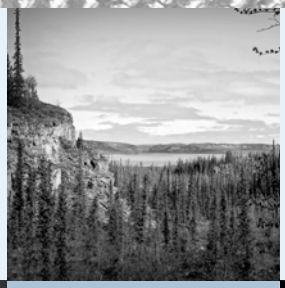
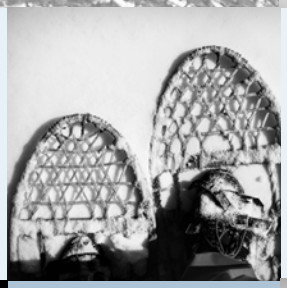
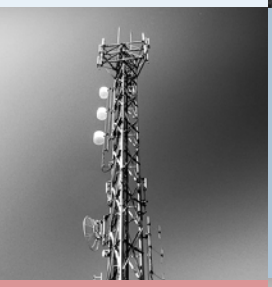
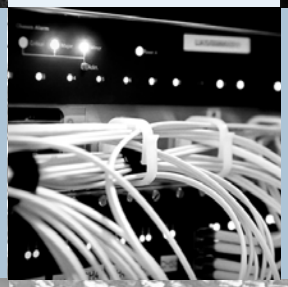
Eetsii tthak t'agwahii getr'ootanahchàh

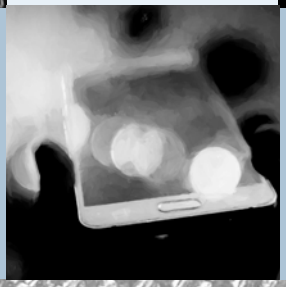
(Learning About the Machine that Does It All)

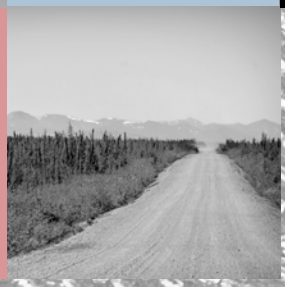












Digital Content and Connectivity with Dinjii Zhuh Contexts

Student Workbook

Eetsii tthak t'agwahii getr'ootanahchàh (Learning About the Machine that Does It All)
Digital Content and Connectivity with Dinjii Zhuh Contexts

R. McMahon; M.McNally; C.Fraser; H.Pearce; T.Fontaine

ISBN 978-1-7750507-4-2

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Acknowledgements

The University of Alberta, in partnership with the Gwich'in Tribal Council (GTC), is pleased to provide this learning resource, which was developed to accompany digital literacy pilot workshops that we facilitated and delivered in June 2017 and 2018 on the traditional territories of the **Dinjii Zhuh** (Gwich'in peoples) and Inuvialuit nations. We acknowledge the significance of Treaty 11 (1921), Inuvialuit Final Agreement (1984), and Gwich'in Comprehensive Land Claim Agreement (1992).

We recognize the moral, intellectual, and cultural rights of Dinjii Zhuh and Inuvialuit as the sole owners of their knowledge, including (but not limited to):

- Cultural heritage objects
- Scientific, technical, and ecological knowledge
- Documentation of local Indigenous knowledge in all forms
- Literary and artistic works

This is a joint project between the GTC and the University of Alberta's Faculties of Extension and Education. It was made possible through funding support from the **Canadian Internet Registration Authority's Community Investment Program** (CIRA). We also received travel support for our June 2018 workshops from the Government of the Northwest Territories Department of Education, Culture & Employment. The GTC also provided support for this project.

This learning resource was jointly developed by the project team:

Dr. Rob McMahon, Associate Professor, Master of Arts in Communications and Technology Program, Faculty of Extension, University of Alberta
Dr. Michael B. McNally, Associate Professor, School of Library and Information Studies, Faculty of Education, University of Alberta
Crystal Gail Fraser, PhD Candidate and Contract Instructor, Department of History & Classics, University of Alberta
Hanne Pearce, MLIS and MA in Communications & Technology, University of Alberta
Trish Fontaine, MA in Communications & Technology, Program Coordinator, UAlberta North

We are pleased to have worked closely with the GTC on developing this curriculum. Many thanks to Carolyn Lennie, Tony Devlin, Suraj Chhetri, and other GTC staff for your continued support and direction. The project could not have taken place without the strong support and involvement of GTC staff during the conception, planning, and implementation of our June 2017 pilot project and the follow-up workshops in 2018. Special thanks to Sharon Snowshoe, Alestine Andre, and Ingrid Kritsch. Hąį' choo to Agnes Mitchell for providing a translation of the project name and land acknowledgement into **Dinjii Zhuh Ginjik** (Gwich'in language). We thank UAlberta North for planning, funding, and on-site staffing support for the workshops and related activities.

A special hąį' choo to those who expressed an interest in our project. Tania Larsson, Jacey Firth-Hagen, Kristian Binder, Dennis Allen, Angela Koe, and Annie Buckle have provided new insights into the digital innovations and challenges in the North. We are honoured to share their stories in this publication. We also thank our workshop participants, who provided helpful feedback that supported the development and improvement of these resources.

We thank Dr. Ali Shiri (School of Library and Information Studies, University of Alberta) and Lyle Fabian, Katlotech Communications Ltd. for providing webinars about **digital content** and **digital connectivity** in the North during the lead-up to the June 2018 workshops. Links to recordings of these webinars are available in this workbook.

We also thank the following individuals for contributing their expertise on different aspects of digital content/connectivity:

- Sharon Farnel, University of Alberta (Metadata advice, sharing her knowledge of decolonizing description/metadata)
- Michael Wynne, Washington State University (Mukurtu Indigenous content management system)
- Dr. Jane Andersen, New York University (Local Contexts; Intellectual property and Indigenous peoples)
- Catherine Bell, University of Alberta (Intellectual property, intangible cultural heritage and Indigenous peoples)
- First Nations Information Governance Centre (**OCAP®** principles)
- Students of the Winter 2018 LIS 598 Information Policy Class, University of Alberta (Pilot testing 'Make the net-work' guided learning exercise)

A summary article about this project is published in Northern Public Affairs.[1]

Graphic design and layout of this handbook, including cover, is by Hanne Pearce.

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1 Link: http://www.northernpublicaffairs.ca/index/volume-6-special-issue-2-connectivity-in-northern-indigenous-communities/exploring-digital-literacy-learning-with-the-gwichin-tribal-council/
2 Link: https://creativecommons.org/licenses/by-nc/4.0/

Table of Contents

Meet the Gwich'in Digital Literacy Project Team

The 2018 Gwich'in **Digital Literacy** Project is pleased to introduce the University of Alberta project team. From L-to-R:

Photo: Hanne Pearce

Crystal Gail Fraser

PhD Candidate and Research Assistant, Department of History & Classics, University of Alberta

Shoorzri' Crystal Gail Fraser vàazhii. Shiyughwan kat da' Juliet Mary Bullock **shahanh** t'iinch'uu ts'at Bruce Fraser shityè' t'iinch'uu. Guuyeets'i' dechuu. Ts'at Marka Andre shitsuu t'iinch'uu ts'at Richard Bullock shitsii t'iinch'uu. Inuvik ts'at Dachan Choo Gęhnjik gwits'at Gwichyà Gwich'in iłhii.

Crystal Gail Fraser is Gwichyà Gwich'in and originally from Inuvik and Tree River, Northwest Territories. She is the daughter of Juliet Mary Bullock and Bruce Fraser and the granddaughter of Marka Andre and Richard Bullock. Crystal is currently completing a PhD on the history of residential schooling in Inuvik from 1959 to 1996. She has made Amiskwaciwâskahikan (Edmonton) and Treaty 6 her home with her daughter Quinn and partner Charlie. Crystal hopes that by learning digital literacy, **Dinjii Zhuh** can lead local projects that are innovative, independent, and creative with the aim of further entrenching our status as sovereign people.

Trish Fontaine

Program Coordinator, UAlberta North

Trish grew up on a small family-run dairy farm in Vermont, just south of Quebec. She comes from a large family with eight siblings, eighteen nieces and nephews, and ten great-nieces and nephews. Trish has a background in wildlife biology, focusing on bird conservation and mapping. She now works at UAlberta North supporting projects being done in northern Canada. Trish spent years working in the Florida Everglades, western and northern Alaska, and the NWT. She enjoys being on the land, watching birds, hunting, hiking, and canoeing. After focusing on digital inclusion in northern communities for her Master's thesis (Communications & Technology, University of Alberta), Trish looks forward to meeting people from the North and finding out what more she can do to help with new technologies coming to the regions.

Dr. Michael McNally

Co-Investigator and Associate Professor, Faculty of Education, University of Alberta.

Michael was born in Calgary, but at the age of four moved to Ottawa where he grew up as an only child. His mother came from a farm in Ontario and his dad grew up in Montreal and Toronto. Michael studied history at the University of Waterloo before studying library and information science at the University of Western Ontario where he completed a PhD in copyright policy. In 2012, he moved to Edmonton to join the Faculty of Education at the University of Alberta with his son and wife (and now has two more children). Since coming to Edmonton, much of Michael's work has focused on rural **broadband** including working with the team that created *Understanding Community Broadband: The Alberta Broadband Toolkit*. His three small children keep him busy with playing soccer, swimming, and time at the park. Michael enjoyed the June 2018 workshops; that was his first trip to the NWT and he was excited to learn about digital innovation in the region and share what he knows about **broadband** and copyright.

Dr. Rob McMahon

Principal Investigator and Associate Professor, Faculty of Extension, University of Alberta

Rob was born in a small town in England and moved to Shawnigan Lake, B.C. at one year old. His dad is Welsh and his mom is Swedish and he has four siblings. He grew up moving around British Columbia and spent time in Northern B.C. (Burns Lake) and Vernon before moving back to the coast to Salt Spring Island. He completed a PhD in the School of Communication at Simon Fraser University that focused on the Northern Indigenous Community Satellite Network, a non-profit **broadband** system covering the Hudson Bay area that was set up by First Nations and Inuit partners. Rob and his wife moved to Edmonton in 2015 to join the Faculty of Extension at the University of Alberta. Rob has been involved in digital technology initiatives with First Nations and Inuit partners and communities in different regions of Canada. Read about these Stories from the **First Mile**. He enjoys hiking and camping in the mountains, and in December 2018 he and his wife started a family with their new baby boy! Rob is excited about continuing to work with Northern partners and learning more about digital innovations in the NWT.

Hanne Pearce

Research Assistant, Faculty of Extension, University of Alberta

Hanne Pearce was born in Helsinki Finland to a Finnish mother and Polish father. She came to Canada with her parents when she was two years old. She grew up in Calgary and the Edmonton area, spending most of her childhood summers in Europe with her grandparents. After completing a Bachelor of Arts at the University of Alberta in 2000, she moved back to Helsinki, Finland to get in touch with her Finnish heritage. She spent several years abroad, working and traveling. She moved back to Canada in 2002, and after working for the Alberta Government briefly, she started work at the University of Alberta Libraries (UAL). Her passion for library work prompted her to start a Master's degree in Library and Information Studies, which she completed 2010. As her work at UAL took an increasing focus on communications, she decided to return to her studies again, finishing her MA in Communciations and Technology in the fall of 2018. Hanne is also a freelance photographer and graphic designer. She enjoys reading and writing everything from poetry to research articles, knitting and gardening. She currently lives in Sherwood Park with her husband and two little dogs. In the spring of 2019 she started in a new role at the UAL Digital Scholarship Centre where she hopes to be more active in promoting digital literacy to the community. She believes digital literacy is the most important literacy in the 21st century and she is always excited to share what she knows and to learn from others.

Learning Objectives

Welcome to our course on digital literacy in the North! In the following modules, we will cover many concepts and aim to accomplish the following goals:

- Share knowledge about **new digital technologies**
- Explore links between **digital content** and **digital connectivity**
- Discuss digital content and digital connectivity in the Northwest Territories (NWT)
- Highlight northern **digital innovators**

This student workbook accompanies a facilitator handbook. A course facilitator will provide you with a hands-on introduction to digital content and **digital connectivity** in northern Canada. Through an interactive learning process, you will discover examples of **digital innovations** taking place in **Dinjii Zhuh** and other NWT communities and resources that can support your own community-based technology development projects.

This material provides you with an introduction to digital technology (content and connectivity), **knowledge management**, digital rights, project management, and **broadband** policy, all in the unique context of the **Dinjii Zhuh**. It also covers some of the benefits and challenges that arise alongside emergent digital technologies.

Throughout this course, we have **bolded** various words. A **bolded** word reflects:

1) Key words about **technology**, which are explained in the Glossary at the end of this workbook. Visit the Glossary to read definitions of these words.

2) Words that appear in Indigenous languages and especially **Dinjii Zhuh Ginjik**. We invite you to share any words we may have missed or that you would like to see added to future workbooks!

The curriculum is also meant to stimulate your interest in **digital technologies**. It ends with a session about additional resources and supports for people who want to pursue further work or study in this area.

Course Objectives

By the end of this course you should be able to:

- Identify key elements of **digital content** and **digital connectivity** and how they work together to form northern **broadband** systems
- Identify supports and barriers to digital content and digital connectivity in northern communities
- Discuss the role of community engagement in digital innovations
- Create unique **digital content** and illustrate its many applications
- Build a tabletop model for a community broadband network
- Recognize your digital rights and know how to employ them
- Identify resources for further learning and possible career paths
- Learn about and participate in a community of Indigenous **digital innovators**

Our Approach

This workbook takes an interactive, hands-on approach to learning about **digital content** and **digital connectivity**. Above all, we encourage you to explore appropriate and useful ways to learn about and discuss **digital literacy**. We want to hear from you about topics to cover, activities to do, and innovative projects that **Dinjii Zhuh** and other northerners are working on. We hope you enjoy the course!

If you have questions or feedback about this workbook, please email us at:
DigitalNWT@ualberta.ca

Find us on Facebook at:
https://www.facebook.com/digitalgwichin/

Our website is located at:
http://www.digitalNWT.ca

Module 1: Introduction to Digital Content

This first module provides an introduction to digital content. The first thing we should note is that you already engage with digital content (and **digital connectivity**) every day, in many different ways, at home and work. While we hope that this course will introduce some new terms, concepts, and uses, much of the content will feel familiar.

Digital technologies take a range of forms. They include **social media** sites like Facebook and Instagram. They include mobile phones, computers, laptops, and tablets. They are reflected in the websites we visit and the different types of digital data used in health care, education, culture and language, and economic development. In this workbook, we will take a closer look at these different applications, devices, and uses of digital content and **digital connectivity**.

This course takes a critical view of emerging digital technologies and covers how they impact our lives and communities in positive and negative ways. Much of this workbook is designed to demystify technology and unpack how it works and what it means. Technology can be developed and used in many different ways. It is not neutral; there are many choices and decisions that go into the development and use of technology. To consider these aspects of how digital technology impacts our lives, think about:

- One thing you like about digital technology
- One of your concerns about digital technology

Now, think about the broader impacts of these positive and negative aspects of digital technology. We asked about your personal thoughts, but think about how these things affect your family, friends, colleagues, community, and the entire North. Very quickly, it becomes apparent how digital technology has deep impacts on our relationships and societies.

These kinds of questions about the uses, impacts, challenges, and potential of digital technologies are the focus of digital literacy learning. When we talk about digital literacy in this workbook, we mean:

Photo Credit: Jessie Curell.

Jennie Vandermeer

Everrrr Sexy Health & Wellness

(Business Promoted through Facebook and Instagram)

Jennie Vandermeer is Sahtúgot'ı̨nę and grew up in Délı̨nę, Denendeh. She currently resides in Tłegǫ́hłı̨ (Norman Wells) and is the founder of Everrrr Sexy Health & Wellness. She is also employed as a Biologist with the Government of the Northwest Territories for the Sahtú Region.

Jennie is passionate about helping people be happy, healthy, and strong in all aspects of their lives. She provides support and information on nutrition, exercise, healing, and personal development from a Dene/northern perspective. A recovering alcoholic and survivor of domestic violence, Jennie credits her recovery to having a strong tie to her Dene culture and people.

Jennie believes that although many Indigenous people are challenged by intergenerational trauma and addictions, they are incredibly strong and resilient. This resiliency is evoked in the Délı̨nę Got'ı̨nę term Denenı́ Nátsə (Dene K'e), which means: to have a strong, powerful mind. In Jennie's words, "Remember you have the strength and resiliency of your ancestors in your blood. You can get through whatever challenges you're facing."

Jennie uses the concept of Denenı́ Nátsə in her business Everrrr Sexy Health & Wellness, which has a very strong presence on social media platforms, such as Facebook and Instagram. Jennie has been sharing her story with others through social media with hopes that it will help them see that a healthier way of life is possible.

> *The range of knowledge, skills, and behaviours used with digital devices such as smartphones, tablets, laptops and desktop computers. This term includes the ability to locate, organize, understand, evaluate, and analyze information using digital technology. It involves a working knowledge of current digital technologies and an understanding of how they can be used effectively.* [1]

This course aims to explore the kind of digital literacy discussed in the quote above. The following readings, activities, and examples are designed to explore digital literacy in the context of **Dinjii Zhuh**. We will look at the different ways that **Dinjii Zhuh** and other Indigenous and non-Indigenous northerners have taken ownership and control of digital technologies. Northern innovation is an emerging area that combines the commitment and ingenuity of northern peoples with the development and use of emerging digital resources.

We invite you to learn more about these projects in the pages that follow and to share your own stories and examples of northern digital innovation with us. We are very interested in hearing about:

- Your experiences, interests, and challenges with digital technologies
- Uses of digital technologies for: culture and language, business development, politics and governance, health care, education, event planning, and even information management (reports, meeting minutes, records)
- Improving these resources. Please send us your ideas, challenges, and/or technical words that we should spend more time on

Send us your thoughts and ideas by email or
Email: DigitalNWT@ualberta.ca
Facebook: https://www.facebook.com/digitalgwichin/

Before we delve into digital technologies, let us review how **Dinjii Zhuh** have developed communication and media over time.

1 First Mile Connectivity Consortium (2016), Digital Technology Adoption in Northern and Remote Indigenous Communities, p.9. Available at: http://firstmile.ca/report-digital-technology-adoption-in-northern-and-remote-indigenous-communities-in-canada/

A Short History of Dinjii Zhuh Oral Culture and Media

Dinjii Zhuh have had a long history of engaging with their environments through the use of **media**. Indeed, in the past as today, **Dinjii Zhuh** communities have always been careful judges of coming change and made informed decisions about their social, economic, and political worlds. Early settlers, missionaries, fur traders, and explorers attempted to construct Indigenous societies as backwards, historical relics resistant to change, and even dangerous.

In recent years, however, historians have demonstrated that Indigenous cultures were (and are) dynamic, fluid, and adaptable, something that Indigenous peoples have always known. People often incorporate some cultural changes while rejecting others, as they see fit. There have been other forces, however, brought on by colonialism that Indigenous northerners have been less successful at navigating. These include the 1928 influenza epidemic, the devastation of Indian Residential Schools, and the decline of the fur trade economy.

The following image depicts various historical developments that are important to how we understand **Dinjii Zhuh** involvement in **media** and technology and uses the example of **Dinjii Zhuh Ginjik**.

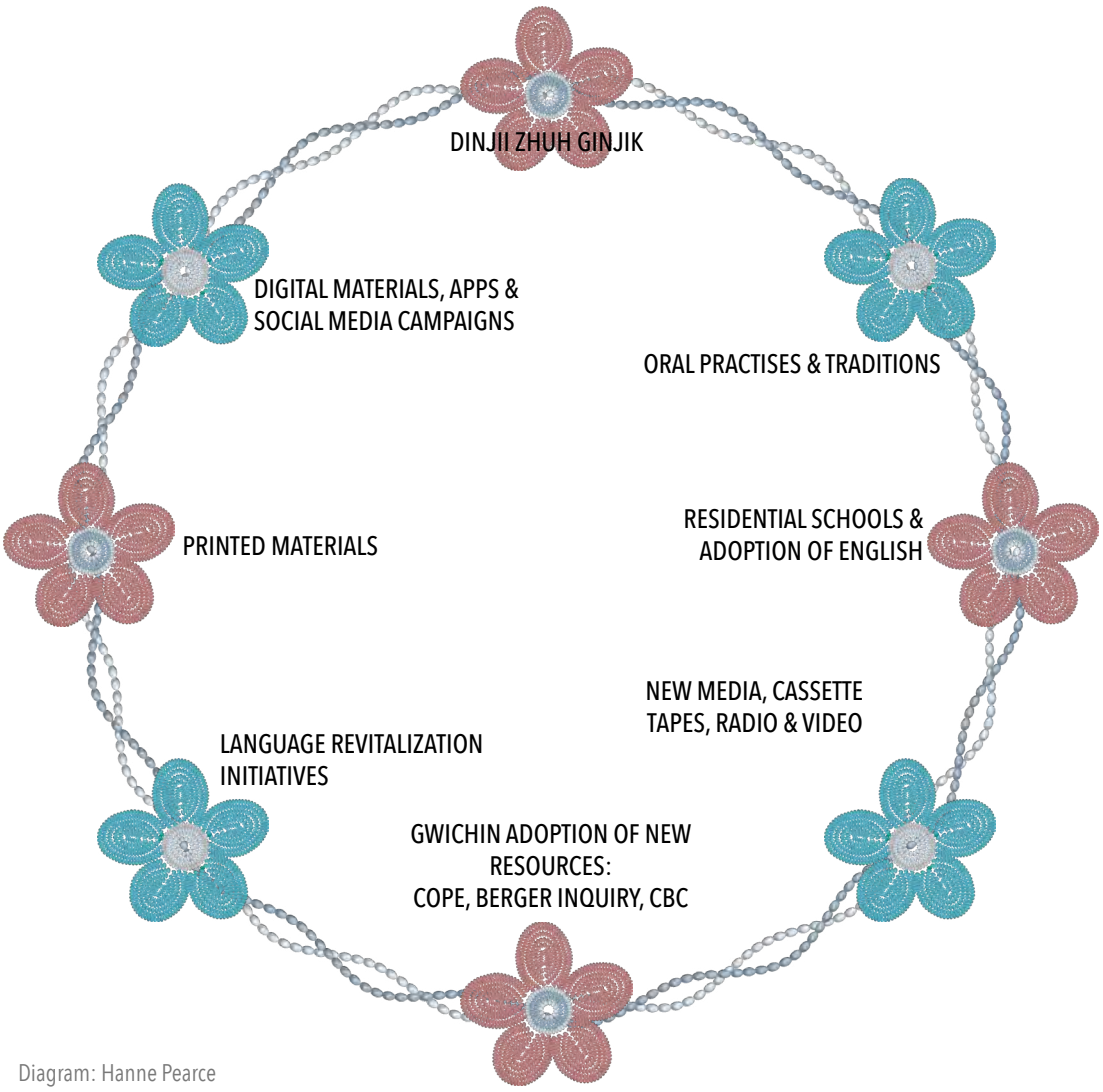
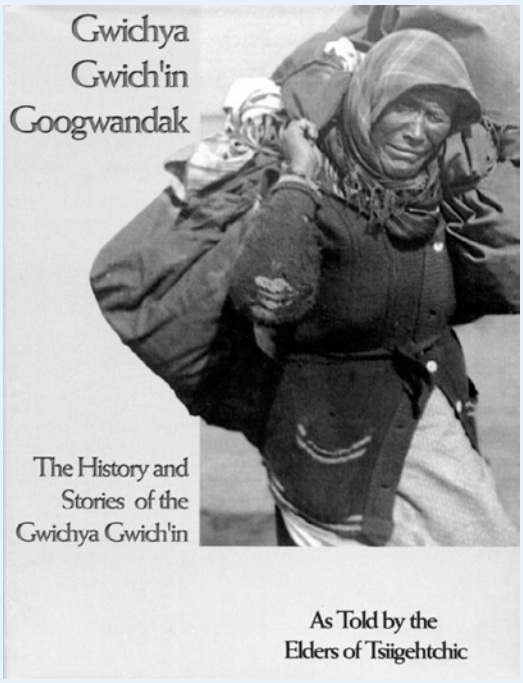


Diagram: Hanne Pearce



Gwichya Gwich'in Googwandak:

The Histories and Stories of the Gwichya Gwich'in As Told by the Elders of Tsiigehtchic.

Michael Heine, Alestine Andre, Ingrid Kritsch, Alma Cardinal and the Elders of Tsiigehtchic. *Gwichya Gwich'in Googwandak: The History and Stories of the Gwichya Gwich'in As Told By The Elders of Tsiigehtshik*. 2nd revised and expanded edition. Tsiigehtshik & Fort McPherson: Gwich'in Social and Cultural Institute, 2007.

Reprinted and slightly modified with permission from the GTC's Department of Cultural Heritage/Gwich'in Social and Cultural Institute's website: www.gwichin.ca.

This publication presents the story of **Gwichyà Gwich'in** life on the land from pre-contact times to the present. It is based on information and stories provided by **Gwichyà Gwich'in anjòo** during oral history and archaeological research carried out from 1992 - 2001. Also incorporated is archival information and oral history interviews carried out in the late 1960s and early 1970s during the COPE (**Committee of Original Peoples' Entitlements**) project in preparation for land claim negotiations in the Mackenzie Delta. Numerous archival, personal and Gwich'in Social and Cultural Institute (GSCI) project photographs, drawings and maps illustrate the text.

In this cyclical image, we show the interconnected and reciprocal aspect of **Dinjii Zhuh Ginjik** and digital **media**. Although fluid and changing, **Dinjii Zhuh Ginjik** has been a critical part of our culture since **ts'ii dęjį,** the oldest days of the land. Our language formed our social relations with each other, the land, and the spiritual world. Indeed, **Dinjii Zhuh** practised an oral, story-telling based culture that prioritized the histories and experiences of Indigenous peoples as a fundamental part of life-long learning processes[1]. Oral traditions and specialized knowledge guided nearly all aspects of **Dinjii Zhuh** lifestyles, politics, economies, and relationships with both animal and spiritual worlds. There are many resources you can use to learn about both ancient and recent **Dinjii Zhuh** histories. The most notable resource is *Gwichya Gwich'in Googwandak: The Histories and Stories of the Gwichya Gwich'in As Told by the Elders of Tsiigehtchic*[2].

Similar to the experiences of **Indigenous peoples** in other regions in Canada, **Dinjii Zhuh** children attended Indian **Residential Schools**. The first residential school in the NWT opened in 1867 in Zhahti Kų́ę́ (Fort Providence), with other schools opening in Xátł'odehchee (Hay River), and Deníu Kų́ę́ (Fort Resolution) shortly thereafter. **Dinjii Zhuh** children travelled thousands of kilometers to attend these schools, some separated from their families for years. In order to allow children to remain closer to their families, Roman Catholic and Anglican residential schools opened in Akłarvik (**Aklavik**) in 1926 and 1936, respectively. Historians have outlined the oppressive nature of these schools and the colonial policy behind the schools that supported programs of assimilation and cultural genocide. A part of the curriculum in these schools was designed to eliminate the speaking of Indigenous languages, including **Dinjii Zhuh Ginjik** and **Inuvialuktun**, and teach (often through abusive methods) English, French, and Latin.

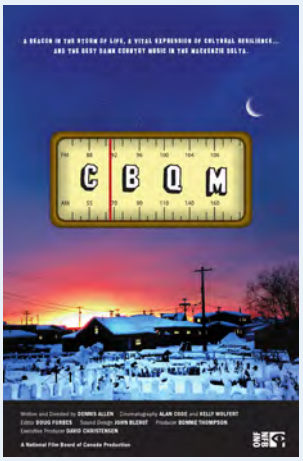
When Aklavik's **Immaculate Conception Indian Residential School** and **All Saints Indian Residential School** closed in 1958, students were moved to **Grollier Hall** and **Stringer Hall** in the new government town of Inuvik, where many of these harmful policies continued.

1 Michael Heine, Alestine Andre, Ingrid Kritsch, and Alma Cardinal define . *Gwichya Gwich'in Googwandak: The History and Stories of the Gwichya Gwich'in As Told by the Elders of Tsiigehtchic*, Revised Edition (Tsiigehtshik and Fort McPherson: Gwich'in Social and Cultural Institute, 2007), 403.
2 Ibid.

Although **Grollier** and **Stringer Halls** policies were hostile to the speaking of Indigenous languages, early exposure to new **technologies** had the possibility of entertaining some children, and therefore interrupting the monotony of hostel life. Some student memories include tinkering with radios, listening to analogue music on record players, learning how to service movie projectors, and other related activities. Occasionally, a student might develop a special interest and perhaps go on to pursue a related career.

During the mid twentieth century, many newcomers arrived in what is now known as the **Gwich'in Settlement Area** (GSA). This included military personnel (for projects such as the Canol Pipeline and the **Distant Early Warning [DEW] Line**), federal bureaucrats, Indian Agents, Royal Canadian Mounted Police officers, medical staff, missionaries, and teachers.

As such, there was an influx in 'modern' video and audio technology in the region. For example, an important technological advance arrived in the North in 1960 when the **Canadian Broadcasting Company** (CBC) started to offer shortwave service to the High Arctic. A decade later, the **Anik A1 Satellite** allowed the CBC to beam television signals to the North, which was a landmark in northern technology.



CBQM

Reprinted with permission from the National Film Board's website, www.nfb.ca. Stream CBQM for free on their website! www.nfb.ca/film/cbqm

This feature-length documentary pays tribute to CBQM, the radio station that operates out of Teetł'it Zheh, a small town about 150 km north of the Arctic Circle in the Canadian Northwest Territories. Through storytelling and old-time country music, filmmaker and long-time listener Dennis Allen crafts a nuanced portrait of the "Moccasin Telegraph," the radio station that is a pillar of local identity and pride in this lively northern Teetł'it Gwich'in community of 800 people.

Dinjii Zhuh quickly became skilled in these areas and demonstrated themselves efficient in adopting new tools that helped them to not only succeed, but to also retain their culture and language in a new way. Indigenous northerners quickly adopted new forms of technology and modified them to improve their lifestyles, while at the same time retained traditional Indigenous tools and methods of living. New tools, such as outboard motors, CB radios, snowmobiles, and chainsaws sprung up in the region to complement on-the-land activities of hunting, fishing, harvesting, and trapping.

Related to language preservation, **Dinjii Zhuh** entered careers that allowed them to use technology as a way to both make a living and retain their culture. For instance, COPE was an important response to increasing questions around oil and gas extraction in the North during the 1960s. COPE also examined what role Indigenous northerners would play in expanding capitalist economies. Originally formed by Inuvialuit, this political organization aimed to take a grassroots approach and conducted over 24,000 interviews, including some with **Dinjii Zhuh**, to learn more about the views and knowledge of the people they represented.

An extensive collection of COPE recordings exists today; the majority of the Gwich'in recordings have been translated and transcribed. The original reel-to-reel recordings are housed at the Gwich'in Tribal Council Department of Cultural Heritage, and have also all been digitized (and are available through the archives with permission from the Department).[3].

3 For more on the Committee of Original Peoples' Entitlement, see: Inuvialuit Regional Corporation, "COPE: An Original Voice for Inuvialuit Rights," available online at www.irc.inuvialuit.com

Photo Credit: ICRC.

Committee of Original Peoples' Entitlement (COPE)

After years of political marginalization, the arrival of an increasing number of settlers, and a burgeoning government infrastructure in the North, Agnes Semmler gathered support for a new Indigenous organization that would come to represent the interests of those who lived in the Western Arctic. Victor Allen, Jim Koe, Bertha Allen, and Jessie Amos helped to lead the organization when it formed on a January night in 1970. **COPE's** main objective was to engage with oil companies and "provide a united voice for all the original people of the Northwest Territories" and "work for the establishment and the realization of native rights[4]. As **COPE's** objectives expanded, fieldworkers conducted 24,000 interviews in an attempt to better understand the views and knowledge of people it sought to represent. According to Taimani, by 1973, **COPE** had:

> organized the first conference of Arctic Native People in Coppermine (now Kugluktuk), helped people in Arctic Red River (**Tsiigehtchic**) get compensation for damage to their fish nets, helped start the Northern Games, produced weekly radio broadcasts in Native languages, helped preserve the history and heritage of Native people by interviewing and taping elders, helped refurbish and support the Native community hall in Inuvik, supported Native business ventures and promoted and lobbied for adequate housing for low-income families.[5]

These interviews were given in English, **Inuvialuktun**, **Dinjii Zhuh Ginjik**, and **Dené Tha** and were led by then CBC reporter Nellie Cournoyea and Oblate priest Father Robert Lemeur. Working as a broadcaster and station manager at CBC Inuvik, Cournoyea began recording **Dinjii Zhuh, Inuvialuit**, and **Sahtú** Elders beginning in 1963 and concluded this project in 1979, when she was elected as a Member of the Legislative Assembly for the Western Arctic. These recordings, stored on compact cassettes, became known as the **COPE stories**. They were intended to be used to inform school curriculum, promote Indigenous language literacy, and preserve oral histories. This collection of reels, audio cassettes, and sound CDs are currently housed at the **NWT Archives** in Yellowknife, NWT and contain approximately 1013 recordings. For more, see NWT Archives N-1992-253.

After a decade of public discontent and unrest around schooling, Indigenous languages, and curriculum, territorial politicians, and bureaucrats invested an increasing amount of time and effort in consulting communities about education initiatives in the early 1980s. By this time, some schools had hired Indigenous language teachers. The political will to include Indigenous northerners in territorial decision making was effective and brought new legislation forward that ultimately affected a surge in interests to preserve and grow local languages. For instance, the Legislative Assembly's Special Committee on Education held forty-three public hearings across the North about the state of education in the territory.

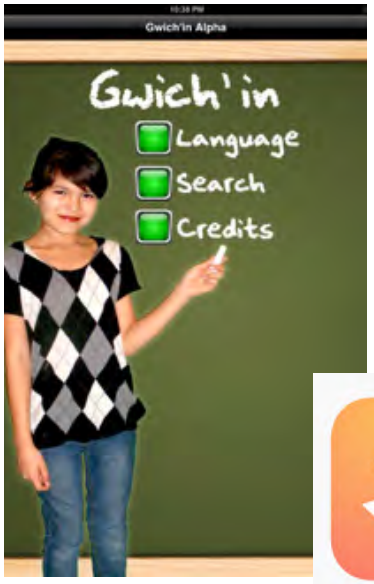
As a result of this work, *Learning: Tradition and Change* was published in 1982. This important resource highlighted the need for culturally-appropriate curriculum, including the marginalization Indigenous language studies for primary and secondary school students. Two years later, in June 1984, the Legislative Assembly of the Northwest Territories passed its first **Official Languages Act**. The Act officially recognized all Indigenous languages spoken in the Northwest Territories. These two important events generated financial resources, new opportunities for teachers to use technologies in classrooms to teach languages, and a renewed desire to learn **Dinjii Zhuh Ginjik** and **Inuvialuktun**.

Since then, **Dinjii Zhuh** have remained optimistic about language revitalization. The GTC has intensified its efforts by creating the Gwich'in Language Mentor-Apprentice Program. Further to their efforts to promote **Dinjii Zhuh Ginjik**, the GTC has started to digitize its archived material collected over the past thirty years, which includes vast collections of language resources, oral histories, photographs, and other materials. The intent of this project is to create an online public library that will be accessible to the public.

4 Inuvialuit Regional Corporation, "COPE: An Original Voice for Inuvialuit Rights," undated. See: https://www.irc.inuvialuit.com/sites/default/files/COPE-Original%20Voice%20for%20Inuvialuit%20Rights.pdf.

