than engagement: “Funding is only ever for the program and not for next steps.”

### **Sharing and consolidating grant opportunities, making them easy to find**

As one interviewee outlines, the grant process needs to be built on relationships and not website posts:

*“There is this weird idea that it seems like most government agencies have that if they post something on their website, that people are going to flock to it and seek it out. That’s just not the case.” – [Interviewee]*

### **Improving accessibility by thinking through funding guidelines and program infrastructure**

An education provider applauded the recent recognition that “because of the pandemic, students needed computer access—so the most recent piece of ministry funding we received, we were able to offer provision of laptops” (interviewee).

One economic development officer described a situation where about 80 of their members might have been able to access federal funding for tourism businesses and development administered through Indigenous Tourism BC but for requirements they didn’t meet.

### **Avoiding piecemeal, unsustainable, or prematurely closed funding**

For example, the cancellation of the Rural Dividend was said to have a negative impact on the BC Interior.

## Summarizing Baseline and Future Priorities: Digital Equity in Indigenous Communities

This study has highlighted numerous priorities for digital equity and Indigenous technology futures. The following themes were those directly identified by study participants as key priorities, and are fitting to close out the report as a reminder of the actions ILIT contributors saw as essential. Each theme emerged from a combination of the ILIT survey, virtual sessions, and interviews.<sup>174</sup> Importantly, the context of COVID-19 has likely impacted these responses as the pandemic highlighted the need for tech literacy and telecommunications access as an essential part of life, making these crucial for access to education, health care, and social life.

### Fostering Technology Awareness, Literacy, and Adoption

The most common priority identified by ILIT survey participants for “opportunities for technology in your community” was improving tech literacy, awareness, and uptake. In an open-ended question, nearly one in five respondents (18%) raised this issue—interestingly, participants of 60 years of age or older were significantly more likely than respondents under 30 to do so (30% versus 8.2%).

In part due to a lack of internet coverage and affordable access, Indigenous Peoples, along with seniors, new Canadians, and others, have been excluded from digital literacy and learning.<sup>175</sup> Despite the fact that this trend is causing isolation and making it harder for these individuals to access critical online services and opportunities, there remains starkly “little attention or funding devoted to” addressing it.<sup>176</sup> As one participant expressed:

*“One of the things that our Nation here realized is that often with technology, especially Elders get left behind. I know that technology moves quickly and I feel like in my most recent role before education coordinator, I was in community engagement and one thing I noticed was that we didn’t have opportunity for people coming here and helping our Elders.” – [Community session participant]*

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174 The Indigenous Leadership in Technology survey asked respondents, “What opportunities do you see for technology in your community?” and several key priorities emerged from Indigenous respondents’ open-ended answers, including improving education about technology and tech literacy in community (n = 71), improving telecommunications infrastructure (n = 61), new work opportunities (n = 47), distance or technology-mediated learning and education (n = 32), and supporting sustainability, land-management, (30) and governance (20). Other themes included preserving language and culture, starting businesses, accessing important services, improving communication and social opportunities, and bringing in new hardware.

175 Canadian Internet Registration Authority, “The gap between us: Perspectives on building a better online Canada,” 2018, <https://cira.ca/resources/state-internet/report/gap-between-us-perspectives-building-a-better-online-canada> : “Indigenous women are the group that probably aren’t served the most, said Zeina Osman, co-executive director of Compucorps, a high-tech charity that helps the underprivileged gain access to low-cost computers, technological services and technical training.”

176 Ibid.

A lack of consistent funding, as well as rigid funding constraints (e.g., too complex or precise), cumbersome application processes, and often very short timelines for using funds results in frequently “intense competition for a small pool of funding,” dramatically hampering the size, number, and effectiveness of any efforts, and causing the “trendiest” digital issues to garner “more attention and funding than others.”<sup>177</sup> Further, there remains a frustration that only a narrow handful of actors hold the power and funding to address these critical issues.<sup>178</sup> One education provider commented on their efforts to address this:

*“We have an Elders program where we are teaching elders technology—with COVID, they were completely cut off. We found a program where the FNHA donated us tablets and there’s a program where they’re learning some of that stuff. We’ve taught them to put their COVID vaccines on their phones and stuff. But tech literacy, it’s missing even with the younger generation.” – [Interviewee]*

The same interviewee (from the Northeast region of British Columbia) mentioned that basic tech literacy was missing in all generations because of poor access to hardware and internet, and also because technology was poorly integrated into school programs. In other regions, educators saw this gap more for people over 30. All research participants highlighted improving community tech literacy across all age groups as an essential component of digital equity.

*“. . . [Opportunities in tech include] training our people in information technology (we will always need people to help with computers, cell phones, tablets, media knowledge, graphic designing, repairs and upgrades, etc.) We should be providing entry level training; this can help our people get their foot in the door.”  
– [ILIT survey respondent]*

*“My dad finished his upgrading in post-secondary, was absolutely brilliant—he could be an engineer. But when it came down to tech, there were no resources from teachers to show him how to use a computer. He ended up quitting because he was so frustrated. Half of your access to courses was through computers.” –  
[Community session participant]*

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177 [Ibid.](#)

178 [Ibid.](#)



Beyond employment and education opportunities, participants saw digital literacy as essential to connecting generations of Indigenous people. In particular, digital literacy allows Elders and knowledge-keepers to avoid isolation during events like the pandemic and transfer their knowledge to younger people living in or outside their communities.

*“A week ago, a teacher called me to speak to her class about my experience of being a residential school survivor. I didn’t want to go into the classroom because of the pandemic. I love to share my story, but not in a crowded place. So she said, ‘I am going to video you,’ and she did, into the classroom, and other schools are asking if they can borrow it. It was good to explain what I went through during residential school, and life, what it was like there. I thought that was a really good use for technology, didn’t have to leave home.” – [Community session participant]*

*“I’ll share something since it was something I did yesterday—yesterday was my dad’s 81st birthday and he’s in a care home now and he has a twin brother and they haven’t seen each other for about three years. They talk on the phone but I did a Facetime call and neither of them had ever done that before—it was good for them to say happy birthday.” – [Community session participant]*

### Access to Essential Services, Health Care, and Safety

COVID-19 accelerated the adoption of technology for education and health care within Indigenous communities. In a regional session, one participant shared a story of their Nation using technology to support mental health services and communication during the pandemic. Technology provides an opportunity for remote regions to access mental health,<sup>179</sup> telehealth, and other primary health-care needs. It can also offer essential disaster and emergency response services. As the following participants outline, technology is a lifeline for many:

*“On June 30th the Town of Lytton burnt down, and the community members are now scattered in at least 5 other Cities. The Lytton First Nation and Village of Lytton had no way to communicate to their members. Without the technology for an emergency disaster, people feel like they have no support.” – [ILIT survey respondent]*

*“We need to be better with e-health. We have a doctor that comes in once every two weeks. Community health nurse that comes in. Some people need to talk to a mental health specialist. We’ve been adverting for it for some time, but we can’t get them. Not used to going to health centre and using Zoom and lots of times can’t book an appointment. Better access to e-health and better bandwidth.” – [Community session participant]*

179 Katalina Toth, “Indigenous peoples and empowerment via technology,” *First Peoples Child & Family Review*, 2018, <https://ocufa.on.ca/assets/Digital-Divide-Quebec.pdf>.

An interviewee working in virtual health care for First Nations referenced the “last-mile” telecommunications problem—where the connections from major telecommunications infrastructure to individual communities and homes are the most numerous, hard to update/upgrade, and, therefore, expensive and slow to be built. She observed that a lack of high-quality connectivity infrastructure in homes and nursing stations was severely limiting access to essential services, compounded by a lack of awareness about what virtual care entailed. She commented that in addition to better tech infrastructure, virtual health needed specialized training for community health providers in both patient care and technology:

*“If I was a community health provider and facilitating a meeting with a physician, you need to have a specialized way of managing that. You need to be able to lead the client through what’s going to happen. There’s also maintenance of the equipment, setting it up, what it means to have a solid connection.” – [Interviewee]*

Technology functions as an access point to essential services ranging from emergency response to health care to safety.

### Self Determination, Sustainability, and Land Management

Many participants in the ILIT survey and other avenues for participation described land management, mapping, and building programs for food security and energy independence as priorities for technology in their communities.

*“We’ve been working on a community comprehensive plan . . . One thing the community identified as an issue that not only we face but our entire world is global warming. [We’d like to] find a space in-community for clean energy. Look at different sources of energy that are going to treat our Mother Earth with more care and last a bit longer.” – [Community session participant]*

*“I’d like to learn drones and gis/gps. I’m thinking about the climate crisis and I want skills to help mitigate its impact.” – [ILIT survey respondent]*

Technologies such as GIS and drone-assisted mapping may be used by Nations and communities to help them monitor, manage, and defend their traditional territories. For example, these technologies can be used to compare important traditional sites or endangered species habitat with natural resource proponent development plans. In the quotation below, a virtual session participant discusses “referrals,” a practice through which industry makes requests pertaining to First Nations territory and gives them 30 days to respond in order to be included in further consultations.

The practice of inundating First Nations with so many referrals that they are difficult to respond to in time has been identified as an issue, particularly during COVID-19 lockdowns, and it also came up in this project.<sup>180</sup>

*"I have something to share about how to utilize tech with Elders. I have been working in archeology and environmental impact assessments, oh geez, since I was 15 years old. Something I learned way back then was taking pictures to the Elders to show them what I was doing, where I was at, what we were looking at, what was happening, and then I started explaining what a referral was and how they could participate with the things going on in territory by bringing them pictures, videos, and just in doing that, started gaining trust in what was going on, because [I] could physically see, a lot of the distrust were our survival means." – [Community session participant]*

*"Lots of opportunities in GIS. Maps are always in need to describe the land in a concise and visual way. Being able to quickly, and accurately, communicate where something is critical to inform or make decisions." [ILIT survey respondent]*

## The Future of Culture and Language

Throughout the research, many participants raised culture and language revitalization as an important priority for using technology in their communities. Organizations such as the First Peoples Cultural Council (FPCC) offer grant-funded training in this area, and technology training in language revitalization creates transferable skills in other technology areas.

*"I would like to see that basic technology training and design for everyone's language so people will feel comfortable and will understand."  
– [Community session participant]*

*"I think language is the first thing that comes to mind. Like, the technology language, do they have those words in Chilcotin, Shuswap, Carrier, probably not, so language would be an issue." – [Community session participant]*

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180 For example, as discussed by Stephanie Wood in "B.C. First Nation 'flooded' with resource project referrals from industry, province amid coronavirus lockdown," The Narwhal, Apr. 1, 2020. <https://thenarwhal.ca/coronavirus-bc-first-nation-resource-project-referrals-industry-province/>.

Furthermore, several participants noted that more technology services in their languages would improve accessibility for all ages in-community, as well as help increase language use by younger generations.

*"I believe that there is a need for education and training regarding tools such as the talking dictionary for our communities that are supporting language revitalization as well as how to use technology to offer language learning on-line programs that allow us to use what is available already or to develop new apps to allow children and families to learn our language wherever our members choose to live. Also apps that we can input our language, story telling sessions, writing books and printing resources to be utilized in education to teach our ways of life. Games, dictionaries, pictures, history from our perspective to allow younger people to be creative in designing our knowledge. Library organizing, videos, digitizing, workshops for crafts, regalia, laws, etc. IT's are needed to help and teach the Elders, fluent speakers, mentors as we try to document the knowledge keepers' information."  
– [ILIT survey respondent]*

## What Opportunities Do Indigenous People See for Technology in Their Communities?

*"Here's a great reminder of how are we making technology relevant to our people . . . We went to [a Nation] to set up a youth centre there. Youth everywhere are really interested in learning music. We gifted a piece of DJ equipment and set it up in the basement of the youth centre. Someone came in and taught how to make music and do beats. It's relevant—not just about a skill to go make money, more do you like this stuff and do you have a passion for it? It's important to make technology relevant to us and not the settler state." – [Community session participant]*

As this report shows, Indigenous people in Canada remain under-represented, relative to non-Indigenous people, in "knowledge occupations," which typically require higher levels of education and provide higher salaries.<sup>181</sup> To address this gap, a traditional labour market study asks what skills and training people need to fill in-demand jobs. First Nations and Indigenous people in British Columbia, however, have unique opportunities and agency to shape the composition of "demand" through community economic development, impact benefit agreements (IBAs), entrepreneurship, nation-owned businesses, and land-based rights. Furthermore, the barriers that currently prevent some Indigenous people from accessing the technology sector are not always related to demand. Systemic issues in education, infrastructure, and hiring practices contribute to the under-representation of Indigenous people in the digital economy. Accordingly, this report considers the role of Indigenous self-determination in shaping both "talent supply" and "talent demand" by asking: **What opportunities do Indigenous people and First Nations see for themselves in technology? How will Indigenous people and First Nations shape the future of British Columbia's digital economy?**

181 Alicia Cameron and Alexandra Cutean, "Digital Economy Talent Supply: Indigenous Peoples of Canada," (Ottawa, ON: Information and Communications Technology Council, June 2017). [https://www.ictc-ctic.ca/wp-content/uploads/2017/06/Indigenous\\_Supply\\_ICTC\\_FINAL\\_ENG.pdf](https://www.ictc-ctic.ca/wp-content/uploads/2017/06/Indigenous_Supply_ICTC_FINAL_ENG.pdf).

*“What I hope for, for Indigenous Peoples’ futures and technology, [is] there is equity for all communities to have the same WiFi speed and same opportunity in tech as everybody, and not [different opportunity] because you live in remote community or city centre.” – [Community session participant]*

*“I dream of the day and exchange from community so we can be efficient and needs can be met; [there are] skills within our community and don’t know that they are there. Platform where we can ask questions of ourselves and offer to community and then asking questions, ‘What do I need?’ ‘What skills am I looking for?’ ‘What helps?’ A platform for us to become more connected.” – [Community session participant]*

Across this report, several priorities for technology were consistently articulated by Indigenous research participants, including improving technological literacy and infrastructure across the board in Indigenous communities across British Columbia. While each Indigenous community and person has distinct needs and priorities, the themes discussed articulate a widely shared desire for digital equity in British Columbia—and show that once this is achieved, immense opportunity exists for technology to support not just the minimum of access to essential services, but also sustainability, governance, culture and language, and business development.

We wish to sincerely thank everyone who has contributed to this report, from the many research participants to our research team and our funding partners at the Ministry of Advanced Education and Skills Training’s Sector Labour Market Partnerships Program, (MAEST). We are grateful that so many people saw value in the work and took the time to participate. We hope the impact of this report will increase Indigenous participation and leadership in technology for the next seven generations. It is imperative that Indigenous Peoples are involved in the conversations and decisions that will impact them and guide the future of technology. Indigenous Peoples must have the ability to self-determine their digital future. For this to happen, systemic changes must occur. Our hope is that this report will move the needle, create interventions, and help spur much-needed changes.





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## APPENDICES

### Appendix A. Regional Profiles

In the following section, demand for technology-related roles is discussed for each economic region of British Columbia. Importantly, each of the seven regions analyzed below includes a diverse range of Indigenous communities, institutions, and economies, as illustrated by the comparison between the economic regions and Indigenous language families below. Scholars have suggested that mapping Indigenous traditional territory produces “a very different spatiality than do the social relations and resource management,”<sup>182</sup> and that the act of parceling regions and territories can be inherently colonial. While the following sections will utilize the seven regions of British Columbia to highlight talent demand data, it is important to consider that Indigenous priorities for technology in communities across the province may not align with the borders used in this section.

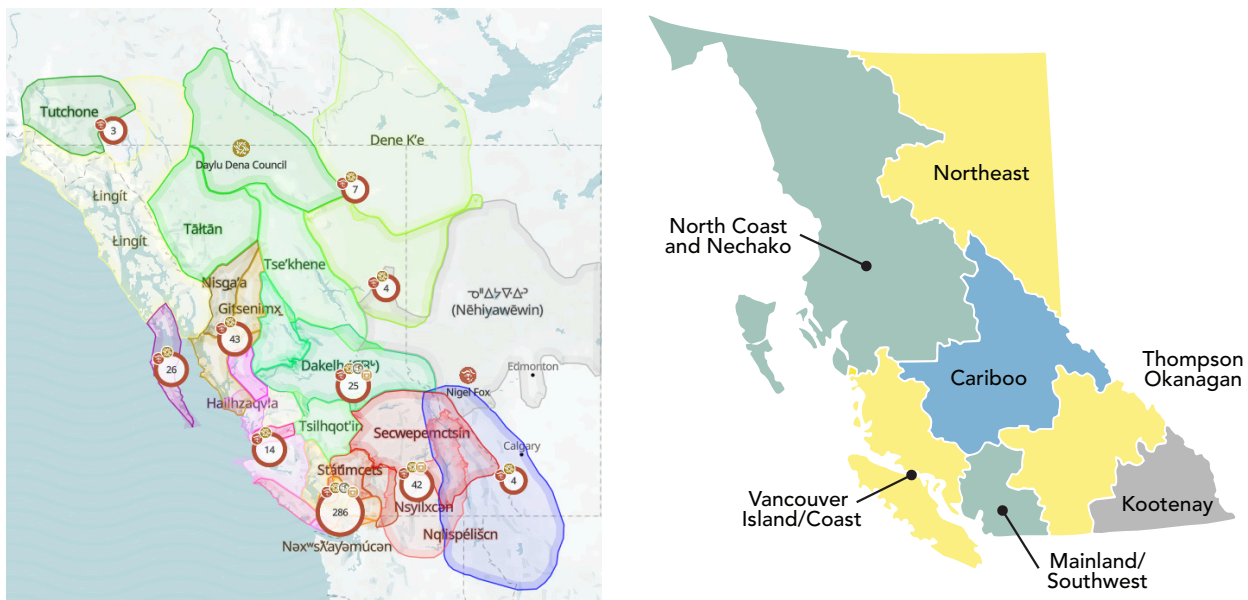


Figure 20. The 34 language families in what is now known as British Columbia (<https://maps.fpcc.ca/>) and the seven economic regions of British Columbia (<https://www.go2hr.ca/research/regional-labour-market-studies>).

The seven regions of British Columbia are used by the Government of BC to map employment and project employment growth, summarized by the table below. In each of the following regional profiles, BC government labour market intelligence and job board data gathered by this project team are compared, alongside an economic forecast for job openings for key tech jobs in each region. This project’s economic forecast includes both job openings due to **economic expansion** and openings due to **replacement of retirees** (see the two types illustrated in the table below). Even in regions with a low

182 Robin Roth (2009). “The Challenges of mapping complex Indigenous spatiality: from abstract space to dwelling space,” *Cultural Geographies*, 16, 207-227.

projected 10-year employment growth rate, many jobs will need to be filled as their current occupants retire. For most of the regions within British Columbia, the BC labour market outlook illustrates that the primary hiring industries are *not* the technology sector. Zooming in to examine job postings and then using those postings to guide a job opening forecast based on related occupations shows that while technology occupations comprise small portions of much of British Columbia, there are significant opportunities in particular areas of the province. Trends of economic diversification and change along with improved telecommunications infrastructure for remote workers could broaden access to in-demand technology jobs in particular areas of BC, while generating greater density of opportunities in others.

Region	Employment	10-year Employment Growth Rate Projection	Job Openings (2019–2029)		
	2019	2019–2029	Job Openings due to Economic Expansion	Job Openings due to Replacement of Retirees	Total Job Openings
Vancouver Island/Coast	402,000	0.9%	37,600	106,200	143,800
Mainland/Southwest	1,623,000	1.0%	177,300	371,300	548,600
Thompson-Okanagan	260,000	1.0%	27,300	68,300	95,600
Kootenay	72,000	0.7%	4,900	19,000	23,900
Cariboo	82,000	0.7%	5,200	16,200	21,400
Northeast	39,000	2.1%	9,500	8,400	18,000
North Coast and Nechako	44,000	0.3%	1,100	8,800	9,900
<b>British Columbia</b>	<b>2,521,000</b>	<b>1.0%</b>	<b>263,000</b>	<b>598,000</b>	<b>861,000</b>

Table 9. Labour market projections summary for the seven economic regions of British Columbia ([https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)). Note that analysis was completed prior to the publication of the 2021 Labour Market Outlook.



## North Coast and Nechako

North Coast and Nechako is the second-largest economic region in British Columbia by land mass and has the second-smallest population (1.6% of BC's population).<sup>183</sup> As of December 2019, the total regional population (age 15 and over) was 66,100.<sup>184</sup> In the North Coast, 60% of the population are First Nations (56,200).<sup>185</sup> In Nechako, 30% of the population are First Nations.<sup>186</sup> In 2018, the region had the second-highest unemployment rate in the province, at 5.9%.<sup>187</sup> In 2019, total employment in the region was 41,700, with the services-producing sector employing the most people, and the regional unemployment rate was assessed at 3.9%.<sup>188</sup> Interviewees from this region discussed the prevalence of weather-related barriers, physical access, connectivity, and remoteness, along with a strong presence of mining and camp work.