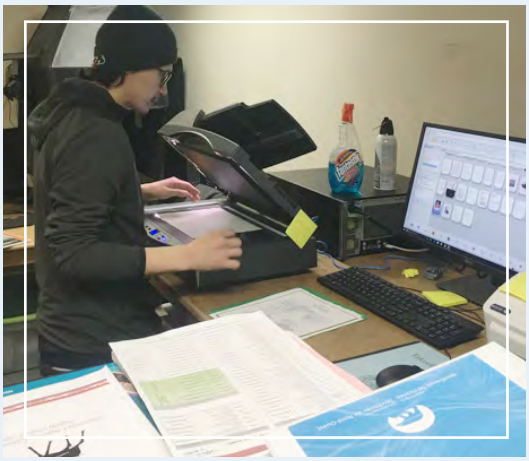
5 Inuvialuit Regional Corporation, Taimani: At That Time. Inuvialuit Timeline Visual Guide (Charles Arnold, Wendy Stephenson, Bob Simpson, and Zoe Hoe, eds. Inuvik: Inuvialuit Regional Corporation, 2011), 139.

There are many other existing ways that Northern innovators are developing and using digital technologies. People engage daily in the **social media** campaign **#SpeakGwichinToMe** which can be found on Facebook, Instagram, Twitter, and YouTube (read more about this project below!). The apps **Gwich'in Alpha App** (below) and **AnkiApp** (below, left) provide easy translations, flashcards, and exercises to help beginners. Additionally, digital **media** has helped shine a spotlight on **Dinjii Zhuh Ginjik**; a recent example is the film *The Sun At Midnight*.



Finally, CBC Radio North offers programming in six Indigenous languages: **Dinjii Zhuh Ginjik**, **Inuvialuktun**, **Dené Tha**, and Dënesųłiné. The CBC North **Dinjii Zhuh** news and current affairs program Nantaii airs Monday to Friday from 1-2pm on CBC 860AM and CBC Radio One online.

Although this discussion may suggest that **Dinjii Zhuh** have overcome the cumulative effects of colonialism and Indian Residential Schools, much work remains. **Dinjii Zhuh Ginjik** is is currently one of the most endangered languages in Canada, with less than 400 fluent speakers. Nonetheless, many **Dinjii Zhuh**, from **anjòo** to **k'eejit**, are working hard to keep the language strong. On the following pages there is an excerpt from our interview with tireless language advocate Annie Buckle of Aklavik.



Above: Wade Vaneltsi scans documents.
Photo Credit: Crystal Gail Fraser.

The Gwich'in Tribal Council's Digitization Project

The Gwich'in Digital Literacy Team had a conversation with Andrew Cienski, Language Revitalization Specialist at the GTC about the digitization project currently underway. When the language centres in Teetł'it Zheh (Fort McPherson) and Tsiigehtchic closed, all materials were moved to the GTC in Inuvik. The collection contains thousands of documents, which includes language research, oral histories, Elders' autobiographies, mythological stories and legends, land-based knowledge, old-time stories, interview transcriptions, audio collections, ethnologies, and other valuable resources. Andrew and Digital Archivist Wade Vaneltsi are currently organizing and digitizing these materials so the Dinjii Zhuh community can access these resources.

Before the digitization could begin, Andrew researched a coding system to organize the files. With the help of the NWT Archives in Yellowknife, Andrew and Wade started with the Elders' biographies, since those files are currently the most valuable to the broader community. Andrew explained that by starting with Elders' biographies, "it gives us an opportunity to merge the transcripts with the oral recordings." After Wade scans the documents, he enters the metadata (name, description of content, links to other files, etc.) to create easy search terms. The audio files are then digitally cleaned to improve sound quality (background noise, amplification, etc.). They are currently experimenting with innovative software to produce the best quality audio file for future preservation.

As the new archive at the GTC forms, a plethora of new questions have arisen. Who should have access to these files? How does an archive treat culturally-sensitive materials in respectful ways? Is there traditional knowledge contained in these archives that was not intended to be shared widely? These are all valid questions that the GTC is currently considering.

Photo: Hanne Pearce

Reprinted with permission (with slight modifications) from the GTC's Department of Cultural Heritage/Gwich'in Social and Cultural Institute's website: www.gwichin.ca.

The Sun At Midnight

This 93-minute feature film is a coming-of-age story set in the **Dinjii Zhuh** community of Teetł'it Zheh and the surrounding mountains. It is the result of a seven-year collaboration (2009-2016) between the Gwich'in Social and Cultural Institute (now GTC Department of Cultural Heritage) and screenwriter, director, and producer Kirsten Carthew. The film was produced by Kirsten Carthew and co-producer Amos Scott of Jill & Jackfish Productions, in association with the DCH.

It is the first feature film written, filmed, and produced in the Northwest Territories, with much of its filming on **Dinjii Zhuh** nan (land) near the Arctic Circle. It also including **Dinjii Zhuh** actors and community people from Teetł'it Zheh in key roles. The film is an Indigenous adventure film about a **Dinjii Zhuh k'eejit** (young person) raised in the south and sent north to stay with family in Teetł'it Zheh following the death of her mother. She tries to escape by boat to the nearest community, becomes lost, and encounters a **nìvèh t'ah'ii** (hunter) who reluctantly takes her under his wing teaching her about **Dinjii Zhuh nits'ǫǫ tr'igwindàih** (culture). The tables are turned when he is seriously injured by a bear attack and it is her turn to save them both.

Alongside Indigenous actors Devery Jacobs (Rhymes for Young Ghouls, Mohawk Girls) and Duane Howard (The Revenant, Bury My Heart at Wounded Knee), the film stars local NWT acting talent: William Greenland, Sarah Jerome, Laura Firth, Shayla Snowshoe, Jaclyn Roberts, and Paul McKee. Staff from the GSCI/DCH, Sharon Snowshoe, Ingrid Kritsch, and Alestine Andre were involved at the script stage, and along with Elders and community members, have actively championed the film, been cultural advisors, and provided assistance since 2009. As a result, the GTC and these staff in particular have been acknowledged as Associate Producers.

Annie Buckle, Dinjii Zhuh Ginjik Language Instructor and Radio Host

Annie Buckle is the daughter of Alfred Semple of the Yukon and Catherine Vittrekwa of Teetł'it Zheh. She is currently the **Dinjii Zhuh Ginjik** instructor at the **Ehdiitat Gwich'in Band** in Aklavik. Annie is very passionate about learning and teaching our language and focuses on the Teetł'it dialect. She is an experienced educator in northern communities and has found that her most cherished moments include teaching toddlers and young children the language. Annie advocates for on-the-land programming, but also enjoys reaching out to Aklavik residents on her weekly radio show.

Annie on learning Dinjii Zhuh culture and the importance of our relationships with the land:
I like to teach people about what I know. I try to teach others about it. And there are different methods of teaching language. I always thought there was just one way, one classroom, one way of doing it. Just in the classroom. But when you think about it as a language teacher, you like to do hands-on stuff especially with animals and some traditional stuff…

[W]e're visual people. Because if you sit in a classroom you're talking about skinning a caribou and there's no hands-on [activity], you'll never know how to do it.

If I asked five people, "Would you come to the band and go to my classroom because we're going to have Gwich'in language, they'll just say, "yeah yeah, see [you] later."

But they don't show up. But at least five people, when I tell them, "I'm going to out to the camp and this is what we're going to be doing out there." So they'll be five of them but they'll bring their friends. That's how much they want to go out. They'd rather be on the land do something than sitting in an office.

Annie on the preservation of Dinjii Zhuh Ginjik:
I'm here and I had a beautiful gift. It's not anybody's gift. It's from our creator and he gave it to all of us. You know, when you do talk it [Dinjii Zhuh Ginjik], you talk it. You know how it touches you when you use the language? It's a beautiful thing.

Annie on using radio technology to share her knowledge:
We have a local radio and we go on there at two o'clock. We just talk greetings. We talk about little things, the weather or we sing a song. When you're on there, you're not even thinking of who's out there. You're challenging [yourself].

Annie recalls how her parents and ancestors communicated with each other before the widespread adoption of new technology. This was particularly challenging, given the number of Dinjii Zhuh Ginjik dialects.

Source: Gwich'in Tribal Council, Rose Gyàh Ditł'ih: Rosie Sets a Snare, Rosie Series 3. Inuvik, Northwest Territories: Gwich'in Tribal Council, 2018.

Source: Gwich'in Tribal Council, Rose Ųųkaheh: Rosie Goes Berry Picking, Rosie Series 2. Inuvik, Northwest Territories: Gwich'in Tribal Council, 2018.

She told us:
You know, long ago you're out on the land and there's nothing like this. You going to have to find a way to understand each other, communicate. They probably just made signs most of the time and did things to show them...

From what I [have] seen when I was young and hearing the language more at that time, like I said, I hear the language. I hear my mom talk and I do what she tells me to do. But then if I go to somebody's place and they talk a different language, I'm just listening constantly because I didn't know that language. It's probably a different dialect. So I look and try to figure out what they're saying. So do it and they say, "haaaa." [laughter] So I just...I don't know. As I go into the world, I see different things so I understand.

Digital Innovators and Communications Organizations

Now that you have an understanding of some of the long history of **Dinjii Zhuh** innovation in communications and **media**, let's take a look at some of the organizations working in this area today. Here are some examples of digital innovators and organizations working in the northern territories!

Gwich'in Tribal Council's Department of Cultural Heritage

Reprinted with permission (with slight modifications) from the GTC's Department of Cultural Heritage/ Gwich'in Social and Cultural Institute's website: www.gwichin.ca.

Following the signing of the **Gwich'in Comprehensive Land Claim Agreement** in 1992, the GTC established a number of organizations to deal with new responsibilities created by the agreement. The [**Gwich'in Social and Cultural Institute**] GSCI was established as the cultural and heritage arm of the GTC in response to concerns about the decline of Gwich'in culture and language and the need to implement heritage resource issues identified in the land claim Legislation and Policy. In the fall of 1993, the Institute began operation with the mandate to 'document, preserve and promote Gwich'in culture, language, traditional knowledge and values.'

Image Credit: GTC Department of Cultural Heritage.

From September 1993-March 2016, the GSCI operated as a non-profit society with registered charitable organization status and was governed by a seven member Board of Directors composed of representatives from the four Gwich'in communities and the GTC. The objective of the Institute was to conduct research in the areas of culture, language and traditional knowledge so that this body of knowledge would be recorded and available for future generations and the development of programs appropriate for Gwich'in needs. This was believed essential in building new awareness of, and pride in, Gwich'in culture.

On April 1, 2016, the GSCI became a department under the **Gwich'in Tribal Council** called the Department of Cultural Heritage. The Department's mandate continues and staff continue to work with the four communities of Aklavik, Fort McPherson, Inuvik, and Tsiigehtchic which all fall within the Gwich'in Settlement Area, established by the land claim agreement. The Institute also continues to carry out heritage research in the Yukon in traditionally used areas described as the Primary and Secondary Use Areas in the claim.

Photo: NWT Archives | James Jerome

James Jerome, Gwichyà Gwich'in Photographer (1949-1979)

James Jerome was born on July 31, 1949 in Aklavik, the youngest of six children. He grew up on the East Channel of the Mackenzie River at a camp known as Nichìitsìi diniinlee. His father, Joe Bernard Jerome, was a Special Constable with the Royal Canadian Mounted Police (RCMP), as well as a trapper and chief of the Gwichya Gwich'in of Tsiigehtchic. His mother was Celina (Coyen) Jerome.

After spending a number of years on the land with his parents, he attended Grollier Hall residential school in Inuvik. Upon graduating from high school, he trained to be a welder and after receiving his certificate, travelled across Canada.

James had received his first camera when he was twelve years old and upon his return to the Mackenzie Delta began travelling on the land and photographing families at fishing camps. During this time he became concerned that the Gwich'in culture would disappear as the elders died. He worked for the Native Press newspaper as a photographer, and later as a freelance photographer. At the time of his death, he was working on a book about Dene elders of the Mackenzie Valley entitled 'Portraits and History of the Dene Elders'. James Jerome died in a house fire in Inuvik on November 17, 1979.

Map of the Gwich'in Settlement Area

Native Communications Society (NCS) of the NWT

Reprinted with permission (with slight modifications) from the NCS-NWT's website: www.ncsnwt.com.

The NCS-NWT has been in operation since 1982. In that time, it has expanded its operations to include radio (CLKB Radio) and television broadcasting, delivering **Aboriginal** language services to 33 different communities and three diamond mines, as well as into Alberta and Nunavut. NCS Productions Ltd. was incorporated in April 2010 and is currently housed in a separate location than CKLB Radio. The newly incorporated NCS Productions Ltd. has produced two years of six one-hour episodes of DENE: A Journey for the Aboriginal Peoples' Television Network (APTN).

In the last 28 years, NCS has grown to a staff of twenty, and a strong Board of Directors, some having sat on the Board for as long as 16 years. In the past, NCS has undergone some intense challenges financially, administratively, and with fulfilling the NCS Mandate. In the two years under

the management of the new CEO, NCS is now experiencing exceptional growth, and maintaining fiscal responsibility to its funders and Revenue Canada, while progressively expanding programs and services.

The intent of creating the for-profit NCS Productions Ltd business within the Native Communications Society in April 2010 was to access and increase funding otherwise unavailable to the non-profit parent organization, and to provide services and products that would bring in business revenues, while promoting and preserving the Aboriginal culture, languages and traditions in the NWT.

The NCS also saw that the film and video industry was a growing sector in the NWT and actively lobbied for the creation of the **NWT Film Commission** to strengthen the film production industry in the NWT, recognizing that the demand for quality services was increasing and needed governmental support.

NCS Productions Ltd. will cater to other clients and major productions in all areas of video and film production, and provide the rental of equipment. Services will also be geared to educational institutions, industry, government, tourist companies, Native development corporations, community organizations, and families or individuals. NCS TV Productions Ltd has a separate stand-alone Strategic Business Plan.

Amos Scott, Tłı̨chǫ, Filmmaker, Photographer, and Owner of Adze Studios

Amos Scott is a Tłı̨chǫ filmmaker, photographer, and communications expert. He started his career in journalism working with CKLB, CBC North, and APTN National News. Amos owns Adze Studios and produced the documentary series DENE: A Journey.

You can watch DENE: A Journey on the APTN website here: http://aptn.ca/deneajourney/

Photo Credit: David Stewart.

Dez Loreen, Inuvialuit Communications Society

Dez Loreen first began as a production assistant and is now the manager of the Inuvialuit Communications Society, overseeing the TV and magazine departments. He was born and raised in Inuvik and is now married and a father to a nine-year-old daughter. Although Dez is not university-trained, his fifteen years in the industry has served as professional development, giving him expertise in all fields of northern media. Dez's professional passion overlaps with his personal interests in producing short films (horror and comedy). Dez encourages "others to get out and do what makes them happy, because it could also bring joy to others."

CKLB Radio

Reprinted with permission from the NCS-NWT's website: www.ncsnwt.com.

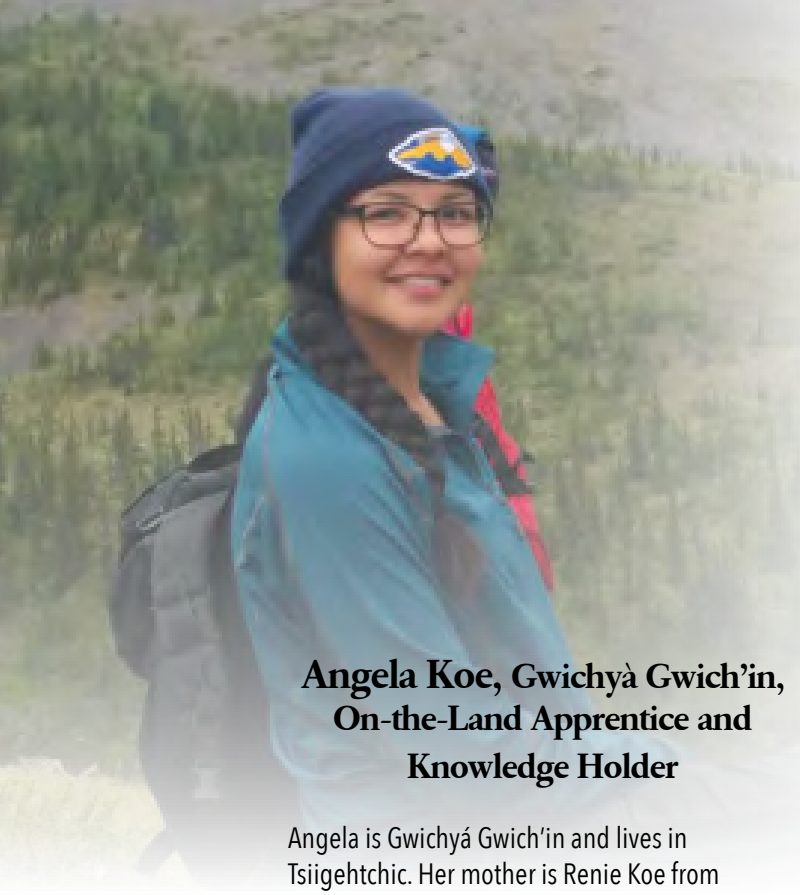
CKLB Radio owns transmission equipment and broadcasts to 33 territorial communities as well as to the Diavik Diamond Mine, the De Beers Snap Lake Diamond Mine, and Ekati/BHP Mine Site. Four communities in northern Alberta receive broadcasting from CKLB, although they provide their own community equipment as they are out of the NCS jurisdiction. One community in Nunavut provides their own broadcasting equipment and location maintenance.

CKLB programming is provided in English and Aboriginal languages, and focuses on Aboriginal issues, interests, cultures and lifestyles, including a broad range of music genres, Aboriginal music, regional news and unique radio specials. Online streaming of CKLB is available at the NCS website for listeners around the globe.

Autumn Schnell, Dinjii Zhuh tr'iinjoo, Radio Broadcaster at CiTR in Vancouver

There are many Dinjii Zhuh who are making professional contributions to radio. Meet Autumn Schnell (right), a Dinjii Zhuh tr'iinjoo (woman) living on unceded Musqueam, Squamish, and Tsleil-Waututh lands. Autumn is a First Nations and Indigenous Studies major at the University of British Columbia and she works at CiTR as an Indigenous Collective Coordinator. Autumn has curated content for CiTR, Discorder Magazine, HASTAC 2019, the Symposium for Indigenous New Media and Artspeak Vancouver. You can hear Autumn on Unceded Airwaves, Vancouver Co-op radio, and a forthcoming podcast series on Indigenous new media called "Recoding Relations."

Photo: Hanne Pearce



Angela Koe, Gwichyà Gwich'in, On-the-Land Apprentice and Knowledge Holder

Angela is Gwichyá Gwich'in and lives in Tsiigehtchic. Her mother is Renie Koe from Teetł'it Zheh and her father is Dale Blake from Tsiigehtchic. Angela was raised in Tsiigehtchic and had to relocate to Inuvik to finish school when she was fifteen years old. She returned to Tsiigehtchic and has spent the last two years on the land with her grandparents. Angela has traveled to the Wind River, Yukon down to Teetł'it Zheh for the past two summers. Angela is enthusiastically engaged in local community matters. She has been spending time learning about the land and **Dinjii Zhuh Ginjik**. We spoke to Angela about her work and her experience with digital technologies.

Angela on using digital technology on the land:
I personally do my own database and writing down a daily journal. But with social media, it's kind of tricky because I take a lot of photos but I don't post them. I just save them for myself. Whenever I go out on the land, I don't normally have service so I try not to touch the cellphone too much, especially with my grandparents but they really don't like that stuff out, unless you're taking pictures.

Angela's thoughts on the use of cell phones among youth, especially when she had to relocate to Inuvik to attend high school:
In Inuvik, I was more than often on my phone. It was just a really big distraction. In school it was a bigger distraction. It's a barrier. That phone is a barrier to communication, to communicating with your student friends and stuff in school. You know, meeting friends? [...] You're antisocial because you're so used to being on phone or being behind a screen and talking there. You're not used to standing, like using your voice. You know being yourself?

Inuvik is the only Dinjii Zhuh community connected to high-speed internet via the Mackenzie Valley Fibre Link. Angela responds:
I was at that meeting. They were talking about it and they said Tsiigehtchic was going to be connected to it. So they lied about it, which was so hypocritical, I guess. I don't know. It was so unknown because we [were] all expecting it. We were expecting to find the higher speed of the internet. I'm not sure how they were supposed to connect us to that. They haven't connected us...

It's kind of iffy because we didn't want it anyways. But you know they did consult us. A lot of [residents] were questioning what it would do to the environment, what effects would make in the long run.

Jacey Firth-Hagen, Gwichyà Gwich'in, Founder of #SpeakGwichinToMe

Jacey is Gwichyà Gwich'in and originally from Inuvik. Her mother is Sylvia Firth and her father is Willard Hagen. Jacey's grandparents are Sarah McLeod-Firth and John Firth (maternal) and Margaret (née MacDonald) and Clifford Hagen (paternal). Jacey was raised in Inuvik and is currently attending university in Edmonton.

Jacey is the founder of the #SpeakGwichinToMe campaign, an online movement using **social media** platforms such as Facebook, Twitter, Instagram, YouTube, and Soundcloud. #SpeakGwichinToMe has gained international attention for its efforts to revitalize one of the most endangered Indigenous languages in Canada.

Like many northerners, Jacey is aware of the intergenerational trauma caused by Indian Residential Schools. She works hard daily to counter these effects by focusing on learning her language and inspiring others to learn **Dinjii Zhuh Ginjik** alongside her.

We interviewed Jacey to learn more about her work, and to ask her thoughts about digital technologies and the role they may play in supporting language projects. Here are some highlights from our interview:

Jacey on speaking Dinjii Zhuh Ginjik:
My grandma Sarah McLeod-Firth's first language is Gwich'in and then I was taught at a young age that the Gwich'in language was endangered. It could die out in my lifetime and just being so embodied in my culture and the land and traditions. It was really weird to me. I speak English and I'm Gwich'in, but I can't even speak my language. These are thoughts to have had at such a young age.

Jacey on finding a mentor:
I wanted to learn how to speak, be fluent, so I worked with Annie Jane Charlie. Once a week, maybe a couple times a week, I would look through the Gwich'in dictionary and pick out words I wanted to learn and I'd come to Annie Jane with a list of Gwich'in words that she'd translate for me. I'd study and memorize that list of Gwich'in words.

Jacey on using the internet to find educational opportunities:
The Gwich'in Tribal Council actually posted about a language conference on Facebook to attend in Ottawa. I wasn't a language teacher. I didn't have an educational background. But I applied anyway. I just said I've been wanting to learn my language my whole life. I love my language. I've never been to Ottawa before. I flew there by myself.

Photo: Hanne Pearce

It was actually an Arctic Council language conference. It's more like preserving the language more than a language revitalization conference, but being an Arctic Council conference there was language speakers from across the circumpolar arctic, except for Russia. Unfortunately they couldn't make it. But there was Canada, the States, Norway, Sweden, Greenland, and Finland. And there were presentations from our Indigenous peoples in the Arctic working on language revitalization, language preservation, and how they conduct language surveys. One presentation was from the Sami Youth Council and they were presenting on #SpeakSamiToMe.

Jacey on establishing the #SpeakGwichinToMe social media campaign:

It was a success in the beginning. Honestly it took on a life, its own entity. It was definitely really good for me to be able to start this on social media and then now it's slowly growing out of social media.

I'm in Whitehorse and having to expand #SpeakGwichinToMe to me all across the Gwich'in nation, NWT, Canada, and even the world. Being exposed to people I never would've never met in the NWT, the Gwich'in nation, or anywhere.

I get messages from Gwich'in over the world, people all over the world basically, Gwich'in Elders are coming up to me in Yellowknife, Inuvik, Whitehorse, messaging me on Facebook and everyone's like: 'you're doing such an amazing job' [and] 'thank you so much, your work makes me so emotional'.

Photo Credit: Nigit'stil Norbert.

Jacey Presenting at the Gwich'in Youth Conference in Inuvik, Spring 2017

What's next for Jacey?

I'm just learning how to be patient with myself, how to learn how to ask for help, and knowing that I'm not in this alone. It takes a whole nation to bring back our language.

The #SpeakGwichinToMe documentary was released on National Indigenous Day in June 2018. The documentary was developed by film producers Johanna Luna and Eddie De Juan. View on YouTube by searching "Speak Gwich'in To Me Documentary"

Discussion Questions: Northern and Indigenous Innovators

Quinn Addison Fraser, 3-Year-Old Toddler & Dinjii Zhuh Ginjik Apprentice

Quinn Addison Fraser is a three-year-old toddler who is at the centre of the online language resurgence. Quinn has strong roots to the GSA: her great-great grandparents were Julienne Andre née Ntadettcha and John Tsal. Her great grandparents were Marka Andre and Richard Bullock. Guided by her shahanh (mother) Crystal Gail Fraser and sheejjį (older cousin) Agnes Mitchell, Quinn actively engages in the **#SpeakGwichinToMe** campaign through daily postings on Facebook (see above) and YouTube videos. You can check out hundreds of their videos on their YouTube channel "Learn Gwich'in with Quinn and Crystal." Focusing on words that are relevant to the life of a toddler, this team has fun with their language lessons. They are committed to learning the Gwichyà dialect.

Can you think of other digital innovators or digital organizations in the North?

What are some of the ways that you can use digital content at work? At home?

What are the benefits of digital content at home or at your place of employment?

What are some potential challenges or problems with digital content?

Digital Content vs. Analogue Content

Now that you have had a short introduction to both historical and present-day examples of communications and **media** in northern and **Dinjii Zhuh** contexts, let's look at some of the underlying technologies that make projects like #SpeakGwichinToMe and *DENE: A Journey* possible.

In the next section, we will review what digital content is, and how it is created. We will also examine the devices and networks that support the creation, sharing and use of digital content. It is important to think about these aspects of digital content, because they help us think through both their potential and the challenges that they raise.

What is Digital Content?

Think of digital content as a kind of technology language that is expressed in all kinds of ways - as images, videos, sounds, and other forms of data.

In English, the term "digital" originates from the word "digit," which refers to the fingers on our hands, as well as numbers. The term digit was adopted and modified to refer to a technology language that processes information in the form of numbers.

Most often, this digital language involves the numbers '0' and '1,' which are used in alternating patterns to express different values. These patterns organize signals and information in a way that allows them to be expressed in forms including written words, sounds, and images.

These patterns of 0s and 1s are read or interpreted through equipment you will be familiar with. It include devices such as computers, USB sticks, and digital cameras. These devices read, process, and store a wide range of digital information (sometimes known as 'data').

Photo by Ashirova on Unsplash

Whether or not it is created new or re-created in digitized form, digital content can be found in many different formats. Here are a few examples:

An Image. Digital photograph of the Dempster Highway

Image: Crystal Gail Fraser

A video. The image on the left is a screen capture from Teetł'it Gwich'in anjòo Sarah Jerome's presentation at the GTC's Gwich'in Academic Conference at Carleton University in 2016 on her residential schooling experience. You can watch this presentation on YouTube.

A sound. Meet William Greenland, an award-winning **Dinjii Zhuh** flute player. Listen to William here:

http://www.cbc.ca/player/play/844708419962/

Image Courtsey of William Greenland

Workshop Activity: Lifecycles of a Digital Photograph

NOTE: A workshop facilitator will guide you through this activity. This workbook contains general information about this hands-on exercise, which consists of 10 steps that you can work through to build your own digital library.

This activity is designed to familiarize you with digital objects and how they can be uploaded to the internet and arranged in a digital library for sharing and preservation.

Along with providing a hands-on introduction to digital content, the activity will demonstrate approaches to content management and what **metadata** is (and why it is important). It will also cover issues about copyright and intellectual property.

Step 1: Let's Create a Digital Object

Let's start with three easy steps - to create a digital object! Take your mobile device or camera and go out into your community and take a photo of something that is meaningful to you.

Step 2: Saving Your Digital Object to Your Computer

Once you have finished taking photos, email your favourite one to your workshop facilitator. This is the digital object that you will use to build a simple digital library.

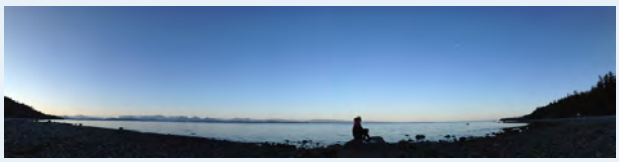


Photo Credit: Wanaao Aurora Piascik.

Gwichyà Gwich'in aspiring photographer, Wanaao Aurora Piascik

Wanaao Aurora Piascik is Gwichyà Gwich'in and currently lives on Vancouver Island. She is the daughter of Juliet Mary Bullock and the granddaughter of Marka Andre and Richard Bullock. Wanaao's creativity during her teen years flourished through her desire to learn more about photography. Wanaao has begun her post-secondary education where her expertise with the camera is paralleled by her curiosity about environmental sciences.

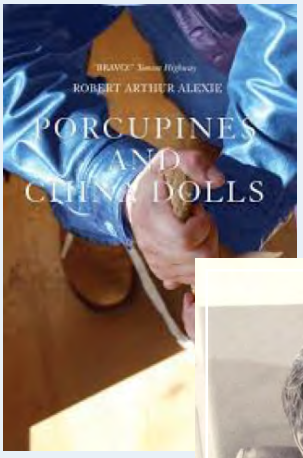
Photo by Alex Cooks on Unsplash

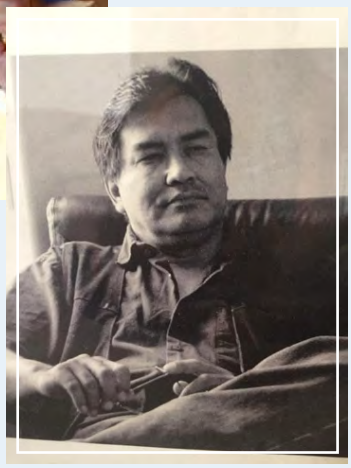
Formats: Types of Digital Content

There are two main types of digital content: it can be either 'born digital' or created from non-digital content through the use of a special device like a scanner.

Born digital content refers to things like digital photographs (such as those taken by your cell phone).

Non-digital content is digital content that is created from other formats, such as scanned versions of photographs taken by older cameras that use film and prints. Non-digital content is also referred to as analogue content.





Above Left: Image courtesy of Theytus Press. Above Right: Image courtesy of Renie Alexie

Robert A. Alexie, Teetł'it Gwich'in Novelist, Leader, and Politician

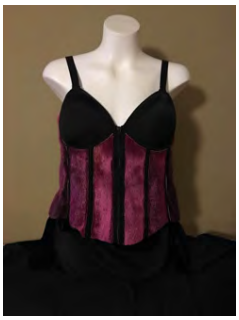
Robert Arthur Alexie was born in Teetł'it Zheh in 1956 to Walter and Enna Alexie. As a child, he attended Fleming Hall and Stringer Hall where he had a love for sports, art, and reading. Robert became an accomplished novelist and writer alongside his successful career in politics. He served as Chief of the Teetł'it Gwich'in and as President of the GTC. Robert was the Chief Negotiator in Dinjii Zhuh land negotiations, which was finalized in the Gwich'in Comprehensive Land Claim Agreement in 1992. He tragically passed away in 2014 and left behind his wife Renie and his children.

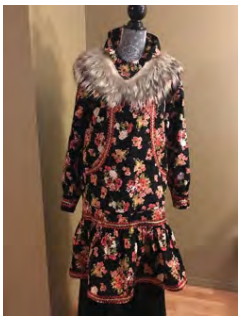
How Do We Make Content Digital?

As noted above, much digital content is not 'born digital'. That means it has an origin elsewhere, such as in oral or physical form, or in another **media** format. Using special devices, we can transform such materials into digital formats.

Below are some examples of non-digital **media**. Can you think of how we might translate these examples into digital forms?

- Sound can be recorded digitally with a microphone. An anjòo verbally shares an important story, from memory, from long ago. This is done so at a culturally appropriate time to a specific audience. For instance, anjòo Mary Kendi shared her knowledge about **ninaa'jh** (bushmen) in 2010. A person writes and publishes a book for others to read. Have you read Robert A. Alexie's Porcupines and China Dolls?
- A soapstone carving, painting, adornment, or clothing is a work of art and expresses meaning through image and shape. Check out the work of **Ehdii Tat Gwich'in** artist Sharon Anne Firth below.





Digitizing Techniques

Digital content requires the use of a special device to access and make use of it. For example, a digital photo must be viewed on a monitor or tablet screen. Before such a photo is viewed in those ways, it might undergo translation by using a device like a scanner (which transforms hard copies of photos, or prints, into digital formats) or a digital camera (which takes a photo using a digital format). The different ways that this process takes place are called digitization.

Optical scan technology is helping researchers at the University of California (UC), Berkeley, preserve audio of 78 Indigenous languages in California, most of which were recorded more than a century ago[1].

As seen in the video, a lot of things have to come together to allow us to create and use digital content on a large scale. This involves more than just the devices we use; it requires a whole digital infrastructure.

A digital infrastructure is a network of connected devices, people, organizations and supports.

What is Needed to Support Digital Content?

Think about the infrastructure that goes into a digital photography business. It might include things like:

- Devices (scanners and cameras).
- People with **media** skills to take and edit photos.
- Computers to store and organize the pictures.
- Internet connections to share them with the world.
- Electricity and transportation links to power batteries and get to places to take photos.

1 Link: https://www.youtube.com/watch?v=H6AqEppqUDA.

Dr. Sharon Anne Firth, Ehdii Tat Gwich'in Olympic Skier, Youth Advocate, and Artist

Dr. Sharon Anne Firth is originally from Aklavik and comes from a large family. She and her twin sister Shirley Firth grew up checking their father's trapline. **Dinjii Zhuh** traditional life conditioned Sharon to become a world class athlete. After training in Inuvik's Territorial Experimental Ski Program (TEST), she and Shirley competed in four Winter Olympics: Sapporo, Japan (1972); Innsbruck, Austria (1976); Lake Placid, New York, United States (1980); and Sarajevo, Yugoslavia (1984). In 2017, she was awarded an honourary Doctorate of Laws from the University of Alberta and is currently an Adjunct Professor in the School of Public Health at the University of Alberta. She is the Ambassador for NWT Fur and was inducted into the Order of the Northwest Territories in 2018. In her spare time, Sharon crafts unique clothing and jewelry designs and runs her business "Sharon Anne Firth Jewelry" on Facebook.

Discussion Questions: Making Content Digital

How is digital content different from non-digital content?

What are some of the benefits of digitizing content in your home or at your place of employment?

How about on the land? At your family's fish or whale camp?

What are some of the devices (resources, tools or supports) that you need to digitize content?

What are some of the challenges or problems with using these devices to digitize content?

Image courtesy of Cynthia Walker.

Cynthia Walker, Gwichyà Gwich'in, Creative, Marketing, & Digital Strategist, Owner of Rebel Soul Creative

Gwichyà Gwich'in woman and creative strategist Cynthia Walker of Edmonton has had enormous success in the field of branding, marketing and graphic design. She uses technology as a tool to create digital content. Whether creating useful, relevant content for her clients, for her client's clients, or simply crafting artwork for personal interest, brand awareness and community engagement on and off-line, she recognizes and respects that this industry demands continued learning in order to stay on top of current trends and technology. Cynthia notes that "The irony is that while it can be overwhelming at times, the technology is becoming more advanced and intuitive, and is ultimately designed to make our lives easier."

Workshop Activity: Lifecycles of a Digital Photograph

Viewing Device-Driven Metadata (Step 3)

Along with capturing and storing digital content, our devices can tell us a lot about that data. In fact, our devices capture a lot of information about our **digital content**, as well as other things such as location, time and date information of photos or videos we create. It is important to be aware of the kind of information that our devices are collecting from our activities.

This activity is designed to introduce you to **metadata**, which we discuss later as "information about information". **Metadata** is very useful in organizing and managing your digital content.

As an introduction to this concept, let's look at the information that is stored on a device about **digital content** that you create. This 'device-driven **metadata**' is automatically captured or embedded in digital objects such as photographs.

Most technology designed to capture content in digital formats, like the digital cameras on our phones, will automatically save this kind of **metadata**. Anyone can find this device-driven **metadata** if they look at the digital object (or a copy of it) saved on their computer.

Now that you have taken your digital photo and moved it to a computer, you can easily view this **device-driven metadata**. In this activity, a facilitator will show you how to find and view this information on your computer. You may be surprised at what information is being captured from your digital device!

Photo by Markus Spiske on Unsplash

Discussion Questions: Device-Driven Metadata

What kind of information is 'embedded' in your digital object?

What are some of the benefits of knowing this information about your digital object?

What might be a negative result of the device collecting this information?

Photo by Danliel Korpai on Unsplash

Module 2: Organizing Digital Content

In Module 1 we covered an introduction to **digital content**. Through the activity steps, you created and saved a **digital object** (photograph). Once physical and analog artefacts are digitized, the next step is to consider how they will be accessed and used.

As covered earlier, digital content requires the use of certain devices to access and make use of it; for example a digital photo must be viewed on a monitor or tablet screen.

Digital content also needs to be organized so it can be easily found. This second module looks at how you can organize digital content using resources such as **website access rules** and **metadata**.

This work requires careful planning and consideration of how digital content will be organized and accessed. One way to think through this planning is through **website access rules**. We will cover some of the '**back-end**' and '**front-end**' considerations that people and organizations think about when they are building a website, which illustrate different ways to protect and share **digital content**.

The device-driven **metadata** activity provided an introduction to another aspect of organizing content: **metadata**. In this module, we go into more detail about **metadata**. When used effectively, **metadata** can be a powerful way to organize, share and apply **digital content**.

We will also consider some of the ways that people and organizations control and share the **digital content that they have created.**

Digitizing Content Changes the Content

Digitizing content changes it in many ways. Compared to some other forms of analogue **media**, like books or cassette tapes, digital content is easier to create, copy, delete, remix, share, store, and preserve.

Create - it is now much easier to take professional-quality photos and record professional-quality sounds. Think about the cameras and recording devices that you carry in your pocket all the time - in your mobile phone. These phone apps are so much easier to use than professional cameras and audio recording equipment!

Remix - it is also simpler to edit and alter our digital content - sometimes also on our phones. A digital photo can be cropped or given a visual effect (e.g. changed to black and white); audio and video files can be easily cut and edited. You can apply Instagram or Snapchat filters to adjust how your videos and images look.

Mash-up - a mash-up is when you combine digital content to make things like photo collages, songs made by sampling from several other songs (hip-hop and rap music uses this technique a lot).

Share - it is much easier to make copies of your digital content and share them with friends, family, and the world. Perfect copies can be made an no cost and shared with anyone who has access to the internet. **Social media** makes it even easier to share content!

Search/Retrieve - because of **metadata** (which you will learn more about in this module) large numbers of files can be searched at a single time. The internet can also be easily searched to find material; think about the Google search engine.

Digital is Different

Here is a short video explaining some of the ways that digital content helps us create and connect with one another. The video was created by Dr. Michael Wesch, an Associate Professor at Kansas State University: The Machine is Us/ing Us.[2]

Store - content can be stored and copied on computers, smartphones, USB sticks, memory cards, or on the internet (ie. in the cloud).

Organize - files can be put in folders on your computer or in your email. These files are easily moved or copied among folders.

Preserve - because copying is simple and low-cost, and content can be stored on multiple devices or in the cloud, preserving content can be made simple. With digital content, remember the rule of LOCKSS, which stands for: "lots of copies keeps stuff safe".

Destroy / Delete - with the click of a button, digital content can easily be deleted. While you can sometimes 'undo' this and retrieve deleted content, in some cases it can be hard to restore.

2 Link: https://www.youtube.com/watch?v=NLlGopyXT_g

Despite all these exciting uses, digital content makes some things harder to do. For example, compared to **analogue content** like books or casettes, it is harder to control and own **digital content**.

Therefore, digitizing content can have both positive and negative effects.

There are many ways to use **digital content** in our daily lives. From creative expression to practicing language to learning about our world, **digital content** brings many benefits to ourselves and our communities.

At the same time, there are negative impacts associated with **digital content**. People can access hurtful or hateful materials, be exposed to **misinformation**, or learn about inappropriate things.

As well, since **digital content** can be very easily copied and shared. Think about a video or photo that **goes viral** on **social media**; it can be harder to control than **analogue media**.

For these reasons we should think carefully not only about the kinds of digital content we can access and use, but also about its impacts, both beneficial and negative.

How is Digital Content Organized?

Once physical and analog objects are digitized, the next step is to consider how they will be accessed and used.

Digital content needs to be organized so it can be easily found. Think about the hundreds (maybe even thousands?) of digital photographs you have taken.

How do you organize them? How do you find the ones you may be looking for? Let's be honest: do you sit down and organize your photos??

Given our busy lives, it is fair to assume that many of us don't think about how best to organize our **digital content**. And that is okay.

Photo by Samuel Zeller on Unsplash

Organizing this information, however, can also be a useful practice to help save you lots of time over the long term, especially for digital information and files at work!

Organizing **digital content** requires careful planning and consideration.

Digital content differs in type and format quite extensively, as different software and computer developers are constantly developing new ways to store digital content.

In the next two sections we will consider two techniques that they use: **website access rules** and **metadata**.

Website Access Rules: Front-end and Back-end of Websites

In some ways, websites are like stores; they house and organize things and present different perspectives to view those things.

The **front-end** of both websites and stores is the public-facing side of these organizations. It is carefully organized and presented for a broad audience: think of carefully arranged bales of **uutsik** (dry fish) or **kaiitreh** (shoes or moccasins) sold at the GTC office.

The **back-end** of websites are like the warehouses storing the things that will later be arranged at the storefront. This part of a store is not designed for the public and often houses many more things than are available at a store. Importantly, the owners of a store will think carefully about the content at the **back-end** before it is placed in the **front-end**. They have control over how and why they want to display it to the public.

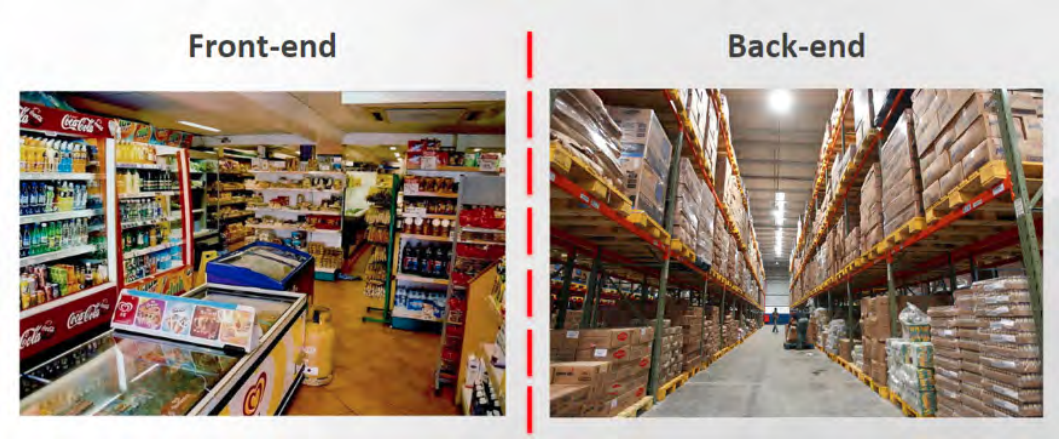


Image credit: Front-end: Joseph Mischyshyn Back-end: Secom Bahia

Turning to how **digital content** is organized, we can think about how different tools help us manage and organize digital content in ways that separate public from private information. The image on the next page is organized like the store image, showing both **front-end** and **back-end** aspects.

The diagram on the next page illustrates a website. Notice how some, but not all, of the material is available to the public. The group of people on the left side are the public; they can see a certain image,

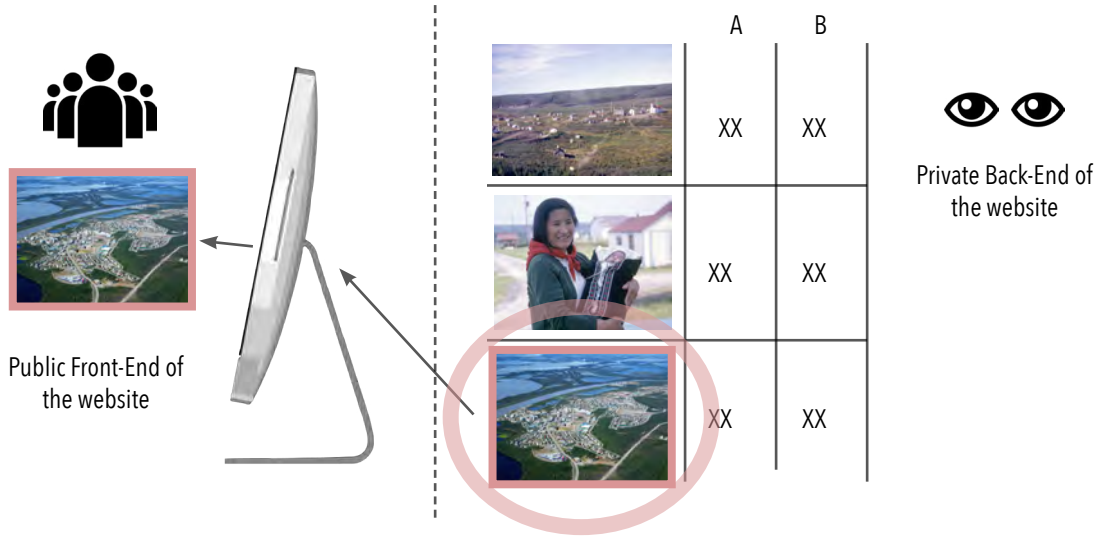


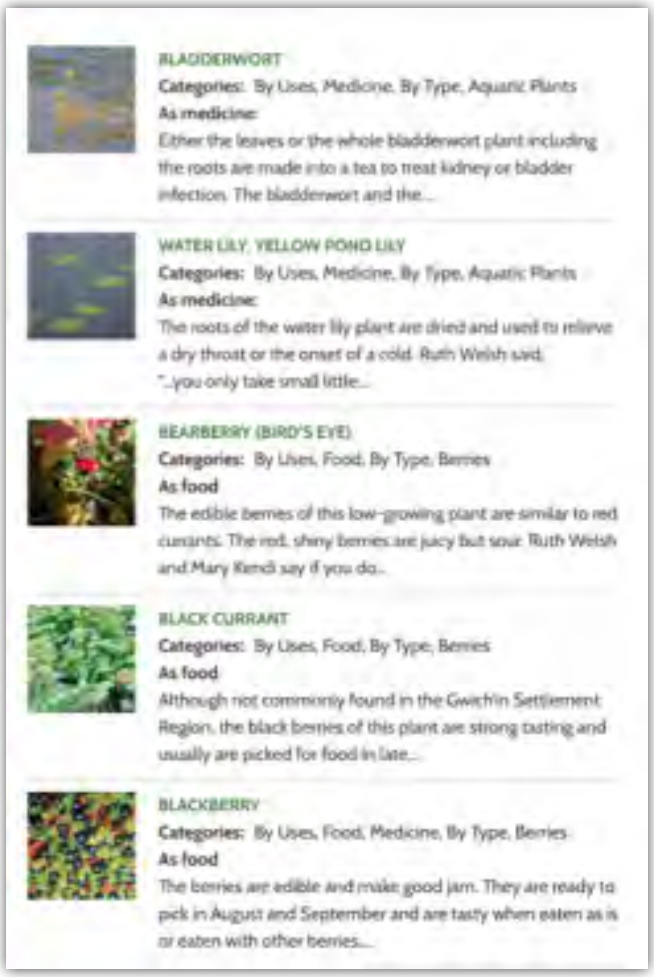
Diagram: Gwich'in Digital Literacy Team - Eye icons: from Iconmoon, Public Icon: OCHA CC BY at flaticon.com

which is illustrated on the right side with the red circle. The eyes on the right side are those of the website owner, who has collected a number of digital photographs, but only chose to share that one publicly.

Let's learn a little more about the back-end of a website. The image below illustrates three key elements in the back-end (private) part of a website:

1. **Object** - this is the **digital object**, like a photograph that is stored and organized in the website. In this example, you can see six different **digital objects** that are housed in the database or catalogue at the right side of the image.
2. **Record** - this is the information about the **digital object**, the **metadata**, which we describe in more detail later. You can see in this example that the **metadata** includes information about the object: that it is a dog team from **Tsiigehtchic**.
3. **Database / Catalogue** - this illustrates a collection of **digital objects** and the records they are associated with. It is meant to show that the **back-end** of a website, just like that of a store, contains a number of items that may or may not be presented publicly.

Diagram: Gwich'in Digital Literacy Team - Photos: Keith Billington - GTC-DCH



BLADDERWORT
Categories: By Uses, Medicine, By Type, Aquatic Plants
As medicine:
Either the leaves or the whole bladderwort plant including the roots are made into a tea to treat kidney or bladder infection. The bladderwort and the...

WATER LILY, YELLOW POND LILY
Categories: By Uses, Medicine, By Type, Aquatic Plants
As medicine:
The roots of the water lily plant are dried and used to relieve a dry throat or the onset of a cold. Ruth Welsh said, "...you only take small little...

BEARBERRY (BIRD'S EYE)
Categories: By Uses, Food, By Type, Berries
As food
The edible berries of this low-growing plant are similar to red currants. The red, shiny berries are juicy but sour. Ruth Welsh and Mary Kendi say if you do...

BLACK CURRANT
Categories: By Uses, Food, By Type, Berries
As food
Although not commonly found in the Gwich'in Settlement Region, the black berries of this plant are strong tasting and usually are picked for food in late...

BLACKBERRY
Categories: By Uses, Food, Medicine, By Type, Berries
As food
The berries are edible and make good jam. They are ready to pick in August and September and are tasty when eaten as is or eaten with other berries...

Now let's look at the **front-end** of a website. The image below illustrates an example of a public website about plants that was created by the GTC. As you can see in the image below (and explore by visiting the website at: https://gwichin.ca/plants), the GTC has chosen to make publicly available a database that features certain records and objects about plants in the region.

The objects (shown in the red circle in the image below) are photos of a family with their dog team, and the records provide information about that image. What are some examples of that information? It is the **metadata**

that was created for this website.

Image Credit: GTC Department of Cultural Heritage.

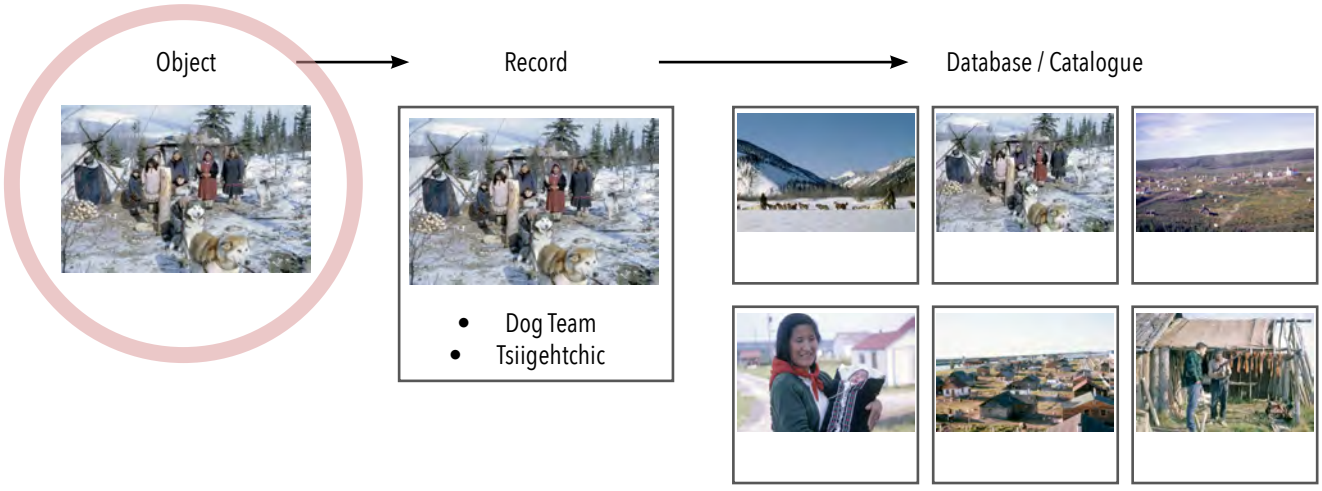


Diagram: Gwich'in Digital Literacy Team - Photos: Keith Billington - GTC-DCH

Mukurtu Digital Library: Plateau Peoples Web Portal

Another example of a website is the **Plateau Peoples Web Portal**, which was created using **Mukurtu**[3] (pronounced: MOOK-oo-too), a freely available and open-source digital library system. **Mukurtu** was designed by and for Indigenous communities. It is an open-source webpage management system you can use to create a **community archive** or **digital library**.

Link: https://plateauportal.libraries.wsu.edu/

We will be using **Mukurtu** as a tool to demonstrate and learn about how digital content can be organized, shared, and preserved in a **digital library**.

Introducing Metadata: How is this relevant to me?

Now that we have covered **website access rules**, let's examine another resource that we can use to organize our **digital objects**. **Digital objects** have a number of helpful design features; one is the ability to embed them with information.

This **metadata** allows for much easier ways to organize and search for the **digital objects** we need. As illustrated below, in our website diagram, **metadata** applies more details to the record (which provides information about objects in a database).

Gwich'in Digital Literacy Team - Photos: Keith Billington - GTC-DCH

3 Link: www.Mukurtu.org

What kind of **metadata** might be important to record for digital content at home or at work?

Types of Metadata

There are many different types of **metadata** to help us organize our digital objects.

Describing what something is about is one type. This **subject metadata** changes depending on who is describing it. This is very important in digital collections because it describes "about-ness" in one consistent way, so we can collect content together, even if it is different formats or types of content.

Describing the fixed characteristics of something is another type of **metadata**. This **objective metadata** refers to things like the format, or the time and place the digital object was created.

The **metadata** describing the format of **objects** will be different: for example a photo, map, or book. The **subject metadata** about the object, however, would be the same.

As a short activity to illustrate the difference between subject **metadata** and objective **metadata**, take a look at the images below.

Diagram: Hanne Pearce | Gwich'in Digital Literacy Team

Subject metadata: What is the **Dinjii Zhuh Ginjik** name for this place, "Fort McPherson"?
Objective metadata: See how "Fort McPherson" is represented as a photo, map, and book.

There are many other standards that we can used to describe digital objects. These include:

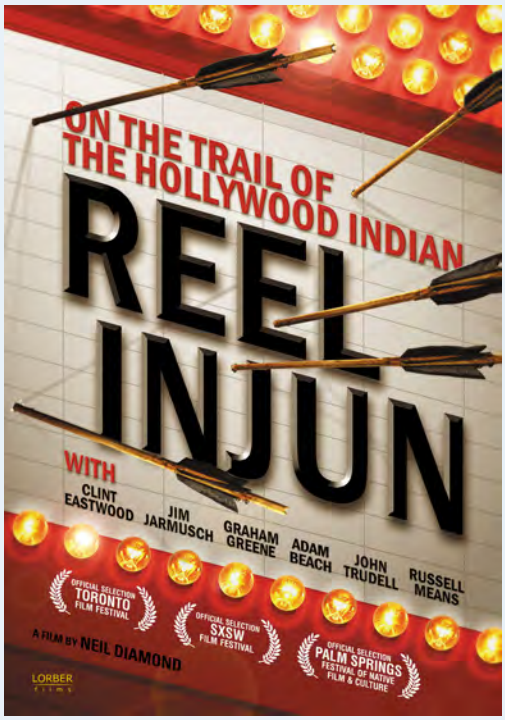
- Subject
- Description
- Geographic tags
- Time
- Authors(s) and Contributor(s)
- Language
- Format information (file)

A major standard for **metadata** that is used widely is the **Dublin Core Metadata Initiative** that has 15 different **metadata** categories, including the ones listed above and more.

What might be some of the problems with using just one type of **metadata**?

By describing digital objects with the same subject **metadata**, we make them findable and accessible. It is important that the people and communities most familiar with digital objects are involved in creating and setting the **metadata** standards used to describe and organize them. Otherwise, digital objects can be labelled incorrectly.

Can you think of an example from TV, radio or online **media** that included incorrect information about something?



Reel Injun film

Nehiyaw (Cree) filmmaker Neil Diamond explores different ways that Indigenous peoples have been represented in film. These range from silent films starring Indigenous peoples to stereotypes with non-Indigenous movie stars, 'white saviour' narratives, and modern Indigenous filmmakers. It includes interviews with actors, activists, and film historians. You can learn more about the documentary here: http://www.reelcanada.ca/films/reel-injun/

Let's do a subject **metadata** activity. Take a look at the photos below and write down what you think each photo is about. Then show the photos to a friend and ask them to do the same thing (without looking at your answers).

Photos Keith Billington - GTC-DCH

Did you get the same results?

This activity demonstrates that subject **metadata** is, indeed, a very subjective perception that means different things for different people. For this reason, most digital libraries adopt standards to make their **metadata** consistent.

Activity: Lifecycles of a Digital Photograph

Uploading the digital object into Mukurtu (Step 4)

NOTE: You need to work through this activity with a workshop facilitator who has installed **Mukurtu** on their computer. The activity illustrates how you can add your digital photograph to the **Mukurtu** digital library.

At this point, we have captured and created a digital object, uploaded our image to a computer, and added it to the **Mukurtu** digital library. We will now start building a public record that will describe this image in our digital library.

This activity allows you to add more information about your photo for the digital library. **Metadata** consists of more than the technical information associated with your **digital object**. It also tells us important details. These include:

- A title or name for the image
- The category this image belongs to
- Identifying any people in the image
- Adding some keywords that can help locate the image in the image bank

Now that you know about **metadata** and differences between descriptive **metadata** and subject **metadata**, you are ready to start applying public **metadata** in **Mukurtu**. **Mukurtu** allows you to add several different types of metadata, such as:

Title	Creator	Type	Subject
Category	Original Date	Language	People

Note: The user can set this information so it is only viewable/accessible to them (ie. not publicly viewable). This facilitator will describe this function to you.

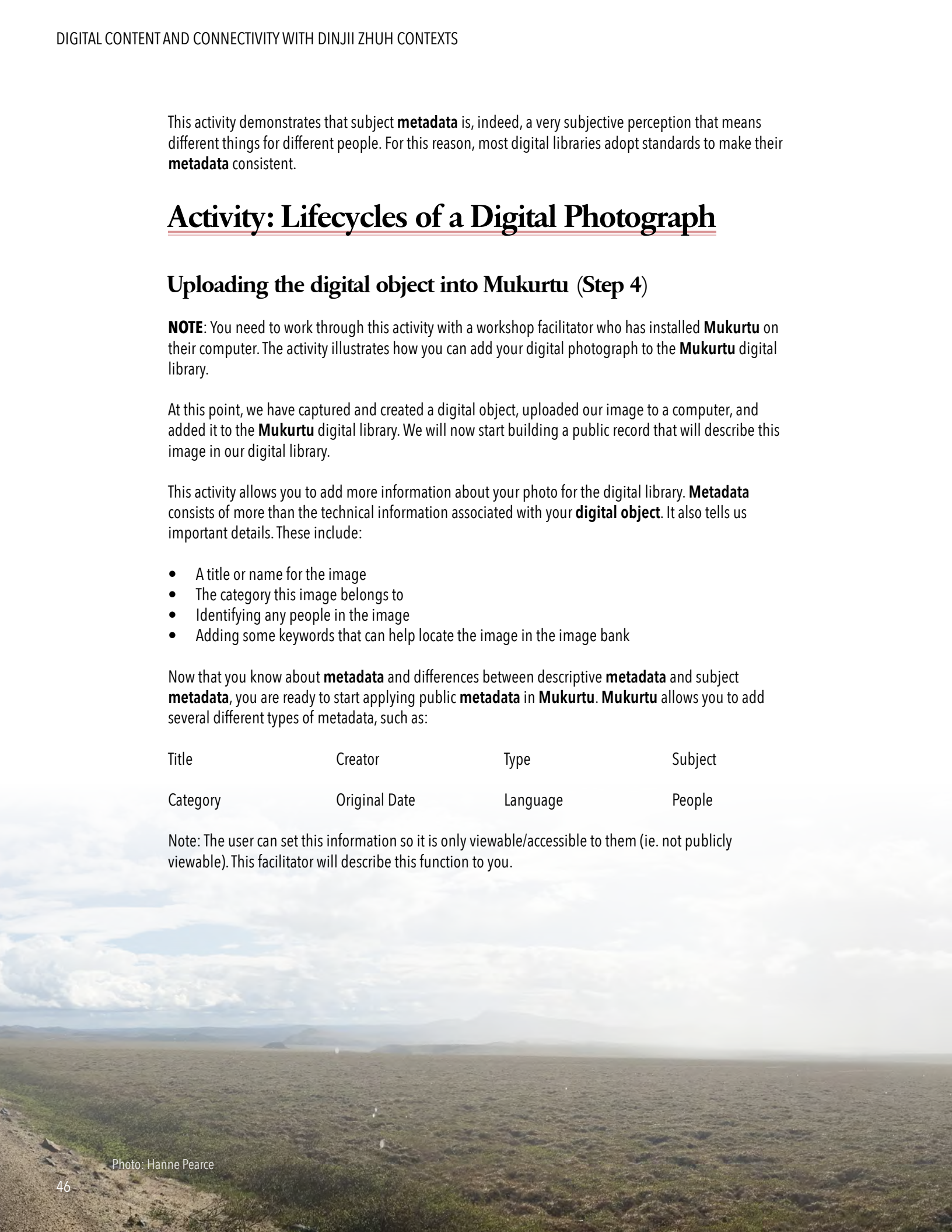


Photo: Hanne Pearce

The Gwich'in Tribal Council's Management of Metadata

One place to start learning about using a standard to organize **metadata** is the GTC's Department of Cultural Heritage. That organization has outlined a process that they use to guide collaborations between **Dinjii Zhuh** communities, **Dinjii Zhuh** institutions, and qualified research teams[4].

Discussion Questions: Subjective and Objective Metadata

What kinds of **metadata** are important to record for digital content at work?

What are some problems with using just one type of standard for **metadata**?

How can we solve them?

Research Information from GTC's Department of Cultural Heritage

Reprinted with permission from the GTC's Department of Cultural Heritage website: https://www.gwichin.ca/researcher-information.

Every year, exciting and important social science research is undertaken in the Gwich'in Settlement Area. Often this research is the result of collaborations between Gwich'in communities, Gwich'in institutions, and qualified research teams.

The Gwich'in welcome collaborative research that invites research participants and local community members to determine appropriate research areas and approaches. Collaborative research methodologies often involve direct community benefits in the way of training, education, capacity building, Elder-youth interaction and employment.

Researchers who are interested in working with Gwich'in communities or in the Gwich'in area should be aware that there are several processes through which research is licenced. The GSCI recommends that researchers in any discipline start their licensing process early, and those interested in social science research contact appropriate community and regional organizations near the start of their planning processes. Specifics about working with Gwich'in communities can be found in the GSCI document: Conducting Traditional Knowledge Research in the Gwich'in Settlement Area: A guide for researchers[5].

4 Link: https://www.gwichin.ca/content/gwich%E2%80%99-tribal-council-launches-new-cultural-heritage-website.
5 Link: https://nwtresearch.com/sites/default/files/gwich-in-social-and-cultural-institute_0.pdf

Presenting, Archiving, and Preserving Content

Now that we have covered some of the technical elements of organizing digital content - **website access rules** and **metadata** - we can move to public-facing (front-end) examples of collections of digital content. Specifically, we focus on digital libraries and issues related to the **archiving** and **preservation** of **digital content**. With reference to our website access rules diagram, this discussion relates to the '**database / catalogue**' aspects.

Diagram: Gwich'in Digital Literacy Team - Photos: Keith Billington - GTC-DCH

Digital Innovations: Digital Libraries

Digital libraries are collections of digital content online. In some cases the content of digital libraries are freely available, while other digital libraries require you to pay access their content.

Digital libraries are different than other websites as they seek to preserve and grant access to digital content for users interested in exploring it. In many ways, digital libraries are similar to physical libraries.

Here are examples of a digital and a physical library

Screenshot from Inuvialuit Cultural Resource Centre

Image of the Inuvik Centennial Library

Image source: https://www.inuvik.ca/en/getting-active/Library.asp

Examples of Digital Libraries

To explore some online digital libraries, visit the links below:

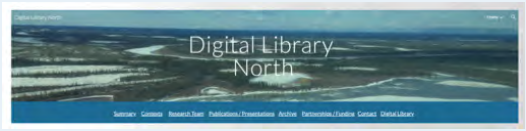
- Blackfoot Digital Archives [6]
- Sípnuuk Digital Library [7]
- Indian Peoples of the Northern Great Plains Digital Collection[8]
- Internet Archive[9]
- New York Public Library[10]
- Bodleian Library Oxford [11]
- Kenojuak Cultural Centre [12]

Archiving and Preservation

Digital content continues to evolve as new technologies and methods of storing and preserving information are discovered. The **storage devices** and **file types** that we used 10-15 years ago are already obsolete. For example, most people no longer watch films on VHS tapes or listen to music on cassette tapes.

If the purpose of digitizing content is to preserve it, then we must maintain the content on current technology to make sure future generations can access it. This means periodically migrating or transferring content into newer formats. For example, old films are now being digitized so they can be **streamed online**.

6 https://www.blackfootdigitallibrary.com/digital/collection/bdl
7 https://sipnuuk.karuk.us/
8 http://arc.lib.montana.edu/indian-great-plains/
9 https://archive.org/
10 https://digitalcollections.nypl.org/
11 https://www.bodleian.ox.ac.uk/
12 http://kenojuakcentre.ca/



Digital Library North and Dr. Ali Shiri's Webinar

The following summary is printed with permission from the Digital Library North Research Project Homepage.

This project is a collaboration between the Inuvialuit Cultural Research Centre in Inuvik, Northwest Territories and researchers at the University of Alberta in Edmonton, Alberta.

In Canada's North access to information has been limited by the lack of high speed communications infrastructure and relevant digital information sources. With improved digital connectivity in the Mackenzie Valley and the Inuvialuit Settlement Region (ISR), the development of a digital library to support digital content delivery within this region is becoming more practical and pressing.

The objective of the Digital Library North project is to create a digital library infrastructure to address the information needs in Canada's northern regions.

On April 12, 2018 we hosted a webinar with Dr. Ali Shiri from the University of Alberta School of Library and Information Studies. Dr. Shiri has been the lead on the Digital Library North project.

You can watch the webinar at this link:
http://bit.ly/WebinarDLN2018

Image courtesy of Ali Shiri

Thunder in Our Voices: An Example of an Online Archive

In 1975 non-Indigenous radio reporter Drew Ann Wake travelled north to cover the **Berger Inquiry** hearings. Thirty-five years later, Wake discovered her audio cassettes from those hearings, which consisted of 150 hours of northerners' testimony. She, along with photographer Linda MacCannell, decided to take their recordings and photographs to communities along the **Nagwichoonjik** (Mackenzie River) so people could hear the voices and see pictures of Elders.

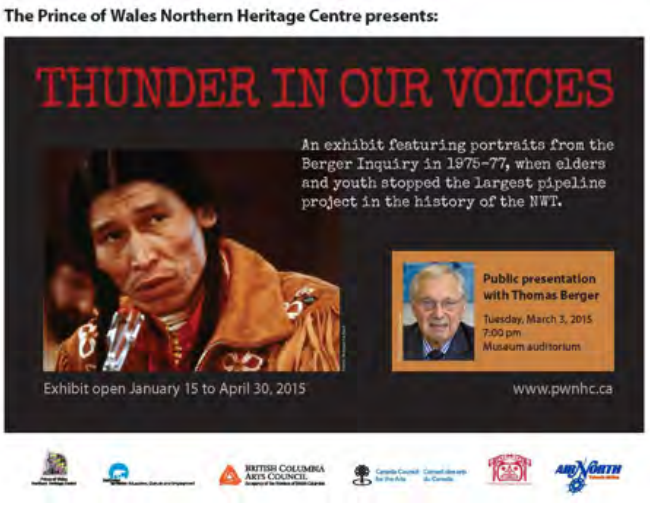


Image Source: http://www.edgenorth.ca/event/exhibit-opening-thunder-in-our-voices-with-presentation-by-thomas-berger/

They first visited **Tthenáágó** (Nahanni Butte) and discovered that they had the only existing photographs of Elders who were born in the late nineteenth century. Wake and MacCannell left computer discs with the images on them in the communities they visited. Over the course of four years, they visited 25 communities and the exhibition *Thunder in Our Voices* began to form.

The Prince of Wales Northern Heritage Centre in Yellowknife launched Thunder in Our Voices on the fortieth anniversary of the day the Inquiry opened. In 2016, **Beaufort Delta Education Council** (BDEC) staff in Inuvik watched an interactive version of the exhibition, which focused on the historical images of the **Berger Inquiry** hearings. This event prompted a response from an Indigenous woman who was also a BDEC school principal.

A historical image from the Berger Inquiry when Judge Thomas Berger visited Tsiigehtchic. Gwichyà Gwich'in women Julienne Andre (née Ntadettcha) (R) and Alestine Andre (L) offer their testimony on March 13, 1976 in Tsiigehtchic. Photo Credit: Michael Jackson, obtained with permission from Drew Ann Wake

Photo: Hanne Pearce

She said:

These are our voices. I don't know how we can tell our Elders that these stories are going to reside on a server far away. They should be here, on our server, on our computers, so our children can hear them as often they want.

This woman raises some important issues about the archiving and preservation of digital content. She also asks questions about the ownership and control of that content.

Barriers to Archiving and Preservation

Despite the many benefits of using tools to capture, store and organize your digital content, there are several barriers to **archiving and preservation**. Some of the ways that **digital content** can be lost or made unavailable over time include:

Obsolescence: Technological changes can make it so devices (like phones and computers), software programs (like **Mukurtu** or Instagram) or file formats (like .JPEG or .MP3) no longer work. This is called **obsolescence**. For example, some file formats that were used by software from the 1990s and early 2000s such as Corel's Word Perfect text files, may not be easily opened on modern computers. Storage hardware can also become obsolete, such as the **floppy disk.**

When **preserving digital content**, unfortunately you can't simply assume that it will be usable forever. You have to actively check your copies to make sure that the file format and storage medium are still readable.

Above L-R: Marka Bullock (née Andre), Julienne Andre (née Ntadettcha), and Alestine Andre at Dachan Choo Gę̣hnjik.

Summer of the Loucheux: Portrait of a Northern Indian Family (Graydon McCrea and Tamarack Films, 1983)

The 1983 film Summer of the Loucheux "[s]hows how a twenty-eight-year-old native Loucheux Indian leaves her city job every summer to go fishing with her family, renewing her relationship to the land. [It u]ses archival photos in reconstructing the recollections of her grandmother and provides an overall observation of Loucheux traditions."

This film, originally recorded on analogue film, has now been digitized and is housed on the Internet Archive website, where you can watch it by visiting: https://archive.org/details/summeroftheloucheuxportraitofanorthernindianfamily

Redundancy: Sometimes an accident or an event can destroy data, particularly if it is housed in only one place. An example: if building catches fire or a computer breaks down, have you saved your information in another place?

In cases where there is no backup for your **digital data**, there is a lack of **redundancy**. This is one challenge that **cloud computing**, which stores **digital data** in a 'cloud' of networked places, attempts to solve.