### Key Industries and Sectors

Historically, this region was heavily involved in mining, agriculture, fishing, and forestry. These were all industries that heavily employed First Nations people. However, the 2017 BC Labour Force Survey identified the top five industries in the region to be: retail trade (12.4% of regional employment), manufacturing (10.8%), construction (10.5%), health care and social assistance (9.6%), and transportation and warehousing (9.3%), with educational services (8.1%) not far behind.<sup>189</sup> In 2020, the top ten industries in the region were:<sup>190</sup>



183 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx) . 47.

184 Province of British Columbia (2020). "North Coast & Nechako: Regional Overview." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako>

185 BC AFN. North Coast. <https://www.bcafn.ca/first-nations-bc/north-coast>

186 BC AFN. Nechako. <https://www.bcafn.ca/first-nations-bc/nechako>

187 Province of British Columbia (2019). "BC Labour Market Outlook : 2009 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx) p.66

188 Province of British Columbia (2020). "North Coast & Nechako: Regional Overview." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako>. Source: Monthly Labour Force Survey, 3-month moving average, seasonally unadjusted"

189 Province of British Columbia (2020). "North Coast & Nechako: This Region's Industries and Sectors." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako#this-region-industries-sectors>

190 Province of British Columbia (2020). "North Coast & Nechako: This Region's Industries and Sectors." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako#this-region-industries-sectors>

Top 10 Industries	Share of this region's employment	Share of BC employment	Sector
Retail Trade	12.4%	1.7%	Services
Manufacturing	10.8%	2.6%	Goods
Construction	10.5%	1.9%	Goods
Health Care and Social Assistance	9.6%	1.4%	Services
Transportation and Warehousing	9.3%	2.9%	Services
Educational Services	8.1%	2.0%	Services
Accommodation and Food Services	5.6%	1.3%	Services
Forestry and Logging with Support Activities	5.6%	12.3%	Goods
Repair, Personal and Non-Profit Services	4.8%	1.8%	Services
Public Administration	4.5%	1.9%	Services

Table 10. North Coast and Nechako: Key Industries and Sectors (Province of British Columbia, 2020).

### Key Occupations: Economy Overall

The occupations with the largest number of job openings in 2019 included retail and wholesale trade managers (1,000 employed), transport truck drivers (1,390 employed), and retail salespersons (1,340 employed).<sup>191</sup> In 2019, the three industries forecast to grow the fastest between 2019 and 2029 were air transportation, nursing and residential facilities, and support activities for transportation.<sup>192</sup> The 2019 edition of the British Columbia Labour Market Outlook report identified the twenty-four National Occupation Codes (NOCs) with the highest projected growth in the region. None of these NOCs were directly related to technology.<sup>193</sup> However, ICTC analysis of regional job postings sheds some light on the types of technology jobs available in the region, as shown in Figure 20.

191 Province of British Columbia (2019). "BC Labour Market Outlook (2019-2029) for this region" <https://www.workbc.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako#bc-labour-market-outlook-for-this-region>

192 Province of British Columbia (2019). "BC Labour Market Outlook (2019-2029) for this region" <https://www.workbc.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako#bc-labour-market-outlook-for-this-region>

193 British Columbia Labour Market Outlook: 2019 Edition. [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

## Core Technology Job Openings

Some opportunity in technology can be seen in an economic forecast of job openings in each region. In the figure below, the top ten technology occupations in British Columbia are aggregated into a data point called “core tech occupations” (aggregated in regions where the data points for some of these occupations are too low to present on their own). The NOCs that make up the “core technology occupations” for British Columbia are:

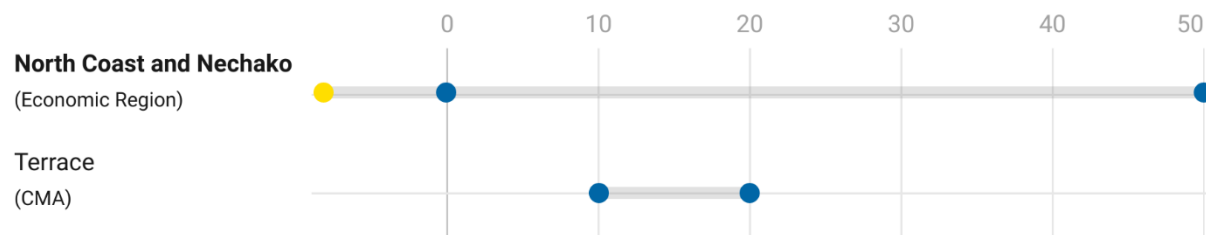
#0213	Computer and information systems managers
#1123	Professional occupations in advertising, marketing and public relations
#2171	Information systems analysts and consultants
#2172	Database analysts and data administrators
#2173	Software engineers and designers
#2174	Computer programmers and interactive media developers
#2175	Web designers and developers
#2281	Computer network technicians
#2282	User support technicians
#5241	Graphic designers and illustrators

In the chart, the leftmost blue dot illustrates a “pessimistic” forecast, while the rightmost shows an “optimistic” forecast, with WorkBC’s projections for the same 10 occupations over the same span of time marked in yellow. A major city for each region is also presented, illustrating to what degree each region’s job openings occur in one place. For the North Coast and Nechako region, there are currently very few core tech occupations projected.

## North Coast and Nechako: Core Tech Occupations



Projected Job Openings (2022-2026)



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 21. Five-year forecast of core tech job openings, North Coast and Nechako region.

Importantly, the prevalence of particular occupations is not necessarily related to *how hard they are to fill*: as we saw in employer survey data earlier in this section, many employers struggle to fill core technology jobs even if they are not posting very many of them. Cybersecurity roles, for example, are rare, but difficult to fill once posted. Accordingly, regions like the North Coast and Nechako may face a core talent challenge: because technology roles are posted infrequently, people with those skill sets may move to other areas to look for opportunity, leaving employers in the region with a greater challenge in filling technology-related jobs. As we will see in the section to come, this is the case for many of the lower-populated regions in the province.

### North Coast and Nechako: Most Commonly Posted Technology-related Roles

By examining *all* job postings listed on key job boards for this region from February to November 2021, it is possible to see more technology-related roles emerge.<sup>194</sup> Many of the technology-related occupations involve transferrable skills whose application is not limited to the technology sector (e.g., project management, business, and data analysis). Accordingly, while “core tech occupations” may be few and far between, applicants interested in technology-related fields may be able to go to other industries to gain skills they can carry with them to the technology sector.

## North Coast and Nechako

Top technology jobs in the region

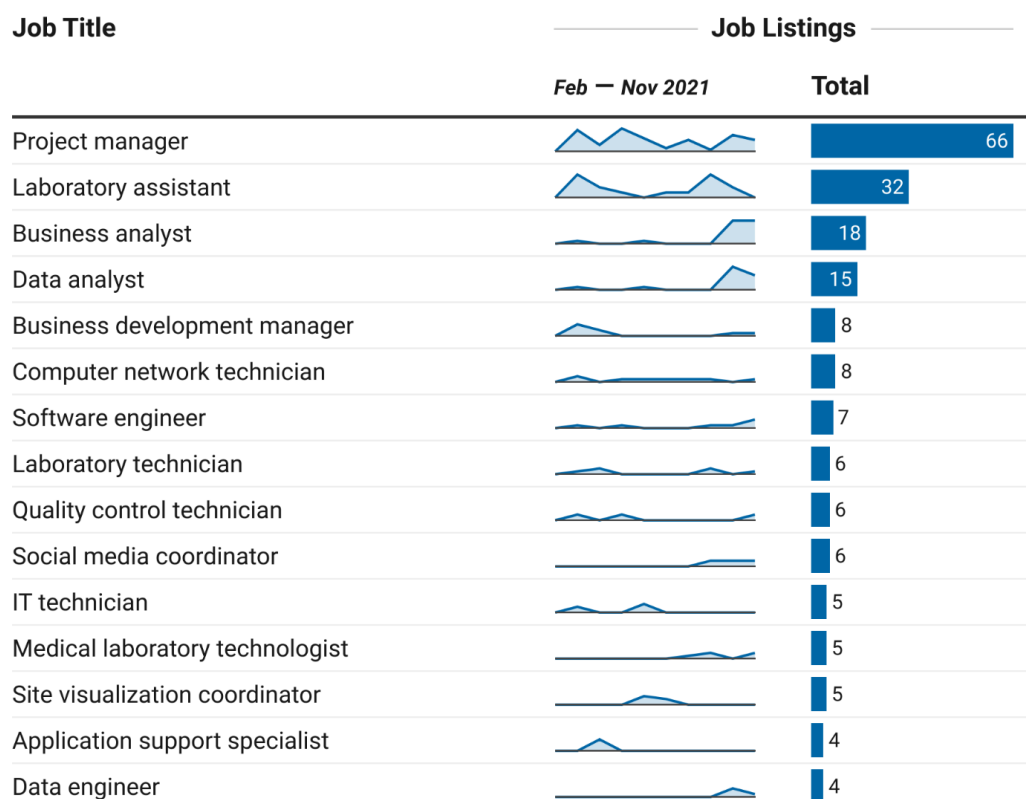


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 22. Top technology jobs posted, North Coast and Nechako Region, Feb.–Nov. 2021.

194 Roles were manually classified as “technology” or “non-technology” based on O\*Net and NOC classifications.

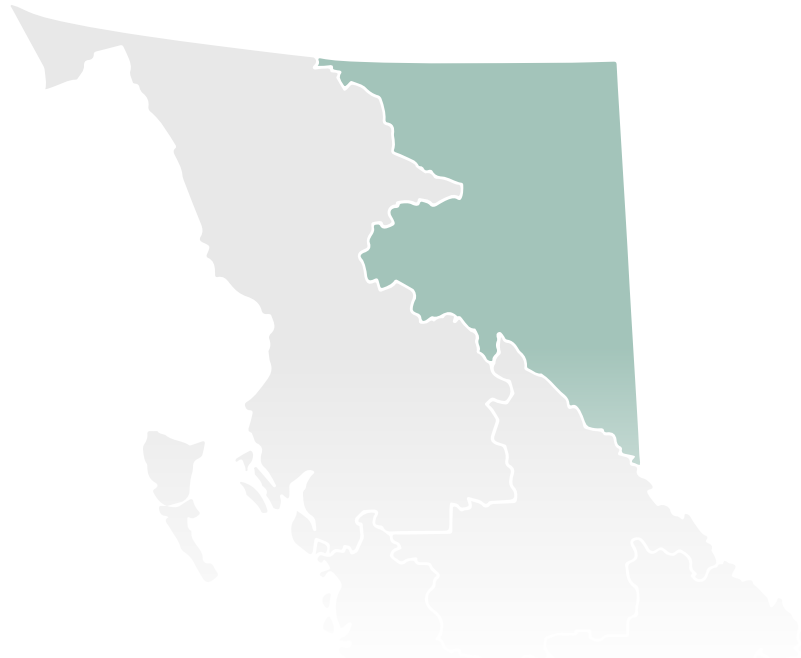


## Northeast

The Northeast region is the largest region in British Columbia, as well as the least populated; only 1.4% of the province's residents and 1.6% of the province's employed workers are located there.<sup>195</sup> At present, 7% of the region's population is First Nations.<sup>196</sup> The region has a younger population than the provincial average,<sup>197</sup> as well as British Columbia's highest labour force participation rate (72.6%).<sup>198</sup> In January 2020, the total regional population (age 15 and over) was 55,200.<sup>199</sup> In January 2020, the total regional employment was 39,000 and the unemployment rate was 4.2%.<sup>200</sup> Like the North Coast and Nechako region, interviewees discussed significant barriers related to connectivity in this region, along with a shortage of educational opportunities for technology.

### Key Industries and Sectors

The Northeast is a centre for oil and gas operations in British Columbia. The main sources of employment in the region are in the construction, oil and gas, forestry, and fishing industries.<sup>201</sup> The service sector is the primary source of employment in the region, but the region also comprises around 3% of BC employment in the goods-producing sector, including "agriculture, forestry, mining, oil and gas, fishing, hunting and trapping, utilities, construction and manufacturing."<sup>202</sup> In 2019, the three industries anticipated to have the fastest employment growth in the region up to 2029 were: telecommunications, insurance carriers and related activities, and rail transportation.<sup>203</sup>



195 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx) P. 69:

196 BC AFN. Northeast. <https://www.bcafn.ca/first-nations-bc/northeast>.

197 Ibid., p. 49.

198 Province of British Columbia (2020). "Northeast: Regional Overview." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/North-Coast-Nechako>

199 Ibid. Source: Monthly Labour Force Survey, 3-month moving average, seasonally unadjusted

200 Ibid. Source: Monthly Labour Force Survey, 3-month moving average, seasonally unadjusted

201 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx) P. 66:

202 Province of British Columbia (2020). "Northeast: Regional Overview." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Northeast>

203 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx) P. 70:

The updated regional profile provided by Work BC identified the top industries in the region as:<sup>204</sup>

Industry	Share of this region's employment	Share of BC employment	Sector
Construction	16.3%	2.8%	Goods
Health Care and Social Assistance	10.5%	1.3%	Services
Retail Trade	10.4%	1.6%	Services
Mining and Oil and Gas Extraction	7.6%	11.1%	Goods
Transportation and Warehousing	7.1%	1.9%	Services
Accommodation and Food Services	6.8%	1.4%	Services
Repair, Personal and Non-Profit Services	6.1%	2.1%	Services
Educational Services	6.0%	1.4%	Services
Manufacturing	5.6%	1.2%	Goods
Finance, Insurance and Real Estate	4.8%	1.2%	Services
Professional, Scientific, and Technical Services	3.8%	0.8%	Services

Table 11. Northeast: Key Industries and Sectors (Province of British Columbia, 2019).

### Key Occupations: Economy Overall

The 2019 edition of the British Columbia Labour Market Outlook report predicts 22 National Occupation Codes with the highest growth in employment between 2019 and 2029, including registered nurses, teachers, and public and environmental health inspectors. There are no explicitly “technology” occupations in the list.<sup>205</sup>

204 Province of British Columbia (2020). “Northeast: This Region’s Industries and Sectors.” BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Northeast#this-region-industries-sectors>

205 British Columbia Labour Market Outlook: 2019 Edition. [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)



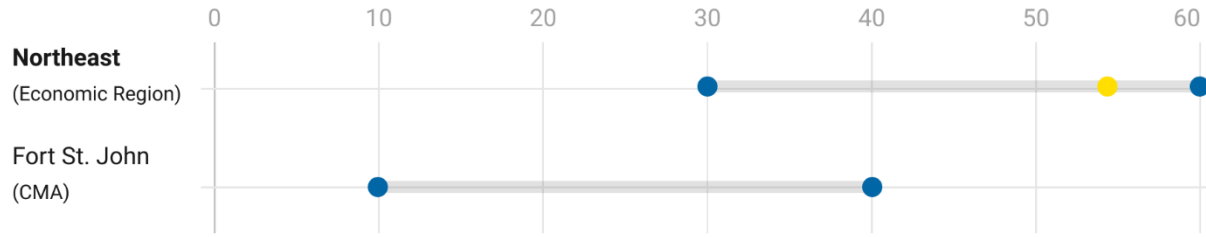
## Core Tech Occupations

Using the same methods and occupations listed in the previous North Coast and Nechako section, core tech occupations' five-year openings for both employment growth and retirement/replacement are illustrated below, using the same "pessimistic" to "optimistic" scenarios shown by the blue dots. A significant proportion of projected job openings in core technology roles in the next five years are in the city of Fort St. John.

### Northeast: Core Tech Occupations



Projected Job Openings (2022-2026)



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 23. Five-year forecast of core tech job openings, Northeast region.

## Most Commonly Posted Technology-related Roles

As with the North Coast and Nechako region, when examining *all* technology-related roles posted from February to November 2021, the occupations that appear pertain to sectors other than ICT. As before, jobs that are scarce may still be hard for employers to fill, and thus still provide some opportunity for persons interested in these careers who would like to stay living in their regions.

### Northeast

Top technology jobs in the region

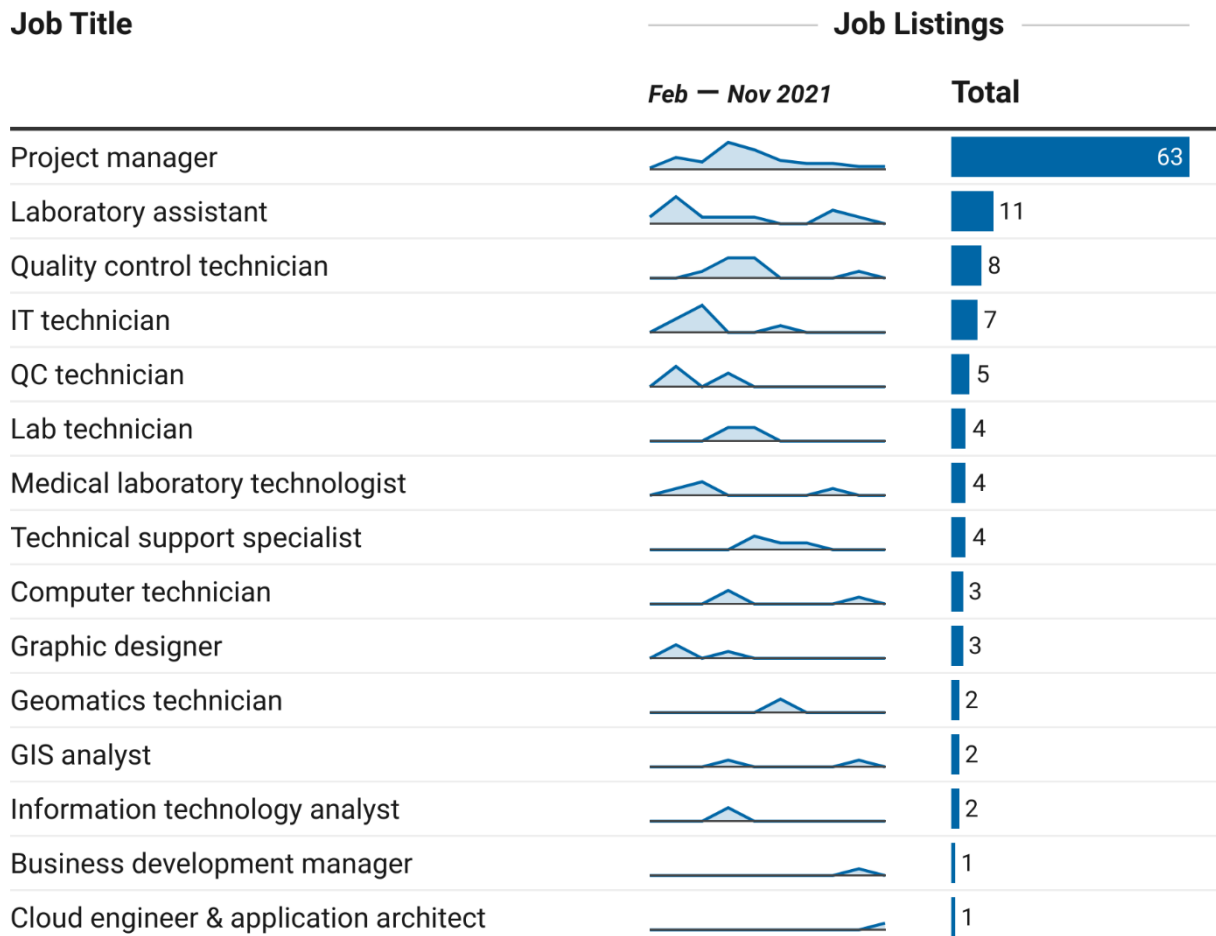


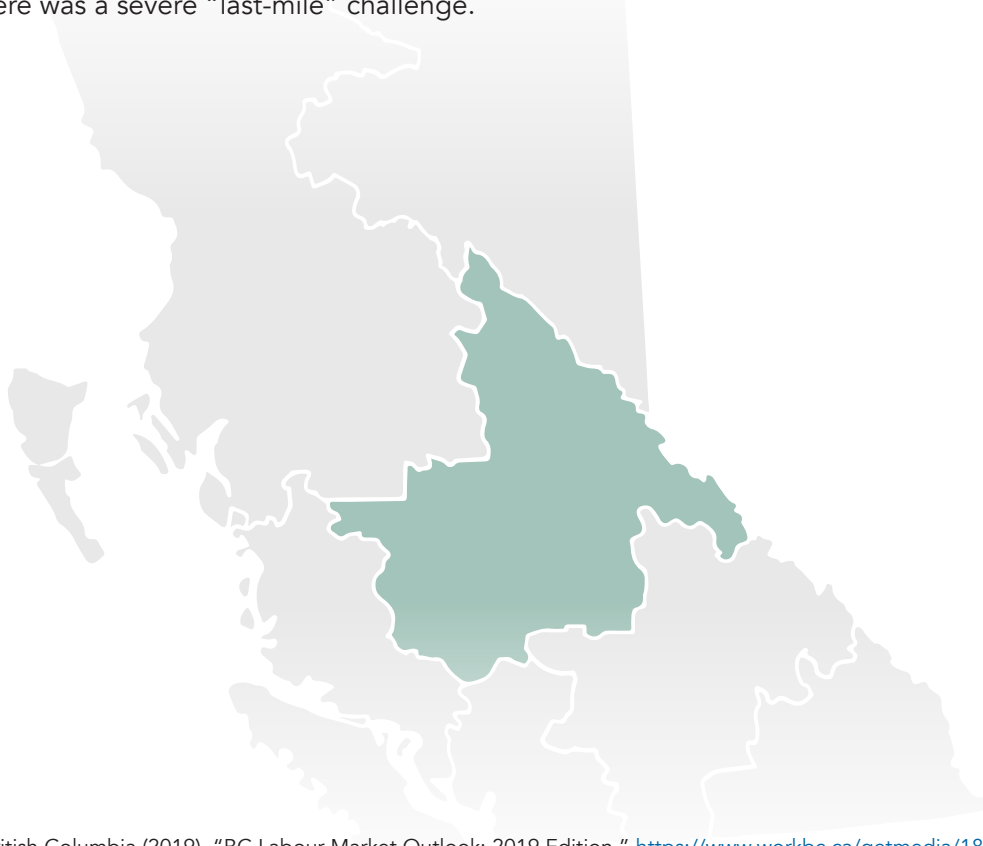
Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 24. Top technology job postings in the Northeast region, Feb. 2021–Nov. 2021.