However, as raised by the **BDEC** principal in her discussion of *Thunder in Our Voices*, cloud computing can result in a loss of **ownership** and **control** over **digital content**. This is an issue that is explored in the next section, about protecting **digital content.**

Lack of, or expensive, bandwidth: One of the ways that **digital connectivity** impacts digital content is through the availability of bandwidth that we can use to transfer digital files. If **bandwidth** is not available, extremely slow, or **expensive** to use, it can influence our ability to share and store our digital files.

Discussion Questions: Archiving and Preservation

What might be some challenges for **preserving digital content** for the future?

What kinds of **digital content** might communities want to preserve?

How can **Dinjii Zhuh** knowledge be housed and protected appropriately online?

Module 3: Protecting Digital Content

When creating stories based in Indigenous cultures, there is a risk of appropriation[1]. **Cultural appropriation** is when one culture takes material from another culture for their own purposes or benefit, frequently losing the cultural materials' context or significance in the process. When using cultural material from another culture there is a risk of disregarding sacredness and meaning, such as wearing a headdress to a concert. Other **cultural appropriation** may reinforce stereotypes, as seen in halloween costumes.

Often there is a power imbalance where the culture being appropriated is at risk of exploitation. With **cultural appropriation**, persons with greater privilege may benefit from cultural elements that are or were prohibited or penalized for persons in more marginalized cultures. Non-Indigenous people may profit from making and selling dream catchers or other other cultural items without the right context or teachings, and Indigenous people may be discriminated against for practicing their own cultures. Co-creating stories with storytellers, knowledge keepers, and Elders will help ensure cultural material is not shared inappropriately or without consent.[2]

Cultural appropriation is a complex and controversial topic. Take time to consider where your own opinions lie on using materials from other cultures, and why you have those beliefs or opinions.

Who Owns Digital Content?

Content that has been digitized and made available online will probably eventually be found by others who may be interested in using that content. Most people will just want to read, listen, watch, learn from and enjoy it.

Some may, however, want to reuse it for their own work. Reuse and remixing of content has been happening for as long as people have created and shared **media**.

Tools to Manage and Protect Digital Content

There are many different ways we can try and manage and protect the **digital content** we create. **Copyright** Law protects creators and lays the groundwork for concepts of **Fair Dealing** as well as **Creative Commons Licences**. Software and website **Terms of Use** and **End User Licensing Agreement**s are legal contracts that also govern information use.

CBC's Rosanna Deerchild: Cultural Appropriation v.s. Cultural Appreciation

Rosanna Deerchild with *CBC's Unreserved* talks about halloween costumes and the difference between cultural appropriation and cultural appreciation. Cultural Appropriation v.s. Cultural Appreciation [2] (3m38s)

1 This section was written by Amanda Almond, an MA student (Community Engagement, University of Alberta). Amanda developed this content with Saddle Lake Cree sculptor Stewart Steinhauer and Knowledge Keeper Dr. Diana Steinhauer to support a collaborative digital media project focused on Indigenous-settler relations.

2 https://www.facebook.com/%20cbcunreserved/videos/1302918419732348/.

Examples of Remix

Ahead By A Century / Silatujuujutit[3]- The Jerry Cans Cover The Tragically Hip

Leanne Betasamosake Simpson[4]

Tribe Called Red (feat. Tanya Tagaq)[5]

Cultural rules and knowledge-sharing protocols are grounded in and developed by communities and knowledge holders.

Technical rules are ways that we can use devices and software to create barriers around our work, such as the **Mukurtu** access rules. Another example is **Technological Protection Measures** (also known as digital locks) that can prevent users for accessing or copying content.

Educational rules include guidelines for users, such as **Traditional Knowledge Labels** developed by **Local Contexts.**

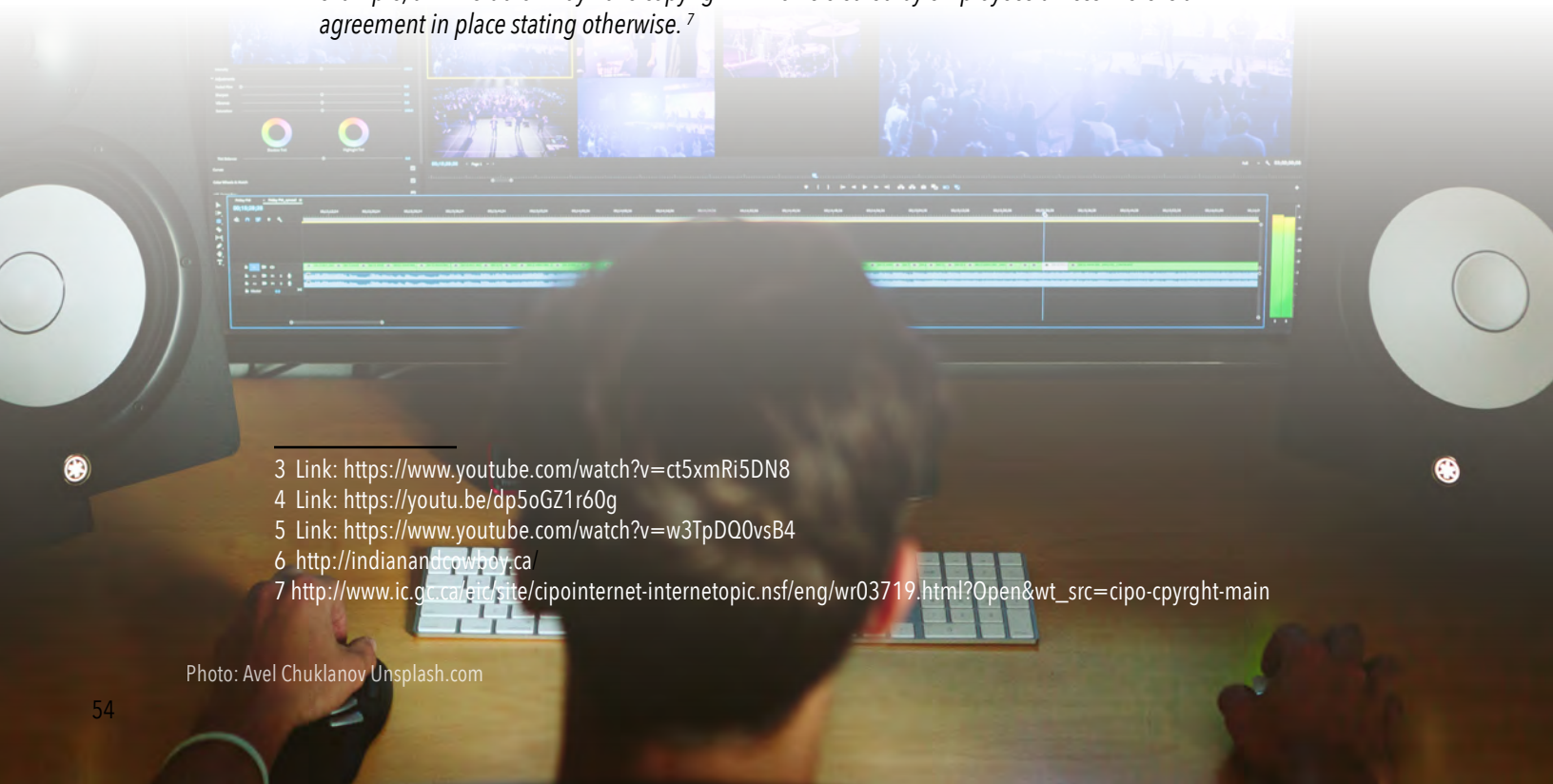
Commercial rules include charging people for access to a **digital library**: think of online content-sharing platforms like Netflix and Spotify. There are examples of these kinds of platforms being controlled by content producers. One example is the donation-based Indian & Cowboy media platform, which was developed by Anishinaabe comedian and writer Ryan McMahon to support emerging Indigenous voices in **media**[6].

In the next section, we will explore some of these resources.

Legal Rules: Copyright (and its Alternatives)

Content created in the modern legal context of most countries is now protected by **Copyright**. In Canada, **copyright** is governed through the **Copyright Act**. The **Canadian Intellectual Property Office** states copyright is:

> *the exclusive legal right to produce, reproduce, publish or perform an original literary, artistic, dramatic or musical work. The creator is usually the copyright owner. However, an employer–for example, a film studio–may have copyright in works created by employees unless there is an agreement in place stating otherwise.* [7]



3 Link: https://www.youtube.com/watch?v=ct5xmRi5DN8
4 Link: https://youtu.be/dp5oGZ1r60g
5 Link: https://www.youtube.com/watch?v=w3TpDQ0vsB4
6 http://indianandcowboy.ca/
7 http://www.ic.gc.ca/eic/site/cipointernet-internetopic.nsf/eng/wr03719.html?Open&wt_src=cipo-cpyrght-main

Photo: Avel Chuklanov Unsplash.com

Photo by Mike Giles5655 on Unsplash.com

Copyright protections are subject to certain exceptions and limitations.

Fair Dealing is a specific set of exceptions defined in the **Copyright Act** that allow for the use of copyright protected materials without permission by those are not the copyright holder. The **Copyright Act** provides eight fair dealing categories: research, private study, education, parody, satire, news reporting, criticism and review. It is important, however, to note determining if a use (or dealing) is fair is a complicated process.

Other **Exceptions** in the **Copyright Act** range from exceptions for educational institutions, libraries, and museums to personal exemptions for creating user-generated content and making personal copies in different mediums.

This is the **copyright symbol** and it is often used to show who the **copyright** holder is in a work.

©

9 https://copyright.ubc.ca/guidelines-and-resources/faq/basics/
10 https://www.ualberta.ca/copyright/intro-to-copyright-law/canadian-copyright-law

Copyright Resources

For the purposes of this introductory course, we have simplified some elements of copyright. Here are some resources that you can visit for more information:

- Canadian Intellectual Property Office has a "Copyright Guide"[6] that provides an introduction to copyright.
- University of British Columbia has an introductory copyright page that answers some Basic FAQs[8]
- University of Alberta has some more detailed information about Canadian Copyright Law[9]

That said, a work can still be protected by **copyright** even if the symbol is not included. You don't need to include **the copyright** symbol to protect your own work. Simply by making an original work in a fixed format you hold the copyright to that work. For example, you are the copyright holder for any photographs that you took for the 'Lifecycles of a digital object' activity.

Some authors want to encourage authors to reuse their work. **Creative Commons (CC) Licenses** are a popular way to indicate that content is free to be used under certain conditions. Although CC work is still protected by **copyright**, it also has a licence that grants some uses. Most **CC Licenses** require other who use the work to acknowledge the original creator, but allow others to copy and view the work. **CC Licenses** also allow authors to determine if others can remix their work and sell it or use it commercially. The symbols on the right side of the image above indicate what conditions a **CC License** holds, such as 'non-commercial' or 'share alike.' Visit the CC website to learn more: https://creativecommons.org/ .

CC0 "No Rights Reserved"[11]
CC0 enables scientists, educators, artists and other creators and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.

In contrast to CC's licenses that allow copyright holders to choose from a range of permissions while retaining their copyright, CC0 empowers yet another choice altogether – the choice to opt out of copyright and database protection, and the exclusive rights automatically granted to creators – the "no rights reserved" alternative to our licenses.

Activity: Can you use it?

This activity is led by the workshop facilitator. It involves working in groups to decide whether a set of materials is in the copyrighted, open access or public domain.

Authors, Publishers, Employers, and "Rights Holders"

When talking about copyright we often use the word "authors." For example: "copyright protects authors." One important part of **copyright** is the fact that many of the rights can be transferred from one person or group to another person or group. This often happens when one signs a **publishing agreement** (usually to have content published by a press, paper or magazine), or if one signs a **music recording contract** or **TV/film/movie contract**. In these cases, even though you may be the author, the contract transfers your rights to the publisher who becomes in legal terms the **rights holder**. Depending on the terms of the contract, you may not be able to copy the content, even though you are the author.

11 Link: https://creativecommons.org/share-your-work/public-domain/cc0/

In Canada, generally, **copyright** lasts for the life of the author, the remainder of the calendar year in which the author passes on and for 50 years following the end of that calendar year. Therefore, protection will expire on December 31 on the 50th year after the author dies, after which it becomes part of the **Public Domain**. Content in the **public domain** is free to be used or remixed by anyone without permission. (Note, the general copyright term may be adjusted to life of the author plus 70 years due to trade deals such as United States-Mexico-Canada Agreement, or USMCA.)

Also, in general, if you create content while working as an employee, the employer gets the copyright (or is the "**rights holder**"). Just because you author something doesn't mean you end up with the copyright in the long run.

Finally, when you pass on, copyright is transferred to your heirs. This means you may be the "**rights holder**" for some of your relatives if they have passed away.

Discussion Questions: Copyright (and its Alternatives)

How do authors benefit from copyright?

How is copyright problematic in terms of community content? For example, cultural/Indigenous knowledge?

How can we address this challenge?

How might copyright of **Dinjii Zhuh** or local digital content support local jobs?

What might be the benefit of making some **Dinjii Zhuh** content available by Creative Commons?

Photo by Aaron Huber on Unsplash

Copyright and Indigenous Cultural Rights

Copyright was originally developed to promote learning and education, but has developed into a means to encourage authors of content to make their work available by providing certain legal protections, such as control over the copying and re-sale of their work.

Copyright is designed specifically towards protecting individuals. As noted above, it does allow others to do certain things to creative works without the permission of the author. While this means you can use copyrighted materials in certain ways, it also means that other people can use your material in ways you may not want or agree with.

Copyright is a western European idea originally created to protect individual writers. It has always celebrated and emphasized individual authors. This is problematic when the content is cultural and belongs to a group or whole culture.

Dr. Marie Battise, a Mi'kmaq Professor at the University of Saskatchewan, has researched these topics in Indigenous contexts. She writes:

> *a trademark, or a copyright cannot adequately protect a ceremony that uses striking sacred society symbolism to communicate empirical knowledge of medicinal plants. The medical knowledge may be patented, but the patent will expire in a matter of years. The text and music for the ceremony can be recorded (or fixed) and copyrighted, but only the recorded version will be protected and only for the lifetimes of the performers plus fifty years. The symbols can be protected as trademarks forever, but their significance will be diminished when they are taken out of context.*

Remember, the idea that someone can own a creative expression, a piece of art or song is relatively new from a historical perspective. The notion of ownership can be a challenging concept when it comes to sharing **digital content**.

Indigenous legal systems have different ways of understanding ownership. For example, individual versus collective or community ownership. For **Indigenous peoples**, stories may not be owned, but instead held to preserve and share knowledge with and for future generations. Permission to share stories may require certain relationships, protocol, and ceremony (called **transferred rights** in some contexts, such as Piikani Niisitapi, or Blackfoot).

Western perspectives may use concepts of copyright and intellectual property to convey ownership and how a story may be shared. For example, verb-based languages like Cree are more relationship-based.

Issues around ownership are far too complex to go into detail about here. Below we will discuss some introductory approaches to sharing and protecting knowledge and digital content.

Resource for Cultural Knowledge-Sharing Protocols: iPINCH

Intellectual Property Issues in Cultural Heritage (iPinCH) is an international interdisciplinary research project working to explore and facilitate fair and equitable exchanges of knowledge relating to heritage.[12] The IPinCH website offers teaching resources, including university-level course syllabi and video presentations. The site also has an archive of "Appropriation (?) of the Month" articles, including a midterm and final exam exploring cultural appropriation.[12]

Cultural rules and knowledge-sharing protocols

In 2016, Inuvialuk filmmaker Dennis Allen and anthropologist Drew Ann Wake arrived in Tuktoyaktuk to train high school students to make video documentaries. The students selected Elder Persis Gruben, to share her survival experiences from 1956 when caribou were scarce. She told the students:

> *My Mom and Dad always teach us: 'If you get caribou, don't throw (away) the bones. Put them in a clean box and keep it. You might need it sometime. I hammered those bones and boiled then and we drink that broth… We started looking for roots. We picked those and put them in oksuk (bearded seal oil). We ran out of water, all the creeks was [sic] dry. I took my Mabel and (we walked) to the creek. There was a big rock in the middle of that creek. 'Go see that rock, around that rock, must be a little bit of water.' So they run and said: 'Mom, there's water!'*
>
> -Drew Ann Wake and Amy Perreault, Whose Voices?

The students found Persis' story of particular importance since her story of "near starvation has lessons we may need some day." Inuvialuit students recognized the need to not only preserve these important teachings, but also to critically think about their futures and engage with their culture today.

12 Link: http://www.sfu.ca/ipinch/

Faced with today's uncertain digital world with respect to copyright, **Indigenous peoples** have thought deeply about how to share and protect their information and data. Whether or not it is created new or re-created in digitized form, data can be found in many different formats. **Indigenous forms of data** include:

> *Any facts, knowledge, or information about a Native nation and its tribal citizens, lands, resources, programs, and communities. Information ranging from demographic polls to educational attainment rates, maps of sacred lands, songs, and social media activities are all data.*[13]

Indigenous peoples have many ways of collecting data about themselves, from oral storytelling to totem poles to Niisitapi Winter counts. For some, **Indigenous data sovereignty** has been a way of reclaiming the practise of gathering data to benefit Indigenous peoples. The US **Indigenous Data Sovereignty** Network defines Indigenous data sovereignty as *"the right of a nation to govern the*

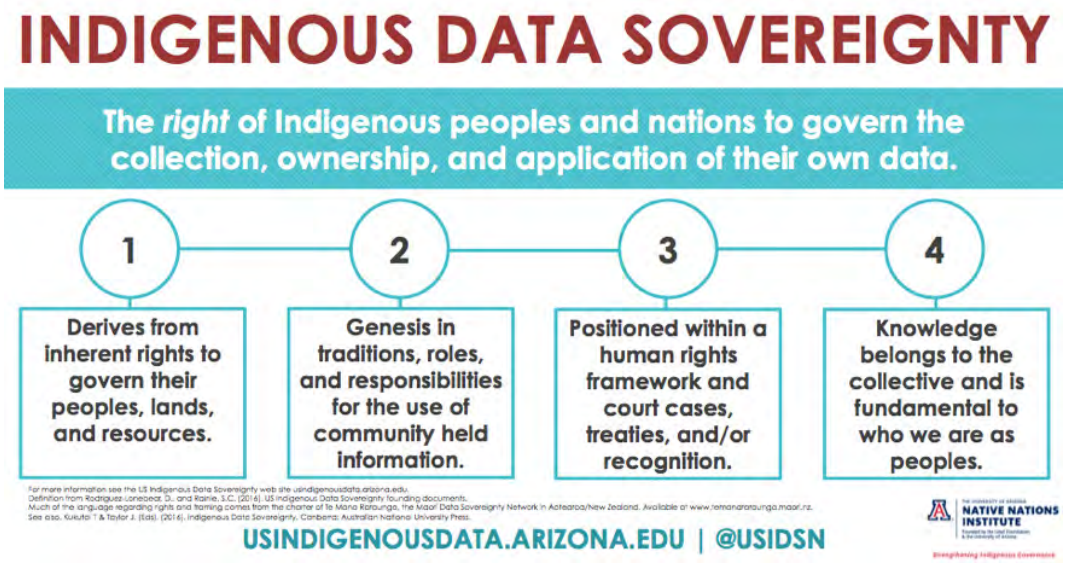


Image: US Indigenous Data Sovereignty Network.

collection, ownership, and application of its own data."[14]

In Canada, **OCAP® principles** were defined by the Steering Committee of the First Nations Regional Longitudinal Health Survey as a "expression of self-determination in research." These principles were articulated in response to a damaging history of research with Indigenous peoples, and while originally developed from a First Nations perspective, the principles can be extended to other Indigenous contexts.

The **OCAP®** principles were developed by the **First Nations Information Governance Centre** (FNIGC)[15]. You can learn more about **OCAP®**; register for a short online training course, and watch

13 Rainie, S.C., Rodriguez-Lonebear, D., & Martinez, A. (2017). Data Governance for Native Nation Rebuilding, p.1. Link: http://usindigenousdata.arizona.edu/sites/usindigenousdata/files/spotlight/files/policy_brief_data_governance_for_native_nation_rebuilding_v0.5_1.pdf

14 US Indigenous Data Sovereignty Network, 2018, para. 2

15 http://www.fnigc.ca

a short video about **OCAP®** at their website[13]. The Dene Nation[16] and the Council of Yukon First Nations[17] are both members of the FNIGC. According to the website, Snookie Catholique represents the Northwest Territories as a Board Member on the FNIGC.

Example: Applying OCAP® to **Digital Networks**

The **OCAP® principles** can be applied to many different kinds of projects, including **digital content** and **digital connectivity**:

> *In Canada, OCAP – ownership, control, access and possession – principles are now being applied in several policy areas. OCAP is a response to the role of knowledge production in reproducing colonial relations and was originally developed by First Nations to apply self determination to research.[18] OCAP applied to telecommunications, or self determination applied to broadband networks, has at least two implications.*
>
> *First, that First Nations must retain access to and possession of the capacity and resources to effectively manage the content, traffic and services on their local network.*
>
> *Second, that First Nations have a right to own and control the local broadband network in their communities in order to support the flow of information and services.* [19]

OCAP® Principles

Ownership - Ownership refers to the relationship of a First Nations community to its cultural knowledge/data/information. The principle states that a community or group owns information collectively in the same way that an individual owns their personal information.

Control - The principle of control asserts that First Nations Peoples, their communities and representative bodies are within their rights in seeking to control all aspects of research and information management processes which impact them.

Access - First Nations Peoples must have access to information and data about themselves and their communities, regardless of where it is currently held. The principle also refers to the right of First Nations communities and organizations to manage and make decisions regarding access to their collective information.

Possession - Although not a condition of ownership per se, possession (of data) is a mechanism by which ownership can be asserted and protected. When data owned by one party is in the possession of another, there is a risk of breech or misuse. This is particularly important when trust is lacking between the owner and possessor.

Technical Rules: Mukurtu

As noted above, technical rules to protect Indigenous **digital content** include ways that we can use devices and software to create barriers around our work. These tools help us manage and organize digital content in ways that separate public from private information.

16 http://www.denenation.com/
17 https://cyfn.ca/
18 Schnarch, 2004.Learn more here: https://jps.library.utoronto.ca/index.php/ijih/article/view/28934
19 Kakekaspan, O'Donnell, Beaton, Walmark, & Gibson, 2014, p. 3.

The image below (in the red circle) illustrates the section of website access rules that we are considering.

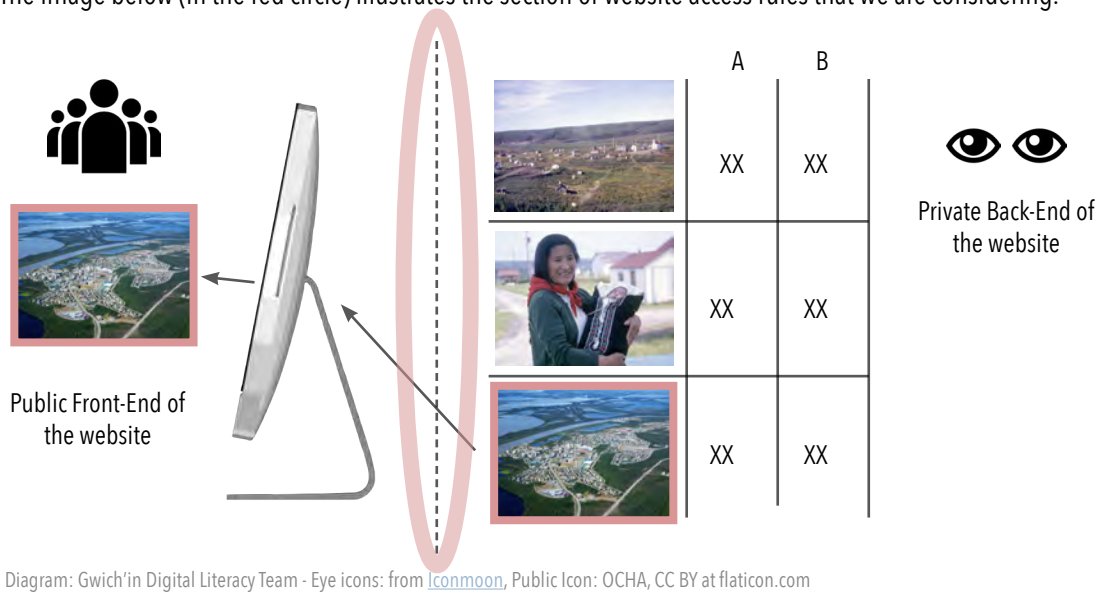


Diagram: Gwich'in Digital Literacy Team - Eye icons: from Iconmoon, Public Icon: OCHA, CC BY at flaticon.com

The **digital library** system we have been using in this workshop and workbook, **Mukurtu**, is a grassroots project aiming to empower communities to manage, share, narrate, and exchange their **digital heritage** in culturally relevant and ethically-minded ways.[20]

In 2007, Warumungu community members in Australia collaborated with researchers Kim Christen and Craig Dietrich to produce the **Mukurtu** Wumpurrarni-kari Archive. **Mukurtu** is a Warumungu word meaning 'dilly bag' or a safe keeping place for sacred materials. **Mukurtu** Content Management System has grown into an open source platform flexible enough to meet the needs of diverse communities who want to manage and share their digital cultural heritage in their own way, on their own terms.

Activity: Lifecycles of a Digital Photograph - Communities and Protocols in Mukurtu (Step 6)

Digital Libraries and archives typically group items in special ways to make digital items easier to search and discover. **Mukurtu** uses special groups called COMMUNITIES to organize content into categories in cultural or geographical communities. Your workshop facilitator will create groups for **Dinjii Zhuh** communities.

Mukurtu also has a unique feature that other digital libraries do not - PROTOCOLS. Protocols enable communities building a digital library to put controls on who can see certain items. They can set these viewing protocols based on rules like traditions or beliefs. For example, traditional knowledge in some nations restricts certain knowledge to just one gender or to just a family or community. For the purposes of the workshop we will only use an OPEN and a CLOSED protocol.

Community - **Mukurtu** allows you to select which community collection your image belongs to. You can add it to several communities or restrict it to just one.

20 You can learn more about Mukurtu at: www.Mukurtu.org

Protocol - Once you have selected a community, the protocol menu will update to provide more options - you can set rules to determine who can find it and view it.

If you were building a public digital library, you would have to consider carefully what protocols to use. You might ask questions like:

- Who do I want to be able to see this image (gender, age, community, etc.)?
- What time of day, week, month or year should this image be able to be viewed.
- Should I apply any cultural protocols to control how people may view the image?

A unique feature of **Mukurtu** is that it provides the ability to create rich metadata records. Rich metadata describes community and cultural narratives associated with a digital object. **Mukurtu** calls this digital heritage. This can include: what the image depicts, stories or information about the author of the item.

The Traditional Knowledge field in **Mukurtu** is designed to present information about the traditional information depicted or tied to the digital heritage item. For example, if the digital heritage item is a photograph of a place of traditional significance users can describe in detail why this place is significant for the community and how that relates to the item being presented.

Discussion Questions: Technical Rules

Why do you think it is important to organize digital objects into groups?

Why do you think it is important to use protocol to organize digital content?

Educational Rules: Local Contexts and TK licenses

Finally, we consider educational rules. These rules include guidelines for users, such as Traditional Knowledge labels (TK labels) developed by Local Contexts, which were developed to help communities manage their digital heritage.

Local Contexts supports Indigenous communities in the management of their intellectual property and cultural heritage in the digital environment. The organization, which is a partnership between Indigenous communities and researchers, provides legal, extra-legal, and educational strategies to help navigate copyright law and the **public domain** status of valuable cultural heritage.

Traditional Knowledge labels are an innovative approach to the digitization of Indigenous intellectual property and cultural heritage. As described by the **Local Contexts** website:

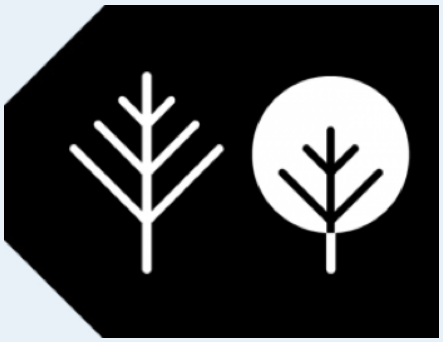
> **TK Labels** *are a tool for Indigenous communities to add existing local protocols for access and use to recorded cultural heritage that is digitally circulating outside community contexts. The TK Labels offer an educative and informational strategy to help non-community users of this cultural heritage understand its importance and significance to the communities from where it derives and continues to have meaning.*

TK Labels is designed to identify and clarify which material has community-specific restrictions regarding access and use. This is especially with respect to sacred and/or ceremonial material, material that has gender restrictions, seasonal conditions of use and/or materials specifically designed for outreach purposes.

TK Labels also can be used to add information that might be considered 'missing', including the name of the community who remains the creator or cultural custodian of the material, and how to contact the relevant family, clan or community to arrange appropriate permissions.

The **Local Contexts** website offers several valuable educational resources, including:

- Descriptions of key concepts such as intellectual property or protocol
- Training modules on **intellectual property** and **traditional knowledge**
- Templates
- Publications
- Step-by-step guide



TK Seasonal (TK S)

TK labels are meant to be customized by each community. Here is an example of a TK label, courtesy of the Local Contexts website.

This label should be used when you want to let external users know that the material that is openly circulating has seasonal conditions of access and use. This could mean that some material should only be used and heard at particular times of the year. It could also mean that the environment and land where this material derives also influences and impacts its meaning and significance. This label can be used to help external users know that there are land-based teachings in this material which affect proper use and respectful understanding.

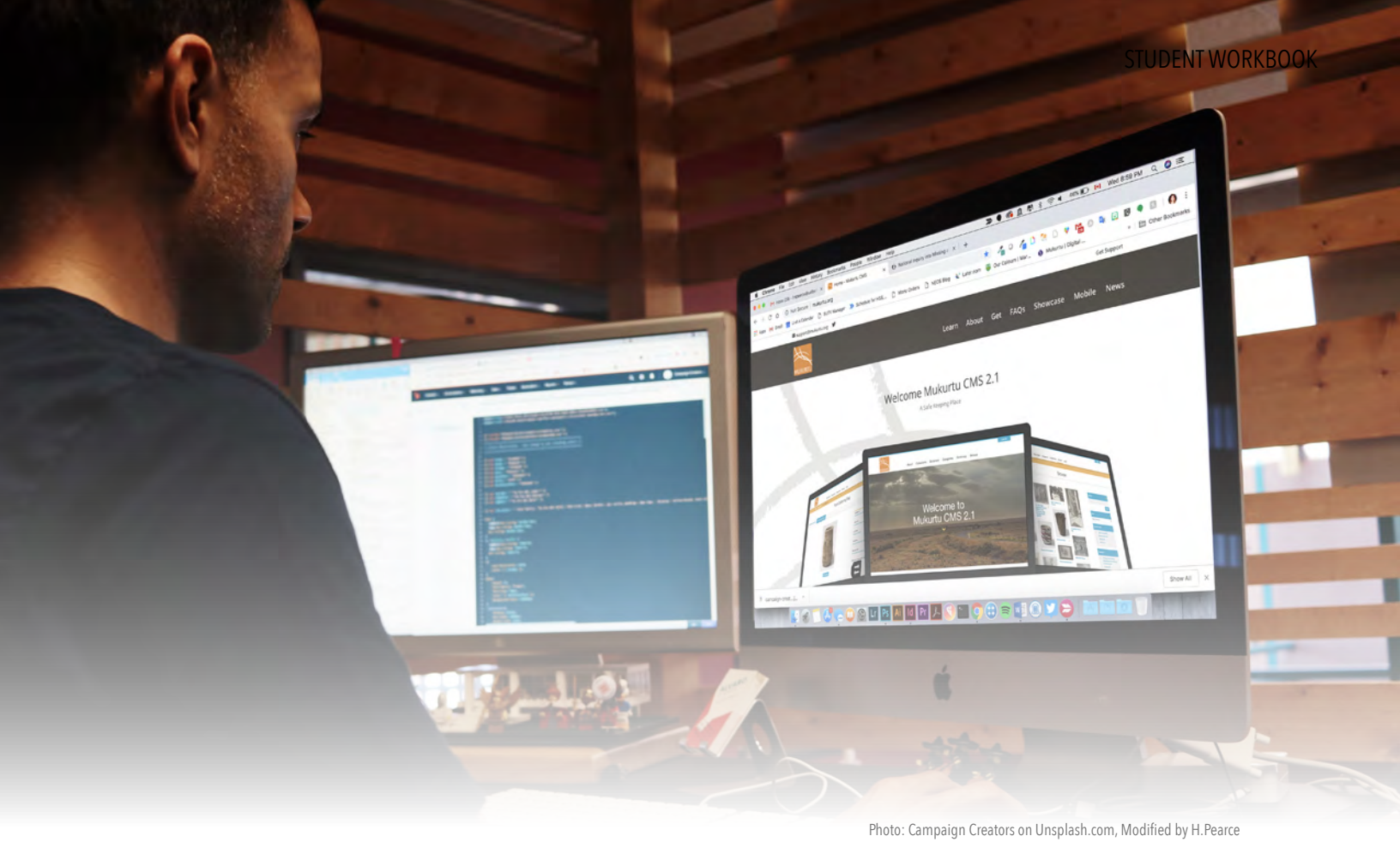


Photo: Campaign Creators on Unsplash.com, Modified by H.Pearce

Local Contexts are working towards a new paradigm of rights and responsibilities that recognizes the inherent sovereignty that Indigenous communities have over their cultural heritage. Learn more at: www.localcontexts.org

NOTE: You can apply a TK label in **Mukurtu** under the 'Traditional Knowledge Labels' option.

Discussion Questions: Digital Rights

When thinking about sharing stories like the one that Elder Persis Gruben told the high school students about her survival experiences, it is important to ask the following kinds of questions:

- Who does this material belong to?
- Are there cultural, intellectual, and ethical guidelines that need to be considered?
- Which individuals, communities and/or nations need to be consulted?
- Is all information appropriate to collect or are special considerations around sensitive records/ materials required?
- What is nature of the proposed usage of materials?
- Do cultural rules around offensive, secret, or sacred materials apply?
- How will we ensure that the right nations, communities, and peoples have unlimited access to their own materials?

Remember the GTC's Department of Cultural Heritage website, and their page for researchers working in the GSA? They provide some great resources to help you think through these kinds of questions.

Module 4: Using Broadband

With so much digital content being used in our lives and societies today, connectivity to the internet has become a critical resource. In 2016 the **Canadian Radio-television and Telecommunications** (CRTC), the independent federal government agency that regulates Canadian broadcasting and communications activity, ruled that **broadband** internet is a basic telecommunications service.

The ruling means that all communities in Canada, no matter their size or location, must be able to access high-speed internet services. However, in many regions, including **Dinjii Zhuh** territories, the underlying networks that can deliver these services still need to be built and will need to be operated and maintained over the long term.

In fact, local **digital connectivity** remains limited and unreliable in most NWT communities, with high prices charged for services and data overage (when a user exceeds their data plan). Consider:

- How is the internet connectivity in your community?
- Is it reliable?
- High-speed?
- Affordable?

These are the kinds of questions we will explore in this part of the workbook and workshop. We will also examine solutions to challenges of limited, expensive **digital connectivity**.

There are many ways that you can become involved in decisions about **digital connectivity**, as a user and as a provider of internet services. You may not be aware of these opportunities, but consider:

- Government regulators and internet service providers need to hear from you about the quality, reliability, speed, and cost of services.

- Your neighbours, colleagues at work, business partners, and service providers in areas like health and education can work with you to ensure that your whole community receives the digital connectivity you require.

- If you are interested in a career in technology, there are many local and regional jobs focused on building, operating, and maintaining digital connectivity services.

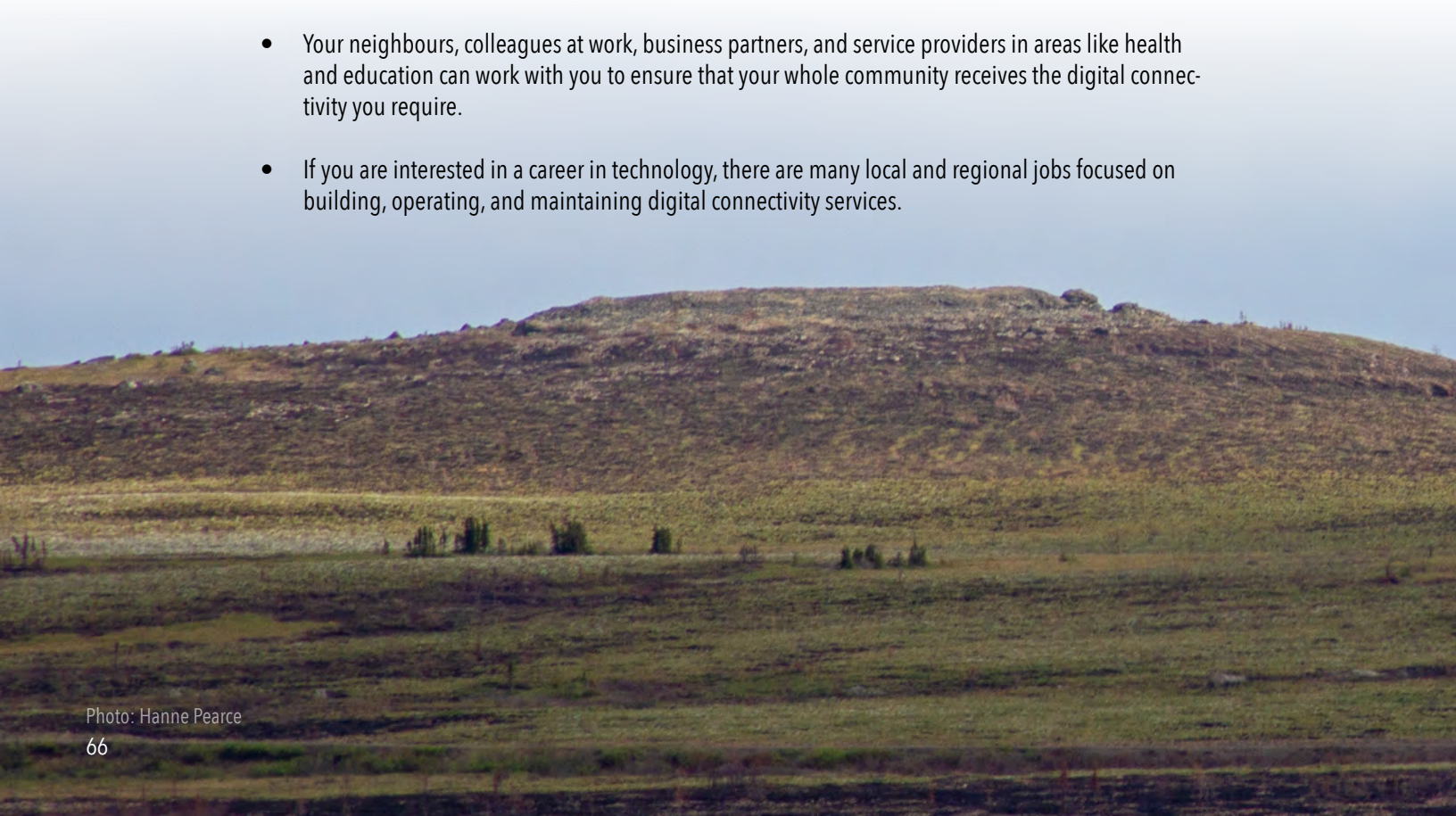


Photo: Hanne Pearce

In this workbook, you will learn about your **digital rights** as a user of **broadband** services. This includes learning how to test the speed of your service, find out how much your data services cost (and how to plan for lowering those costs), and file complaints with internet service providers and government regulators to ensure that you are getting what you pay for.

You will also learn about how you can contribute to the development of **broadband networks** in your community. There are many different ways that **broadband** services can be developed, including by local and regional organizations. **Broadband networks** can be set up as businesses, as non-profits, as cooperatives, or even as government services (as is the case for Tamaani Network in the Nunavik region of Quebec).

The recent development of the **Mackenzie Valley Fibre Link** and the planned **Dempster Highway Fibre Line** project provides new options for NWT residents to review these options and choose the most effective solution. In some cases, local communities may be interested in owning and operating their own internet systems, called **community networks**[1]. As noted in the 2018 Global Information Society Watch report, community networks are *"communication networks built, owned, operated, and used by citizens in a participatory and open manner."* [2]

The below sections cover what **broadband** is, how **broadband** is being developed in the NWT, the benefits and potential negative impacts of **digital connectivity**, and some information about how some communities in the North are building and operating their own community networks. As we will discuss, Indigenous communities have led local and regional community networking initiatives since the early days of the internet. Gaps and challenges, however, remain today. The good news is that you can play an important role in working through these issues.

Our goal for this section is to provide resources and information to support **Dinjii Zhuh** community members in choosing the **broadband** development option that best meets their needs, and ensure that they are aware of their rights as users of **broadband** services. We hope that this information is useful in thinking through some of the benefits and challenges of **digital connectivity** in the NWT.

1 Link: https://www.giswatch.org/en/infrastructure/limits-internet-technology-options-community-networks
2 Ramilo, C.G. (2018). Preface. Community Networks: Global Information Society Watch 2018, USA: Association for Progressive Communications and International Development Research Centre.. Available at: https://giswatch.org/sites/default/files/gw2018_preface.pdf

We often talk about the internet, but digital connectivity is much more than just visiting websites and streaming Netflix. In today's world, digital connectivity is an increasingly important enabling infrastructure that supports all kinds of activities. To reflect this broader view of digital connectivity, we use the term broadband.

Michael McLeod, MP NWT

What is Broadband?

According to Liberal MP of the NWT Michael McLeod, "**Broadband** Internet is key for 21st century communities. The Government of Canada is proud to be part of this important project that provides NWT residents with improved Internet access to a wide range of services, stimulating economic development and enhancing Northern Canadians' quality of life." [3]

Broadband refers to an always-on, high-capacity digital data transmission service. As we discuss later, it is provided through different network technologies, including fibre optic cables, wireless towers, satellites, and mobile cellular phone services.

Many different organizations provide and use **broadband**, from large companies like NorthwesTel to smaller non-profit and cooperative organizations like K-Net services in Northwest Ontario. The free online book *Stories from the* **First Mile***: Digital Technologies in Remote and Rural Indigenous Communities* provides a history of some of the Indigenous-led community network projects in Canada.[4]

Regardless of the kind of organization providing it, **broadband** is an important resource for individuals, communities, and organizations. While **broadband** has become the main way that we access the internet, the connectivity it provides also allows for a range of other **broadband**-enabled applications. These include:

- Accessing online education
- Two-way voice and video calls (like Skype)
- Transmitting health data
- Using GIS maps
- And much more

Discussion Questions: What is Broadband

Take a moment to think about **broadband** services and applications that you use every day. Why is **broadband** important to:

You?

3 Link to source of quote: https://www.newswire.ca/news-releases/high-speed-internet-and-4g-wireless-in-every-northwest-territories-community-682536281.html

4 Link: http://firstmile.ca/wp-content/uploads/Stories-from-the-First-MIle-2018.pdf

Your friends and family?

Your community?

The Gwich'in Settlement Area?

Connectivity in Aklavik, Teetł'it Zheh, Inuvik, and Tsiigehtchic

	All Households		With Home Internet Access						Without Home Internet Access	
			Total		With Wireless		Without Wireless			
	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Northwest Territories	**14,730**	**100.0**	**11,659**	**79.2**	**10,229**	**69.4**	**1,430**	**9.7**	**2,991**	**20.3**
Aklavik	226	100.0	119	52.7	87	38.5	32	14.2	106	46.9
Fort McPherson	277	100.0	127	45.8	86	31.0	41	14.8	150	54.2
Inuvik	1,279	100.0	1,069	83.6	978	76.5	91	7.1	198	15.5
Tsiigehtchic	57	100.0	35	61.4	31	54.4	4	7.0	22	38.6

Source: NWT Bureau of Statistics: https://www.statsnwt.ca/Housing/internet_usage.html

Office of the Auditor General of Canada: Fall 2018 Report on Connectivity in Rural and Remote Areas

In November 2018, the Auditor General of Canada released a report focused on **broadband** connectivity in rural and remote areas, including the North.[5] As noted on the report's website:

"Accessibility to **broadband** high-speed Internet continues to lag behind for certain population groups in Canada, notably communities in rural and remote areas. This is despite significant investments by the public and private sectors to support **broadband** deployment.

This audit focused on whether Innovation, Science and Economic Development Canada and the **Canadian Radio-television and Telecommunications Commission**, according to their respective roles and responsibilities, monitored the state of connectivity, and developed and implemented a strategy to meet the connectivity needs of Canadians in rural and remote areas."

The report highlighted three major findings, which you can read more about on the report's website. Briefly, they are:

1. National broadband strategy
Innovation, Science and Economic Development Canada did not have a plan to bring high-quality internet services to Canadians in rural and remote areas.

2. Connectivity funding
The Connect to Innovate program did not ensure maximum benefits from public money spent.

3. Radio frequency spectrum management
Small Internet service providers struggled to acquire high-quality spectrum in rural and remote areas.

Broadband Development in the NWT

Despite these important benefits, **broadband** connectivity remains limited and unreliable in most NWT communities. High prices are charged for services and especially for **data overage fees** (when someone uses up their monthly **data cap**). [5]

In recent years the Government of Canada has paid increasing attention to this challenge. For example, in Fall 2018 the Auditor General of Canada released a report about **broadband** in rural and remote regions that stressed the need for a strategy to connect Canada. As noted above, the CRTC established a new **basic service objective** for **broadband** (BSO) for **broadband** in December 2016. This BSO recommends that minimum speeds of 50 Mbps download and 10 Mbps upload and an unlimited data option for fixed **broadband** access services - should be made available to everyone living in Canada. The **CRTC** also set up a **broadband** fund to support the building of networks to help deliver these services, with a special focus on rural, remote and northern regions of the country, including the NWT.

The CRTC's **broadband** standards were established after years of advocacy by Indigenous and public interest groups concerning access in the northern territories. This work included Indigenous participation in 2012 hearings on NorthwesTel's Modernization Plan, a 2014 inquiry on satellite services, and the **BSO** hearings noted above. Unfortunately, despite these efforts, the major telecom providers serving these communities continue to deliver **digital connectivity** services and infrastructure below the CRTC's recommended speeds.

With regards to affordability, the **CRTC** has generally encouraged competition, though it has stepped in to regulate retail (household) rates in some northern regions, including the NWT. This means that the government placed a cap on the amount that a NorthwesTel could charge for internet in certain communities.

5 Link: http://www.oag-bvg.gc.ca/internet/English/att__e_43221.html

As noted in a news article published in IT World published in March 2015:

> *The Canadian Radio-television and Telecommunications Communications (CRTC) has ordered NorthwesTel Inc., the local internet and phone service provider in Northern Canada to slash residential broadband rates in the Yukon and Northwest Territories by as much as 10 per cent to 30 per cent.*
>
> *The reduction will be reflected in resident's bills for May 4 [2015].*
>
> *The CRTC also said that NorthwesTel is not allowed to increase internet service rates until the end of 2017. The commission also ordered the provider to reduce additional data usage charges and to stop applying additional fees for stand-alone internet service. As of February 2016, the company must lower its charges for additional usage by at least $0.50 per gigabyte.*[6]

Are you aware of this price cap on retail internet services?

What kind of prices to you pay for internet services today?

The Federal Government, through departments like Innovation, Science and Economic Development Canada, has also been involved in supporting **broadband** development in the north. It has set up **broadband** funding programs, most recently the $500 million **Connect to Innovate** (CTI) program managed by Innovation, Science and Economic Development Canada, and a **broadband** fund currently being established by the **CRTC**.

The CTI fund contributed to several major projects in Canada's North, including the **MVFL**, the **Dempster Highway Fibre Line**, and satellite infrastructure in Nunavut. These projects received significant public funding to provide **broadband** in northern Canada.

6 Link https://www.itworldcanada.com/article/crtc-lowers-internet-rates-in-northern-canada/166777

Photo: Hanne Pearce

According to a May 14, 2018 press release, the **NWT Broadband Infrastructure** project was also recently completed.[7] The release notes that this initiative brought 4G wireless and high-speed internet to all 33 communities in the NWT. This was a major milestone for Délı̨nę, formerly the largest satellite-based community in the NWT. Later that same month, on May 18, 2018 to be precise, a CBC article noted that residents in some NWT communities still lacked high speed services.[8]

Do you know the internet speeds and costs available in these communities today?

Photo: Mackenzie Scott/CBC. L-R: Amy Whynot, an E-learning monitor, stands next to Nadine Kuneluk, Matt Kanayok and Jacob Klengenberg, who are all graduating from their Ulukhaktok high school thanks to the E-learning program.

Broadband Connectivity Supports Education: Helen Kalvak Elihakvik School in Ulukhaktok

Students at the Helen Kalvak Elihakvik School in Ulukhaktok have experienced enormous success through the Beaufort Delta Education Council's (BDEC) e-learning program. Eight years ago, BDEC initiated an e-learning pilot program that connected Teetł'it Zheh students with classes at Inuvik's East Three Secondary School. Prior to this exciting initiative, students who had post-secondary aspirations had to make the hard decision to either relocate to another community and board with a family or undertake independent studies and self-guided learning. Due to increasing connectivity in the North, three students in Ulukhaktok will be pursuing post-secondary education in the 2018/2019 academic year - a first for this community!

It is important to monitor the speed, quality, and cost of these projects for consumers, to ensure that they meet the requirements set by the government.

You can help with this work by checking the speed of the internet you receive, documenting internet access in your community, and reporting the cost of your services.

This workbook will cover some of the ways that you can help ensure that northerners receive adequate, affordable access to **broadband**.

Broadband Benefits and Challenges for Communities

There are numerous benefits to enhanced **broadband** connectivity. These benefits can be generally grouped into two overarching categories: social and economic.

Social benefits of broadband include better access to education, telemedicine and health services, increased access to online government services and programs, improved communication for public safety and emergency services, and greater means to share and access cultural content.

Another important social benefit of **broadband** is its support for preserving and sharing culture and language. As discussed in the digital content modules, Indigenous northerners have long recognized the importance of preserving oral histories, stories and legends. Digital connectivity services provided through **broadband** networks and the internet supports the preservation and sharing of this content.

7 Link: https://www.newswire.ca/news-releases/high-speed-internet-and-4g-wireless-in-every-northwest-territories-community-682536281.html
8 Link: https://www.cbc.ca/news/canada/north/federal-announcement-high-speed-internet-residents-diasgree-1.4668223

Image Courtsey of Tania Larsson

Image Courtsey of Tania Larsson.

Regarding the economic benefits of **broadband**, connectivity is an enabler for economic development and tele/remote-working. Local businesses use **digital connectivity** to make their products or services available to the world. Tourism and cultural industries are also supported by **broadband** connectivity - think of everything from virtual reality tours of the Mackenzie Delta, to talented young people building websites and editing videos or photographs that feature the vibrant cultures and scenery of the North.

Tania Larsson, Teetł'it Gwich'in and Business Owner

www.tanialarsson.com, tania.larsson, @TaniaLarsson

Tania Larsson designs contemporary, northern Indigenous adornment based on Gwich'in culture, created with land-based materials. She is innovative, driven, and dedicated to her art. Through **social media**, she promotes her culture, work and her passion for reclaiming Indigenous knowledge. Tania earned a Bachelor's degree in Fine Arts at the Institute of American Indian Arts, with a focus in jewelry and digital arts at the Institute of American Indian Arts, May 2017. She was the apprentice to renowned jeweler Keri Ataumbi for two years.

Image Courtsey of Dene Nahjo.
Text reprinted with permission from www.denenahjo.com

Dene Nahjo

LAND, LANGUAGE, CULTURE. FOREVER.

MISSION

Dene Nahjo's mission is to advance social and environmental justice for northern peoples while promoting Indigenous leadership by fostering emerging leaders. We strive to live, learn and celebrate our cultures, languages and Indigenous values on the land, guided by our elders, to strengthen relationships in the North.

GOALS

Dene Nahjo strives to implement outreach efforts to Indigenous communities focused on cultural preservation, revitalization and connection to the land as a basis for long-term and substantive change in **Denendeh**. Our goal is to accomplish this by advocating for sustainability and the incorporation of a long-term vision informed by Dene values for the future of **Denendeh**, and by researching and communicating on key issues to provide an informed, alternative voice on public policy issues of concern to Northerners. Through this, we hope to build and sustain a network of local leaders and change-makers for positive change within **Denendeh**, while engaging with key Indigenous organizations on Indigenous and northern issues.

Tania is one of the founding members of **Dene Nahjo**, a non-profit organization that focuses on cultural revitalization projects in the Canadian North. Born and raised in France, she is a Gwich'in and Swedish woman. Her late mother Shirley Firth was born on a trapline in Aklavik, Northwest Territories and went on to become a four-time Olympian who represented Canada in cross-country skiing.

At the age of fifteen, Tania moved to Canada with her family to reconnect with her culture and the Gwich'in land. She has consistently sought opportunities to deepen her understanding of history and culture and to apply this learning to her artistic work. We interviewed Tania to ask about her experience with **digital connectivity**, both growing up and today:

Tania's memories of digital literacy as a child and young adult, growing up in Chérence, France:

I've loved computers since I was a kid. You can find all these pictures of me holding this Fisher-Price interactive toy that was like the predecessor of the iPad. I was hooked to the internet when it became available when I was a teen because I loved that connectivity. You could do whatever you want from wherever you are and it was so amazing.

I became fond of digital art when I got a taste of it in my Grade 9 on-the-job training week. We had to find someone to apprentice under for one week in a professional setting. I had the chance to work with a graphic designer that worked for the same company as my dad. This designer taught me some basics on Photoshop like how to crop pictures and place them in a document. I was amazed to see my work in the printed catalogue six months later and some of the pictures on their website.

I had no idea what I was doing but he showed me a few times and when I got the gist of it, I had fun doing this repetitive work on the computer. To see the final product was really cool. Even though the work was small, I felt like I had a responsibility and it had a positive impact on me.

Tania explaining how our unique cultures and personal interests can build your career when you feel like you don't belong:

I applied to the Institute of American Indian Arts in Santa Fe to do a Bachelor [Degree] in Fine Arts. The first week, we had to introduce ourselves and I shared with the class: "I'm a moose hide tanner, that's my practice!" Since I thought I hadn't done "art" per se, I didn't really fit into any category.

While I was in school, I learned how to design with Photoshop and Illustrator, how to 3D model, and how to make digital arts pieces. The most interesting part of this program was to learn how I could apply these new tools and techniques to my own art practice. Using a laser cutter for my jewelry or leatherwork, using 3D printing for hide tanning, or Illustrator for printmaking [were essential lessons].

I started making jewelry in the studio and learned how to work in metals. Since I was young, I always wanted to have jewelry to show "I'm Gwich'in." I wanted something to represent my culture that I could wear every day.

I found it hard to find Gwich'in jewelry that was not inspired by Southern tribes. All I could find was beaded brick stitch earrings with fringes which represented the National Native jewelry, in my mind. What could I wear as a cultural identifiers? That's why I went into jewelry because I wanted to do more research on adornment and work with my hands.

Above: www.tanialarsson.com. Beaded, diamond, and gold muskox earrings

I realized that digital art was just one aspect of my art practice because it gave me the tools to create faster and to create components for my art. And that was the same with jewelry. It gave me the tools to learn how to make, create with metal which I ended up falling in love with. Throughout that whole process, I was photographing my work and sharing it on Facebook. I was posting on Instagram, posting videos, posting pictures of my process and I got lots of feedback from up here [in the North].

Tania's expertise with digital arts and traditional tools:

I used futuristic technology to create traditional tools. It was a way for me to learn, to have access to our culture. I didn't have hide tanning tools to borrow, tools to have, to be able to make my own since most hide tanners will inherit their tools from their family.

> *That's why I was borrowing from the Smithsonian's National Museum of the American Indian collection. Since you can't bring the physical object out of that environment I laser scanned them in the collection, and 3D printed them at school. Now I had a physical object to base my own tools on, so I did just that in the metal shop. That had never really been done before, especially in the sense of toolmaking. And now I know the Anchorage Museum has a similar program. They're laser scanning items and 3D printing them. So it's really cool that this idea is still being used.*

As well as using **broadband** connectivity to access services and support business development, community members can be directly involved in building, operating and maintaining **broadband** networks. They can set up their own **internet service providers** (ISPs), or work for ISPs as technicians. We will discuss some of the steps in the process of setting up and operating community networks later in this workbook.

Despite these and other benefits of **digital connectivity**, we should also recognize that **broadband** may also bring challenges. These can include new expenses (monthly internet fees, devices, and so on) and an influx of inappropriate content.

It is important to learn from Gwich'in community members about these potential impacts, so that policy and community development plans can mitigate risks and take advantage of the potential of fibre optic connectivity.

Activity - Make the Net-Work

You need to work through this activity with a workshop facilitator. This workbook contains general information about this hands-on exercise, which consists of 10 steps that you can work through to build your own tabletop community **broadband** network.

This activity is designed to familiarize you with different aspects of **digital connectivity**. It provides an introduction to considerations that communities may think about when building or negotiating a local **broadband** network. It is designed to be a starting point for discussion, as well as a way to illustrate technical and social considerations.

Photo: Hanne Pearce

Along with providing a hands-on introduction to **digital connectivity**, the activity will demonstrate issues such as speed, cost and quality of service. Participants will learn how to collect data about these aspects of internet connectivity, and how to file complaints (if required).

Step 1: Let's Consider the Benefits and Consequences of Improved Digital Connectivity

Before we start building the network, the facilitator will lead a discussion focused on these questions:

1. What are the benefits of **broadband** internet at home, at work or in communities?

2. What may be any negative impacts of **broadband** Internet at home, work or in the community?

3. Do any barriers or challenges limit your use of **broadband** (e.g. access, affordability, data caps)?

4. What supports do you need to use **broadband** effectively?

5. How can we ensure effective or appropriate use of **broadband**?

Broadband in Canada: Geographical Digital Divides

Canada was once a world leader in **digital connectivity**. In fact, we were the first country to connect all public schools and libraries to the internet. But despite that strong start, over the past 15 years Canada has been losing ground compared to other countries.

In 2001, the Organisation for Economic Cooperation and Development (OECD) ranked Canada second in the world for **broadband** subscriptions per 100 inhabitants. By the end of 2017, however, that same organization ranked Canada as thirtieth.

These measures particularly affect people living in the North. The CRTC, which releases an annual Communications Monitoring Report, consistently demonstrates that the three northern territories have lower access, lower quality, lower speed, and higher cost of **broadband** internet compared to the south.

In 2017, the CRTC noted that almost half of households in NWT lack access to **broadband** (as defined by the Commission as 50Mbps download/10 Mbps upload), while pricing and quality of service do not match standards in southern Canada. The report noted that over 25% of people in NWT, Yukon, and Nunavut lack **broadband**, especially in rural areas.

As described above, these findings are further validated by the Fall 2018 report of the Auditor General of Canada. That report stated that: "Accessibility to **broadband** high-speed internet continues to lag behind for certain population groups in Canada, notably communities in rural and remote areas".

Geographic Paradox of Telecom Development

In an article published in a special issue of Northern Public Affairs focused on **digital connectivity** in the North, University of New Brunswick researchers Susan O'Donnell and Brian Beaton describe how telecommunications development - including for **broadband** connectivity - plays out differently in urban versus rural regions. The following section is reprinted with permission from their article.

Urban communities currently have the best telecommunications infrastructure. In Canada, cities are connected by dense fibre networks. The fibre cabling is usually installed alongside the existing well-developed network of public roadways. In fact, there is often an over-supply of fibre in urban areas: When installing fibre optic cabling, telecommunications companies often include extra capacity, called "dark fibre" because it is not "lit up" for current use.

At the same time, urban communities have the best public services: Cities have hospitals and medical specialists, all levels of schools and a variety of training facilities, and many other public services. Consequently, where the large population density creates a huge demand for high-speed broadband, residents often have a low need and low appreciation for digital broadband services delivery because they can choose to access their services in-person.

In contrast, remote and northern communities have the same needs for public services but much lower ability for accessing these services in-person. In many of these communities there are no hospitals, high-schools or training facilities. As a result, these communities have a higher need for, and appreciation of, tele-services.

Paradoxically, small Northern and remote communities have much more limited telecommunications infrastructure. Connectivity costs are expensive because the roads network that is heavily subsidized in urban areas is limited in remote and Northern regions. Installing fibre cables in remote areas often involves creating new paths through difficult terrain where no roads exist. This challenge, illustrated in Diagram 1, is also an opportunity for remote and northern communities.

Diagram 1: The Paradox of Telecommunications

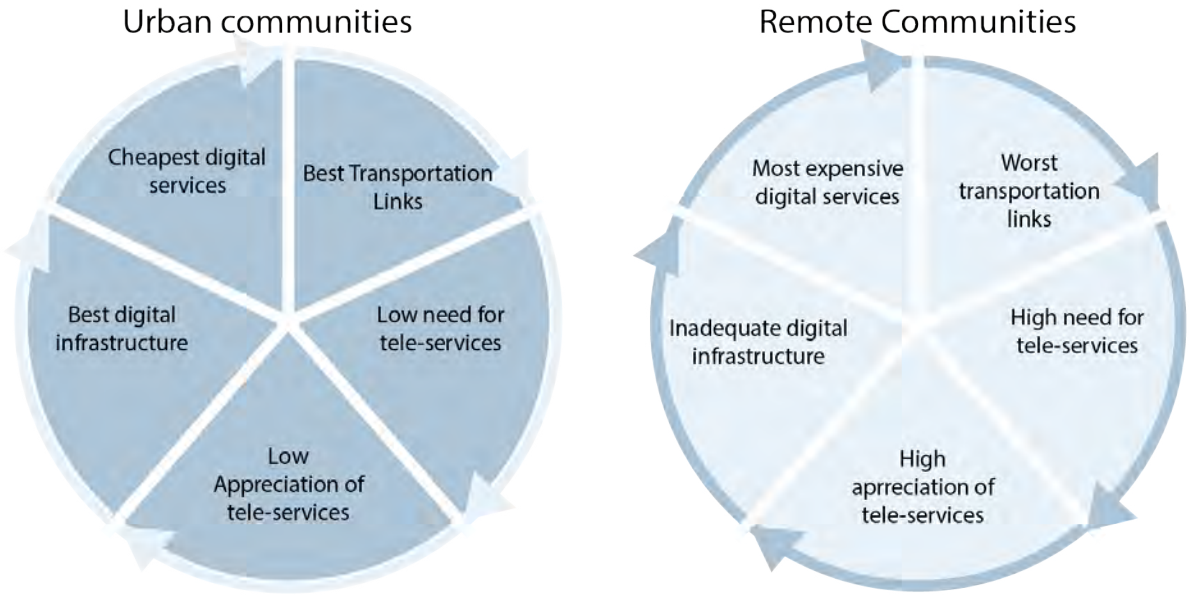


Image Credit: Susan O'Donnell and Brian Beaton/First Mile Connectivity Consortium.

Activity - Make the Net-Work: Broadband and the Environment (Step 2)

This activity is designed to draw attention to some of the geographic, cultural and environmental considerations that are involved in planning **broadband** development in your community. The facilitator will show a printed map of a community during this activity. Participants will look at the map and discuss the following questions:

1. What elements of the community map (geography) impact **broadband** development (construction)?

2. What pieces of nature need to be considered when planning for **broadband** infrastructure?

3. Can you think of areas of cultural importance that might impact **broadband** planning?

4. Can you think of environmental considerations (water, land, trees, wildlife, etc.) that might impact **broadband** planning?

The 'Whole Community' Approach

The section above described some of the challenges and considerations related to planning **broadband** connectivity in northern contexts. Community engagement is central to decision-making around these kinds of local **broadband** initiatives. By working together to identify development goals through structured planning and dialogue, northern residents can shape community **broadband** projects to enable widespread adoption and effective use of this important resource.

Engagement holds a number of benefits for community **broadband** initiatives:

- It supports leadership by providing information from constituents on local needs and priorities.
- It enables strategic planning, research and business support.
- It helps build technical capacity and digital literacy through targeted training initiatives.
- It educates residents on the benefits and uses of broadband.
- It helps identify community champions.

You might be surprised at how cooperation among neighbours and colleagues can support better, faster, and lower-cost **broadband** connections for everyone!

This is the thinking behind the whole community approach to **broadband** decision-making, which is illustrated below.

In their Northern Public Affairs article UNB researchers Susan O'Donnell and Brian Beaton discuss how local leaders and administrators can engage in strategic planning regarding how bandwidth is paid for, distributed and managed in each community.

This approach to **broadband** planning enables local residents to make decisions on how infrastructure and bandwidth is made available to deliver essential services such as e-health and online education. The section below is reprinted with permission from their article.

> *[We] focus on the links between digital technology adoption and community services in small, remote Indigenous communities and the larger network of relationships surrounding the communities. Our understanding is that technology is adopted within a broader ecology of community services and support making it possible for these tools to be available for*

Photo: Hanne Pearce

community members.

Our approach is guided by a conceptual framework called the e-Community model. As described by Judy Whiteduck of the Assembly of First Nations (AFN) in 2010, this model can be used by First Nations as a strategic planning initiative to establish a broadband-enabled public service in every remote and Northern First Nation community. The e-Community model was first introduced by Keewaytinook Okimakanak's KNET (KO-KNET) services in 2005.

We illustrate our model with a simple diagram to guide policy-makers, researchers, and digital systems designers as they work with Indigenous communities to develop digital infrastructure, applications and programs to support sustainable growth and development.

In our approach there are four levels of factors that shape digital technology adoption that need to be considered when designing, developing, operating and sustaining telecommunication networks in remote and Northern Indigenous communities. These four levels are illustrated in Diagram 2.

Diagram 2: The Whole-Community Approach to Telecommunications

Image Credit: Susan O'Donnell and Brian Beaton/First Mile Connectivity Consortium.

You can read more about the four levels of factors in their article. Briefly, they are:

1. Community members/household: The demand by community residents and households for digital infrastructure is an important consideration. This is, however, only one element of the whole-community approach.

2. Community businesses, services, organizations and facilities: The central concept of the whole-community approach is that remote and northern Indigenous communities and their regional representative organizations are responsible for delivering public services, and that digital **broadband** networks are required to deliver these services effectively.

Crucially, in the whole-community approach, the core public services – health centres and schools – are the anchor tenants that make the community and regional networks sustainable. This is because the digital **broadband** network infrastructure required to provide telehealth, telemedicine, and distance and digital education activities in communities can be leveraged to make household connectivity affordable.

3. Regional Indigenous owned and operated digital transport infrastructure connecting multiple communities: The use of the technologies and infrastructure for remote First Nations across Canada is often supported by regional Indigenous community intermediary organizations responsible to Indigenous community leadership. These organizations are staffed with technology experts who, over the past two decades, have been keeping the digital telecommunications transport networks operating.

4. Surrounding lands, waters and space: When planning and developing digital infrastructure in remote and northern regions, land-based activities of Indigenous communities must be considered in the design, build, and maintenance strategies.

Some Indigenous community members often desire land-based lifestyles that can be supported by digital networks to maintain safety and security while out on lands and waters beyond the borders of the communities themselves. The implication is that wide-area mobile wireless networks are another essential service for northern communities.

As illustrated through the whole community approach, it is important that **broadband** planning initiatives involve a diversity of users. These include individuals and organizations as well as local services such as schools, health centres and businesses. This aims to ensure that development projects address the needs of a range of community members.

Photo: Hanne Pearce

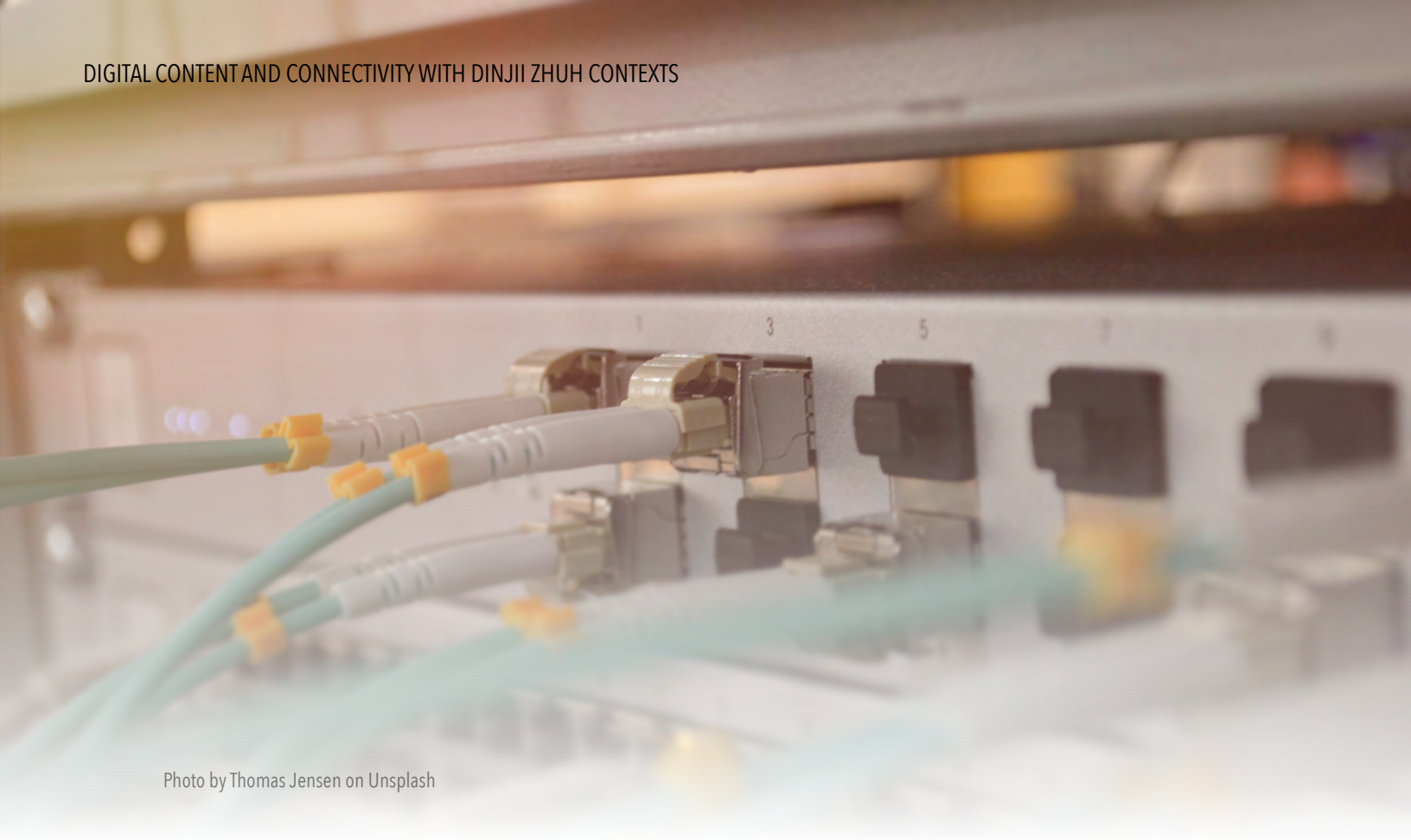


Photo by Thomas Jensen on Unsplash

Identifying Community Assets

A key piece of **broadband** planning involves identifying community assets. Community assets refer to the many strengths that make up a community - people, organizations, buildings, equipment, technical infrastructure, natural features, and so on. These assets are broadly defined, and illustrate the strengths that will guide the development of community networks and **broadband** connectivity.