## Cariboo

Cariboo is British Columbia's third-largest region. It is also one of its least populated regions; only 3% of the province's residents and workers live here.<sup>206</sup> In January 2020, the total regional population (age 15 and over) was 128,300.<sup>207</sup> With a younger population than the provincial average, the region has the second-highest labour force participation rate (66.7% in 2018).<sup>208</sup> Cariboo is home to 153,800 First Nations people, approximately 6% of the region's population.<sup>209</sup> In 2014, the Tsilhqot'in Nation successfully defended their right to lands and title. The Supreme Court found that the six First Nations bands that make up the Nation had successfully argued the "exclusive right to decide how the land is used and the right to benefit from those uses."<sup>210</sup> First Nations in the area are now working with mining companies to ensure their inclusion will add 140 jobs in the region.<sup>211</sup>

Currently, the provincial government has invested in 13 projects, including climate adaptation projects.<sup>212</sup> This is ever more urgent, as most major highways were significantly impacted by flooding and severe weather.<sup>213</sup> Interviewees commented that while many parts of this region had good connectivity, there was a severe "last-mile" challenge.



206 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

207 Province of British Columbia (2020). "Cariboo: Regional Profile." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Cariboo>

208 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx), P. 45:

209 BC AFN. Cariboo. <https://www.bcafn.ca/first-nations-bc/cariboo>.

210 C.J. McLachlin and LeBel, Abella, Rothstein, Cromwell, Moldaver, Karakatsanis and Wagner JJ. (2014). Tsilhqot'in Nation v. British Columbia, SCC, 44, 34986, <https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/14246/index.do>.

211 Canadian Press. "Cariboo-area First Nation works with mining company to ensure expansion of B.C. mine," <https://www.nsnews.com/bc-news/cariboo-area-first-nation-works-with-mining-company-to-ensure-expansion-of-bc-mine-4694575>.

212 Government of BC (July 14, 2021). "Cariboo region communities benefit from economic recovery funding," Ministry of Transportation and Infrastructure, <https://news.gov.bc.ca/releases/2021TRAN0103-001332>.

213 Brianna Charlebois, (November 17, 2021). "B.C. storm disrupts supply chain, could have lasting impacts on economy: experts," *The Canadian Press*, <https://www.quesnelobserver.com/business/b-c-storm-disrupts-supply-chain-could-have-lasting-impacts-on-economy-experts/>.

## Key Industries and Sectors

The region boasts substantial activity in manufacturing and primary resources, including mining, oil and gas, fishing, forestry, and hunting and trapping. The forestry industry is particularly well developed.<sup>214</sup> According to Work BC data from 2020, the top ten industries were:<sup>215</sup>

Industry	Share of this region's employment	Share of BC employment	Sector
Health Care and Social Assistance	14.2%	3.8%	Services
Retail Trade	12.8%	3.3%	Services
Manufacturing	11.3%	5.3%	Goods
Construction	7.7%	2.7%	Goods
Accommodation and Food Services	6.6%	2.9%	Services
Educational Services	6.6%	3.2%	Services
Transportation and Warehousing	6.1%	3.6%	Services
Public Administration	4.6%	3.7%	Services
Repair, Personal and Non-Profit Services	4.4%	3.2%	Services
Professional, Scientific, and Technical Services	3.9%	1.6%	Services

Table 12. Cariboo: Key Industries and Sectors (Province of British Columbia, 2020).

## Occupations: Economy Overall

According to the 2019 Edition of the British Columbia Labour Market Outlook, there are no tech-related National Occupation Codes among the twenty-three occupations with the highest predicted growth between 2019 and 2029.<sup>216</sup> Like other regions, these occupations included nurses, teachers, social workers, accountants, and accommodation service managers.<sup>217</sup>

214 Province of British Columbia (2020). "Cariboo: Employment Statistics." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Cariboo#employment-statistics>

215 Province of British Columbia (2020). "Cariboo: This Region's Industries and Sectors." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Cariboo#this-region-industries-sectors>

216 Note: a 2021 version of the BC Labour Market Outlook exists but was published after the preparation of secondary data for this report. It can be found at: "BC's Labour Market Outlook: 2021 Edition," Work BC, <https://www.workbc.ca/labour-market-industry/labour-market-outlook.aspx>.

217 British Columbia Labour Market Outlook: 2019 Edition. [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

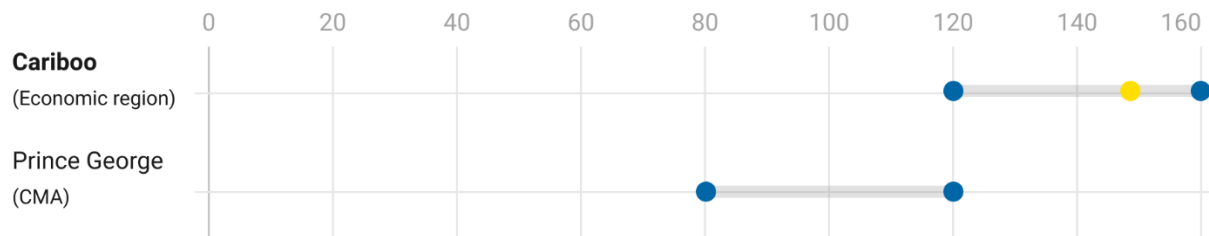
## Core Tech Occupations

Using the same methods and occupations listed in the first (North Coast and Nechako) regional section, core tech occupations' five-year openings for both employment growth and retirement/replacement are illustrated below, using the same "pessimistic" to "optimistic" scenarios shown by the blue dots. A significant proportion of projected job openings in core technology roles in the next five years are in the city of Prince George. Cariboo shows more core technology-related roles than the previous two regions, likely due in part to the presence of a larger urban centre; nevertheless, the roles are still infrequent enough to be able to disaggregate with certainty.

### Cariboo: Core Tech Occupations



Projected Job Openings (2022-2026)



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 25. Five-year employment forecast, Cariboo region, core technology occupations.

### Most Commonly Posted Technology-related Roles

Examining the top technology-related roles in each region illustrates that many of the same transferable and non-ICT sector jobs present are similar to those in the North Coast and Nechako region and the Northeast regions. However, this is the first appearance of certain occupations like data analyst and technology sales representative, and just as the two previous regions offered some highly specialized roles that were likely difficult to fill, there is also opportunity for a small number of highly skilled technology workers in this region.

# Cariboo

Top technology jobs in the region

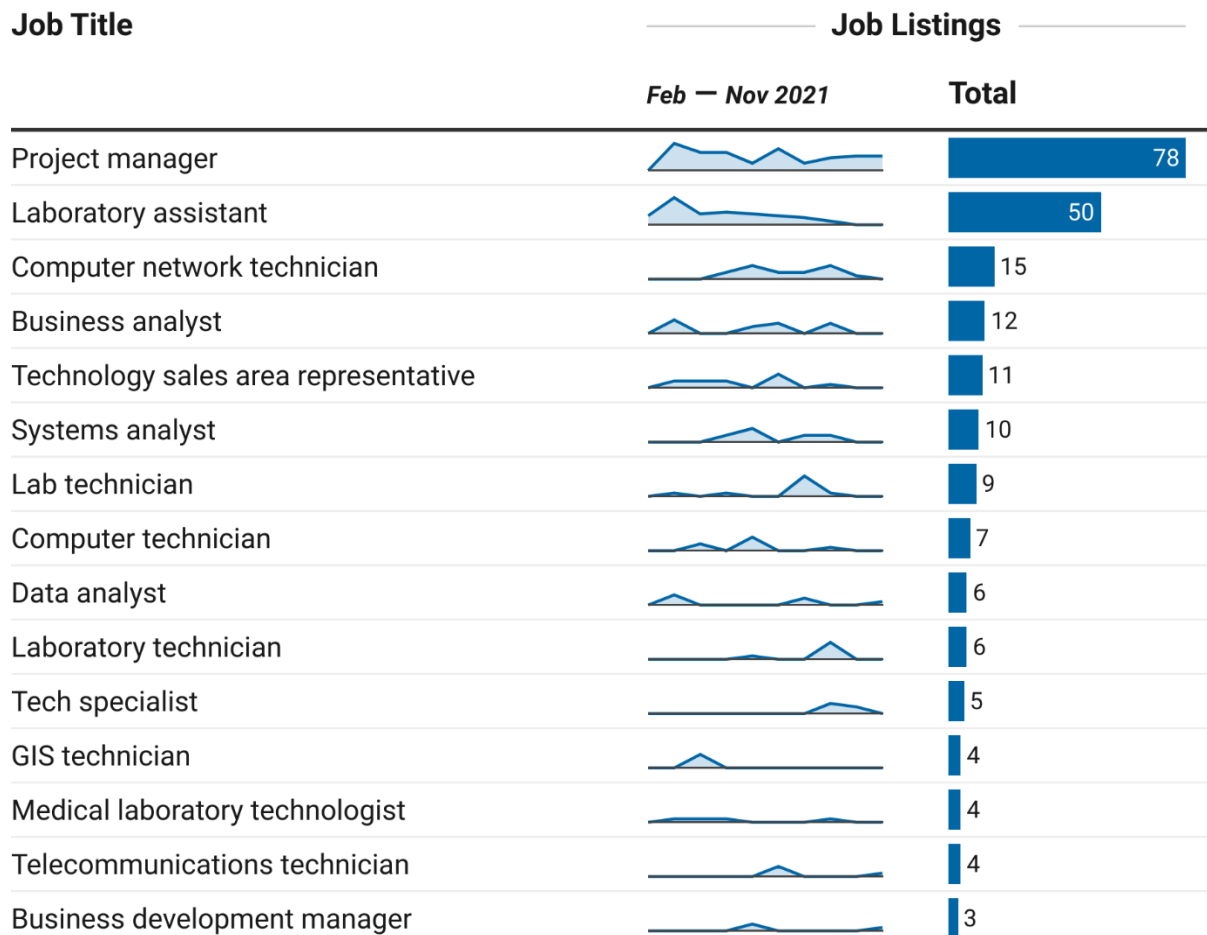


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 26. Top technology roles in Cariboo region, Feb.–Nov. 2021.





## Vancouver Island/Coast

Although it represents British Columbia's second-most populated region and is home to around 15.7% of the province's workers, much of the Vancouver Island/Coast region is rural and sparsely populated.<sup>218</sup> The majority of residents live in the area near Victoria, as well as the mid-island area between Nanaimo north and Campbell River.<sup>219</sup> Out of all of British Columbia's regions, it has both the highest share of seniors (those aged 65 and older) and the smallest share of children (age 14 and younger). First Nations people make up about 5% of the region's population.<sup>220</sup> In 2017, the region's labour force participation was the lowest in the province at 60.8%.<sup>221</sup> However, due to an influx of younger people leaving the competitive housing market in the Mainland/Southwest region, the labour force participation rate was up to 61.5% in 2018 and was no longer the lowest in the province.<sup>222</sup>

In January 2020, the region had a total regional population (age 15 and over) of 692,200 and an unemployment rate of 5.1% (and only 3.5% in Victoria).<sup>223</sup> Interviewees saw strong discrepancies between the northern and southern parts of the island and internet quality. They also commented that the greater Victoria area was a very cohesive tech community that could be hard to break into but was a close-knit and supportive group when there. One economic development interviewee noted that there was significant entrepreneurship in the region, but that successful companies tended to be "gobbled up" due to low business density.



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218 Province of British Columbia (2018). "BC Labour Market Outlook: 2018 Edition." [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx), p. 37

219 Ibid, p. 27

220 BC AFN. Vancouver Island & Coast. <https://www.bcafn.ca/first-nations-bc/vancouver-island-coast>.

221 Ibid, p. 37

222 British Columbia Labour Market Outlook: 2019 Edition. [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

223 Province of British Columbia (2020). "Vancouver Island & Coast: Regional Overview." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Vancouver-Island-Coast>. Source: Monthly Labour Force Survey, 3-month moving average, seasonally unadjusted

## Key Industries and Sectors

As this region is home to the provincial capital, Victoria, a significant proportion of British Columbia's public administration jobs are located there. First Nations communities are significantly involved in the eco-tourism, aquacultural, and agricultural industries.<sup>224, 225</sup> The tech sector in the region is growing, with investments in automation, workforce skills, and capital equipment.<sup>226</sup> According to the 2019–2029 British Columbia Labour Market Outlook report, the top 10 industries in the region were:<sup>227</sup>

Industry	Share of this region's employment	Share of BC employment	Sector
Health Care and Social Assistance	15.4%	19.6%	Services
Retail Trade	12.5%	15.7%	Services
Construction	9.3%	15.8%	Goods
Accommodation and Food Services	8.1%	17.1%	Services
Public Administration	7.4%	28.2%	Services
Professional, Scientific, and Technical Services	7.3%	14.2%	Services
Educational Services	7.2%	16.8%	Services
Manufacturing	5.0%	11.0%	Goods
Repair, Personal and Non-Profit Services	5.0%	16.8%	Services
Finance, Insurance and Real Estate	4.7%	11.8%	Services

Table 13. Vancouver Island/Coast: Key Industries and Sectors (Province of British Columbia, 2020)

From 2019 to 2029, the region's fastest growth sectors are expected to be: computer systems design and related services, support activities for transportation, motion pictures and sound recording, and nursing and residential care facilities. This reflects the area's older population, but also the influx of younger people from the Lower Mainland area.<sup>228</sup>

In the 2019 British Columbia Labour Market Outlook, two tech-related National Occupation Codes (NOCs) were identified for high growth in the region between 2019 and 2029:<sup>229</sup>

- Information systems and consultants (NOC 2171), with 1,650 predicted openings
- Computer programmers and interactive media developers (NOC 2174), with 1,180 projected openings

224 BC AFN. Vancouver Island & Coast. <https://www.bcafn.ca/first-nations-bc/vancouver-island-coast>.

225 <http://viea.ca/wp-content/uploads/2020/11/2020SOTI-Report-WEB-New.pdf>

226 <http://viea.ca/wp-content/uploads/2020/11/2020SOTI-Report-WEB-New.pdf>

227 Province of British Columbia (2020). "Vancouver Island & Coast: This Region's Industries and Sectors." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Vancouver-Island-Coast#this-region-industries-sectors>

228 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

229 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

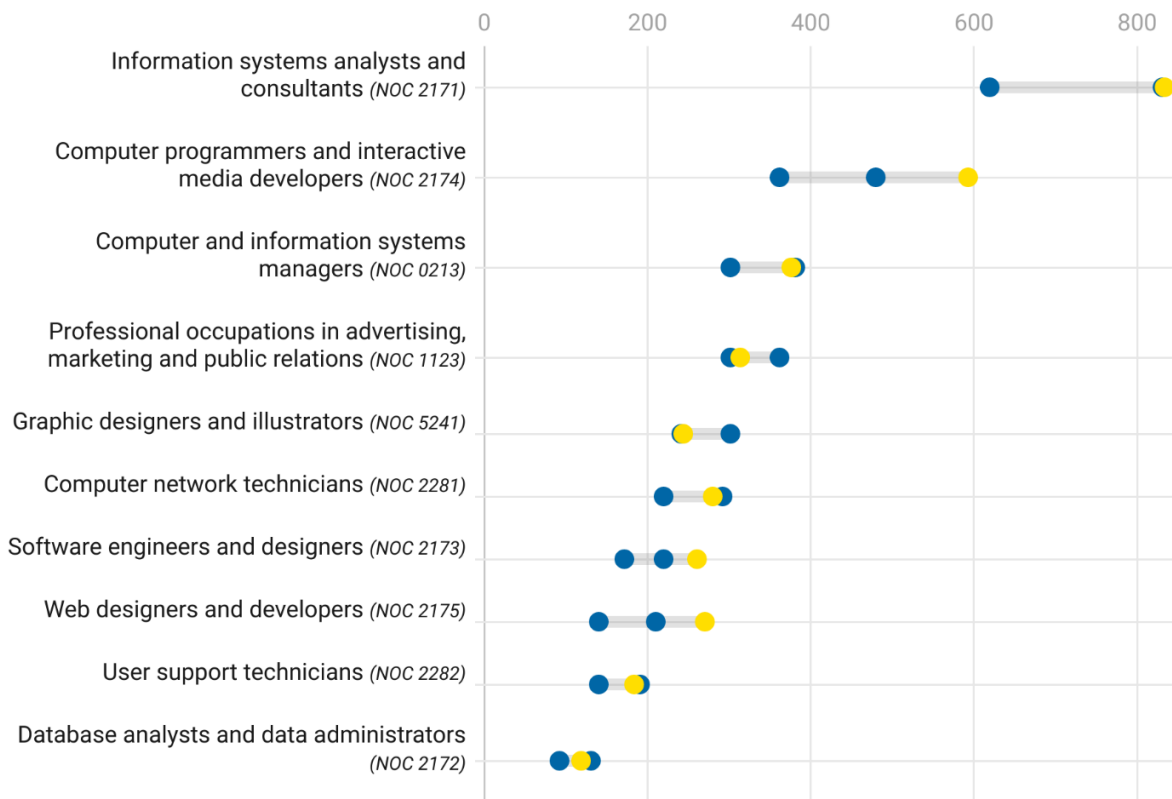
## Core Tech Occupations

Using the same methods and occupations listed in the first regional section, core tech occupations' five-year openings for both employment growth and retirement/replacement are illustrated below, using the same "pessimistic" to "optimistic" scenarios shown by the blue dots. Unlike in the previous regions presented, there are enough job postings in this region to be able to disaggregate the core tech occupations by NOC. In examining each of these, the reader should keep in mind that an NOC is an *aggregation* of job titles and thus includes positions with the same competencies as the titles listed below, but is not limited to jobs with the exact titles shown.

### Vancouver Island/Coast: Core Tech Occupations



Projected Job Openings (2022-2026), by occupation



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 27. Five-year employment forecast, Victoria region, core technology occupations.

For this region, there is also sufficient data to forecast these 10 occupations within the city of Victoria (yellow dots are absent from the figure below because WorkBC does not provide city-level forecast data). From this chart, it is possible to see that while Victoria comprises a significant proportion of technology occupations expected to grow in the next five years, there is also a range of occupations that will open in other areas of the province.