Assets include **broadband** users such as homes, businesses, and community anchor institutions. A network cannot be successful without users. As illustrated in the whole community diagram, a community is made up of many different types of **broadband** users from larger institutions like schools and hospitals to business of all sizes and individual homes.

Large institutions, also called anchor tenants, are usually the biggest users of **broadband** within a community and have the need for the greatest amount of **digital connectivity**. Examples of anchor tenants include community centres, schools, hospitals, and libraries.

Another important asset to identify are technical skills. Deploying and operating a network will require a broad range of expertise. Some of these skills will be technical ones, related to telecommunications infrastructure management. Others will include identifying those who can be involved in the deployment and maintenance of the physical network (e.g. fibre trenching and splicing skills, installing antenna for sending/receiving data). Often, people involved in telecommunications planning and delivery note that social and business elements make up three-quarters of the work.

Another important asset to identify is the decision making authority of the community over the network. Developing and maintaining a **broadband** network will require access to land (some private and some public) to deploy and maintain infrastructure. It can also include environmental and cultural

considerations about land use. While telecommunications is regulated by the federal government, local governments do have some important regulatory powers, particularly around rights-of-way, which can be used for shared infrastructure.

Another action that community leadership such as local governments can take is to adopt a "dig once" policy. This means that conduits that house fibre optic cables are installed at the same time as other municipal infrastructure (road, water, and sewer). Adding fibre conduits as part of another construction project costs only a few cents for every dollar spent, dramatically reducing the cost of building **broadband** networks. Dig once policies can also be coordinated with building codes and development plans so that fibre is put in place in new communities and business parks.

Local leaders can also consider the use of utility poles to avoid the cost of trenching fibre underground. Depending on ownership of these poles, and the terms of existing contracts, it may be possible to coordinate the use of existing utility poles for aerial fibre. If a full fibre deployment is too expensive, consider using a combination of the above strategies along with strategic planning to develop a transition strategy, whereby fixed wireless is used in the short term with a longer term goal of deploying fibre.

When planning for community **broadband**, local governments can engage in exercises to determine demand. Always consider what neighbouring communities and regions are doing. A choice of a specific **broadband** solution in one community may have impacts on its neighbours: how can communities collaborate on a regional basis?

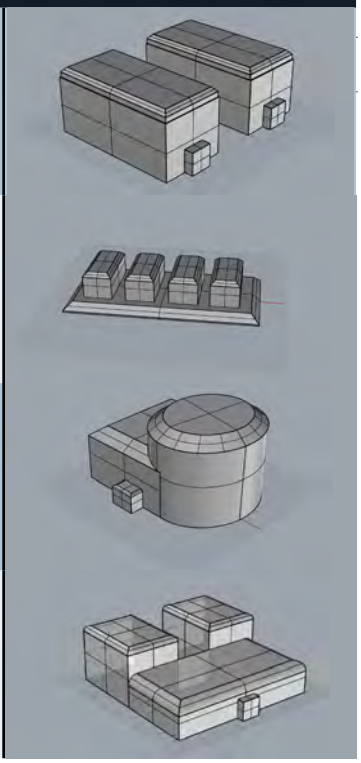
Activity - Make the Net-Work: Let's Find and Place Our Community Assets (Step 3)

This activity is designed to draw attention to community assets that participants can draw on when discussing and planning **broadband** development. The facilitator will have 3D-printed pieces that illustrate different community assets. Participants will discuss the following questions, and then place some of the 3D-printed pieces to demonstrate assets in their community:

1. What are the major community anchor institutions in your community?

2. Why are community anchor institutions important when it comes to **broadband** planning?

3. Are there any other types of organizations that need to have a **broadband** connection? What are they and why is **broadband** important to them?

Piece Name	Type of Infrastructure	Sample Image
Businesses	Premise (End User)	
Homes	Premise (End User)	
Hospital	Community Anchor (major users)	
School	Community Anchor (major users)	

Images: Hanne Pearce | Gwich'in Digital Literacy Team.

Module 5: Broadband Technologies

We began our discussion of **broadband** connectivity by focusing on social considerations - how it affects our communities, and what role ourselves and our communities can play in **broadband** development and effective use. **Broadband** development ideally involves a whole community approach, where neighbours and colleagues review and discuss their options together. We also reviewed some of the challenges of **broadband** connectivity in the North, as well as the many assets located inside northern communities. We discussed some planning considerations to guide **broadband** development.

In this Module, we turn to some of the technologies that make up **broadband** systems. While focused on technical elements, this material is designed for non-experts - it provides an introduction to the different ways that **broadband** systems can be developed. While social elements are key to **broadband** development, it is also important to be aware of technical considerations.

Types of Broadband Connection Technology & Speed Comparison

There are a number of different types of **broadband** technology. Each technology is a little different in terms of how it sends signals and the speed of connection that it provides. The chart below illustrates some of the benefits and drawbacks of these different technologies, which are described in more detail on the next page.

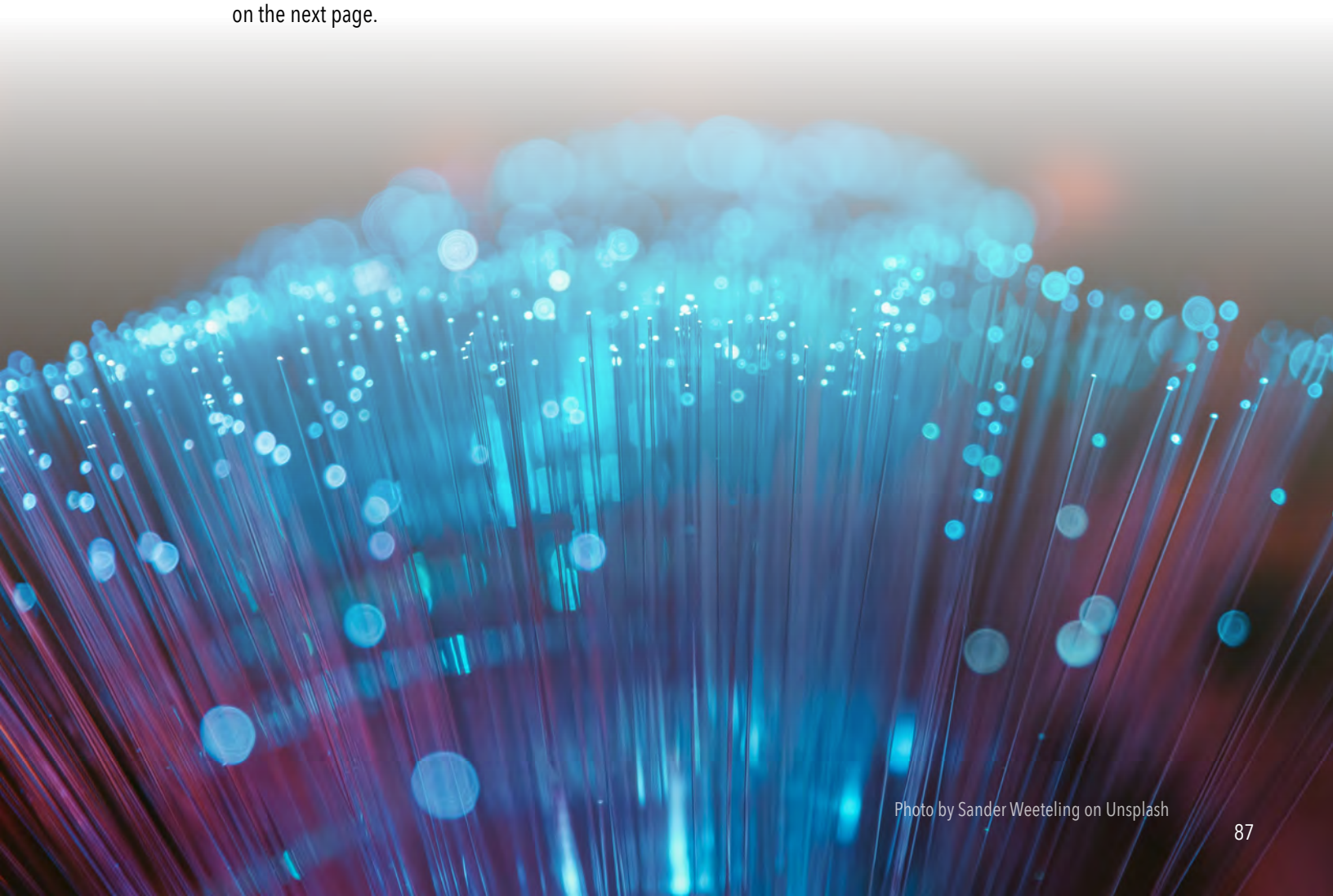


Photo by Sander Weeteling on Unsplash

Comparison of **Broadband** Technologies

Type	User Types	How it Works	Advantages	Disadvantages
Fixed Wireless	Transmission by tower to fixed points, using wireless spectrum	Costs include tower deployment and maintenance and radio antenna infrastructure	Less intrusive to deploy; doesn't requirewired connections with each home / businesss	Requires line of sight to recieve; can face capacity constraints with multiple users
DSL	Transmission over copper telephone lines	Requires access to copper telephone lines	Uses existing and ubiquitous infrastructure	Slowest of the wired **broadband** connections types; performance declines with distance.
Coaxial Cable	TranslmIssion over coaxial cable	Requires access to coaxial cable lines	Fastest of legacy wired conenction types (copper and coaxial cable)	Performance declines with congestion from multiple users
Fibre	Transmission over fibre optic cables	Costs include fibre deployment (trenched or aerial), potentially electronics at the ends of fibre cables	Fastest of all connection types; allows symmetrical connections (Same upload and download speeds)	Expensive to deploy at first (compared to fixed towers)

Table by Hanne Pearce adapted from *Understanding Community Broadband: The Alberta Broadband Toolkit*.

Fixed Wireless Access (FWA)

Fixed Wireless Access (FWA) should not be confused with mobile wireless. Fixed Wireless **Broadband** is a system that transmits information via radio waves from towers to fixed points (not mobile phones). The speed of data transfer can be set up to 100 Mbps in the aggregate; however, this has to account for a download/upload split (e.g. 80 Mbps download, 20 Mbps upload), and this aggregate is further divided by number of concurrent users (e.g. 5 concurrent users means 16 Mbps download and 4 Mbps upload each).

FWA is typically not as fast as wired connections; however, in some cases wireless can outperform **DSL**. For most spectrum bands, the receiver must be within line-of-sight of the tower to connect. Towers connect to **Backbone** infrastructure either through wireless microwave backhaul, which is more commonly used or by wired connections (e.g. fibre), which are less common. Fixed wireless is typically ideal for remote and sparsely populated areas.

Mobile/Cellular Networks

Mobile or cellular networks, sometimes called mobile wireless, are the means through which our cell/smartphones are connected to the internet. Similar to **Fixed Wireless Access**, mobile wireless technology uses radio waves from towers; however, they differ in that the receiving point (your phone) does not have to have a fixed location.

While mobile wireless offers many advantages and can provide high speed connections, mobile connections are only offered by certain providers who have acquired a licence to certain radio waves which are auctioned off by the federal government. Because these spectrum licences are very expensive, mobile wireless plans are often expensive and and can have very low data caps.

Wireless Mesh Networks

Wireless Mesh networks are a specific type of fixed wireless technology that addresses some of the limitations described above. Mesh networks use a network of wireless access points that are distributed in a point-to-point manner that looks like a mesh net or a spider web. By 'meshing' together a number of wireless links, mesh networks can interconnect with one another to send and receive data.

Alternatives for Wi-Fi Wireless Radio Links

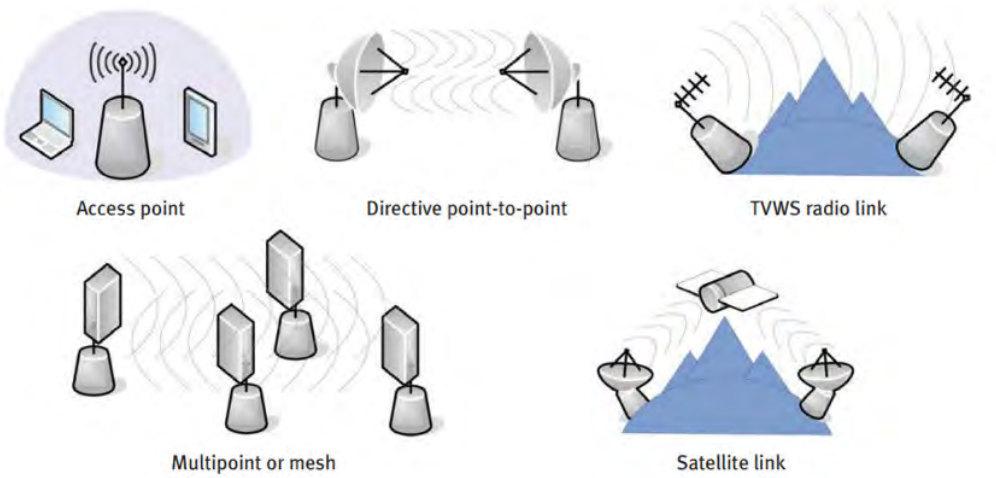


Image: Leandro Navarro, Leonardo Maccari and Renato Lo Cigno (reprinted from Global Information Society Watch 2018).[1]

As noted in the 2018 GIS-Watch report, which has an excellent overview of mesh networks and other **broadband** technologies:

> *"In mesh networks, all nodes cooperate in the distribution of data throughout the network to the mutual benefit of its participants. With each participating node, the reach, throughput and resilience of the network expands. Mesh networks are able to adapt to changes: when a node joins or leaves the network, the others automatically reconfigure to guarantee connectivity to the modified network. In some sense, they can grow "organically" with the growth of the community of people that use/manage them" (pp.15-16).*

1 Link: See p.16 here: https://giswatch.org/sites/default/files/gw2018_t1_limtis_internet.pdf

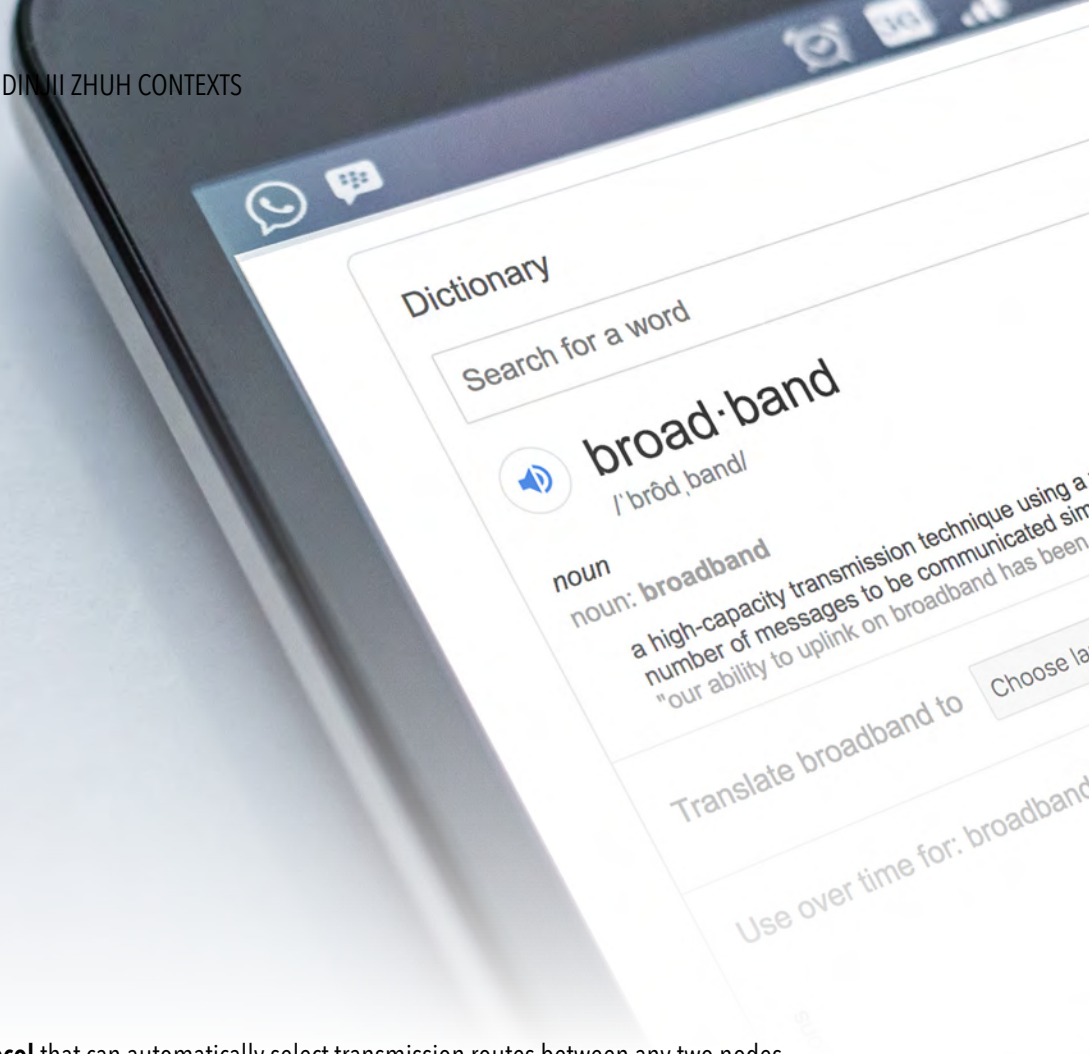


Photo by Edho Pratama on Unsplash

By using a **routing protocol** that can automatically select transmission routes between any two nodes on the network, mesh networks can be adapted and grown as new participants join, new areas are reached, and more capacity is added to links and internet gateways. This work can be done at a lower cost than traditional wired or wireless networks.

Digital Subscriber Line (DSL)

DSL stands for **Digital Subscriber Line**. It uses a telephone connection and transmits data as sounds, which are interpreted by a receiver that re-interprets the sounds into data. The speed of **DSL** can reach up to 100 Mbps per user with the latest technology. However, performance deteriorates depending on the distance between the end user and the **DSL** Access Multiplexer (usually a telephone exchange centre).

DSL was developed by phone companies to replace dial-up; unlike dial-up phone lines can be used for both internet and voice calls at the same time. While both **DSL** and dial-up use copper phone line technology, note that dial-up is capable of only very limited speeds (56 Kbps) and as such is considered a "narrow-band" rather than **broadband** technology.

Coaxial Cable

Cable **broadband** is sent over cable lines along with cable television signals. It has a speed up to 160 Mbps in the aggregate, which can decline with concurrent users. The mode separates the Internet signals from television signals. It is faster than **DSL**, but speeds can suffer from high numbers of concurrent users at peak times.

Fibre

Fibre broadband signals travel through fibre optic cable as flashes of light, which are much faster than sound signals. The speed of fibre **broadband** is generally 1 Gbps (1000 Mbps), though some communities in the U.S. are now deploying 10 Gbps networks.

Fibre allows symmetrical (equal) upload and download speeds, but most implementations tend to be asymmetrical. The speeds of fibre connections are limited by the electronics attached to the end of the fibre optic cables, not by the network infrastructure itself.

Broadband Speeds

Diagram by Hanne Pearce adapted from *Understanding Community Broadband: The Alberta Broadband Toolkit*.

Wired Versus Wireless Networks

Broadband networks come in two major types: wired and wireless. While there are two major types of **last mile**/end user connections, it is important to note that all networks rely on wired **backbone** networks (discussed below) at some point.

Wired networks send signals through various types of wires (copper, coaxial cable or fibre). These networks tend to be faster, but require every user to have a wire entering their house/business to connect them.

Wireless networks send signals through the air using radio-spectrum. Wireless networks need both antennas to send information (towers or satellites) and receive information (satellite dish, home

antenna or a cell phone). Wireless networks have some advantages in that they don't require wires, but also have limitations in that they tend to be slower. Wireless networks are also, generally, more complicated to operate.

Recently developed mesh network technology addresses some of the technical limitations of wireless networks, while retaining their benefits. As described earlier, mesh networks are small, low-cost wireless systems that can be deployed through an array of access points that use special routing software to interconnect. Because they can be slowly developed in ways that require little technical expertise or coordination, and allow communities to build up their technical and organizational capacities, they are a strong choice for community networks. As noted in the GIS-Watch article:

> *Without a large initial capital expenditure for a spectrum licence and expensive infrastructure, it is much easier and less risky to create low-cost, bottom-up network infrastructures owned and managed by initially small communities of participants.* [2]

Finally, it is important to remember that wired and wireless networks complement each other (although they may appear as substitutes). Using a mix of wired and wireless technologies is often a better approach than focusing on one type of connection exclusively.

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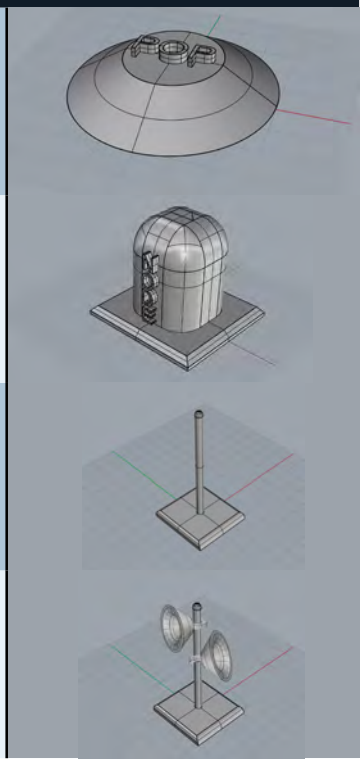
2 See p.16 in Navarro, L., Maccari, L. and Lo Cigno, R. (2018). At the limits of the internet: Technology options for community networks, in Global Information Society Watch 2018: Community Networks. USA: Association for Progressive Communication and International Development Research Centre. Available at: https://giswatch.org/sites/default/files/giswatch18_web_0.pdf Link: https://giswatch.org/sites/default/files/gw2018_t1_limtis_internet.pdf.

Photo by Taras Shypka on Unsplash

Activity: Make the 'Net-Work' - Let's Find and Place Our Wired and Wireless Network Pieces (Step 4)

This activity reviews wired and wireless elements of a **broadband** network. You can draw on this material when discussing and planning **broadband** development. The facilitator will have 3D-printed pieces that illustrate different parts of wired and wireless networks. You will begin by reviewing the descriptions of wired and wireless **broadband** technologies noted above, and match them to the 3D-printed pieces.

Wired and Wireless Pieces of a Broadband Network

Piece Name	Type of Infrastructure	Sample Image
PoP (Point of Presence)	Network Infrastructure	
Node	Network Infrastructure	
Wireless Tower	Network Infrastructure	
Satellite Farm	Network Infrastructure	

Images: Hanne Pearce | Gwich'in **Digital Literacy** Team.

The second step in this activity involves building a simple wired network. The facilitator will give you a limited amount of string (representing **DSL**, fibre or cable lines), and ask them to "connect your community."

Once you have finished connecting your community (building a network), the facilitator will ask you about a few things to consider:

1. Do you have enough string to connect all the homes, businesses, and anchor tenants?

2. If not, how will you decide whom to connect?

3. What challenges exist with connecting remote buildings with wired connections?

4. What if there was a new building erected on the outskirts of your community that needed **broadband**. How might you connect it?

5. What if there was no more fibre (string) available, or it was too expensive; what other options exist?

Local and Backbone Networks

Broadband networks involve more than just local systems. Otherwise, how would a community network connect to the broader world?

Remember that the internet is a 'network of networks,' which serves to connect communities, regions, countries, and continents together. While our material has focused on local, community-level connections, it is also important to consider how they connect to other communities and regions.

There are two important connections that a community must consider as part of an overall **broadband** solution: **backhaul network**s and a local Point of Presence (PoP). These two connections are illustrated below.

Backhaul Networks and Local Point of Presence Connections

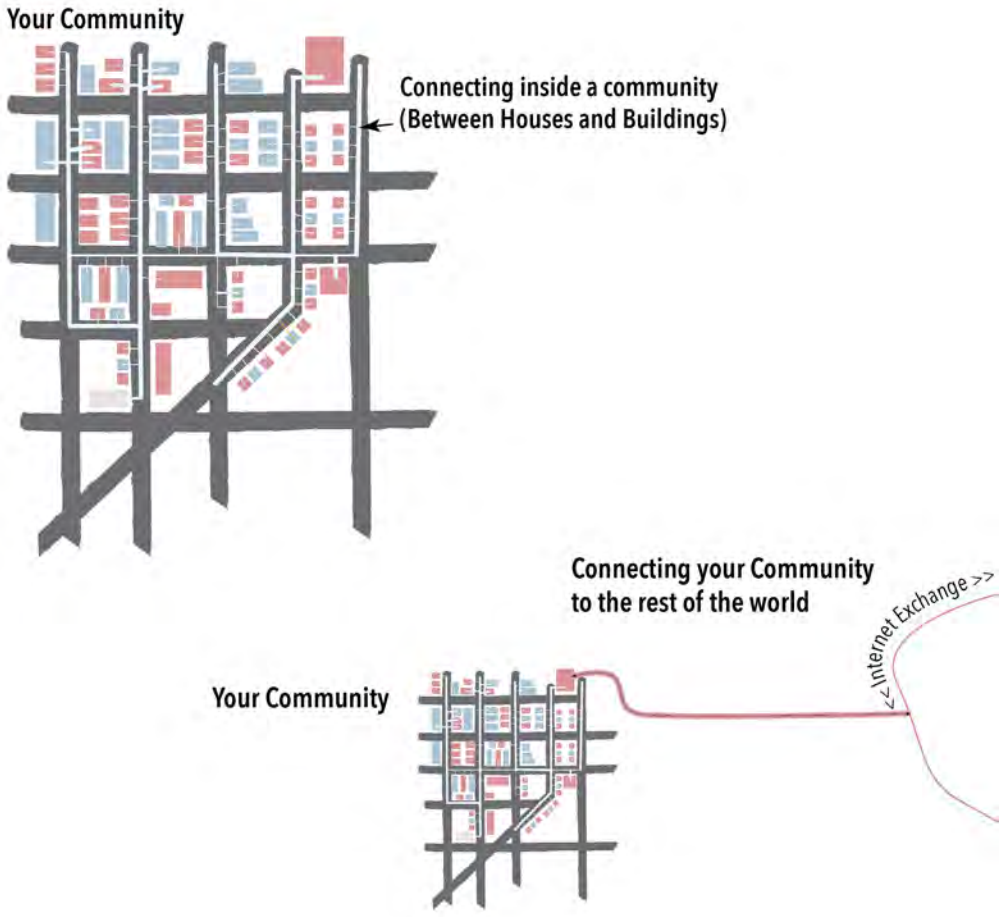


Diagram by Hanne Pearce adapted from *Understanding Community Broadband: The Alberta Broadband Toolkit*.

Backhaul Networks

Your community must have a connection to the broader internet infrastructure (**backhaul**), and specifically an interconnection with an Internet Exchange (IX) or with another third-party network through a transit, peering or interconnection agreement. This **backhaul** connection provides the link between your community and the rest of the world.

PoP (Point of Presence)

Inside your community, a PoP is the physical location and infrastructure where the **backhaul network**s is available for interconnection with the local network. Your community will also need a means of connecting the individual households and businesses within the community, also known as the last, first or final mile. This connection serves to link buildings inside your community with one another and with the **backhaul network** infrastructure that connects to the broader internet. The place where the backhaul and local networks meet is known as a PoP.

Demand Aggregation and Benefits of the 'Whole Community' Approach

Sometimes an individual community may have a need for greater **digital connectivity**, but not be large enough to be support a network on its own. One solution is for communities to work together so that the overall demand is greater. This solution is known as demand aggregation.

Map of A Set of North American Fibre Optic Lines

Image: W3Media.net https://www.w3media.net/about.php

As discussed earlier, when planning for community **broadband**, discussions with different individuals and organizations helps determine demand. Even if you partner with an ISP to deliver **broadband** service in your community, they may require some evidence of demand within the community.

Demand aggregation can serve as a way of engaging the community. You can even have neighbourhoods hold friendly competitions to see where demand for **broadband** is greatest. There are demand aggregation software tools that can be used to facilitate this process.

Regional Broadband Infrastructure: Connecting Communities

Regional **broadband** networks connect communities to the rest of the world. Sometimes referred to as transport or backhaul infrastructure, they provide the **backbone** of **broadband** connectivity. These transport links consist of networks of submarine fibre optic cables, satellite transmissions, and wireless and terrestrial telecommunications. The maps below illustrate these different regional transport networks.

Map of Submarine/underwater Broadband Cable

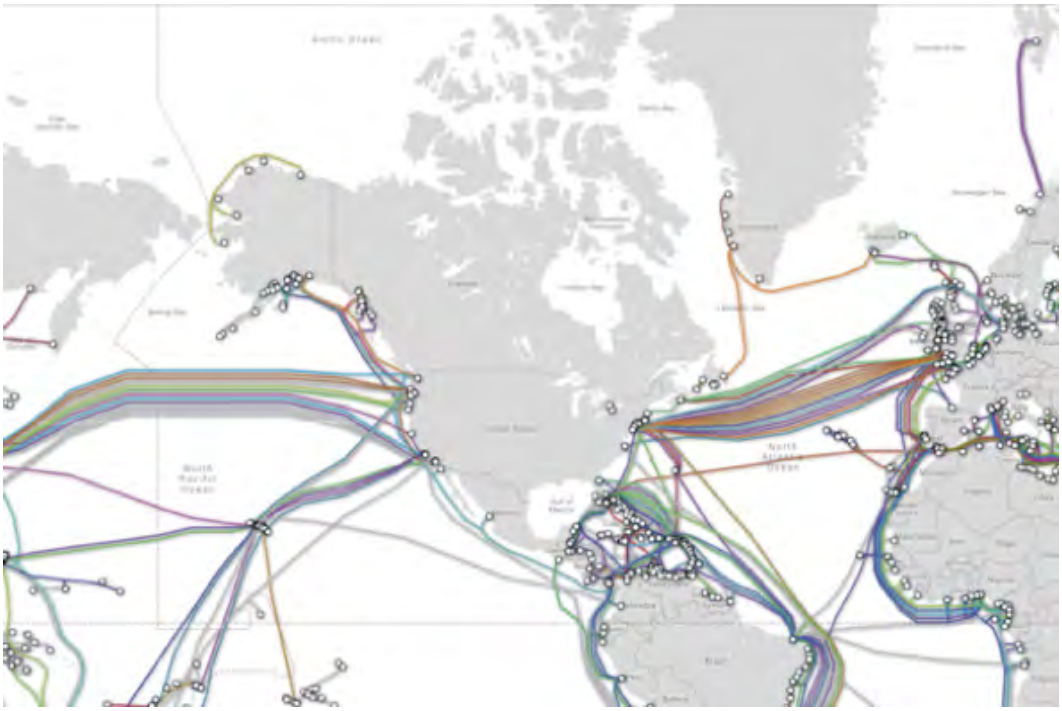


Image: https://www.submarinecablemap.com/

Many different organizations provide these services, from telecommunications conglomerates such as NorthwesTel (a subsidiary of Bell Canada), as well as regional players such as K-Net in Northwest Ontario (discussed below), which also operates a community cellular phone network called K-Mobile.

While **digital connectivity** in much of northern Canada remains limited, a number of developments point to increased access. Rising temperatures are melting ice and opening new sea and terrestrial routes, which may reduce construction costs.

Technical innovations, such as mesh networks, provide more reliable, higher capacity, lower-cost options for networking. As well, more favourable business models, such as support for high-frequency stock trading, the construction of northern data centres, and increased demand for data from resource extraction and scientific projects are driving demand (and helping pay) for projects.

Finally, the increasing use of **digital connectivity** for commercial and public services has sparked corresponding investment on the part of government and private sector funders.

Example: KO-KNET (NW Ontario)

In Canada, regional providers operating in northern regions of the country include K-Net in Northwest Ontario, Tamaani Internet Services in Nunavik, and the Eeyou Communication Network in Eeyou Istchee in Quebec. These regional Indigenous networks support online health, education and other public services, and help interconnect organizations across the Arctic. The map below illustrates some of the regional First Nations and Inuit networks operating in Canada.

Map of Regional Indigenous Broadband Networks

Image: K-Net/First Mile Connectivity Consortium.

K-Net is perhaps the longest running and largest of the regional Indigenous **broadband** providers. K-Net was set up in the 1990s by the Keewaytinook Okimakanak Tribal Council, during the early days of the internet. It was established by the communities to work with the communities and its staff of First Nations and their non-Indigenous colleagues are familiar with and understand the needs of communities.

The organization also has a long history of partnerships with outside organizations, and has been involved in setting up and managing a range of online public services, including health (KO-Telemedicine) and education (Keewaytinook Internet High School).

Network Map of K-Net Services

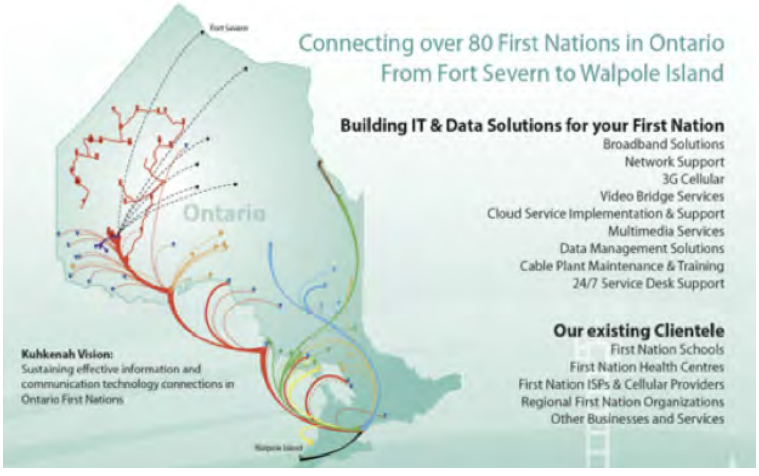


Image Credit: K-Net.

K-Net even set up its own cellular phone service, called K-Net Mobile. K-Net Mobile provides services to fly-in communities in northwest Ontario, and uses a 'pay as you go' plan. As a community owned and operated service, revenues are distributed back to the communities. Here is a map of K-Net Mobile's coverage.

Coverage Map for K-Net Mobile

Image Credit: K-Net.

Photo by Hassan OUAJBIR on Unsplash

Regional Broadband Projects in the NWT: Mackenzie Valley Fibre Link

Closer to home, there are other examples of regional **broadband** projects. The **Mackenzie Valley Fibre Link** (MVFL) project was a Government of the Northwest Territories initiative that also involved NorthwesTel, Ledcor Developments Ltd., and LTS Infrastructure Services Limited Partnership (a consortium known as the Northern Lights General Partnership).

The $81 million MVFL project, completed in June 2017, intended to provide fibre optic telecommunications links (Points of Presence) for some communities in the Mackenzie Valley and Beaufort Delta regions. This is done through the installation of 1,154 km of high-speed fibre optic telecommunications cable from McGill Lake in the south to Inuvik in the North.

At present, seven communities are directly served by Points of Presence connection to the fibre link, bringing high-speed telecommunications capabilities for the benefit of education, health and industry. An extension to Tuktoyaktuk was planned following the completion of the all-weather highway extension from Inuvik, although that project has not been completed at present. Do you know the status of the fibre extension to Tuktoyaktuk?