## Victoria: Core Tech Occupations



Projected Job Openings (2022-2026), by occupation

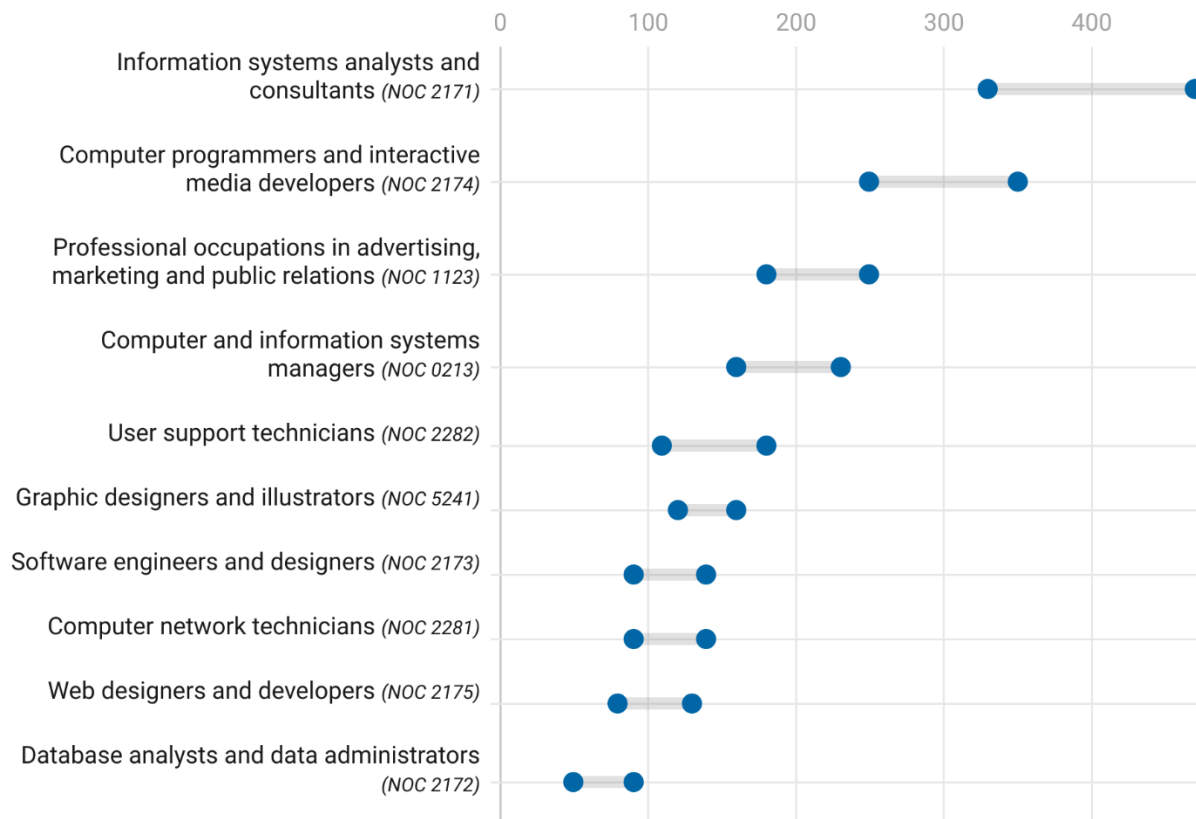


Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 28. Five year forecast of core tech job openings, Victoria region

## Most Frequently Posted Job Titles

As discussed previously, it is interesting to examine the difference between technology-related roles posted in Victoria, as compared with the rest of the province, to consider the opportunities available to people outside of this major city. To examine this, ICTC collected job board data for tech roles on the island, both *including* and *excluding* Victoria. A significant difference in the types and specializations of roles can be seen between these two figures. Indeed, the roles available outside of Victoria more closely resemble those of other, lower-populated regions.

## Vancouver Island/Coast

Top technology jobs in the region (outside of Greater Victoria)

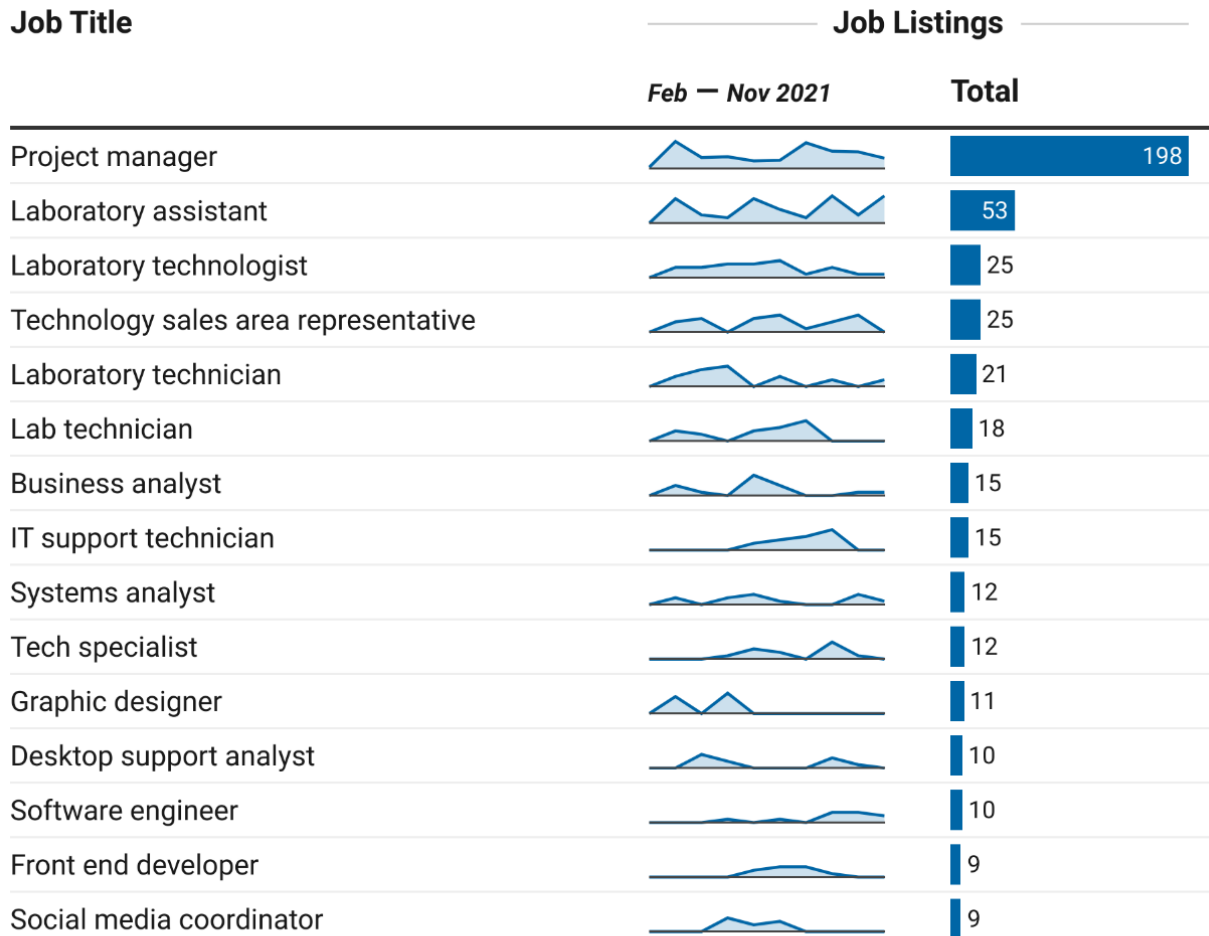


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 29. Top technology job postings in the Vancouver Island/Coast region, excluding Greater Victoria.

# Greater Victoria

Top technology jobs in the metropolitan region

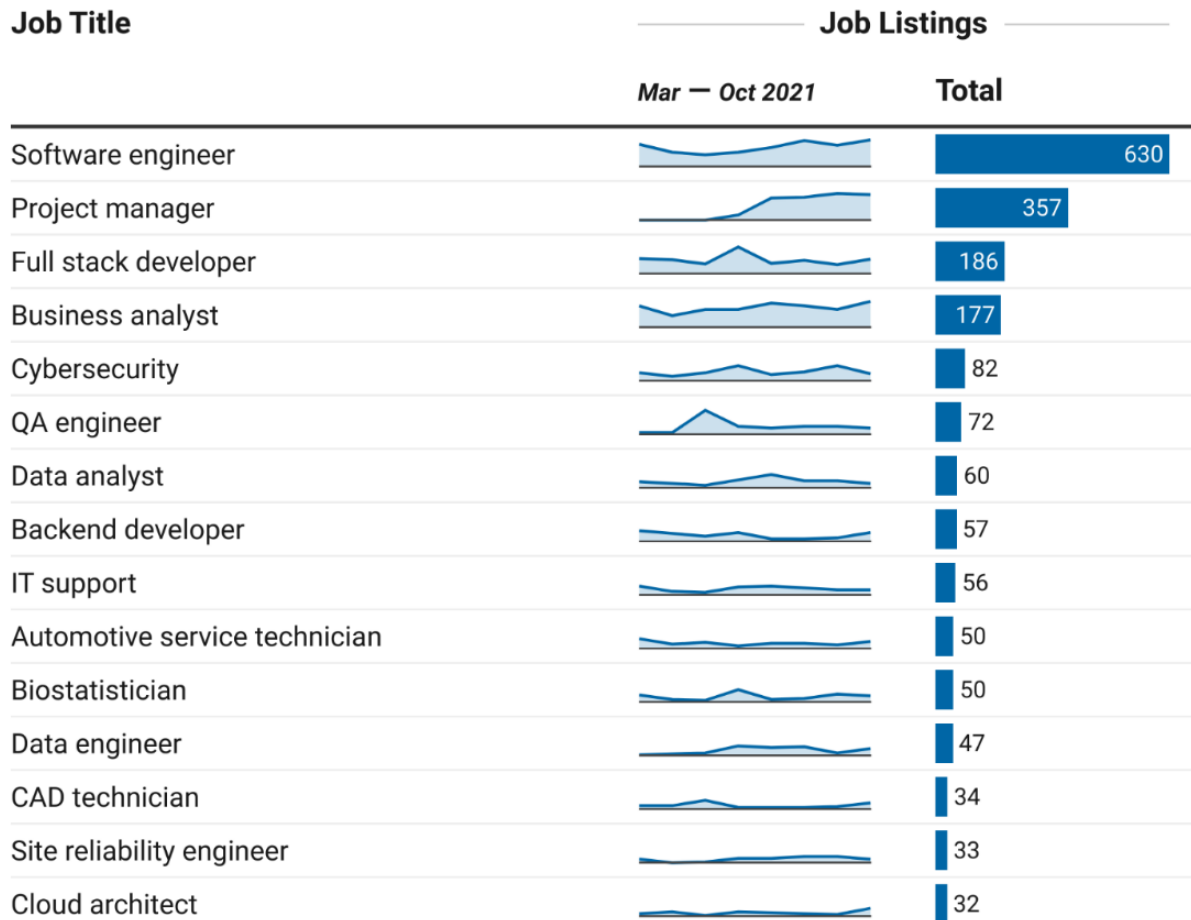


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 30. Top technology-related jobs in Greater Victoria, March–Nov. 2021.





## Mainland/Southwest

The Mainland-Southwest region is British Columbia’s smallest region by land mass. It is also by far the most populated region, home to two-thirds of the province’s population and workers.<sup>230</sup> It has one of the youngest populations in the province, and holds the highest share of working-age population (15–64) for a region in BC.<sup>231</sup> The region has the smallest percentage of First Nations, making up less than 1% of the population.<sup>232</sup> At the heart of British Columbia’s economy, the region’s unemployment rate is regularly below the provincial rate.<sup>233</sup>

Most employment is in the service sector. The region holds the majority of all provincial service-sector jobs in insurance, real estate and leasing, finance, and professional scientific and technical services in this region.<sup>234</sup> However, the region also hosts a significant number of goods-producing jobs in construction, manufacturing, mining, agriculture, forestry, fishing, and utilities. As a highly urban area, it has low numbers of “resource-based operations,” and accounts for only a quarter of British Columbia’s forestry, mining, oil and gas, fishing, and hunting and trapping jobs.<sup>235</sup>

### Key Industries and Sectors: Economy Overall

According to the 2019 BC Labour Market Outlook, the top ten industries of the region are:<sup>236</sup>

Industry	Share of this region’s employment	Share of BC employment	Sector
Retail Trade	11.4%	64.3%	Services
Health Care and Social Assistance	11.3%	59.2%	Services
Professional, Scientific, and Technical Services	9.1%	73.0%	Services
Construction	8.9%	61.6%	Goods
Manufacturing	7.4%	67.0%	Goods
Finance, Insurance and Real Estate	7.3%	74.8%	Services
Accommodation and Food Services	7.1%	61.5%	Services
Educational Services	6.8%	64.4%	Services
Information, Culture and Recreation	6.3%	74.6%	Services
Transportation and Warehousing	6.2%	70.0%	Services

Table 14. Mainland/Southwest: Key Industries and Sectors, (Province of British Columbia, 2020).

230 Ibid, P. 39:

231 Province of British Columbia (2020). “Mainland & Southwest: This Region’s Industries and Sectors.” BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Mainland-Southwest#this-region-industries-sectors>

232 BC AFN. Lower Mainland-Southwest. <https://www.bcafn.ca/first-nations-bc/lower-mainland-southwest>.

233 Ibid.

234 Province of British Columbia (2020). “Mainland & Southwest: This Region’s Industries and Sectors.” BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Mainland-Southwest#this-region-industries-sectors>. Vancouver, in particular, has been designated the “financial and business capital of BC,” home to the headquarters of numerous businesses and financial institutions

235 Ibid.

236 Ibid. Source: 2017 Labour Force Survey

Due to pipeline projects, the oil and gas, support activities for mining, and oil and gas extraction were anticipated to be the fastest-growing industry in the region between 2019 and 2029. In addition, computer systems design and related services is anticipated to be one of the quickest-growing industries to 2029, reflecting the younger population, British Columbia’s advances in technology-based employment, and attraction of tech companies to the province.”<sup>237</sup>

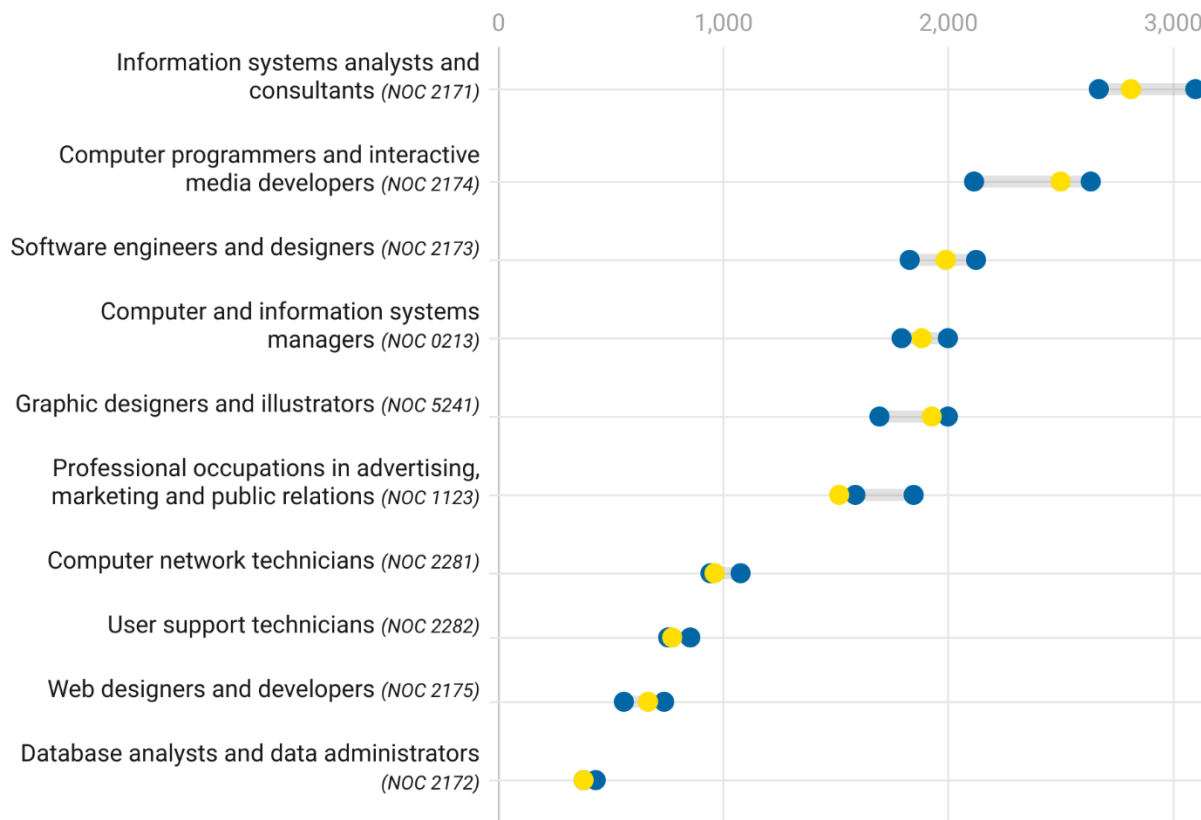
### Key Occupations: Core Tech Roles Highly Present

In the 2019 Labour Market Outlook, computer programmers and interactive media developers (NOC 2174) was expected to be the fastest-growing occupation in the region between 2019 and 2029, with 4,750 predicted job openings.<sup>238</sup> The five-year forecast for “core technology occupations” conducted by this project team shows that NOC 2171, information systems analysts and consultants, is also likely to have significant demand in the coming years, with over 2,500 job openings during this time period.

## Mainland/Southwest: Core Tech Occupations



Projected Job Openings (2022-2026), by occupation



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 31. Five-year forecast, Mainland/Southwest, core tech occupations.

237 Province of British Columbia (2019). “BC Labour Market Outlook: 2019 Edition.” [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

238 Province of British Columbia (2019). “BC Labour Market Outlook: 2019 Edition.” [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)



Examining the same set of NOCs over the next five years in Vancouver, it is clear that while the city offers the majority of the region's core technology postings, there are still numerous such roles available in other parts of the Lower Mainland. Changes in the relative importance of particular roles in the region as a whole and then Vancouver in particular (e.g., computer and information systems managers are fourth-highest in the region, compared with sixth-highest in Vancouver alone) may also point towards differences between the Vancouver Metropolitan area and other areas. Note that the figure below lacks yellow dots because WorkBC does not provide projections at the city level.

## Vancouver: Core Tech Occupations



Projected Job Openings (2022-2026), by occupation

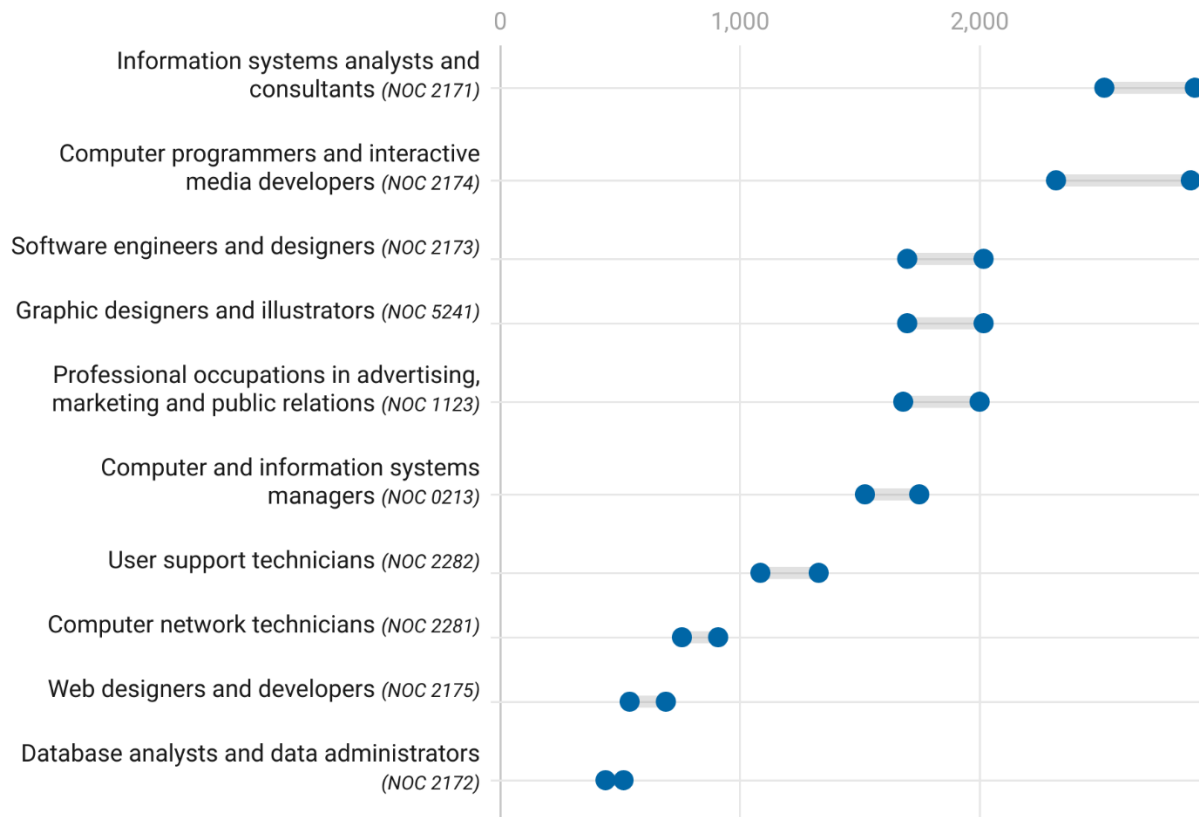


Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 32. Five-year forecast of core tech job openings, Vancouver region

## Top Technology-related Jobs Posted

ICTC collected job board data for tech roles on the Mainland both *including* and *excluding* Vancouver. A significant difference in the types and specializations of roles can be seen between these two figures. As with the Vancouver Island/Coast region, the jobs being posted outside of Vancouver more closely mirror the rest of the province, though with several ICT-focused roles standing out in the top ten.

## Mainland/Southwest

Top technology jobs in the region (outside of Metro Vancouver)

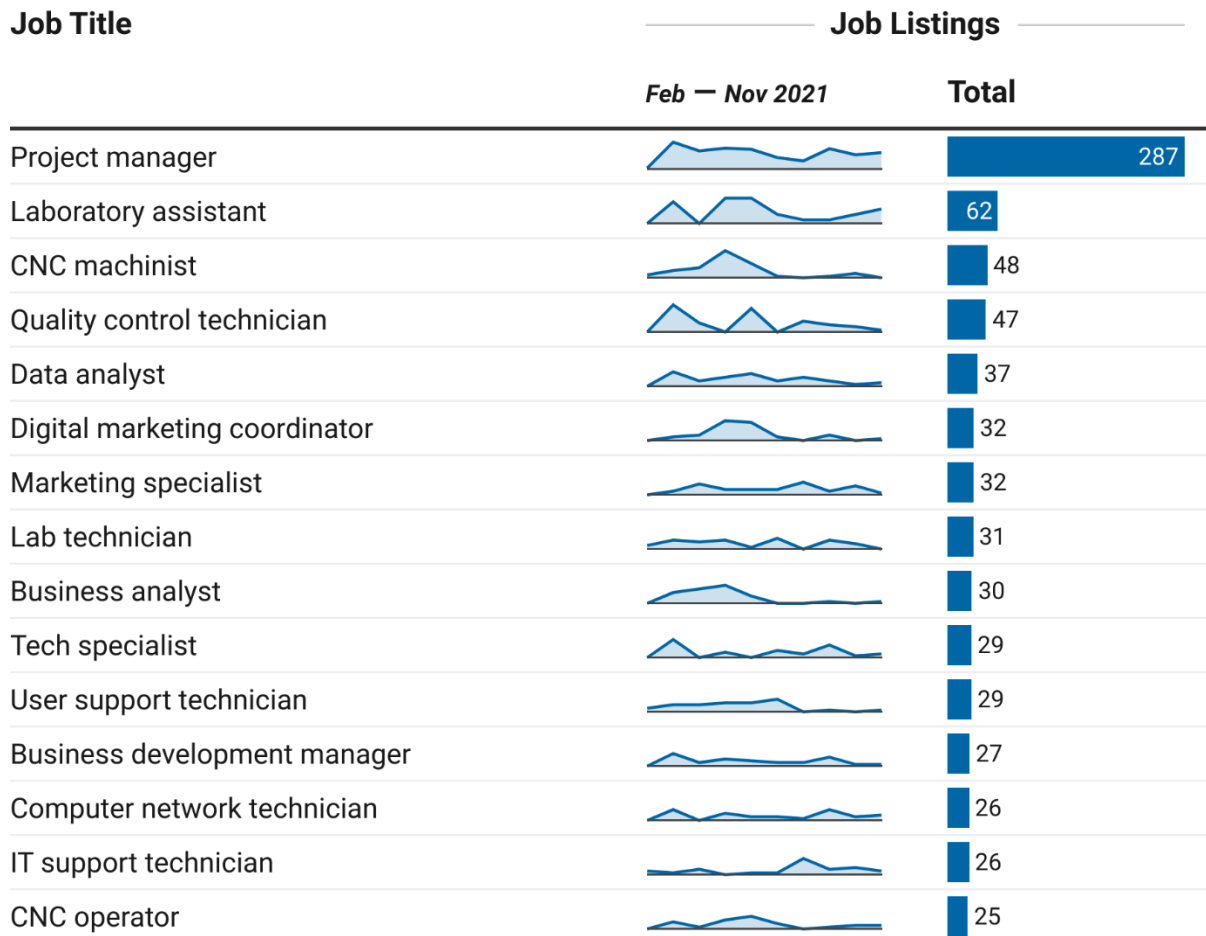


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 33. Top technology jobs in the Mainland/Southwest region outside of the Greater Vancouver area.

# Metro Vancouver

Top technology jobs in the metropolitan region

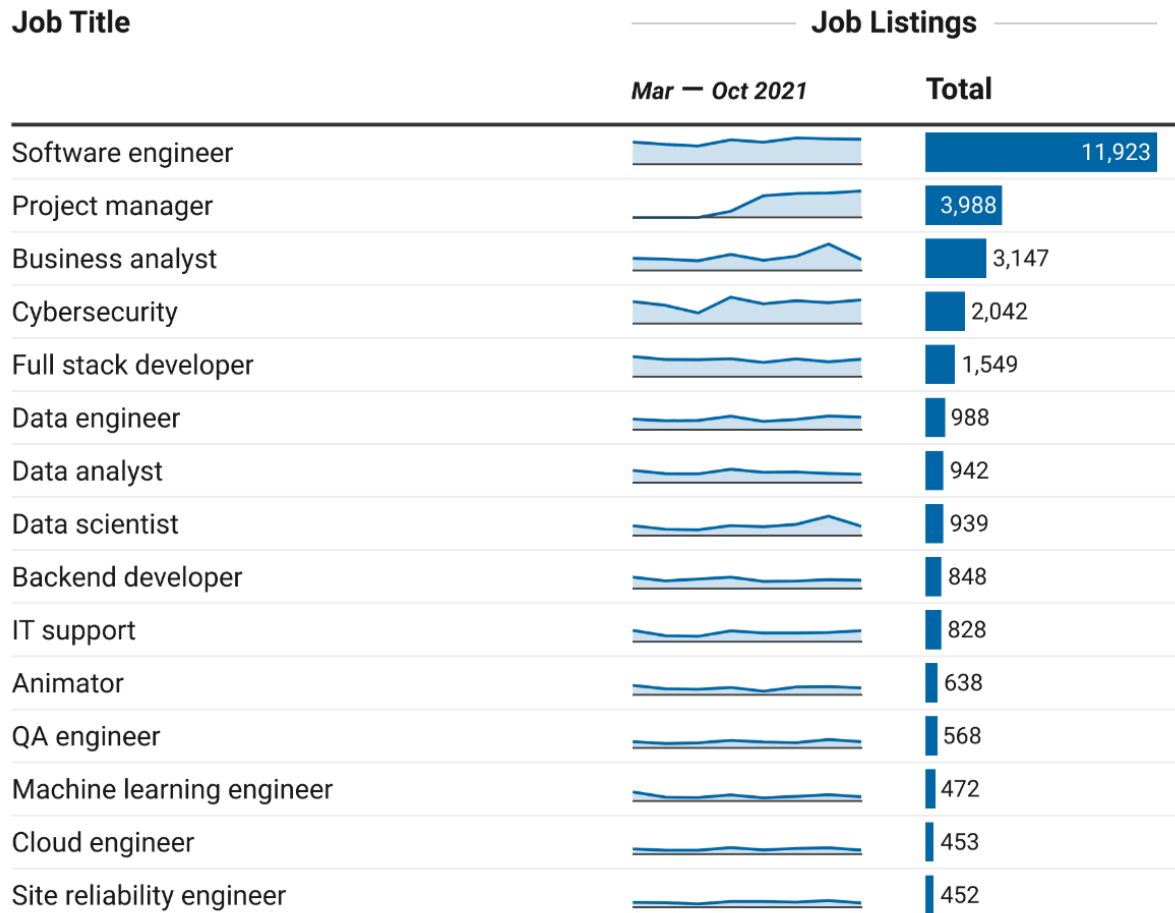


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 34. Top technology-related jobs in the Greater Vancouver area.

## Thompson-Okanagan

Home to 11% of the province's residents, the Thompson-Okanagan region is the third-highest-populated region in British Columbia.<sup>239</sup> The share of the population that is of working age (15–64 years old) is the lowest share in the province.<sup>240</sup> First Nations make up just over 3.4% of the region's population. The unemployment rate was 6.1% in 2018 (the highest of all British Columbia's regions),<sup>241</sup> and in January 2020, it was 5.5%.<sup>242</sup> Interviewees from this region noted that they were seeing a greater prevalence of remote work in recent years, and that talent pools for tech were sometimes small.



239 Province of British Columbia (2020). "Thompson Okanagan: Regional Profile." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Thompson-Okanagan>.

240 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

241 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

242 Province of British Columbia (2020). "Thompson Okanagan: Labour Market Information." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Thompson-Okanagan> Source: Monthly Labour Force Survey, 3-month moving average, seasonally unadjusted



## Key Industries and Sectors

The region holds a large share of British Columbia's employment in service-sector industries, due to its popularity as a vacation and retirement destination. It also accounts for a moderate share of BC's employment in the goods-producing sector. It has a significant proportion of the province's agricultural jobs and is home to some of the province's best vineyards, orchards, and cattle ranches.<sup>243</sup> According to the British Columbia Labour Market Outlook report, the industries with the largest share of regional employment were:<sup>244</sup>

Industry	Share of this region's employment	Share of BC employment	Sector
Health Care and Social Assistance	14.0%	12.0%	Services
Retail Trade	12.3%	10.5%	Services
Construction	10.9%	12.4%	Goods
Accommodation and Food Services	8.9%	12.7%	Services
Educational Services	6.3%	9.9%	Services
Manufacturing	6.2%	9.3%	Goods
Professional, Scientific, and Technical Services	5.7%	7.6%	Services
Finance, Insurance and Real Estate	5.2%	8.8%	Services
Information, Culture and Recreation	4.6%	8.9%	Services
Repair, Personal and Non-Profit Services	4.3%	9.8%	Services
Business, Building and Other Support Services	3.9%	10.2%	Services
Public Administration	3.9%	9.9%	Services
Mining and Oil and Gas Extraction	2.5%	21.8%	Goods
Agriculture and Fishing	2.3%	20.7%	Goods
Forestry and Logging with Support Activities	1.6%	22.5%	Goods

Table 15. Thompson-Okanagan: Key Industries and Sectors, (Province of British Columbia, 2020).

243 Province of British Columbia (2020). "Thompson Okanagan: Regional Profile." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Thompson-Okanagan>.

244 Province of British Columbia (2020). "Thompson Okanagan: This Region's Key Industries and Sectors." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Thompson-Okanagan#this-region-industries-sectors>. Source: 2017 Labour Force Survey

The fastest-growing industries in the region from 2019 to 2029 are anticipated to be water transportation, management, scientific, and technical consulting services, and primary metal manufacturing.<sup>245</sup> Among the 22 occupations with the largest number of projected job openings in the region for 2019–2029, no tech occupations were present.<sup>246</sup>

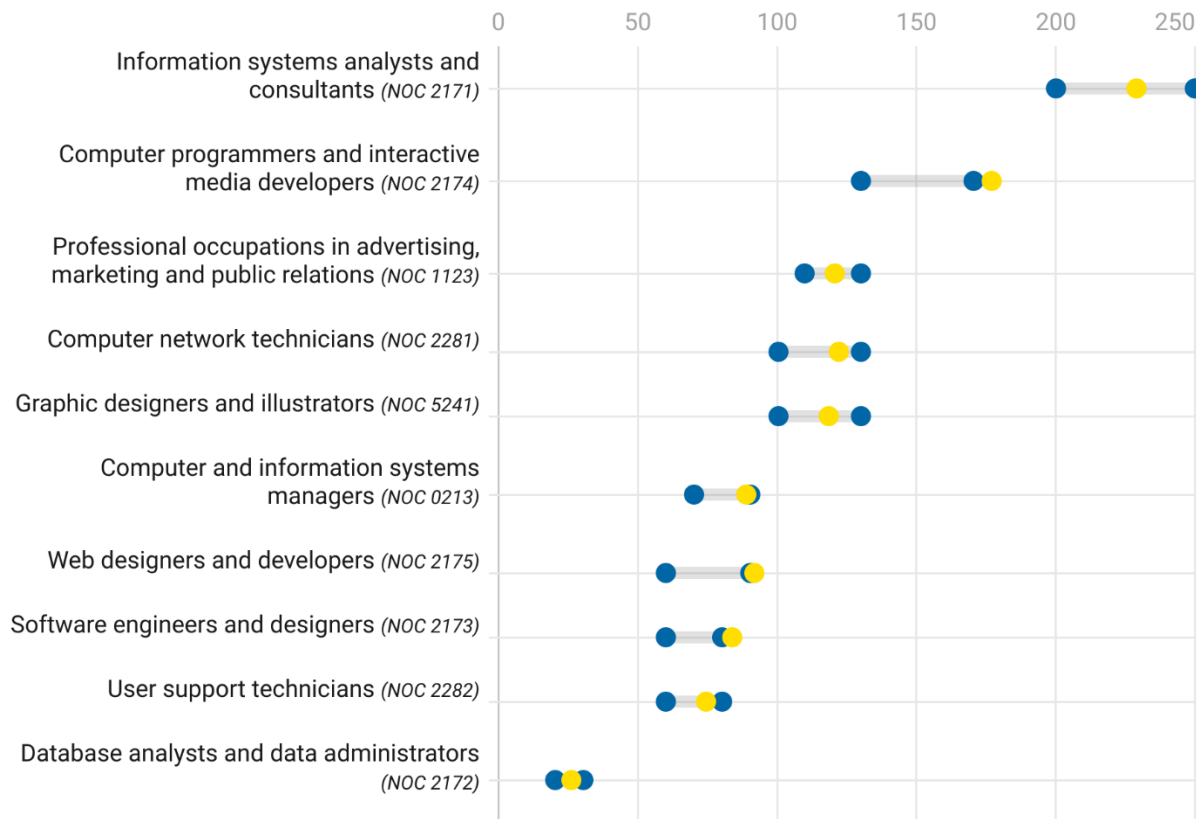
### Core Technology Occupations

Despite core technology occupations not appearing in the list of the highest number of projected job openings, quite a few core technology roles are projected to open up over the next five years—most notably, information systems analysts and consultants (NOC 2171).

## Thompson/Okanagan: Core Tech Occupations



Projected Job Openings (2022-2026), by occupation



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 35. Five-year forecast of core tech job openings, Thompson/Okanagan region

245 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

246 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)



Examining core tech occupations for Kelowna alone, it is clear that a significant number of technology-related opportunities are offered in the region's most populated city (about half of the projected occupations for each NOC above). Kelowna may offer more work for user support technicians than the rest of the region (nearly all of this NOC's numbers come from Kelowna).

## Kelowna: Core Tech Occupations



Projected Job Openings (2022-2026), by occupation

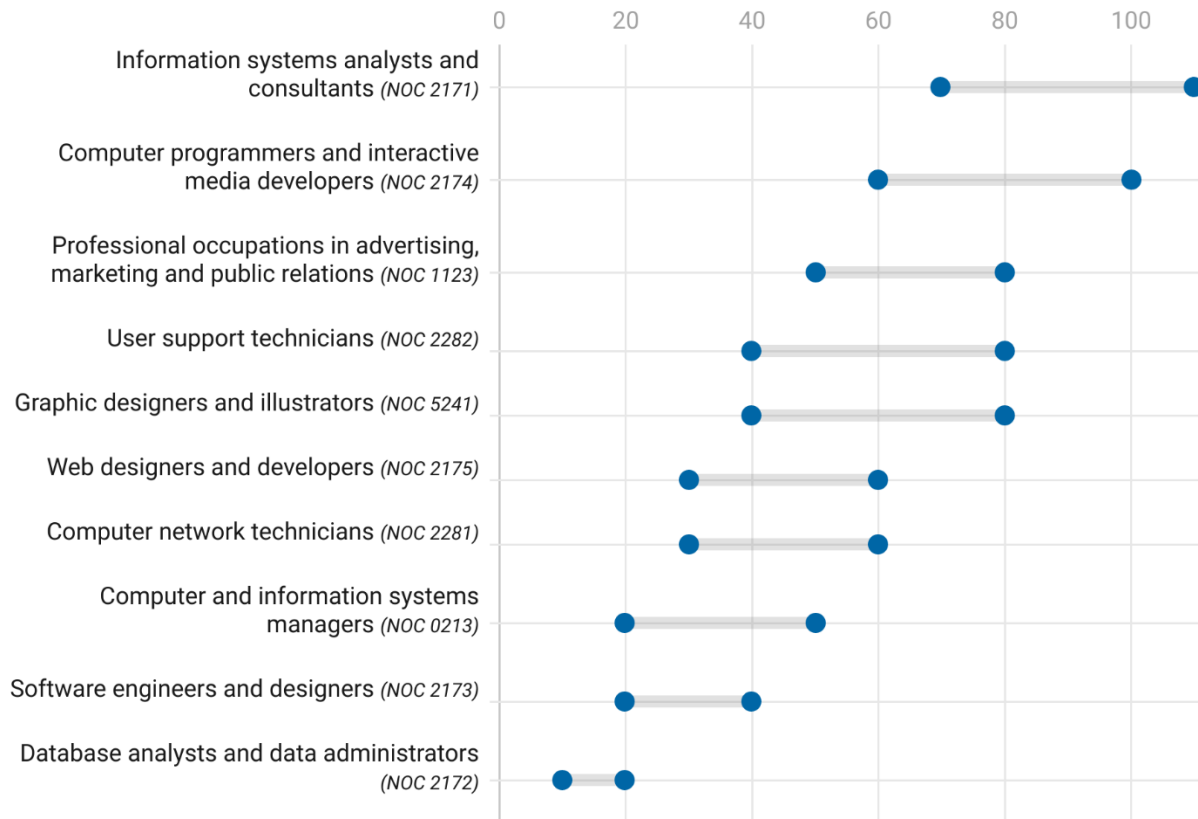


Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 36. Five-year forecast of core tech job openings, Kelowna region

## Most Commonly Listed Job Titles

Alongside the projections for core technology roles, there are several job titles that have shown frequent postings over the last year. Like in other regions of British Columbia, many of these are titles with transferrable skill sets that can be applied both within and without the technology sector, while others are specific to particularly large industries in the province.