Map of Mackenzie Valley Fibre Link and Dempster Highway Fibre Line

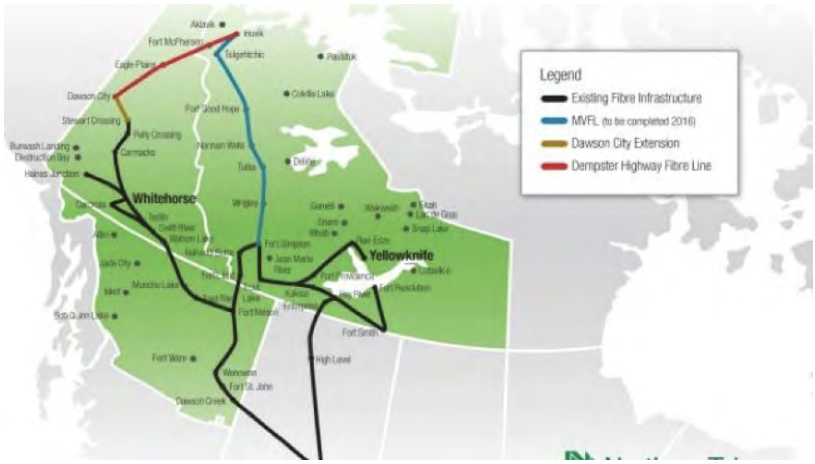


Image Source: https://www.cbc.ca/news/canada/north/dempster-highway-fibre-line-cost-1.4120725.

As illustrated in the map above, NorthwesTel is proposing to construct a 775 km fibre optic line from Dawson City, Yukon to Inuvik, NWT. This redundant fibre link along the Dempster Highway (estimated to be operational in 2021) will improve backhaul connectivity between these regions and connection in the south. This $79 million project was also funded through public support for 75% of the project (provided by the Federal Government and Yukon government).

Through a twenty-year contract, NorthwesTel will operate both the MVFL and the Dempster Highway fibre line.

Activity - Make the Net-Work: Local and Backbone Networks (Step 5)

This activity reviews the distinction between **backbone** and local networks. It provides participants an opportunity to learn about these two types of networks, and the kind of technical infrastructure that they use. Participants will discuss the following questions:

1. Where does the MVFL go?

2. Why might it be important to think about where the '**backbone**' connection to the internet goes?

Next, the facilitator will show participants the 3D printed piece illustrating the 'Point of Presence' (PoP). Participants will place the PoP and discuss the following questions:

3. What considerations did you think through in adding the PoP?

4. How might your community's PoP relate to other PoPs?

Local Broadband Infrastructure: Making Connections Inside Communities

Individual households and businesses are connected with each other, as well as with the regional transport networks. These local access systems link homes, businesses, organizations, and individuals inside communities. As discussed earlier, both types of networks use different technologies, including satellite, **DSL**, cable, fixed wireless (microwave towers), and fibre optics. They can be set up in such a way as to adjust levels of network control, and potential innovation, by local organizations and residents.

As illustrated in the map below, many local communities are provisioning **broadband** services themselves. These projects are driven by local innovators, such Angus Miles in Fort Severn First Nation in Northwest Ontario. These local projects are supported through community-oriented training initiatives that focus on network operations and maintenance. These projects are documented on the FirstMile.ca website, which showcases local ownership and control of **broadband** development initiatives in Indigenous communities.

Map of Indigenous Community Networking Projects

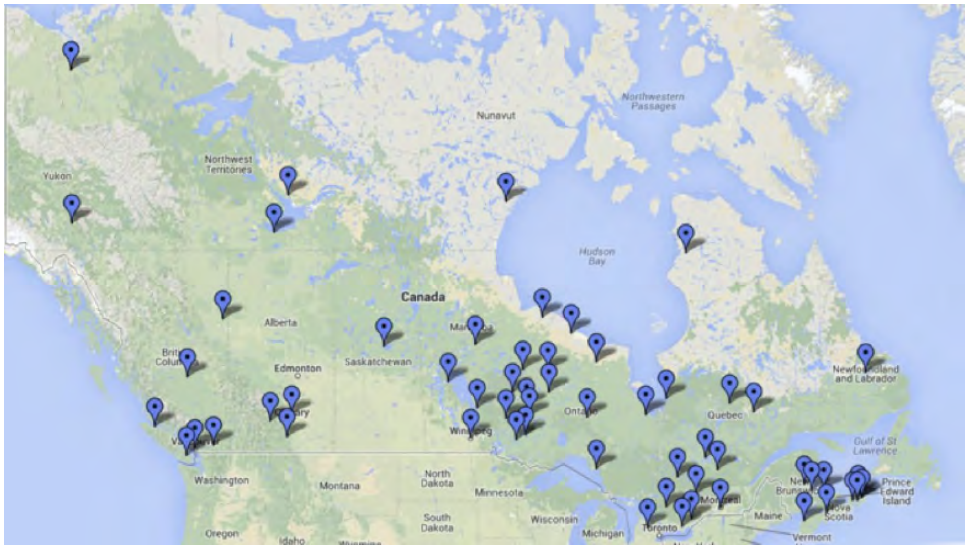


Image Credit: First Mile Connectivity Consortium.

As noted on the FirstMile.ca website:

> *Across Canada, First Nations are building broadband systems and using them to deliver services in their communities. Outside of major centres, many remote and rural First Nations remain underserved. The experiences of the early adopters of these tools and systems help create new opportunities for those starting their first mile broadband connectivity journey. The First Mile website is a place to share best practices and lessons learned. Together we are conducting research and publishing the stories of how First Nations are putting First Mile concepts into action so that we may learn and grow together.*

You can learn more about these projects in a free book that celebrates the achievements of these communities, called Stories from the First Mile: Digital Technologies in Remote and Rural Indigenous Communities.

Local Broadband Projects in the NWT: K'atl'odeeche First Nation Fibre Optic Network

Some of these Indigenous **Community Network**s are located in the NWT. For example, K'atl'odeeche First Nation (KFN) is a Dene community near Xátłodehchee (Hay River). The KFN **Fibre** Network was a locally-owned and -operated fibre optic network built in 2011.

Prior to the build, the community had been using dated copper phone lines to access the internet and the service was expensive and unreliable. The fibre network could provide a much faster and more reliable connection to local homes, businesses, and services. The project was funded by the federal agency CanNor for $275,000. Local students and community members documented the project with photographs and videos.

Henry Tambour Tours the K'atl'odeeche First Nation Network

First Mile Community Stories: Tour K'atlodeeche First Nation's Community Network

Image: First Mile Connectivity Consortium.

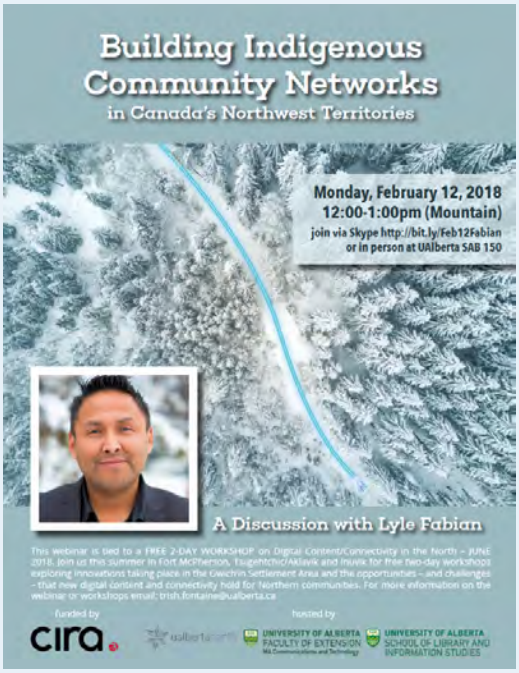
Henry Tambour, a member of the K'atl'odeeche First Nation and the band's network technician, helped replace the copper infrastructure that had been in place since the early 1980s with fibre. He worked with project manager Lyle Fabian (now at Katlotech Communications). Lyle and Henry set up local wireless connections and software and a local system that broadcasts over a community radio signal and records proceedings so people outside the community could participate in community meetings. Anyone who was hard of hearing had access to special headsets. You can watch a short video about Henry's work[3].

Activity- Make the Net-Work: Considerations for Network Design (Step 6)

This activity reviews some design considerations that apply to both local and regional networks. It illustrates the concept of **redundancy** and access to adequate bandwidth, both of which are important issues for **broadband** development in the North.

Regardless of the deployment approach used for connectivity infrastructure, it is important for network managers to determine adequate minimum bandwidth, otherwise local networks can be overwhelmed.

3 https://youtu.be/st4H7l9wtdo



Lyle Fabian and Katlotech

On February 12, 2018, the Gwich'in Digital Literacy Team hosted a webinar[3] with Lyle Fabian from Katlotech Communications. Lyle has led a number of connectivity projects in the NWT, including building wired and wireless infrastructure for K'atl'odeeche First Nation, DeBeers Canada Gahcho Kue Diamond Mine Project, Yellowknives Dene First Nation, and Jean Marie River First Nation.

This happened in Canada in August 2009 during Operation Nanook, a military exercise that overloaded cell phone and internet networks in Iqaluit, impacting the ability of groups to communicate and share data.

This issue also highlights the need for redundant backup connections, which can address such system overloads or network breaks due to cut cable or fibre optic lines – which sometimes happens in the North. 1. Have you ever experienced a 'cut' in the line? What was it like? How long did it last?

2. What happens when either the local network or **backbone** network gets 'cut'?

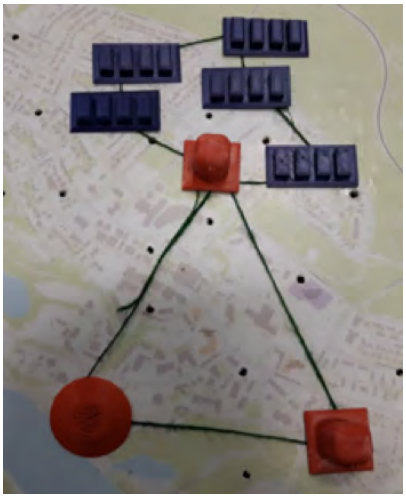
3. What might be some good solutions for ensuring a network doesn't get cut?

Next, participants are asked to build a **redundant network**. *They can use string to build a loop, so that even if the line is cut in one place, everyone still has access. Participants discuss the following questions:*

4. Does building a **redundant network** take more string?

5. Why is it important to carefully plan a route to make an effective loop?

The facilitator will then use the community network map and materials to demonstrate nodal network design in two situations: a simple nodal design and nodal design on a fully built board (illustrated below).



Simple nodal design
PoP and two nodes (red) connected.
Node connects a loop of homes (blue).

Nodal design on fully built board
Node (red) connected to primary local network (green string).
Node connects a loop of premises (blue and white string).

The facilitator will end this activity by asking participants to 'clean the board' and combine what they have learned to build a community network. They will be asked to include considerations of redundancy, nodal design, and wireless and wired infrastructures.

6. Try to be as effective as possible in using the string.

7. Afterwards, let's consider how much string this took.

8. Are you surprised by how complex your final network is?

Module 6: Assessing Broadband

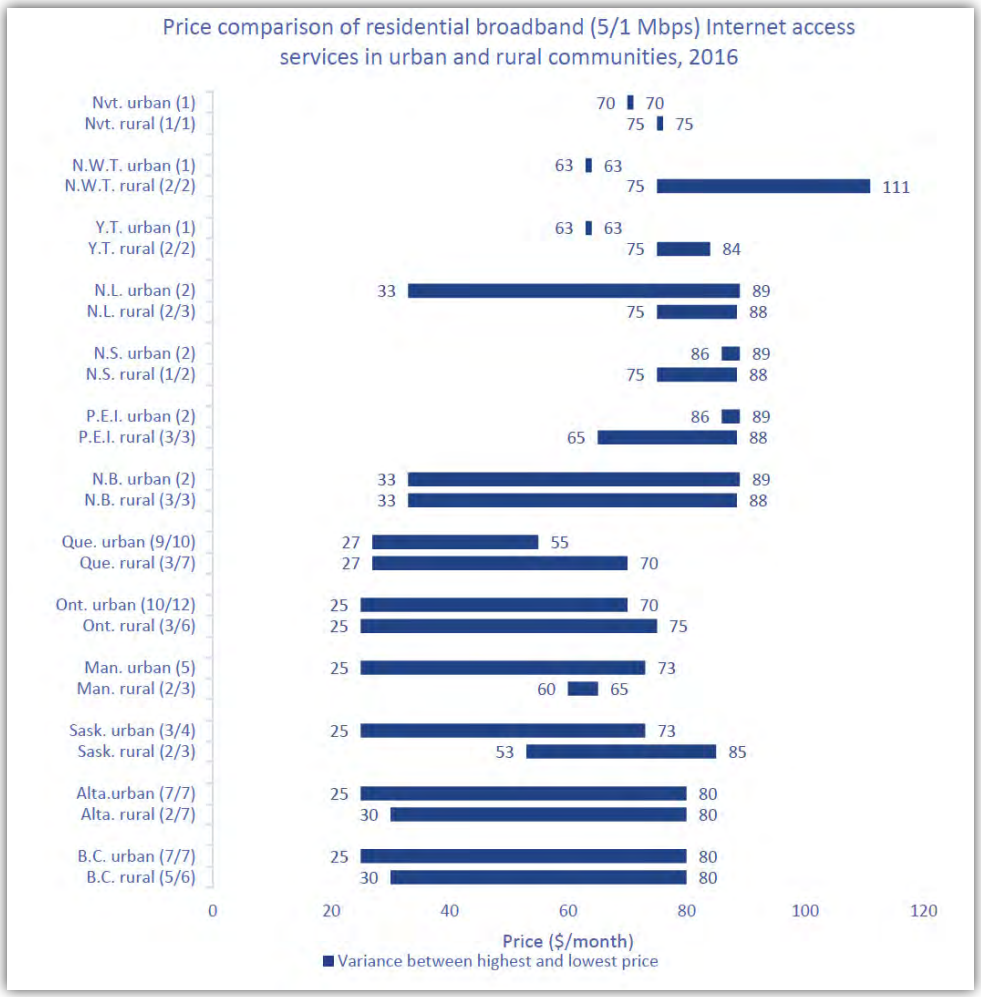
In this module we turn to your experience as a **broadband** user. After a **broadband** system has been built, there are still many things to consider. These include questions around affordability, access, quality of service, long-term operations and management, and the potential for **broadband** development to support local organizations and jobs.

When assessing **broadband** it is important to think beyond current uses and consider future use and demand. Over the last two decades demand for **broadband** capacity has grown steadily as more devices and uses have become available. Think about your own use of **broadband**, which has probably changed over the past few years from sending email and visiting simple web pages to demands for multiparty video-conferencing and high definition streaming video.

In this part of the workshop we will review some of these options and try to identify key opportunities and challenges for this work in **Dinjii Zhuh** contexts.

Broadband in Canada: Speed and Cost Issues

As noted earlier, residents and organizations located in NWT communities have much to gain from better **broadband** connectivity, but also face many barriers to achieve it. Despite having clear interests in the benefits of **digital connectivity**, such as for access to health and education, pay the highest prices and have the lowest quality and speed of **broadband** connectivity services.



The CRTC's 2017 Communications Monitoring Report points out that NWT **broadband**, particularly in rural regions of the territory, is among the most expensive in Canada. The image below illustrates this through 2016 data comparing prices of residential **broadband** internet drawn from Fort Smith and Fort Simpson:

Image Source: *CRTC 2017 Communications Monitoring Report* [p.266].

There are some government supports in place to address these high costs. For example, in May 2018 a CBC News article noted that NorthwesTel would lower costs for internet in eight NWT communities (Colville Lake, Gameti, Lutselk'e, Paulatuk, Sachs Harbour, Sambaa K'e, Ulukhaktok, and Wekweeti), and Old Crow, Yukon. This price drop came about due to more than $4.6 million in funding from the federal government. NorthwesTel stated that costs for the highest speed package would be reduced from $200 to $80 per month.

How much do you pay for internet services? Is it expensive?

The CRTC has also noted that the NWT also has the lowest availability for high speed connections. This is illustrated in the table below (in the red box):

Photo by Lloyd Dirks on Unsplash

Internet of Things

One key trend driving future demand is the emergence of the Internet of Things (IoT). The IoT describes an environment where individuals connect to the internet through computers and smartphones, while billions of networked 'smart' devices are simultaneously exchanging information. Some of these devices are already available, such as smart thermostats that can be managed remotely. While the IoT offers opportunities for broadband to simplify many aspects of our lives, these technologies will also bring important privacy considerations. How will you make sure your personal information is protected?

Table 5.3.16 Broadband service availability, by speed and province/territory (% of households), 2016

Province/territory	1.5-4.9 Mbps	1.5-4.9 Mbps with HSPA+	5-9.9 Mbps	5-9.9 Mbps with LTE	10-15.9 Mbps	16-24.9 Mbps	25-49.9 Mbps	50 Mbps or higher
British Columbia	98	99	97	99	96	94	93	92
Alberta	99.7	100.0	99	99.9	97	94	95	83
Saskatchewan	93	99.7	90	96	83	62	60	52
Manitoba	98	99.8	95	97	87	78	77	70
Ontario	99	99.9	98	99.8	96	95	93	88
Quebec	98	99.7	98	99	95	92	91	90
New Brunswick	98	99.8	96	99	95	93	93	83
Nova Scotia	99.9	100.0	89	99	85	82	82	81
Prince Edward Island	96	100.0	83	100.0	69	67	67	67
Newfoundland and Labrador	89	98	87	98	76	76	73	72
Yukon	97	97	97	97	76	62	62	62
Northwest Territories	99	99	95	95	93	54	54	54
Nunavut	99	99	30	30	0	0	0	0

Sources: Innovation, Science and Economic Development Canada (ISED) and CRTC data collection

Image Source: *CRTC 2017 Communications Monitoring Report*, p. 284.

This issue is also being addressed in part through government support, including for funding through programs such as Innovation, Science and Economic Development Canada's (ISED) Connect to Innovate funding and the CRTC's **Broadband** Fund. In some cases these programs are supporting Indigenous and community networks; in others they are contributing to regional builds such as the **MVFL** and **Dempster Highway Fibre Line**.

Privacy Considertions and the Internet

Privacy is an important part of being human. There are many different kinds of information that are deeply personal that we may only share with close family, such as medical or financial information. When it comes to the internet, privacy requires special consideration.

Nothing you do online is entirely private. Every action you take from visiting websites to sending emails or using apps leaves a trail of data, sometimes called a digital footprint. Every communication on the internet is tied to a certain, specific Internet Protocol (IP) address. And while an IP address is just a set of numbers (of the form 123.456.78.90) and doesn't include your name, it can be linked back to your personal identity.

There are certain actions you can take to reduce the size of your digital footprint. Your internet browser (e.g. Chrome, Firefox) has built in tools that allow you to control, to a degree, who has access to parts of your data trail.

One of the most common means through which websites track our online action is through the use of cookies. Internet cookies are little markers attached to our browsing history that tell websites where we have been. Settings in your internet browser can allow you to turn on/off cookies in general or for specific sites.

Another simple means of protecting privacy can be done through using In-Private or Incognito browsing modes; however, these browsing modes are quite limited in the degree of protection they provide.

There are other actions you can take online to ensure what you do is more private. Sites that start with "https" as opposed to "http" are more secure connections. Setting up a Virtual Private Network (VPN) can also make your online actions more private.

It is important to remember that even using the above steps, nothing is entirely private. If you are using apps or other online services, the providers of those services will have a record of the IP address you used to access that service.

Finally, your internet service provider always knows which websites you have visited and has the means of connecting your IP address to your name/identification through your subscription.

While there can be many privacy concerns, there are also many tips and tools to help keep you safe online. Some of these are common sense, like not sharing passwords or using the same password on different sites.

The Office of the Privacy Commissioner of Canada also has an extensive list of resources and information about online privacy at: https://www.priv.gc.ca/en/privacy-topics/technology-and-privacy/online-privacy/

Furthermore, the CRTC's designation of **broadband** as a Basic Telecommunications Service (speeds of 50 Mbps down / 10 Mbps up) and the Auditor General's report on limited connectivity in rural and remote regions helped establish benchmarks for connectivity speeds.

Nevertheless, information about actual speeds experienced by users in remote and rural parts of Canada is still limited. Government regulators such as the CRTC, as well as **Internet Service Providers** such as NorthwesTel, should be made aware of the speed and quality of service that you are receiving. This will help these organizations monitor these services, build and upgrade infrastructure and services where required, and ensure you are getting what you pay for.

In the next section, we introduce some resources and tools to help you measure and report this information to the appropriate organizations.

Activity: Make the 'Net-Work' Ensuring Network Quality (Step 7)

The quality of an internet connection is dependent on many factors including speed, affordability and limitations on use such as data caps. The following sections provide information on how to assess the overall quality of network, starting first with testing internet speeds.

Testing Speed and Quality of Service

Broadband speeds are a key element of connectivity. With a high speed connection you can use more applications, or connect more devices. Low speeds can negatively impact internet use. They can cause video and audio files to be choppy or even unplayable, and low speeds can make larger files and certain applications and websites unusable.

There are many different websites where one can test speeds, but CIRA, which manages the .ca website domains, has a free speed test. The **CIRA Internet Performance Test** is a useful resource as it not only tests speeds but records the results of your and other users tests and maps these. This helps inform everyone about the speed of connectivity in across the country.

CIRA's Map of Internet Speeds Across Canada

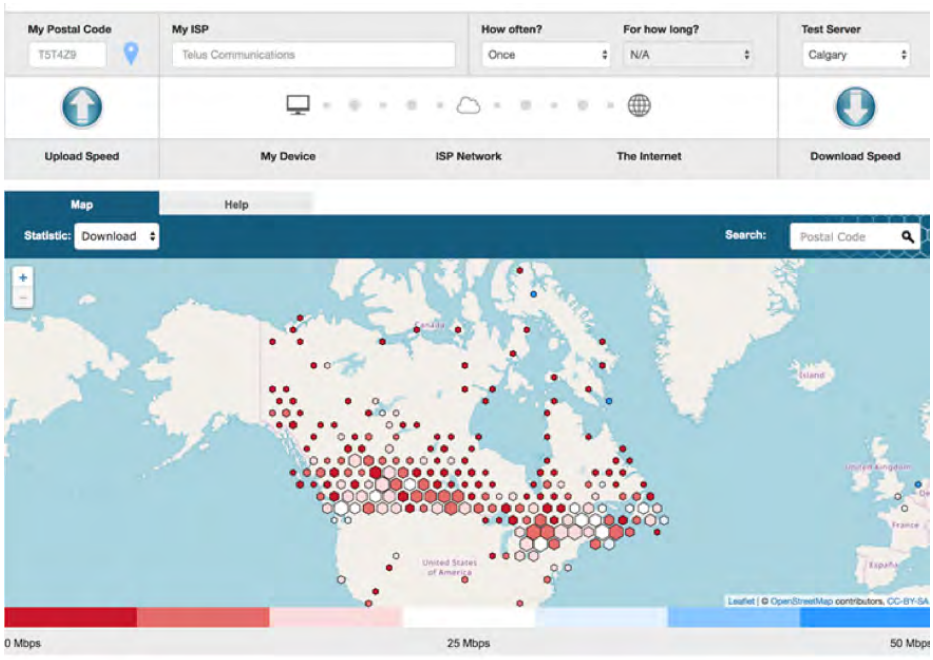


Image Source: https://cira.ca/cira-internet-performance-test-0.

CIRA Speed Test from the Aklavik Inn (June 2018)

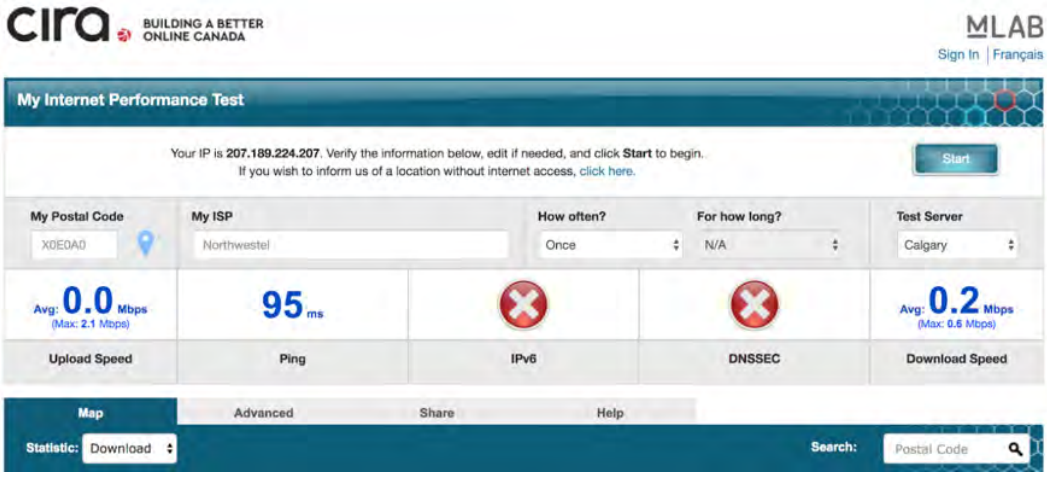


Image Source: Hanne Pearce/Gwich'in Digital Literacy Team.

This short video provides an introduction to how CIRA tests internet performance. CIRA provides a number of resources to support internet users and community networking initiatives. CIRA is also one of the funders that supported the development of this workbook. You can watch the video below:

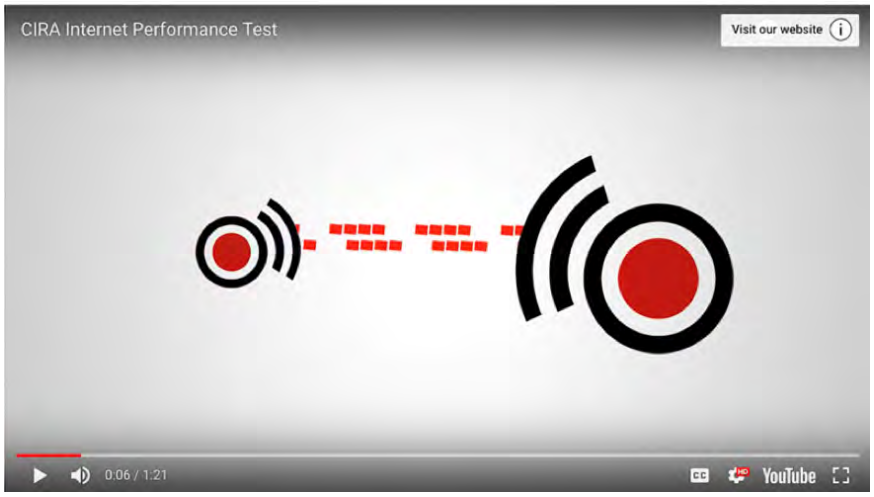


Image Source: https://cira.ca/how-internet-performance-test-works.

Dennis Allen, Inuvialuk Filmmaker

Photo:Courtesy of Dennis Allen

Dennis Allen is the son of Vuntut Gwich'in woman Bertha Allen (née Moses) and Inuvialuk man Victor Allen. He was the second baby who arrived at the newly-constructed Inuvik General Hospital in 1961. Dennis previously worked in the oil and natural resource sector in the Inuvik Region, until his mother inspired him to seek higher education.

After attending the Southern Alberta Institute of Technology, he worked as an intern editor for the widely acclaimed *North of 60* television series. He later became a filmmaker, writer, television producer, and a freelance contractor for TSN and CBC.

Dennis's early films include *Someplace Better* and he also documented an Elder's sacred walking route from Colville Lake to Fort Good Hope. Dennis is eager to educate young Indigenous people on the importance of their cultures and how storytelling is connected to their personhood and sovereignty as Indigenous northerners.

Dennis on **Dinjii Zhuh** communications when he was a child:

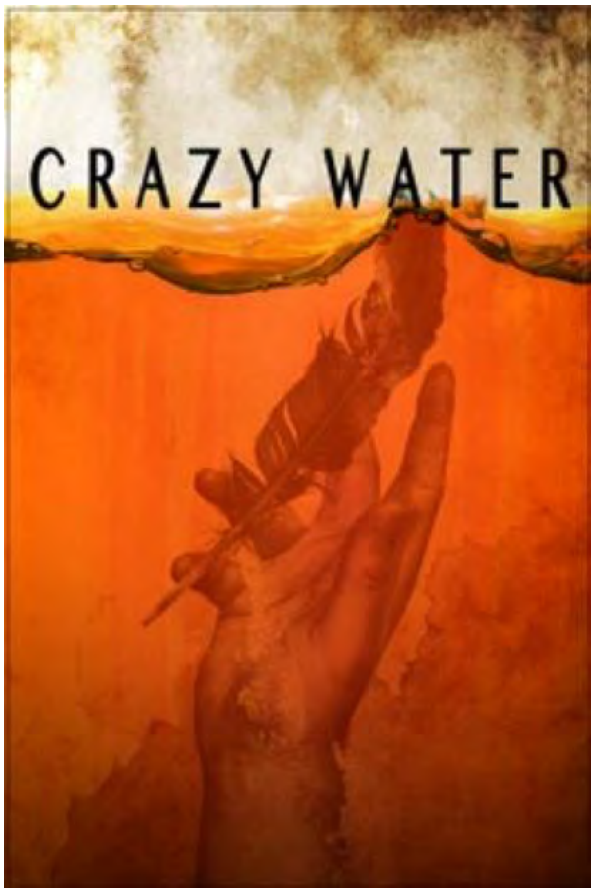
> *The only way that we really communicated was storytelling. [...] So there was lots of storytelling and that's another thing when I was growing up, I spent a lot of time on the land with my dad. And in small communities, where the people entertained one another by telling stories and that's how I grew up. So I grew up at the feet of my father who's a master storyteller and he's known throughout the North for being a good storyteller and that's why I apprenticed. I didn't know it, but I was apprenticing under him as I was growing up and learning how to tell stories. So naturally I love telling stories. I am a storyteller and hopeless storyteller. That's what I grew up with and then eventually I picked up the guitar and I started writing songs and turned my stories into songs.*

Dennis furthers his education, with encouragement from his mother Bertha Allen:

> *It was for one-year certificate [at Grant MacEwan Community College]. Introduction to Communications. It was like playschool. I was in my element with developing our own film, learning how to write, learning how to operate a TV camera, studios, microphones, tape recorders, learning how to interview. And I just fell in love with it. And then after I was done that, I wanted more. I wanted more. [...] From there I went to SAIT in Calgary. [At the] Southern Alberta Institute of Technology and I took a film program there for two years. And I just loved it. It was just, again, it was just like playschool. I got to be creative. And I was challenging myself to do well and I did well and I found that I really loved write and I really love to express myself in lots of different ways. But filmmaking was one of them.*

Dennis builds a very successful career in digital **media**:

> *Roger Ulasavitz from Economic Development in Inuvik helped me put a business plan together and I bought this big frigging TV camera with a tripod and the lights and everything and the mics. Bought this $20,000 camera and I just started calling CBC in Yellowknife. And I said, "Hey, you know, I got this camera up here in the North. I know you guys are always sending crews up here. Why don't you give me a chance and see if you like my footage." So they started sending me a story and I would go chase it down. I would shoot the footage. And I would ship it to them. And they liked it.*



"This feature-length documentary from Inuvialuit [sic] filmmaker Dennis Allen is an emotional and revealing exploration of addiction among Indigenous people in Canada. After years of struggle and shame, 5 Indigenous Canadians bravely come forward with their stories of substance abuse, presenting the sensitive topic of alcoholism in an honest and forthright manner. Alex, Paula, Desirae, Stephen, and Dennis himself maintain a deep and devoted commitment to their traditional culture to achieve long-term sobriety. Through their voices, this insightful doc offers an inspirational beacon of hope for others." Watch Dennis's 2013 film Crazy Water for free on the NFB website. https://www.nfb.ca/film/crazywater/

I started as what you call a stringer. So I was a stringer for CBC for one whole year. And other production companies would come to town and then TSN heard that I was in Inuvik with a camera and they wanted footage of a snowmobile race. So I did that. And that's how I got it. I guess I was just…I don't know if I was naive or what but I just made cold calls to whoever. I just made a whole bunch of cold calls to all these people that I met and I said, "You know, I'm here in the North. I have a camera. If you need any footage, give me a call."

Activity: Let's Do a CIRA Test

This activity illustrates one way to test internet speed and quality of service by using CIRA's Internet performance Test. It also illustrates the difference between advertised and actual internet speeds, which is a common issue with retail internet services, particularly in the North.

Participants should go to: https://performance.cira.ca/ and follow the steps to perform a speed test.

Next participants will consider the following questions:

What are the two speeds listed?

Why is download speed important?

Why is upload speed important?

What kinds of things might impact your speeds?

What is important to test your speeds?

When looking at speeds it is important to note that there are two ways that internet speeds can be measured and reported:

Advertised Speeds are what internet service providers say are the speeds that are available with certain connections. This is the number typically found in marketing materials, such as flyers or web pages.

Actual Speeds are a measure of the actual speed of connection being provided. Tools like CIRA's Internet Performance Test help us measure actual speeds that users are getting from their internet connections.

Many factors affect actual speeds, such as the connection type, time of day, weather, and the number of others users on a network. These factors can cause difference between advertised speeds and actual speeds. Often actual speeds are below advertised speeds, and in some cases the difference between advertised and actual speeds can be fairly significant. Rarely are actual speeds above advertised speeds.

Photo by Galymzhan Abdugalimov on Unsplash

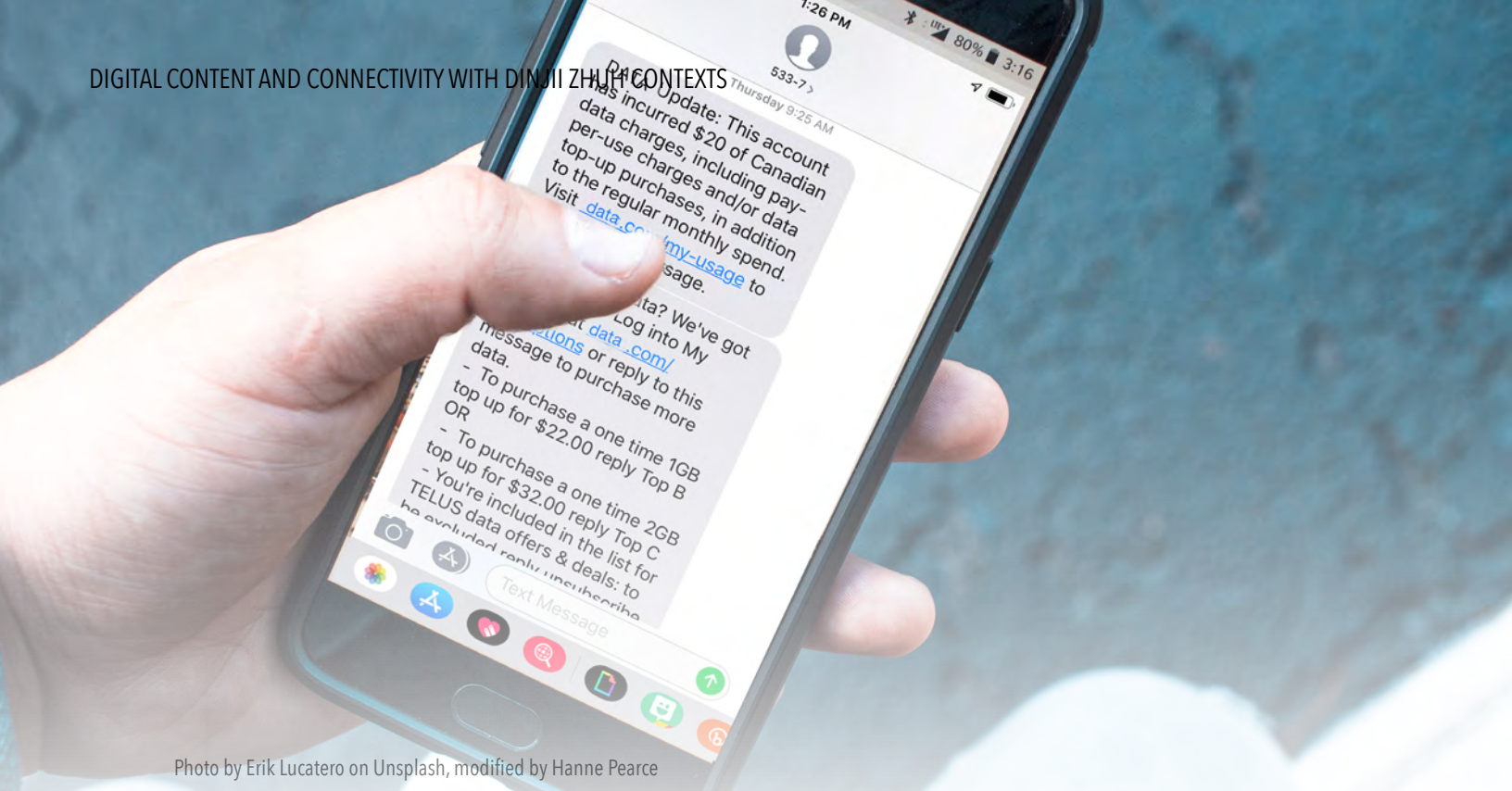


Photo by Erik Lucatero on Unsplash, modified by Hanne Pearce

Data Caps and Affordability.