## Thompson/Okanagan

Top technology jobs in the region

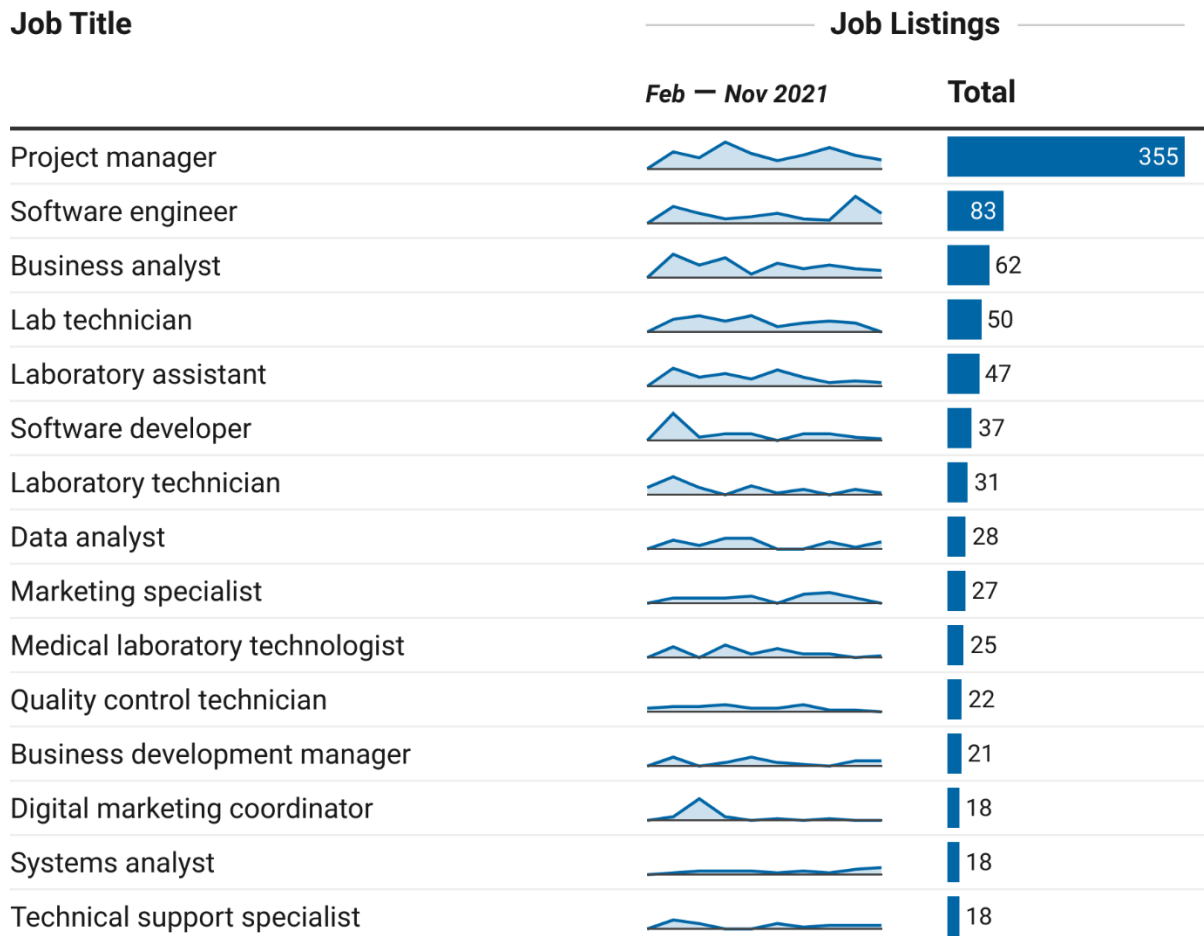


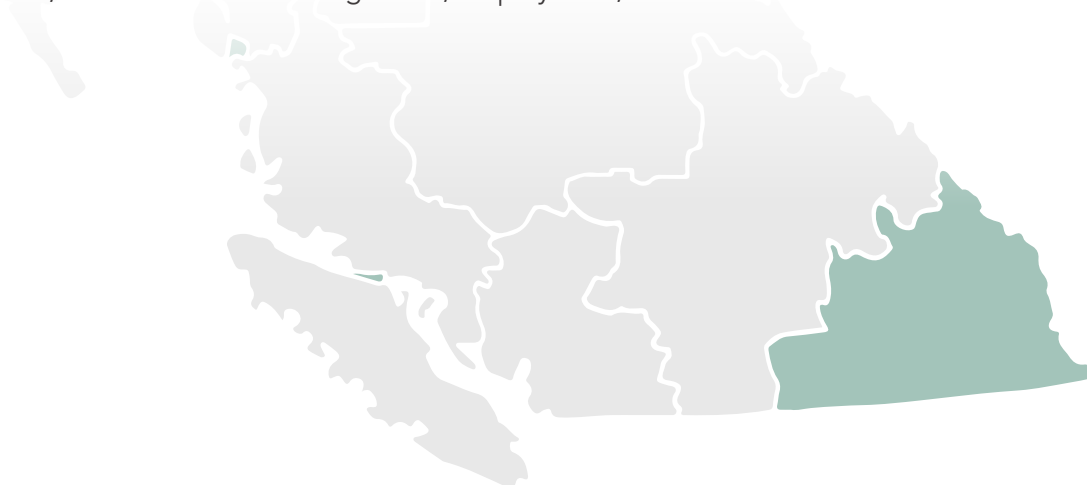
Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 37. Top technology-related job postings, Thompson-Okanagan region, Feb.–Nov. 2021.

## Kootenay

The Kootenay region is the second-smallest region in British Columbia by size,<sup>247</sup> and it is home to only 3% of BC's residents and workers.<sup>248</sup> It has the highest median age of all regions, and in 2018, it had the lowest labour force participation rate, at 61.0%.<sup>249</sup> In 2018, the unemployment rate hit 5.3%, its lowest level since 2009.<sup>250</sup> In January 2020, the total regional population (age 15 and older) was 123,600.<sup>251</sup> First Nations people make up about 1% of the population.<sup>252</sup> Total employment in the region was 70,300, with a regional unemployment rate of 4.4%.<sup>253</sup>

Of all regions, Kootenay has the second-highest number of jobs in the goods-producing sector industries, with the majority of Kootenay's jobs in "mining, particularly coal mining, and utilities, due to the multiple hydroelectric dams located in the region."<sup>254</sup> Nearly one-tenth of all jobs are in the "other primary" sector, including forestry, oil and gas, fishing, mining, and hunting and trapping.<sup>255</sup> Kootenay also has "a strong service sector with employment opportunities in tourism, accommodation and food services industries, due to the abundance of mountain ranges."<sup>256</sup> Several interviewees from this region were working hard at promoting economic diversification, a topic discussed in greater depth under Community-Industry Partnerships. The Ktunaxa Nation are working closely with economic partners in the region to restore "heritage towns" for tourism while preserving their culture and history.<sup>257</sup> The Ktunaxa Nation have also signed an impact management benefits agreement with Teck Resources, a leader in the mining industry; the agreement promises to engage the community on environmental regulation, cultural resource management, employment, and consultation.<sup>258</sup>



247 Province of British Columbia (2018). "BC Labour Market Outlook: 2018 Edition." [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx), p. 42, p. 43

248 Ibid, p. 43

249 Province of British Columbia (2020). "Kootenay: Regional Profile." BC & Regional profiles <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Kootenay>

250 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

251 Province of British Columbia (2020). "Kootenay: Labour Market Information." BC & Regional profiles. <https://www.workBC.ca/Labour-Market-Information/Regional-Profiles/Kootenay>. Source: Monthly Labour Force Survey, 3-month moving average, seasonally unadjusted

252 BC AFN. Kootenay. <https://www.bcafn.ca/first-nations-bc/kootenay>.

253 BC AFN. Kootenay. <https://www.bcafn.ca/first-nations-bc/kootenay..>

254 Ibid.

255 Ibid.

256 Ibid.

257 BC AFN. Kootenay. <https://www.bcafn.ca/first-nations-bc/kootenay>.

258 Teck Resources (May 17, 2016). "Ktunaxa and Teck Sign Historic Impact Management and Benefits Agreement." <https://www.teck.com/news/news-releases/2016-6828/ktunaxa-and-teck-sign-historic-impact-management-and-benefits-agreement>.

## Key Industries and Sectors

According to the 2019 British Columbia Labour Market Outlook report, the top 10 industries with the highest share of the region's employment were:<sup>259</sup>

Industry	Share of this region's employment	Share of BC employment	Sector
Health Care and Social Assistance	11.4%	2.7%	Services
Construction	9.2%	2.9%	Goods
Mining and Oil and Gas Extraction	9.0%	24.1%	Goods
Manufacturing	8.6%	3.6%	Goods
Accommodation and Food Services	8.0%	3.1%	Services
Professional, Scientific, and Technical Services	5.4%	2.0%	Services
Educational Services	5.2%	2.2%	Services
Information, Culture and Recreation	4.9%	2.7%	Services
Finance, Insurance and Real Estate	3.9%	1.8%	Services
Business, Building and Other Support Services	3.1%	2.3%	Services

Table 16. Kootenay: Key Industries and Sectors, (Province of British Columbia, 2020).

The industries anticipated to have the fastest growth rate in employment between 2019 and 2029 are: air transportation, support activities for transportation, and other manufacturing.<sup>260</sup> Among the 22 National Occupation Codes projected to have the highest growth between 2019 and 2029 in the Kootenay region, none were directly ICT-related.<sup>261</sup>

259 Source: 2017 Labour Force Survey

260 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)

261 Province of British Columbia (2019). "BC Labour Market Outlook: 2019 Edition." [https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC\\_Labour\\_Market\\_Outlook\\_2019.pdf.aspx](https://www.workbc.ca/getmedia/18214b5d-b338-4bbd-80bf-b04e48a11386/BC_Labour_Market_Outlook_2019.pdf.aspx)



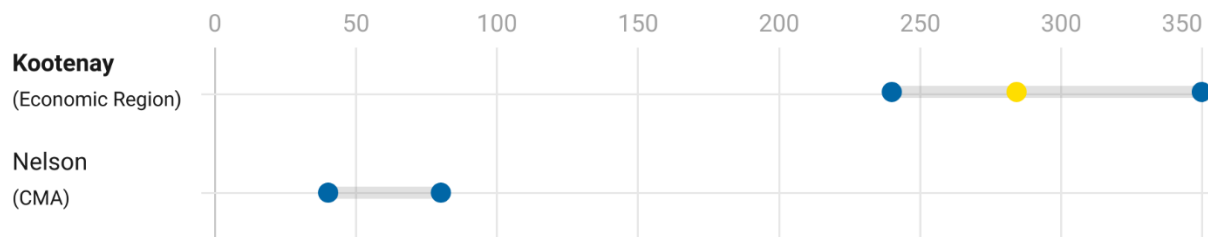
## Core Technology Occupations

Importantly, interviewees in this region noted that Nelson is said to be home to many remote workers for international companies; when such companies post jobs, they are unlikely to show up in this type of analysis because the location is likely to say “various locations” or list major cities. Nevertheless, even though Nelson is not the largest city in this region (Cranbrook is), the project team examined both and found that Nelson exhibited a larger number of core technology job openings than Cranbrook, thus selecting it for the forecast. While there are many core technology postings in Nelson, this region shows much greater geographic dispersion in where occupations are posted.

### Kootenay: Core Tech Occupations



Projected Job Openings (2022-2026)



● WorkBC projections (Source: BC Labour Market Outlook: 2019)

Chart: ICTC • Source: Statistics Canada, WorkBC, Emsi • Created with Datawrapper

Figure 38. Five-year forecast of core tech job openings, Kootenay region..

## Most Common Technology-related Job Postings

Much like other regions, the past year has seen specific technology-related job postings emerge as most common. A small number of highly specialized “core tech”-type positions show up on this list, illustrating that there is some opportunity in the Kootenay region for people with these skill sets. As noted above, internet infrastructure and quality of life in particular areas have also made this region a possible home for remote tech-sector workers.

### Kootenay

Top technology jobs in the region

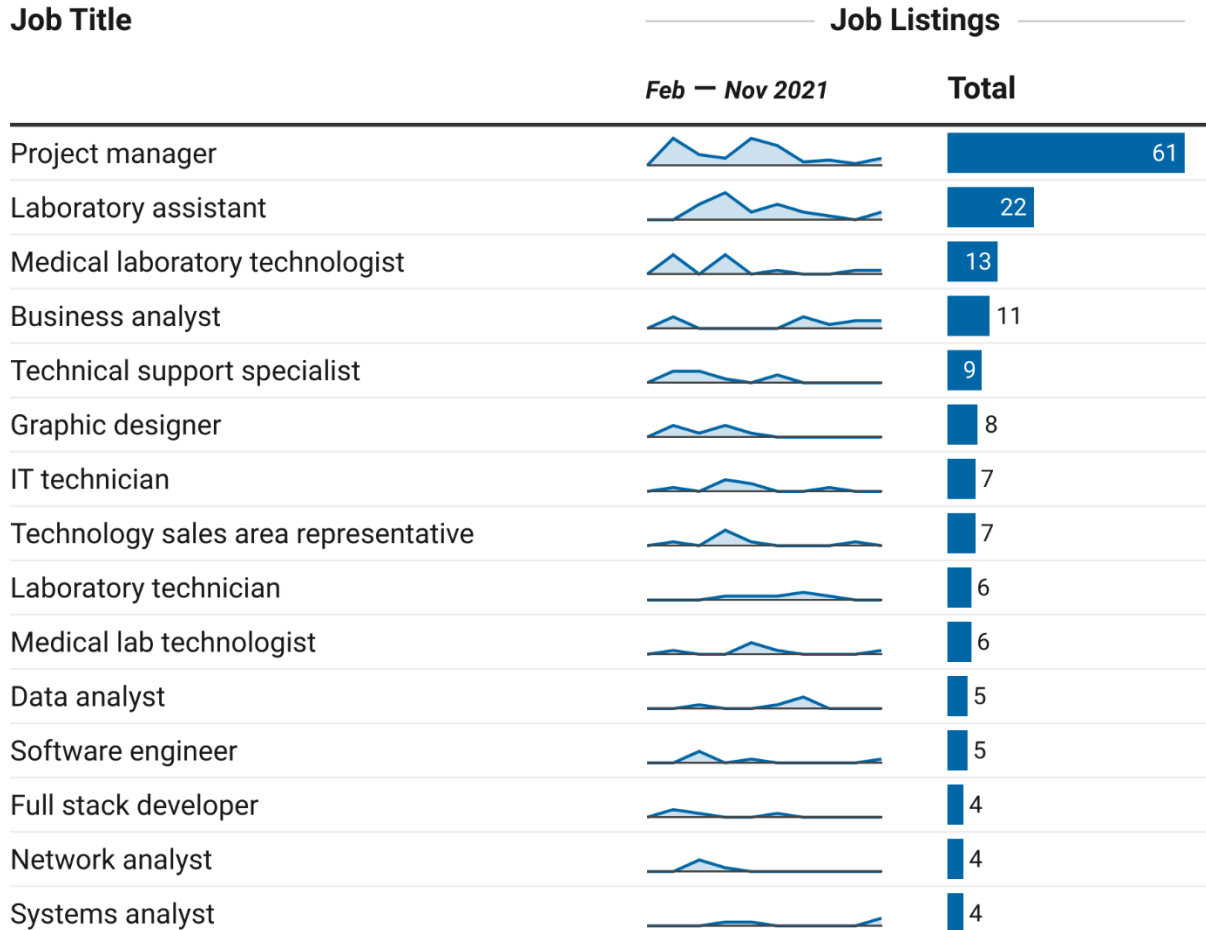


Table: ICTC • Source: ICTC • Created with Datawrapper

Figure 39. Top technology-related roles in the Kootenay region, Feb.–Nov. 2021.

## Appendix B. Demand for Technology-related Roles During COVID-19 in British Columbia

### Hiring for Technology-related Roles During the COVID-19 Pandemic

One of the major goals of having two phases of the Survey of BC Employers was to account for the impact of lockdowns on technology-related hiring, rather than only capturing a single point in time during a difficult period for businesses. Indeed, some of the starkest changes in survey responses between the two phases were related to business outlook and strategy in the face of the progression of the COVID-19 pandemic. With the successful rollout of the vaccination campaign through the province of British Columbia and a resumption of some level of normal service, businesses were understandably more optimistic about hiring trends in Phase II. Compared to Phase I, a significantly larger fraction of businesses reported plans to increase hiring, while significantly fewer reported that they planned to decrease staff levels. While Figure 32 below shows this trend for the full survey sample, the same held true for the sub-sample of repeat participants ( $n = 116$ ), where 10% more intended to increase staffing levels in Phase II than Phase I, and 5% fewer intended to decrease them.

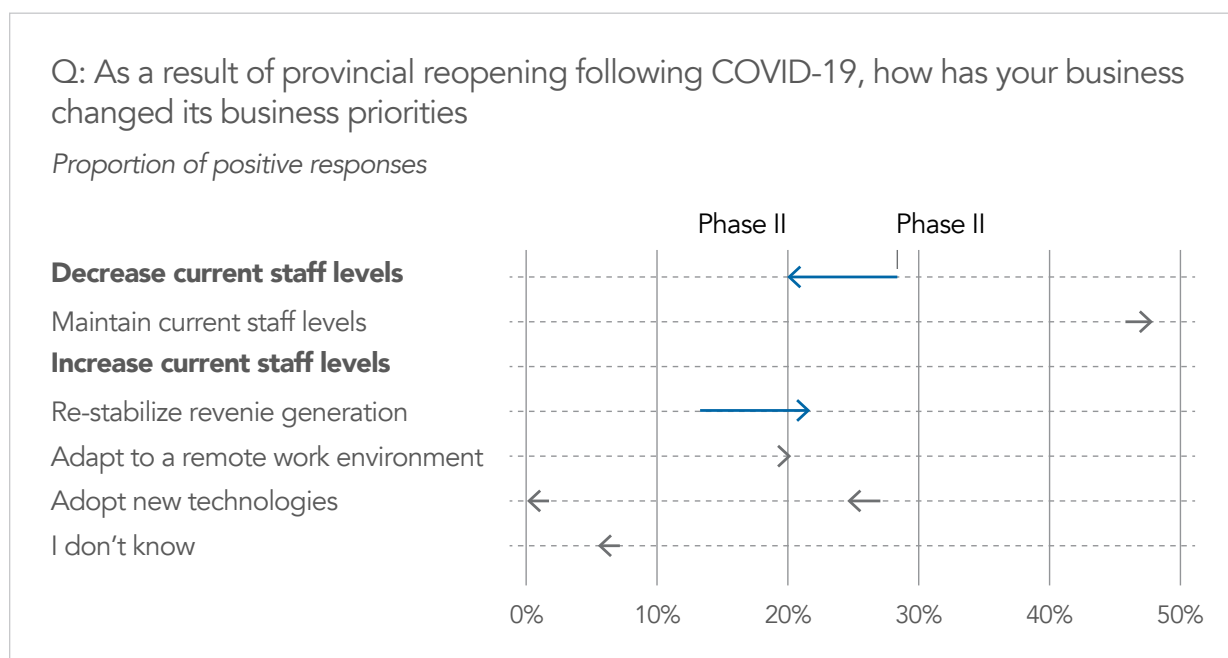


Figure 40. Change in business priorities (Phase II vs. Phase I), Employer Survey BC, 2021.

In Phase II, a larger proportion of firms, across the board, reported having plans to increase hiring in the short run as compared to Phase I. This was true for employees in any role, in technology-related roles, and for employees with an Indigenous background.

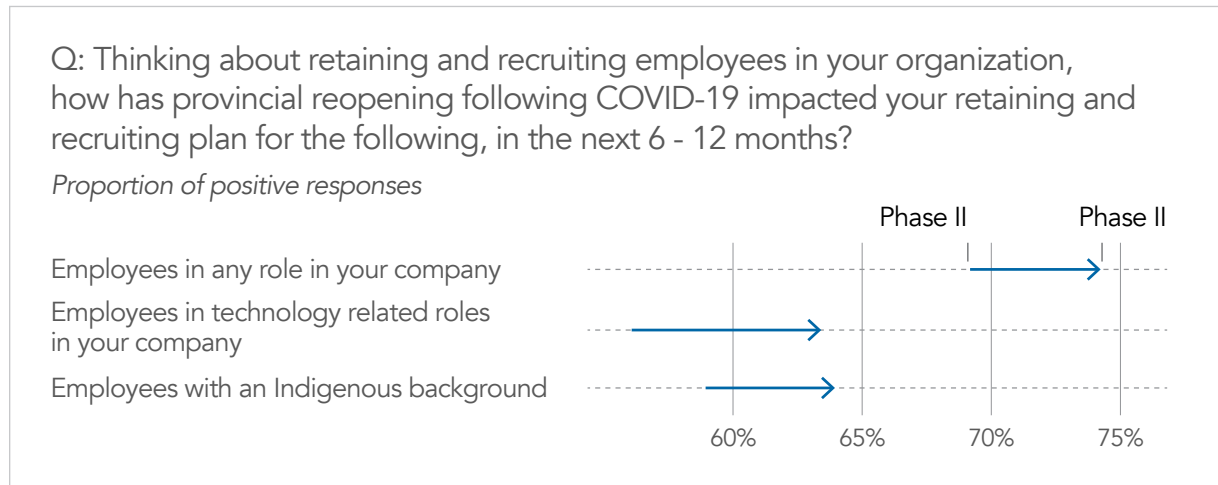


Figure 41. Hiring plans in the near term (Phase II vs. Phase I), Employer Survey BC, 2021.

Drilling down by business size, we find that much of this shift is driven by larger firms, even after accounting for their weight in the survey sample. The largest companies surveyed (50 or more employees) reported significantly higher likelihood of increasing hiring overall, hiring for tech-related roles, and for employees with an Indigenous background. Over 50% of very small businesses (one to four employees), on the other hand, have no plans to increase hiring of any kind in the next year.



Figure 42. Hiring plans in the near term, by size of organization (Phase II), Employer Survey BC, 2021

**More businesses are considering a flexible/remote-friendly work environment.**

Another notable change between the two phases of the survey was in the working environment that businesses envisioned for the upcoming 12-month period. With the successful rollout of vaccinations and the managed reopening of the province over the summer, fewer businesses felt the need to require a 100% remote work environment. In addition, a sizeable number of businesses are looking to establish a hybrid work environment, with a significant increase in the proportion of respondents who are looking to provide their employees with the flexibility to choose their preferred combination of in-person and remote work.

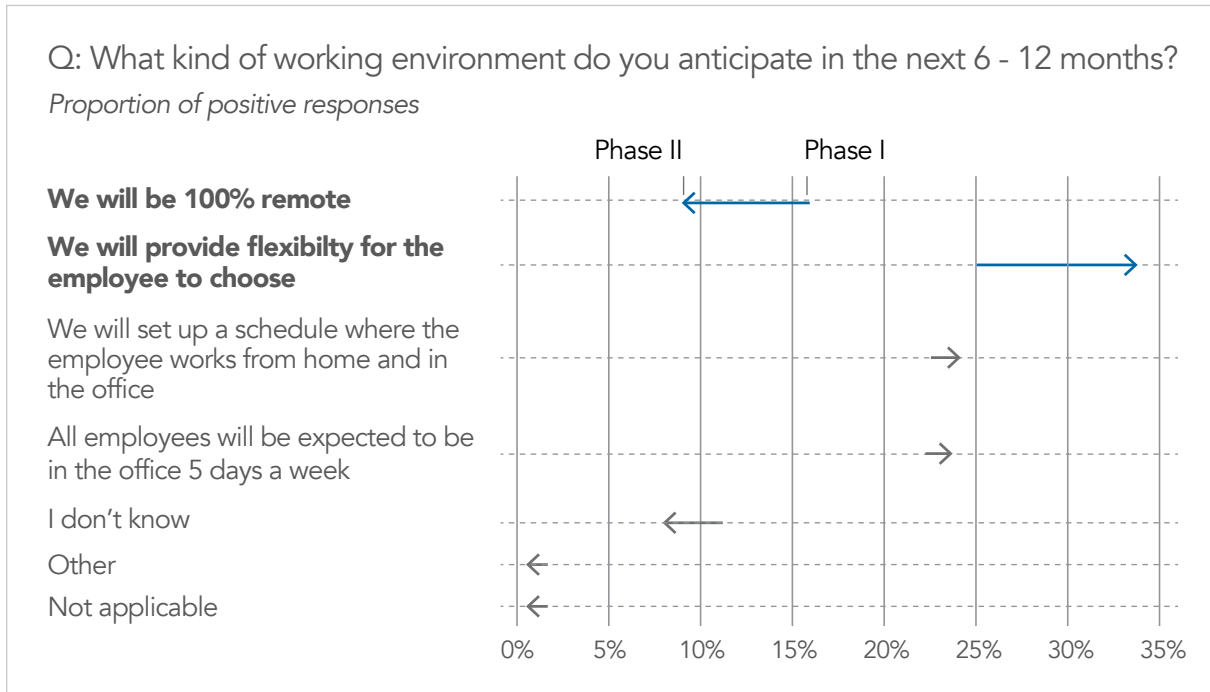


Figure 43. Anticipated working environment (Phase II vs Phase I), Employer Survey BC, 2021.

With remote and flexible work, we find that larger firms are leading this change. As compared to firms of under 50 employees, a significantly higher proportion of the largest firms surveyed (50 or more employees) reported that they would either provide flexibility to their employees to choose their work arrangement or establish a hybrid schedule combining in-person and remote work options.

Interestingly, in the subsample of repeat respondents (n = 116), the same employers were more aware of the minimum connectivity levels that would be required for their staff to successfully work from home in August 2021 (58% able to provide minimum broadband requirement) than they were in Dec.–Jan. 2021 (51%).

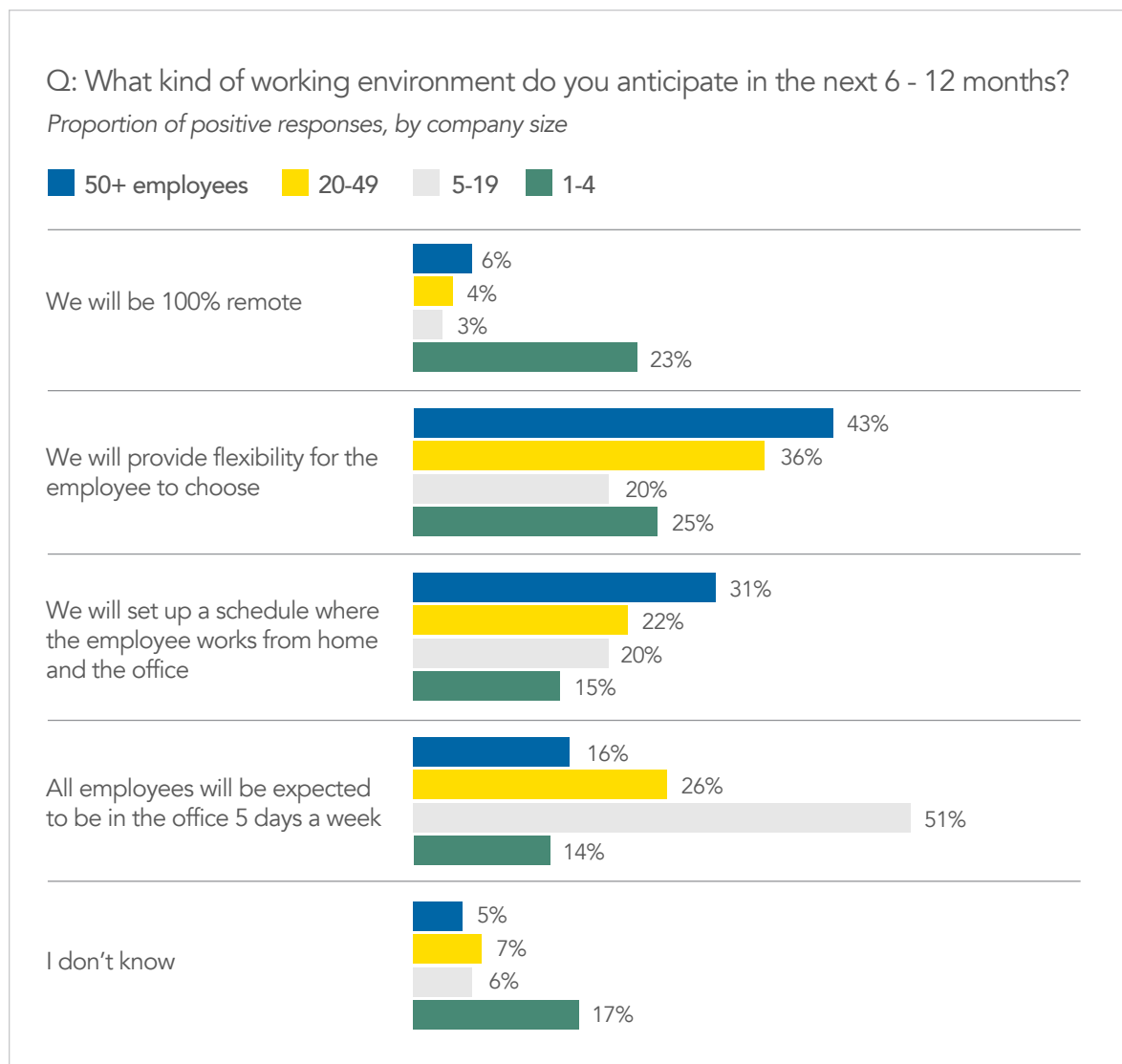


Figure 44. Anticipated working environment, by size of organization (Phase II), Employer Survey BC, 2021.

Certain trends also appeared stable across each phase of the survey. Notably:

**Larger businesses (50 or more personnel) are looking for a wider variety of in-demand roles.**

More than half of larger businesses (53% in both surveys) were looking for dedicated IT support staff, and they were also more likely to be hiring for more specialized roles (e.g., cybersecurity professionals, data analysts, full-stack developers) than smaller companies.

**Businesses that did not currently have dedicated technology-related roles were more likely to be quite small (under 20 staff members).**

About three-fifths (62%) of companies with only one to four personnel had no dedicated technology staff in Phase I, and the same held in Phase II (69%). Two-fifths (43%) of enterprises with five to 19 personnel in Phase I and 25% in Phase II also had no dedicated technology staff.

When asked to list positions that they hired for, respondents were asked which roles they found “hardest to fill,” and which were “most in demand.” Plotting the relationship between these two categories can shine some light on which jobs most urgently need personnel, as compared with jobs that are more highly specialized, and the two do not always match. For example, as seen in the figure below, cybersecurity professionals and full-stack developers are harder to find than they are in demand.



Between the Phase I and Phase II surveys, in-demand roles were roughly consistent: while some figures changed (e.g., a slightly higher proportion of employers—+5%—calling for cybersecurity professionals in Phase II), the only statistically significant difference between the two was a +5% increase in demand for UX designers, from 2% to 7% of employers listing them.

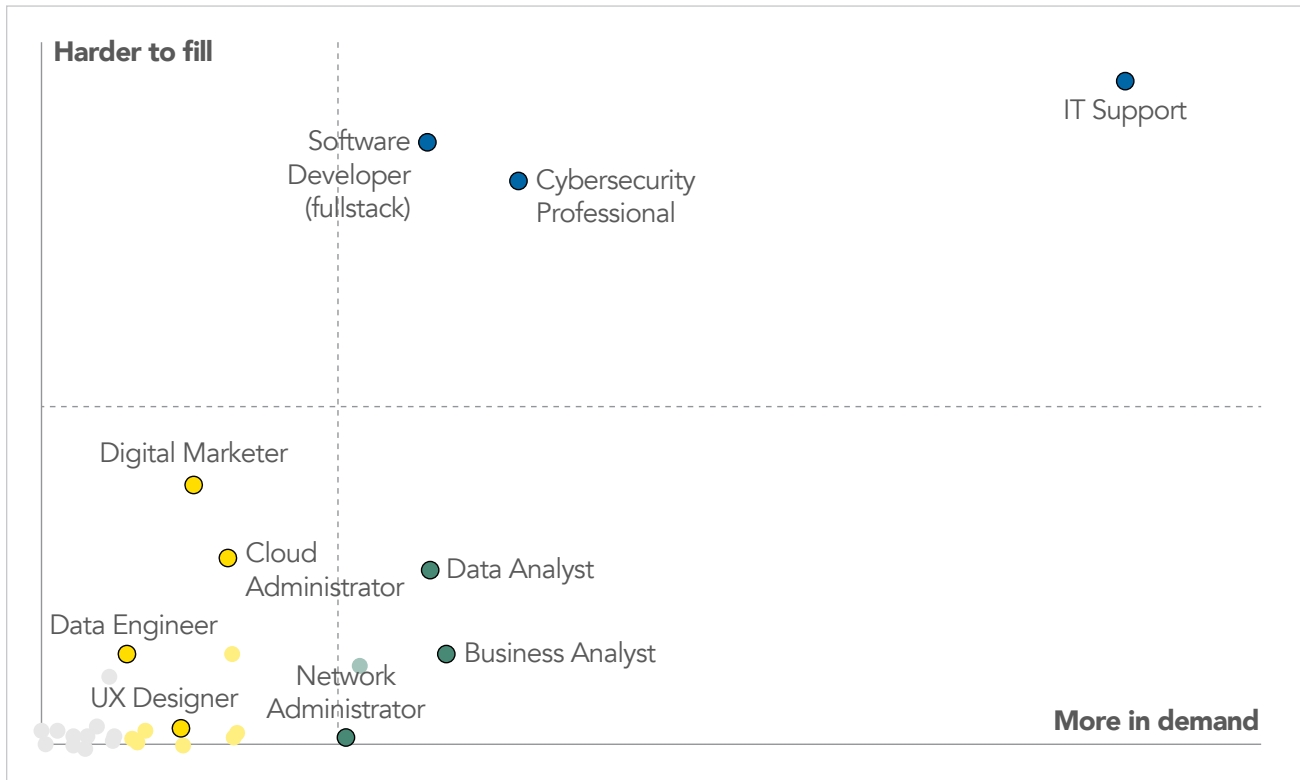


Figure 45. In-demand roles, hard-to-fill roles, employer survey Phase II by relationship.

### What does “IT support” look like?

In open-ended questions, respondents were asked to identify skills they were looking for in the “in-demand” roles they identified. A word frequency cloud for the skills attached to “IT support” shows that employers are looking for core IT skills (software, hardware, security, cloud, network management), along with office-related skills (office, presentation, accounting), knowledge of hardware and software, and human skills such as communication, interpersonal skills, and adaptability. In addition, some of the skills listed are business-related, such as sales and marketing.

Interviewees in all regions of British Columbia discussed digital adoption, including marketing, outreach, media, logistics, and networking, as a key reason why businesses across nearly all sectors required IT support.



Following software skills, interpersonal skills and maturity (knowledgeability and experience) were highly valued. Several interviewees added context to this, commenting that they were often able to find people with strong technical skills, or strong human skills, but rarely both in the same person:

*“Critical thinking, flexibility, resilience, apart from obviously the technical skills. Those are one thing, but a lot of it comes back to these soft skills which are needed in tech as much, right, because it’s such a fast-paced developing industry. People really need to be nimble and thinking on their feet and having the initiative to learn on their own.” – [Interviewee]*

Another interviewee talked about the challenge of finding and retaining someone in IT in rural areas. They mentioned that in cities like Prince Rupert, a big employer like the port could absorb all the region’s IT talent and leave no one as a general contractor serving educational institutions or other types of workplaces:

*“There’s only one IT guy now and he works all the way up to Terrace” – [Interviewee].*

## Industry Change, Technology Adoption, and Automation

Previous research has shown that during times of economic uncertainty, companies may be more likely to turn to new technologies to make their processes more efficient. The necessity of physical distancing during COVID-19 has likely only increased this trend.<sup>262</sup> Research has also shown that the impacts of automation and risk of COVID-19 transmission show demographic trends, disproportionately impacting jobs held by women,<sup>263</sup> and Indigenous people,<sup>264</sup> along with other groups more likely to work in public-facing or labour-related roles. For example, the Future Skills Centre found that Indigenous workers in British Columbia were at a marginally higher risk for automation than non-Indigenous workers (about 2.5% higher) and that the three industries with the highest percentage of jobs at risk in the province were (a) accommodation and food services, (b) construction, and (c) retail trade.<sup>265</sup> Some employers in British Columbia saw technology adoption for labour augmentation occurring:

*“We’ve definitely seen more interest in taking advantage of technology out in the HR industry, being it within operations or in hotels or restaurants and updating their equipment to be more efficient and adaptable. Digital marketing, we’re seeing that even for very small businesses. But it’s really about how organizations can do more with less, especially now since it’s such a hard time to find staff. So what else can they implement to make the work of the staff they do have more effective and efficient, from a more sophisticated online reservation system to a better point of sale system?” – [Interviewee]*

262 Alex Chernoff and Casey Warman (2021). “COVID-19 and Implications for Automation.” *Bank of Canada Staff Working Paper*. <https://www.bankofcanada.ca/wp-content/uploads/2021/05/swp2021-25.pdf>

263 Ibid.

264 Future Skills Centre (2020). “Digital Differences: The impact of automation on the Indigenous economy in Canada.” <https://fsc-ccf.ca/research/digital-differences-the-impact-of-automation-on-the-indigenous-economy-in-canada/>

265 Ibid.

For Indigenous people working in the trades, even where companies are starting to offer higher-technology roles (which may be better paying and more secure), training opportunities for the higher-technology roles may not be available in their regions. Some educational providers in rural and remote areas noted that for their students to get to the “next level” of work, they would likely need to travel for training. An economic development officer saw changes coming in forestry that would require higher and higher skills to hold onto jobs:

*“There will be an initial kind of a change where you don’t need as many engineers, but then they’ll actually need more people trained in GIS because a lot of that has moved into the office instead of going out into the field. There still will be a need for the field crews, but it’s a transformative kind of a change. Like maybe you might not have five engineers, but you have three higher-paid GIS technicians.” – [Interviewee]*

Economic diversification in response to the threat of climate change is a second type of industry change that may change work availability for Indigenous people, a potential raised several times by regional focus-group participants and interviewees. Many felt that there was an opportunity to include Indigenous communities in that diversification (and/or for Indigenous communities to lead sustainable energy projects), but that significant barriers also still existed for workers trying to transition from labour-related jobs to roles with longer-term prospects:

*“[Many Indigenous people] work in mining or forestry, where their parents worked, labour-intensive jobs. And usually, to do employment training, to do academic stuff, people don’t want to go to school for two, four, ten years, even a three-month, six-month program. Young people have families and [it’s hard] to do training, to have that initiative.” – [Community Session Participant]*

*“To me, the only way that rural areas are going to survive the change of governments moving away from extractive industries . . . Like forestry and mining are going to disappear and you’re going to end up with a bunch of ghost towns if you do not support things like digital tech and entrepreneurship. They’ve done a bunch of big-money infrastructure going towards broadband and digital equity, but that last-mile connectivity is still a challenge. But say they fixed that, that’s fine, but you still need to get the skills you need to participate in the global economy. Mentorship is key; having the supports there is key.” – [Interviewee]*

## Survey of BC Employers: Perspectives on Automation and Technology Adoption

When asked if they agreed that their “organization has been impacted by automation and new technologies,” about half of employers in each phase (I: 51% and II: 48%) agreed. Similarly, about half (53% and 52%) agreed that “automation and new technologies in our organization has impacted the skillsets we need in the employees we hire.” For each question, between 21% and 28% disagreed, and the remainder were unsure.

In both phases, larger companies were more likely to feel impacted by automation and new technologies (particularly companies with over 50 employees). The same trend held when respondents were asked whether automation had impacted the skills they look for in employees. Smaller companies were more likely to “strongly disagree” with this statement, whereas companies with over 50 employees were significantly more likely to agree (I: 64%, II: 61%).

Similarly, this question showed regional trends, though they varied by survey phase. In Phase II, Vancouver Island/Coast companies were more likely to agree or strongly agree that they had been impacted by automation than companies in the Mainland/Southwest (agree: 60% versus 44%). In Phase I, Vancouver Island/Coast companies were also most likely to agree that automation was impacting the skills they needed in employees. In Phase I, however, Vancouver Island/Coast companies were on par with other regions, with about half agreeing with the statements. The Cariboo region also had high responses to both of these questions in both survey phases, but a small sample size prevented significance testing. Overall, the key takeaway is that many businesses across British Columbia are considering technology and automation as a part of their hiring and business planning.

Automation presents both opportunities and challenges for the labour market in British Columbia. The 2018 British Columbia Labour Market Outlook report predicts that there will be a total of 903,000 job openings between 2018 and 2028. Around 18% of these openings (166,000 jobs) are forecast to have a high chance of being impacted by automation, with both positive and negative impacts.<sup>266</sup> The impacts of automation are projected to be concentrated in lower-skilled jobs: among occupations that require only high school-level educational attainment, more than 70% of workers have a significant chance of being “significantly” impacted by automation. In contrast, occupations that require a degree have a lower chance of being affected, with only 6% of current workers in such occupations facing this possibility.<sup>267</sup>

Specifically, measured according to future BC job openings, among the “top occupations with a high chance of being affected by automation include: Retail salespersons, Food counter attendants & kitchen helpers, Accounting technicians and bookkeepers, Administrative officers, General office support workers, Drivers, Cooks, Accounting and related clerks, Administrative assistants, Food and beverage servers, Receptionists, Cashiers, Carpenters, Shippers and receivers, Heavy equipment operators, [and] Welders.”<sup>268</sup> It is thus crucial to look to develop policies and programs to facilitate transitioning, retraining, and required “social protection for those unable to adapt.”<sup>269</sup>

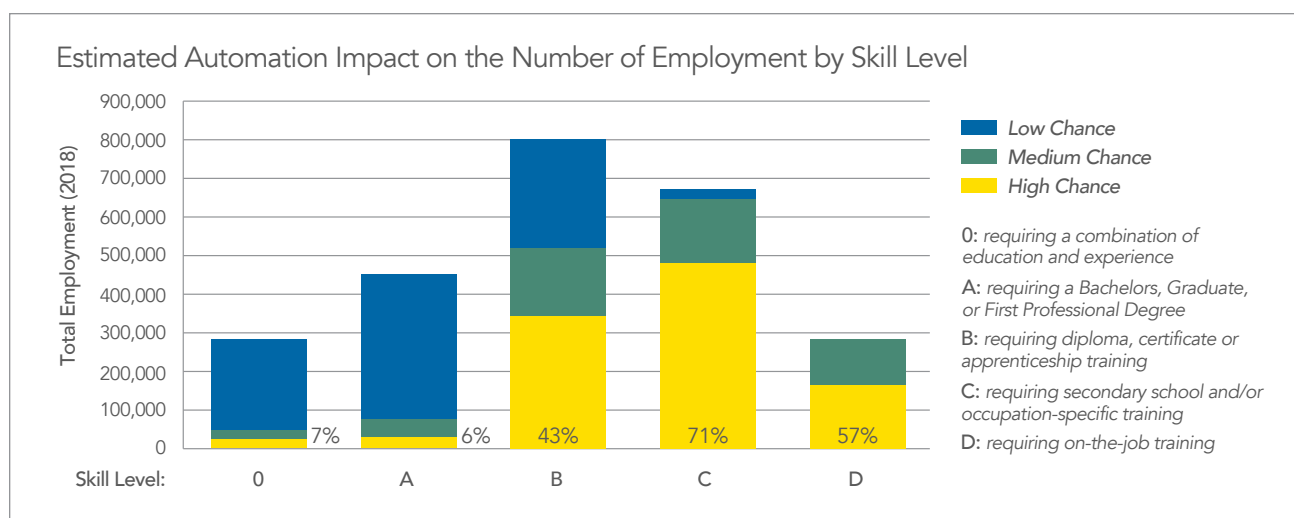


Figure 47: Reproduced with Permission from Source: British Columbia Labour Market Outlook, 2018 Edition; Ministry of Advanced Education and Skills Training, Government of British Columbia.\*

266 Province of British Columbia (2018). “BC Labour Market Outlook: 2018 Edition.” [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx), p. 4

267 Ibid, p. 26

268 Ibid p. 27. Notably, however, across all of these occupations, employers are in fact struggling to fill positions, “based on above average reported vacancy rates.”

269 Ibid, p. 26.

\* Note: this chart represents a pre-pandemic forecast. While a similar chart using 2021 data is not available due to a methodology change in the annual BC Labour Market Outlook, the top 10 occupations from 2021 that have the potential for more rapid automation are similar to those listed in 2018 above, and are: Retail salespersons; administrative officers; food counter attendants, kitchen helpers and related support occupations; general office support workers; drivers; cooks; sales and account representatives; financial auditors and accountants; cashiers; and administrative assistants.

Importantly, however, there are a variety of competencies and skills that are challenging to automate. These include “social intelligence, such as the ability to effectively negotiate complex social relationships, including caring for others or recognizing cultural sensitivities; cognitive intelligence, such as creativity and complex reasoning; and perception and manipulation, such as the ability to carry out physical tasks in an unstructured work environment.”<sup>270</sup> Furthermore, automation may in fact provide workers with opportunities to earn higher wages, if individuals are able to adapt adequately to shifting technologies and evolving needs of employers. For this reason, the crucial dimension in the 21st-century economy “is a person’s capacity to adapt and develop transferable competencies and skills” that “will be highest in demand” in this century.<sup>271</sup> In British Columbia, the skills and competencies necessary for future local job openings across 500 NOC occupations can be estimated “by linking BC’s projected job openings to the U.S. Labour Department dataset called O\*NET<sup>272</sup> (Occupational Network Information).” For BC, these future-resilient skills are primarily “people skills,” including communication skills such as active listening, speaking, and reading comprehension, and “critical thinking” skills.<sup>273</sup> BC researchers have found that while “STEM-related skills and competencies, such as programming, science, mathematics (or numeracy), and technology design, are critical for particular occupations such as computer programmers, software engineers, mathematicians, statisticians and actuaries, physicists, and chemists, [...] these skills are not ranked highly across the wide range of other occupations.”<sup>274</sup> In other words, these highly specialized skills are essential for particular jobs, but human skills are more transferrable.

While this paper is primarily focused on technology-related skills and occupations, it is essential to note that specialized skills cannot stand alone: everyone who is preparing to work in technology, start their own business, or pursue occupations outside of the traditional labour market is likely to need human, transferable, and critical-thinking skills. Notably, in the report, these skills were most commonly identified by ILIT participants as ones they already had; however, ILIT respondents also had relatively little interest in developing more of these skills, perhaps suggesting that the status and relevance of human skills should be elevated in general.

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270 See the literature survey (and their own estimates) in Nedelkoska, L. and G. Quintini (2018), “Automation, skills use and training”, OECD Social, Employment and Migration Working Papers, No. 202, OECD Publishing, Paris. <http://dx.doi.org/10.1787/2e2f4eea-en>. Source taken from: Province of British Columbia (2018). “BC Labour Market Outlook: 2018 Edition.” [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx.p.26](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx.p.26). “The competencies required to do a job vary across occupational groups as a result of the nature of the work. For instance, social perceptiveness and service orientation are very important for health and sales & service occupations, while operation and control are essential for natural resources, agriculture and related production occupations as well as those in manufacturing and utilities. Likewise, 100 percent of projected job openings for management occupations highly require active listening skills, compared to 19 percent for manufacturing and utilities occupations.” (p. 28)

271 Ibid p. 27

272 U.S. Department of Labor, Employment and Training Administration, O\*NET database version 22.3 released in May 2018, <https://www.onetcenter.org/database.html>. See Appendix 1 for additional information about the concepts in this data set. 17 STEM stands for Science, Technology, Engineering and Mathematics.” Source taken from: Province of British Columbia (2018). “BC Labour Market Outlook: 2018 Edition.” [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx.p.28](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx.p.28)

273 Province of British Columbia (2018). “BC Labour Market Outlook: 2018 Edition.” [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx.p.28](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx.p.28)

274 Province of British Columbia (2018). “BC Labour Market Outlook: 2018 Edition.” [https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC\\_Labour\\_Market\\_Outlook\\_2018\\_English.pdf.aspx.p.28](https://www.workBC.ca/getmedia/1dce90f9-f2f9-4eca-b9e5-c19de9598f32/BC_Labour_Market_Outlook_2018_English.pdf.aspx.p.28)

## Appendix C. Glossary of Key Terms

Key Term	A Definition
<b>4 Rs</b>	Respect, relevance, reciprocity, and responsibility (Kirkness and Barnhardt, 2001).
<b>Accomplice</b>	An accomplice works within a system and “directly challenges institutionalized/systemic racism, colonization, and white supremacy by blocking or impeding racist people, policies, and structures” (Indigenous Allyship, p. 2).
<b>Ally</b>	Being an ally is about disrupting oppressive spaces by educating others on the realities and histories of marginalized people (Indigenous Allyship, p. 2).
<b>Anti-racism</b>	Anti-racism moves beyond a narrow preoccupation with individual prejudices and discriminatory actions to the examination of the ways in which racist ideas and individual actions are entrenched and supported (consciously or unconsciously) in institutional structures (Vallianatos, 2018, p. 3).
<b>Co-resistor</b>	Being a co-resistor is about standing together, as an ensemble, in resistance against oppressive forces, and it requires constant learning. It is combining theory and practice by establishing relationships and being deeply involved within a community that informs how one listens critically and understands an issue, and influences the way they go about disrupting oppressive institutions and systemic systems (Indigenous Allyship, p. 2).
<b>Colonialism</b>	The ideology advocating colonization (MMIWG Final Report 1a, p. 83).
<b>Colonization</b>	The process by which Europeans invaded and occupied Indigenous national territories (MMIWG Final Report 1a, p. 83).
<b>Colour-blindness</b>	The racial ideology that posits the best way to end discrimination is by treating individuals as equally as possible, without regard to race, culture, or ethnicity. At face value, this belief appears to not only amount to a dismissal of the lived experiences of people of color, but also suggests that racism does not exist so long as one ignores it. However, within the context of enduring structural and systemic racism, racial colour-blindness serves as a device to disengage from conversations of race and racism entirely ( <a href="#">What Does Racism Look Like? Colorblindness – Anti-racism Resources – Research Help at Fitchburg State University (libguides.com)</a> ).



<p><b>Cultural safety</b></p>	<p>An approach that considers how social and historical contexts, as well as structural and interpersonal power, imbalances, shape health and health-care experiences. Practitioners are self-reflective/self-aware with regards to their position of power and the impact of this role in relation to patients. <i>Safety</i> is defined by those who receive the service, not those who provide it (Ward, Branch, and Fridkin, 2016).</p>
<p><b>Decolonizing</b></p>	<p>Centring Indigenous ways of being, knowing, and doing (MMIWG Final Report 1a, p. 66).</p>
<p><b>EDI</b></p>	<p>Equity, diversity, and inclusion.</p> <ul style="list-style-type: none"> <li>• <b>Equity:</b> A measure of fair treatment, opportunities, and outcomes across race, gender, class, and other dynamics.</li> <li>• <b>Diversity:</b> The range of human differences, including, but not limited to, race, ethnicity, gender, gender identity, sexual orientation, age, social class, physical ability or attributes, religious or ethical values system, national origin, and political beliefs.</li> <li>• <b>Inclusion:</b> Refers to the intentional, ongoing effort to ensure that diverse individuals fully participate in all aspects of organizational work, including decision-making processes. It also refers to the ways that diverse participants are valued as respected members of an organization and/or community (<a href="#">University of Washington Racial Equity Glossary</a>).</li> </ul>
<p><b>Indigenous Knowledge</b></p>	<p>A term that refers to a set of complex knowledge systems based on the worldviews of Indigenous peoples. Indigenous knowledge reflects the unique cultures, languages, governance systems, and histories of Indigenous peoples from a particular location. Indigenous knowledge is dynamic and evolves over time. It builds on the experiences of earlier generations and adapts to present conditions. First Nations, Inuit, and Métis each have a distinct way of describing their knowledge. Knowledge-holders are the only people who can truly define Indigenous knowledge for their communities (<a href="#">Indigenous knowledge – Canada.ca</a>).</p>
<p><b>Indigenous data sovereignty</b></p>	<p>The ability for Indigenous Peoples, communities, and Nations to participate, steward, and control data that is created with or about themselves. The term <i>sovereignty</i> refers to the fact that Indigenous Nations are sovereign in their governance, and that extends to their data and Knowledges as well. It recognizes that Indigenous People are the ultimate authority in their data and Knowledges and aims to redefine Indigenous Peoples’ relationship to research from being participant or subjects to being meaningful partners and co-researchers (<a href="#">Indigenous Data Sovereignty – Indigenous Studies – Research guides at University of Toronto (utoronto.ca)</a>).</p>



<b>Indigenous sovereignty</b>	Arises from Indigenous Traditional Knowledge, belonging to each Indigenous Nation, tribe, and community. Traditional Indigenous knowledge consists of spiritual ways, culture, language, social and legal systems, political structures, and inherent relationships with lands, waters, and all upon them. Indigenous sovereignty exists regardless of what the governing nation-state does or does not do (Karim, <a href="#">Indigenous Sovereignty in Canada — The Indigenous Foundation</a> ).
<b>Intergenerational trauma</b>	A concept developed to help explain years of generational challenges within families. It is the transmission (or sending down to younger generations) of the oppressive or traumatic effects of a historical event ( <a href="#">Inter-generational Trauma: 6 Ways It Affects Families   Office for Institutional Equity (duke.edu)</a> ).
<b>Intersectionality</b>	A prism to see the interactive effects of various forms of discrimination and disempowerment. It looks at the way that racism, many times, interacts with patriarchy, heterosexism, classism, xenophobia—seeing that the overlapping vulnerabilities created by these systems actually create specific kinds of challenges ( <a href="#">critical race theorist Kimberlé Williams Crenshaw to them. magazine</a> ).
<b>Market failure</b>	A market failure can occur when the private sector is relied on to provide goods and services and is unwilling and/or unable to provide these services or goods. In Canada, the private sector is failing to meet demand for telecommunications access in rural, remote, and geographically isolated communities due to the lack of incentives (primarily financial) for private telecommunication companies to address this problem.
<b>MMIWG</b>	Missing and Murdered Indigenous Women and Girls. The National Inquiry into MMIWG released their final report in June 2019 ( <a href="#">Home Page - Final Report   MMIWG (mmiwg-ffada.ca)</a> ).
<b>OCAP</b>	The First Nations Principles of Ownership, Control, Access, Possession—more commonly known as OCAP—assert that First Nations have control over data collection processes, and that they own and control how this information can be used ( <a href="#">The First Nations Principles of OCAP® - The First Nations Information Governance Centre (fnigc.ca)</a> ).

<b>Oppression</b>	Can be thought of as the social act of placing severe restrictions on an individual, a group, or an institution. Political theorist Iris Young created a model called The Five Faces of Oppression. Essentially, Young says that there are five distinct types of oppression and that these types of oppression need to be understood separately and distinctly. Violence is probably the most obvious and maybe visible form of oppression, especially when it is physical, but violence can also be insidious and hidden, or it can be subtle ( <a href="#">Defining Privilege, Oppression, Diversity and Social Justice   Michigan Online (umich.edu)</a> ).
<b>Race</b>	A socially constructed rather than inherently meaningful category, one linked to relations of power and processes of struggle and one whose meaning changes over time. Race, like gender, is “real” in the sense that it has real, though changing, effects in the world and a real, tangible, and complex impact on an individual’s sense of self, experiences, and life chances (Frankenberg, 1993, p. 11).
<b>Right relations</b>	Moving beyond being a good partner and into the journey of reflecting on the impacts that an organization/person has and the potential in centring Indigenous worldview and voices in the work and righting the relationships with Indigenous Nations.
<b>Social determinants of health</b>	The conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life ( <a href="#">Social Determinants of Health - Global (who.int)</a> ).
<b>Structural racism</b>	The overarching system of racial bias across institutions and society. These systems give privileges to white people, resulting in disadvantages to people of color. Example: stereotypes of people of color as criminals in mainstream movies and media (National Museum of African American History and Culture, <i>Taking about Race</i> ).
<b>Systemic racism</b>	Policies and practices that exist throughout a whole society or organization, and that result in and support a continued unfair advantage of some people and unfair or harmful treatment of others based on race ( <a href="#">SYSTEMIC RACISM   meaning in the Cambridge English Dictionary</a> ).
<b>Trauma informed</b>	Supporting healing in a way that does no further harm (MMIWG Final Report 1a, p. 66).
<b>TRC</b>	The Truth and Reconciliation Commission of Canada provided those directly or indirectly affected by the legacy of the Indian residential school system with an opportunity to share their stories and experiences ( <a href="#">Truth and Reconciliation Commission of Canada (rcaanc-cirnac.gc.ca)</a> ).

<b>Two-Spirit</b>	<p>“A term used within some Indigenous communities, encompassing cultural, spiritual, sexual, and gender identity. The term reflects complex Indigenous understandings of gender roles, spirituality and the long history of sexual and gender diversity in Indigenous cultures. Individual terms and roles for Two-Spirit people are specific to each nation. The word “Two-Spirit” was created in the early 1990s, by a group of Two-Spirit community members and leaders. Due to its cultural, spiritual, and historical context, the concept of “Two-Spirit” is to be used only by Indigenous People. However, not all Indigenous People who hold diverse sexual and gender identities consider themselves Two-Spirit, many identify themselves as LGBTQ+” (<a href="#">Two-Spirit (phsa.ca)</a>).</p>
<b>UNDRIP</b>	<p>United Nations Declaration on the Rights of Indigenous Peoples (<a href="#">DRIPS_en.pdf (un.org)</a>).</p>
<b>White fragility</b>	<p>A state in which even a minimum amount of racial stress becomes intolerable, triggering a range of defensive moves (DiAngelo, 2011, p. 1).</p>
<b>White privilege</b>	<p>Refers to the unquestioned and unearned set of advantages, entitlements, benefits, and choices bestowed on people solely because they are white. Generally, white people who experience such privilege do so without being conscious of it (<a href="#">“White Privilege: Unpacking the Invisible Knapsack”</a> by Peggy McIntosh).</p>
<b>White savior complex</b>	<p>An ideology that is acted upon when a white person, from a position of superiority, attempts to help or rescue a BIPOC person or community. Whether this is done consciously or unconsciously, people with this complex have the underlying belief that they know best or that they have skills that BIPOC people don’t have (Nolan, <i>Don’t Let It Get You Down: Essays on Race, Gender, and the Body</i>, <a href="#">What Is White Savior Complex and Why Is It Harmful?   Health.com</a>).</p>
<b>White supremacy</b>	<p>i) the belief that the white race is inherently superior to other races and that white people should have control over people of other races;</p> <p>ii) the social, economic, and political systems that collectively enable white people to maintain power over people of other races (Merriam-Webster Dictionary).</p>
<b>Whiteness</b>	<p>A local of structural advantage, of race privilege; a “standpoint” from which white people look at themselves, at others, at society; a set of cultural practices that are usually unmarked and unnamed (Frankenberg, 1993, p. 1).</p>

## Appendix D. Research Tools

### Community Engagement Sessions

#### FIRST ROUND QUESTIONS:

##### Indigenous Futures

1. **What do you hope for Indigenous peoples' future relationships with technology?**  
(e.g. forestry, internet, e-health, culture)
  - a. What does it mean to integrate Indigenous ways of knowing and being with technology?
2. **What do you feel is your community's greatest strengths or assets?**
  - a. Probe: What makes your community unique?
3. **What opportunities do you see for technology in your community?**

##### Community Experience with Tech

4. **What is one tech-based idea or concept that has been implemented in your community and what was the result?**

##### Accessing Tech Opportunities

5. **If you have done training or work in tech, what was your experience like in accessing that opportunity?**
  - a. Probes: How do you get there? What were your experiences like getting there as an Indigenous person?

##### Family and Community

6. **Could you please tell us about a time you used your tech skills to support others?**
  - a. Could you share any stories about community members sharing tech skills intergenerationally?
  - b. How do community members and families support one another to be online and use tech during the COVID-19 pandemic?

## SECOND ROUND QUESTIONS (if time permitting):

### Indigenous Futures

1. What would your vision be for how technology can be used for wellness?

### Remote Work

2. Is it valuable for you to work in your community or do you prefer to work outside of your community?

### Accessing Tech Opportunities

3. What suggestions do you have to address the barriers that Indigenous people face in securing tech-related employment?
4. If you are interested in getting involved with tech or already studying or working in tech, how would an Indigenous support network be useful to you?

### Internet Speed and Reliability

5. What are the sort of things you accomplish when you have a good internet connection? (e.g. able to watch videos, download, sending resume, using social media, work remotely, etc.)
6. What is your experience in your community with internet access for yourself and what you know about the experience of other community members?

# Plenary Session Engagement

## QUESTION SET - Option 1:

### Indigenous Futures

1. **What do you hope for Indigenous peoples' future relationships with technology?**  
(e.g. forestry, internet, e-health, culture)
  - a. What does it mean to integrate Indigenous ways of knowing and being with technology?
2. **What do you feel is your community's greatest strengths or assets?**
  - a. Probe: What makes your community unique?
3. **What opportunities do you see for technology in your community?**

### Community Experience with Tech

4. **What is one tech-based idea or concept that has been implemented in your community and what was the result?**

### Accessing Tech Opportunities

5. **If you have done training or work in tech, what was your experience like in accessing that opportunity?**
  - a. Probes: How do you get there? What were your experiences like getting there as an Indigenous person?

### Family and Community

6. **Could you please tell us about a time you used your tech skills to support others?**
  - a. Could you share any stories about community members sharing tech skills intergenerationally?
  - b. How do community members and families support one another to be online and use tech during the COVID-19 pandemic?



## QUESTION SET - Option 2:

### Indigenous Futures

1. What would your vision be for how technology can be used for wellness?

### Remote Work

2. Is it valuable for you to work in your community or do you prefer to work outside of your community?

### Accessing Tech Opportunities

3. What suggestions do you have to address the barriers that Indigenous people face in securing tech-related employment?
4. If you are interested in getting involved with tech or already studying or working in tech, how would an Indigenous support network be useful to you?

### Internet Speed and Reliability

5. What are the sort of things you accomplish when you have a good internet connection? (e.g. able to watch videos, download, sending resume, using social media, work remotely, etc.)
6. What is your experience in your community with internet access for yourself and what you know about the experience of other community members?

## Education Engagement Sessions

### QUESTIONS AND PROMPTS TO FACILITATE DISCUSSION

*Note: probes are for facilitators and will not necessarily be shared.*

**1. What opportunities do you see for education and technology for your community?**

*High priority, please start with this question.*

**2. Based on our survey, 40% of respondents said that they are interested in working in “First Nations community.” What does working in “First Nations community” mean to you? (e.g. specific jobs, businesses, or organizations)**

**3. Remote work and learning is increasingly common. Many Indigenous respondents said they would like to stay in their communities, but we know there are barriers such as internet access. What is needed to bring opportunities for remote work and learning to Indigenous community members? High priority**

**4. If you have done training or work in tech, what was your (or someone you support in your role’s) experience like in accessing that opportunity? High priority**

- a. Probes: How do you get there? What were your experiences like getting there as an Indigenous person?

**5. What suggestions do you have to address the barriers that Indigenous people face in securing tech-related education and opportunities? High priority**

- a. Probes: We understand that Indigenous people face many financial barriers to accessing education. (E.g. living expenses). What are some suggestions for how to address this barrier?

**1. Could you please tell us about a time you (or someone you support in your role) used tech skills to support, mentor or teach others? Or a time when someone else has supported you? High priority, please close with this question.**

*High priority, please close with this question.*

- a. Probe: Could you share any stories about community members sharing tech skills intergenerationally?
- a. Probe: How do community members and families support one another to be online and use tech during the COVID-19 pandemic?



# First Nations Technology Council

[technologycouncil.ca](http://technologycouncil.ca)

Canada 



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