In addition to speed, the quality of a network is impacted by its affordability as well as limitations on the use of the internet. These two issues are often tied together in the form of data caps.

Data caps are limitations that internet service providers put on users. Simply, data caps limit the amount of internet (usually measured in **Megabytes** (Mb) or **Gigabyte**s (Gb) that can be used in a given period (usually each monthly billing cycle)). Internet service providers often allow users to go over their data caps, but require fees for the additional data used.

In some cases these charges (often called data cap overages) can be costly and it is not uncommon for people to spent hundreds or thousands of dollars a month on data cap overage charges.

Data Caps at the Aklavik Inn

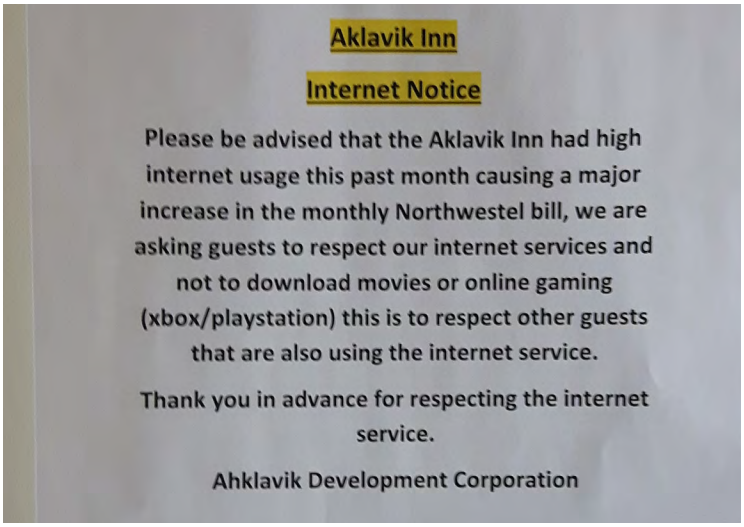


Photo Credit: Michael McNally | Gwich'in Digital Literacy Team.

Data caps can limit online activities. This example is from the Aklavik Inn requesting guests to refrain from downloading movies or engaging in online gaming.

This short video provides an introduction to data caps. It was created by a non-profit organization based in the U.S. called Public Knowledge. According to the organization's website: "Public Knowledge promotes freedom of expression, an open internet, and access to affordable communications tools and creative works. We work to shape policy on behalf of the public interest".[1]

You can watch the video below at:

Image source: https://www.youtube.com/watch?v=xSSO4gf79IQ

Activity: How Quickly Will the Cap be Met?

This activity illustrates data caps. It uses an online tool developed by NorthwesTel to help people plan their internet usage.

Participants should visit the Northwestel Usage Estimator at: http://nwtel.ca/shop/internet/usage-tools/usage-estimator

Start by adjusting the settings to reflect your personal internet usage. How much data do you estimate you will use?

1 Link: https://www.publicknowledge.org/

Now think of all the members in your household. Add estimates of their use of the internet. How much data will your household use?

Do/would you use this tool to plan your internet use?

Do you think it is reasonable to have to plan out your data usage in this way?

Photo: Hanne Pearce

Photo by Markus Spiske on Unsplash

Do the rates for various uses surprise you? Why or why not?

If you have to use less data, how do you select which activities to limit?

What would you like to do more of but can't because of data caps?

Kristian Binder, Inuvialuk and Business Owner of Eighty One Images

eighty_one_images, @eighty-one-images

Kristian Binder was born in Inuvik on July 18, 1981. His mother is Mary-Ellen Binder (née Whittaker), who is originally from British Columbia and his father is Lloyd Binder, who was born at Vàdzaih dehgajį (Reindeer Station).

Kristian was raised in Inuvik and Calgary, Alberta and later lived in Ottawa, Ontario as an adult. He returned to Inuvik in 2011, when he fully embraced northern living. Kristian works for the GNWT as an Accounting Clerk and devotes his free time to his photography business, Eighty One Images.

In particular, his photography with his drone has been acclaimed nationally. Kristian seeks to uphold northern Indigenous cultures and lifestyles through his artwork. Kristian's natural talent and dedication to photography came after he taught himself everything he needed to know:

> *When I was younger, we only had the film camera stuff. And by the time I was a teenager, there wasn't really a lot of great opportunities for photography in Inuvik because we just didn't have the photo development places and dark rooms and things like that. So it was something I was never really too into when I was younger, but when things went digital, they weren't great quality by any stretch. But that opened the door for me to start playing around with it.*
>
> *I never really invested much money into a serious camera. It was always just a point and shoot for me. [...] For the summer of 2012, I got a freelance job doing photography and*

Photo credit: Dez Loreen

writing for a magazine here. And so I figured it was time to get my first proper camera. A [digital single lens reflex camera] DSLR with interchangeable lenses and all of that because I borrowed something for the first for the first few weeks and I was like, "OK I can do this."

A lot of people, myself included, were intimidated by the DSLR cameras. [...] I just watched a lot of stuff on YouTube. Just a ton of tutorials, discussions about lenses, photo editing, and what everything means and aperture and ISO and all that fun stuff.

Kristian invests in a drone:

For as long as I've been serious about photography, when I'm taking a landscape shot [I'd think to myself], "What would that look like 20, 30, 40 feet higher? What about a different angle?" [...] For me the flying was secondary. I just want to get the camera up into places where I can't go. That was why I got it. It was all great.

Kristian turns his hobby into a business, Eighty-One Images:

It started with a calendar and then after that first Christmas of sales. That's when I started branching into what everything is now. [...] I've had things passed around worldwide so that's been exciting. One my most popular items is my mugs with aurora on them and they have ended up all over the world. Japan, Germany, South America, Australia, UK

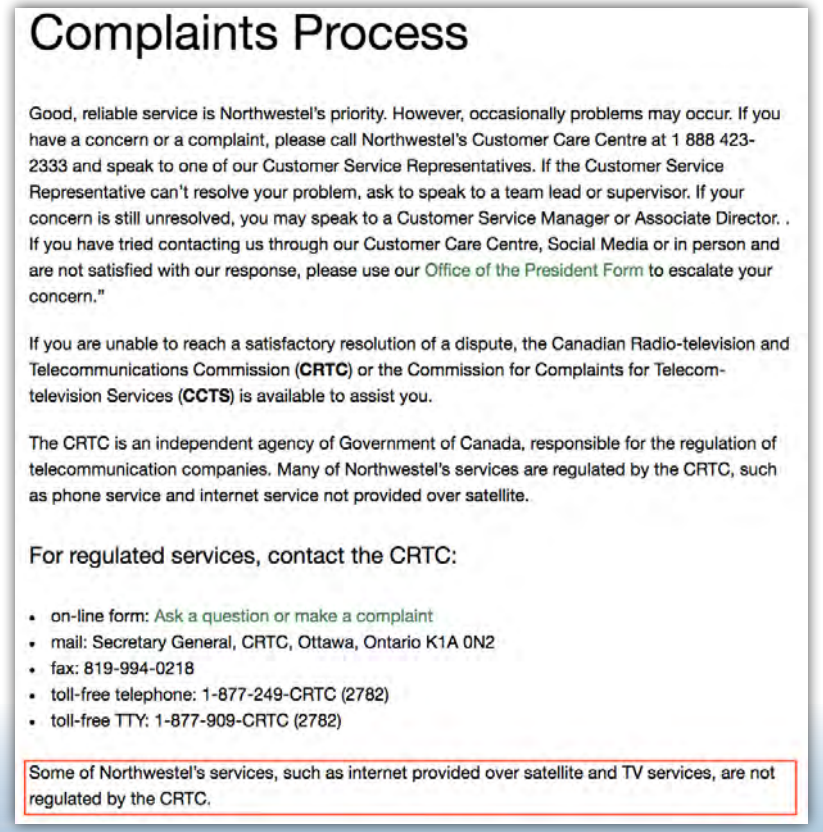
Photo Credit: Kristian Binder, Eighty One Images.

Making a Complaint About your Internet Services

Across most of Canada, the CRTC does not directly regulate the price of internet services, nor does it involve itself in complaints with regards to service or billing. In the NWT, however, the CRTC is more actively involved.

With regard to NorthwesTel's internet rates, the CRTC does have a means for filing complaints (though the CRTC does encourage you to first raise any concerns with your Internet Service Provider, such as NorthwesTel).

If you are a NorthwesTel customer and want to make a complaint about their services, you can learn how at this website: http://www.nwtel.ca/legal/complaints-process



Complaints Process

Good, reliable service is Northwestel's priority. However, occasionally problems may occur. If you have a concern or a complaint, please call Northwestel's Customer Care Centre at 1 888 423-2333 and speak to one of our Customer Service Representatives. If the Customer Service Representative can't resolve your problem, ask to speak to a team lead or supervisor. If your concern is still unresolved, you may speak to a Customer Service Manager or Associate Director. . If you have tried contacting us through our Customer Care Centre, Social Media or in person and are not satisfied with our response, please use our Office of the President Form to escalate your concern."

If you are unable to reach a satisfactory resolution of a dispute, the Canadian Radio-television and Telecommunications Commission (**CRTC**) or the Commission for Complaints for Telecom-television Services (**CCTS**) is available to assist you.

The CRTC is an independent agency of Government of Canada, responsible for the regulation of telecommunication companies. Many of Northwestel's services are regulated by the CRTC, such as phone service and internet service not provided over satellite.

For regulated services, contact the CRTC:

- on-line form: Ask a question or make a complaint
- mail: Secretary General, CRTC, Ottawa, Ontario K1A 0N2
- fax: 819-994-0218
- toll-free telephone: 1-877-249-CRTC (2782)
- toll-free TTY: 1-877-909-CRTC (2782)

Some of Northwestel's services, such as internet provided over satellite and TV services, are not regulated by the CRTC.

Image Source: http://www.nwtel.ca/legal/complaints-process.

NorthwesTel Complaints Process

NorthwesTel suggests that all complaints about its services should be directed to the NorthwesTel Customer Care Centre at 1-888-423-2333, where you can speak to one of its Customer Service Representatives.

If your concern is not addressed, you can escalate to the Customer Service Manager or Associate Director, and ultimately to the Office of the President (http://www.nwtel.ca/about-us/contact-us/office-president-form). You can also reach out to the CRTC to raise complaints about speed, quality of service, or cost of your internet.

Image: Hanne Pearce

CRTC Support Centre

https://crtc.gc.ca/eng/contact/

There are several ways to contact the CRTC with regards to your quality of service:

- On-line form: Ask a question or make a complaint
- Mail: Secretary General, CRTC, Ottawa, Ontario K1A 0N2
- Fax: 819-994-0218
- Toll free telephone: 1-877-249-CRTC (2782)
- Toll free TTY: 1-877-909-CRTC (2782)

Canada also has a specific **Commission for Complaints for Telecom-Televisions Services** (CCTS) that is an independent organization that handles complaints about most telecommunication services.

Visit the CCTS website here: https://www.ccts-cprst.ca/

Consultation Requirements for Indigenous Communities, and Aboriginal and Treaty Rights with Respect to Digital Connectivity.

Indigenous governments, through Indigenous rights, Treaties, and Modern Land Agreements, may also have certain powers regarding **broadband** development. In government funding programs, such as the CRTC's $750 million **Broadband** Fund, applicants are expected to identify any established or asserted Indigenous or Treaty rights that might be affected by the proposed project.[4] As well, applicants are expected to commit to undertaking

2 Link: https://www.canada.ca/en/radio-television-telecommunications/news/2018/11/canadians-invited-to-share-their-views-on-the-creation-of-an-internet-code.html.
3 Link: https://www.cbc.ca/news/business/ccts-november-2018-telecom-complaints-1.4921033
4 Link: https://crtc.gc.ca/eng/archive/2018/2018-377.htm

Internet Complaints and the CRTC's Internet Code of Conduct

Complaints over various elements of internet service are not new, and have been growing over the past few years. Recently the Commission for Complaints for Telecom-television Services (CCTS) (discussed in more detail below) noted that complaints grew by 57% in the 2017-18 period, with the majority of complaints about either mobile wireless or internet services. In total, there were almost 15,000 complaints about telecommunications and televisions services in Canada.[2]

The government and the CRTC are taking steps to respond to the concerns people have about internet services. The CRTC has already developed a Wireless Code (https://crtc.gc.ca/eng/phone/mobile/codesimpl.htm) dealing with some aspects of mobile wireless services, which came into effect in December 2017.

At the time of writing (Fall 2018), the CRTC has begun a consultation aimed at developing an **Internet Code of Conduct**[1]. The Code would have four primary aims:

- Establish consumer-friendly business practices
- Provide consumers with easy-to-understand contracts
- Ensure consumers have tools to avoid bill shock
- Make it easier for consumers to switch providers to take advantage of competitive offers

While it will be some time before it is developed after the consultation, the Code may provide you with more tools and options for dealing with your internet service provider.

any further consultations that may be necessary. The CRTC further notes that it may give special consideration to proposed projects that would serve Indigenous communities.
These are important issues for Indigenous governments and their citizens to be aware of and to monitor to ensure that these recommendations are undertaken in an appropriate, effective manner.

You can contact the CRTC directly for more information at: https://crtc.gc.ca/eng/contact/.

Questions for Discussion: Reporting Broadband, Know Your Rights!

What is the connectivity situation in your community now?

Where can you file complaints in Canada about internet service?

What kind of information should you have ready to make a complaint?

Did you participate in consultations about **broadband** (such the **Mackenzie Valley Fibre Link** or the Internet Code of Conduct)? If so, what was it like?

What should government know about your **broadband** services?

Activity: File a Report with the CCTS

This activity provides a walk-through for participants to file a report about their internet services with the **Commission for Complaints for Telecom-Televisions Services** (CCTS). It utilizes an online complaint form provided on the CCTS website.

The goal of this activity is to provide participants with information about how to present the data they have collected about quality of service, speed, and cost in a formal complaints process.

Participants should first visit the CCTS Complaints Form at: https://www.ccts-cprst.ca/for-consumers/complaints/complaint-form/

The facilitator should guide participants through the interactive questionnaire and encourage them to draw on data collected through earlier activities.

Note: Unless participants want to file an actual complaint, they should not move past the 80% mark (where the CCTS asks for personal information and contact information).

Once participants have prepared or filed a complaint, the facilitator should ask the participants the following questions:

1. Are there certain types of complaints the CCTS won't investigate?

2. What might you want to do before filing a complaint with the CCTS?

Module 7: Conclusion and Resources

In this final module, we review some resources that you can access to learn more about digital content and **digital connectivity** in **Dinjii Zhuh** contexts. We hope that this course has provided you with a good introduction to some of the benefits, challenges and considerations related to the development and use of these emerging digital technologies. For readers interested in learning more, here are some additional resources to explore.

First Nations Information Governance Centre

The **First Nations Information Governance Centre** (FNIGC) is a national organization focused on data collection and analysis with First Nations. It is the home of the First Nations principles of **OCAP®**, which the website notes are a set of principles that guide how research with First Nations peoples should be conducted and how that information should be stored. As stated on the website:

> **OCAP®** *stands for ownership, control, access, and possession. It means that First Nations control data collection processes in their communities and that First Nations own, protect and control how their information is used. Access to First Nations data is important, and under* **OCAP®** *First Nations determine how and when external researchers are allowed to access and use their information.* **OCAP®** *is an important expression of First Nations jurisdiction over its information.* [1]

You can watch a short video about FNIGC's work, Data by First Nations for First Nations, here: https://www.youtube.com/watch?v=XAiwn0tKCIM

1 Link: https://www.afn.ca/uploads/files/nihbforum/info_and_privacy_doc-ocap.pdf

Photo by Kimberly Farmer on Unsplash

FNIGC is responsible for a wide range of work, from research and planning to certification and training. The organization offers a course on **OCAP®** principles through Algonquin College.

Information about this online course, called Fundamentals of **OCAP®**, is available here: https://fnigc.ca/training/fundamentals-ocap.html

FNIGC is an incorporated non-profit organization operating with a special mandate from the Assembly of First Nations' Chiefs in Assembly (Resolution #48, December 2009). It is committed to improving the health and well-being of First Nations people living in 634 communities across the country.

Indigenous Connectivity Summit

The **Indigenous Connectivity Summit** (ICS) is an annual event focused on including Indigenous voices in the decisions and solutions that shape the internet. As noted on the ICS website:

> *Indigenous communities face unique challenges to Internet access and inclusion. To address this digital divide, the Internet Society is bringing together community* **network** *operators, Internet service providers, community members, researchers, policy makers and Indigenous leadership at* **Indigenous Connectivity Summit***s.* [2]

The ICS website includes a number of resources that may be of interest to readers who want to learn more about Indigenous peoples and digital technologies.

Below, is Crystal Gail Fraser's blog post about this summit in Inuvik 2018.

Ah Gwįjzii (Welcome): Inuvik, Northwest Territories Meets the Indigenous Connectivity Summit[3]

> *As I stepped off the plane at the Mike Zubko airport in Inuvik, Northwest Territories, Canada, I deeply inhaled the arctic air. A balmy zero degrees Celsius, an indication that climate change continues to touch the North, for it should have been far colder in October. I observed the scenic landscape of Dinjii Zhuh (Gwich'in) and Inuvialuit territory, taking in the familiarity: the snow-covered rolling hills, stunted spruce trees, and ice crystals in the air. I am home in Nanhkak Thak. In my language, Dinjii Zhuh Ginjik, Nanhkak Thak, means "the whole country around here" or more simply, "our country." This land and all that it holds, means, and represents, has been critical to Dinjii Zhuh culture, economies, and lifestyles since ts'ii dęįį (Time Immemorial). Even though I now reside in Amiskwaciwâskahikan, on Treaty 6 and Métis homelands (Edmonton, Alberta), it is important for me to return to my lands. I was thrilled at the opportunity to share my land, culture, and hometown of Inuvik with fellow conference attendees for the 2018 Indigenous Connectivity Summit, hosted by the Internet Society.*
>
> *My dìdụ (grandmother), Marka Andre Bullock, was a fierce Gwichyà Gwich'in fisherwoman and always reminded me of the importance of our connection to the land. Surely, she learned that from her own mother, Julienne Ntadettcha Andre, who helped negotiate Treaty 11 in 1921 and made her living as a multilingual trapper. Inspired by Marka and Julienne and mentored by my mother, Juliet Bullock, my PhD research is a family history of sorts. I examine the history of residential schooling in Nanhkak Thak during the second half of the twentieth*

2 Link: https://www.internetsociety.org/indigenet/
3 Link: https://www.internetsociety.org/blog/2019/04/collaboration-connectivity-and-self-determination/

L-R: Maria Alvarez, Gordon Gow, Rob McMahon, and Kyle Napier. Photo Courtesy of Rob McMahon.

century. A side project explores how Dinjii Zhuh have used oral histories and communications in a changing world. I was excited to see how my work on the Gwich'in Digital Literacy project would overlap and be enriched by the research and expertise of others at the conference. A partnership between the University of Alberta and the Gwich'in Tribal Council, we are developing digital literacy workbooks for communities and my role has been to incorporate Dinjii Zhuh understandings into the content, design relevant learning/teaching models, conduct interviews with local digital innovators, and serve as a cultural consultant. Read more about the project here[4].

Designed to bring people together to address unique northern connectivity challenges and showcase success stories of Community Networks around the globe to help inspire solutions to improve Internet access for all, the 2018 Indigenous Connectivity Summit brought over a hundred other academics, policy makers, network operators, community members, and business people from all over the world for three days of networking, academic panels, industry presentations, and cultural experiences.

Until recently, road travel beyond Inuvik in October was impossible; air travel the only option. Travellers often waited for the Tuktoyaktuk Winter Road to open before journeying through the Delta, but in November 2017, the much anticipated all-season highway opened, linking

Conference goers taking in presentations at the Indigenous Connectivity Summit in October 2018 in Inuvik, Northwest Territories, Canada. Photo Credit: Rob McMahon.

4 http://www.northernpublicaffairs.ca/index/volume-6-special-issue-2-connectivity-in-northern-indigenous-communities/exploring-digital-literacy-learning-with-the-gwichin-tribal-council/

Photo: Crystal Gail Fraser and her daughter Quinn Addison Fraser visit their ancestral fish camp, Dachan Choo Gęhnjik in August 2018, approximately 240 kilometers upriver from Inuvik. Photo Credit: Megan Fraser.

Inuvik to Tuktoyaktuk year-around. A rare treat for conference goers, we began our three-day sojourn by boarding a tour bus destined for Tuktoyaktuk, an Inuvialuit hamlet on the coastline of the Arctic Ocean.

Back in Inuvik, the conference opened with remarks from the Town of Inuvik, the Gwich'in Tribal Council, the Inuvialuit Regional Corporation, and the Government of the Northwest Territories. Over the next two days, there were thoughtful and provoking presentations from industry, academics, Indigenous organizations, and government that touched on everything from 'train-the-trainer' models to Indigenous language revitalization to local challenges and considerations. In northern Canada in particular, concerns about reliable connectivity, data caps and usage, internet speed, and cost dominated conversations. And although the recent completion of the Mackenzie Valley Fibre Optic Link brought high-speed Internet to the region, many people continued to express discontent around connectivity and accessibility.

I was thrilled to see that local Elders and community members were invited and many attended. A highlight of the conference was hearing Gwichyà Gwich'in Elder, knowledge keeper, and former residential school student John Norbert of Tsiigehtchic offered remarks in Dinjii Zhuh Ginjik. He encouraged the learning of our language and noted how language revitalization is inherently linked to the implementation of new technology. Indeed, this is critical for Dinjii Zhuh as there are less than 400 fluent speakers today. Additionally, it was wonderful to reconnect with people and also see conference attendees interact with the broader community.

Photos Courtesy of Tom Zubko, New North Networks.

Usually, when I return to Inuvik, I am engaged in my own research about the history of Inuvik's residential schools, Grollier Hall and Stringer Hall. These institutions operated from 1959 to 1976 and 1959 to 1996, respectively. Thousands of Indigenous children from all over the North resided at these institutions and were a part of Canada's colonial programming that sought to destroy their Indigenous cultures, languages, economies, and connection to the land. In fact, the Midnight Sun Complex, where the conference was held, sits on the former site of one of these schools.

When not working, I am preoccupied by visits with family, picnics where we eat country food, driving to the ferry crossing where the Nagwichoonjik (Mackenzie River) and Tsiigehnjik (Arctic Red River) meet to check the formation or melting of river ice, fishing at Dachan Choo Gẹ̀hnjik, or hunting for caribou in the mountains at the Northwest Territories-Yukon border nearly 275 kilometers away.

Photo: Designed by Sheree McLeod, this scene depicts an Inuvialuit blanket toss, an activity that conference attendees witnessed at the community feast on Thursday, October 11, 2018. Photo Credit: Crystal Gail Fraser.

This time, being in Inuvik with others who travelled internationally to attend the conference, I was exposed to new people and new ideas, and, for the first time, I thought about the networks and infrastructure that connects this town of nearly 3,300 people to the world. From mail delivery by dogteam to the establishment of aviation in the 1920s to the rise of radios, Distant Early Warning (DEW) Line sites, and early satellite planning, Inuvik is now connected internationally through the World Wide Web. To learn more about this, we visited Tom Zubko's New North Networks and learned the history behind the unique dome. The dome was a part of the DEW Line infrastructure in Tuktoyaktuk and was shipped south to Inuvik via ice road to house New North Networks on the corner of Firth Street and Gwich'in Road in Inuvik.

We also travelled to the Inuvik Satellite Station Facility along the Dempster Highway, a place that I always knew existed but never had the opportunity to see. The satellites here benefit from their location north of the Arctic Circle, which gives them the ability to track, receive, and send data to polar-orbiting satellites. Even though this is not Indigenous technology, people have found a way to celebrate their cultures on the satellites.

Events in Nanhkak Thak and more specifically Inuvik are always unique and offer many learning moments for everyone, whether it is a first visit or a return home. The Indigenous Connectivity Summit offered an intriguing peek into Gwich'in and Inuvialuit cultures and traditions but also how Indigenous northerners are engaged in these global conversations and, in many ways, leading their communities to better ways to engage with the world. As the co-author of the now-viral 150 Acts of Reconciliation for the Last 150 Days of Canada's 150, I view the Indigenous Connectivity Summit, the conversations had there, friendships made, and lessons learned all acts of reconciliation. Although discussions were not framed as such, there was a genuine interest in the North, Indigenous people, and how to better accommodate communities.

Hai' choo, many thanks for all involved in the planning and execution and especially to Bethany Davis who knew all the answers and made time to ensure the comfort of all.

Watch online recorded video of the **Indigenous Connectivity Summit** events in 2017 (Santa Fe, New Mexico) and 2018 (Inuvik, NWT).

Watch the recorded Indigenous Connectivity Summit 2018 Livestream

Photo Credit: Internet Society. https://livestream.com/internetsociety/indigenet2018

Watch the Recorded Indigenous Connectivity Summit 2017 Livestream

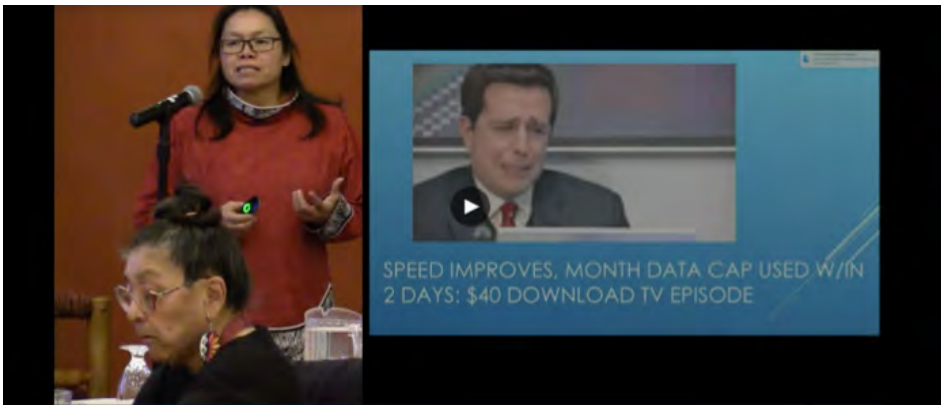


Photo Credit: Internet Society. https://livestream.com/internetsociety/indigenet2018

Participants at the 2017 ICS also spoke about what digital content and **digital connectivity** means to them in a series of video profiles. You can watch these short videos at: http://www.1st-mile.org/indigenous-connectivity-summit.html

The ICS also serves as a hub for online courses to learn more about topics related to community networks and digital technologies. Two technical courses that are available on the website and provided by the Inforum organization are:

Introduction to Network Operations: https://www.internetsociety.org/inforum/network-operations/

Building Wireless Community Networks:
https://www.internetsociety.org/inforum/wireless-community-networks/

The ICS is organized by the Internet Society (an international non-profit organization focused on ensuring that the internet stays open, transparent and defined by its users)[5]. Visit the ICS website for more information and resources, and to learn about any upcoming events: https://www.internetsociety.org/indigenet/

FirstMile.ca

In Canada, the FirstMile.ca website is an online hub focused on Indigenous-led technology development. The website was set up by a national association of First Nations and Inuit technology organizations that operate in rural, remote and Northern regions of the country. As noted on the FirstMile.ca website:

> *Across Canada, First Nations are building broadband systems and using them to deliver services in their communities. Outside of major centres, many remote and rural First Nations remain underserved. The experiences of the early adopters of these tools and systems help create new opportunities for those starting their* **first mile** *broadband connectivity journey. The* **First Mile** *website is a place to share best practices and lessons learned. Together we are conducting research and publishing the stories of how First Nations are putting* **First Mile** *concepts into action so that we may learn and grow together.*

There are a number of resources available for free from the FirstMile.ca website.

Research

The First Nations Innovation Research Project is researching and celebrating achievements with information and communications technologies (ICT). Remote and rural First Nation communities are using **broadband networks** and digital technologies in many innovative ways – to support e-health, e-learning, e-business, e-administration and many other applications and services. Community members use ICT to access services online and communicate with people everywhere.

A team of First Nation organizations and researchers was studying and celebrating these achievements from 2005 to 2018. The First Nations Innovation Research Project team recognizes the value of research to support and develop understanding, evidence-based policy and transformative change. Our research project is called First Nations Innovation (FNI). Since 2005, our research was supported by SSHRC and in-kind donations by our research partners. Click here to access all the FNI publications: http://firstmile.ca/resources/publications/

5 Link: https://www.internetsociety.org/

Community Stories

Community stories showcase innovative uses of Information and Communications Technologies (ICTs) by First Nations communities across Canada. FirstMile.ca has published a free online book called Stories from the **First Mile**: Digital Technologies in Remote and Rural Indigenous Communities.

The work happening in remote and rural Indigenous communities across Canada consistently highlights the effective use of digital information and communication technologies. This book is intended to celebrate the stories of Indigenous innovation and struggles against systemic and circumstantial obstacles, like political silos, lack of infrastructures and challenging environments, and to encourage others to continue this important effort. Download the book here: http://firstmile.ca/new-book-stories-from-the-first-mile-digital-technologies-in-remote-and-rural-indigenous-communities/

Policy

The **First Mile** Connectivity Consortium (FMCC) is engaged in digital policy development with federal, provincial/territorial, and First Nations governments. The FMCC is an award-winning incorporated, independent, national not-for-profit association. Its members are First Nation Internet service providers that also represent residents in remote and rural First Nation communities. The FMCC associate members are university and private sector researchers and others interested in Indigenous and community communications and telecommunication services for the public good.

Free Online Course

The FirstMile.ca website also includes a free online course, Colonialism and the e-Community. Access this course here: http://firstmile.ca/free-online-course/

Understanding Community Broadband: The Alberta Broadband Toolkit

Understanding Community Broadband: The Community Broadband Toolkit was designed for use by Alberta communities to assist in developing broadband solutions. The toolkit is organized into three general sections: learning about broadband, thinking about broadband, and planning broadband. Together these sections aim to identify the key knowledge and actionable steps that a community and its leaders can use to develop and achieve local broadband solutions. The toolkit also contains case examples of broadband solutions from communities across the province. The Toolkit was made possible by funding from the Government of Alberta, Economic Development and Trade.

Download the Toolkit here: https://doi.org/10.7939/R3H708B16

Continuing and Professional Education

In addition to the online resources noted above, there are a number of formal training programs that you can access to learn more about digital content and **digital connectivity**.

University of Alberta

The Faculty of Extension offers a number of continuing professional education programs focused on topics including **Social Media** and Information Access and Privacy. The Faculty also offers a graduate program on Communications and Technology. Learn more here: https://www.ualberta.ca/extension

The School of Library and Information Studies provides a graduate program that covers a range of topics, including copyright and information policy. A fully online offering of the program is available. Learn more here: https://www.ualberta.ca/school-of-library-and-information-studies

UAlberta North is a hub for northern research and teaching at the University of Alberta. In collaboration with northern governments, including Indigenous governments, communities, colleges and agencies, it supports students through grants, awards, training, and summer internships, including the Engage North program. Learn more here: https://www.ualberta.ca/north

Aurora College

Aurora College is focused on student success and is committed to supporting the development of our Northern society through excellence in education, training and research that is culturally sensitive and responsive to the people we serve. The College's adult upgrading programs currently include two courses on Information and Communications Technology: ICT 130 and ICT 140. Learn more here: http://www.auroracollege.nt.ca

Technology Training Institutes and Colleges

There are a number of training institutes that cover courses and programs related to digital technologies. These include:

- Northern Alberta Institute of Technology (NAIT): http://www.nait.ca/
- Southern Alberta Institute of Technology (SAIT): https://www.sait.ca/
- Portage College: http://www.portagecollege.ca/
- Nicola Valley Institute of Technology (BC): http://www.nvit.ca/

Questions for Final Discussion

We end our workbook with some questions to consider moving forward. We are always interested in hearing from you!

Please send us your thoughts and feedback about this workbook and workshop, including ideas for topics you would like to cover, or examples of northern digital innovators.

Our questions to you:
How can we ensure digital technology meets the needs of **Dinjii Zhuh** people?

What is the best way to explain digital technologies to everyday people?

What supports are required for northern communities?

What barriers do you face?

What do you need to keep learning? What other technology learning projects/training opportunities would you like to see?

How do you think you could interest friends and family in these issues?

What would help you stay motivated in learning about and participating in digital content and **digital connectivity** projects?

Máhsí' choo! Thank You!

For additional information, please contact:

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www.digitalNWT.ca

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Jii University of Alberta Treaty 6 guuk'iigeh' jii nanhkak guu' ęįh. Jii dinjii zhuh ttak Cree, Métis, Saulteaux, Niisitapi, ts'at Nakota Sioux niizhet gwits'at. Jii nanhkak łatr'idàł guulùt zhidąh gwì'àn guugweech'ìn.

The University of Alberta is located in ᐊᒥᐢᑲᐧᒌᐚᐢᑲᐦᐃᑲᐣ (amiskwacîwâskahikan) on Treaty 6 territory, traditional lands of First Nations and Métis people.

Glossary

Actual Speeds - Measure the actual speed of connection being provided. Tools like CIRA's Internet Performance test help us measure actual speeds that users are getting from their internet connections.

Advertised Speeds - What internet service providers say are the speeds that are available with certain connections. This is the number typically found in marketing materials, such as flyers or web pages.

Analogue content/media - non-digital content/**media** such as a printed book or photograph. Analogue content/**media** stands in contrast to digital content/**media**.

Anchor tenants - Large institutions that are usually the biggest users of **broadband** within a community and have the need for the greatest amount of **digital connectivity**. Examples of anchor tenants include community centres, schools, hospitals and libraries.

Anjòo - Elder, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

Anik A1 Satellite - An early satellite launched in Canada to support communications services in the far North.

Archiving - Storing and preserving information for the benefit of future generations.

Back End - The 'hidden' part of a website, which consists of information that the website designer controls. This may include more content than is available to visitors to a website. Website designers can set up access rules to control who can see content, as well as what it looks like on a website (for example).

Backbone or Backhaul Network - Your community must have a connection to the broader internet infrastructure (backhaul), and specifically an interconnection with an Internet Exchange (IX) or with another third-party **network** through a transit, peering or interconnection agreement. This backhaul or **backbone** connection provides the link between your community and the rest of the world.

Backhaul Networks - Your community must have a connection to the broader Internet infrastructure (backhaul), and specifically an interconnection with an Internet Exchange (IX) or with another third-party **network** through a transit, peering or interconnection agreement. This backhaul connection provides the link between your community and the rest of the world. Sometimes referred to as transport infrastructure, these regional **networks** provide the **backbone** of **broadband** connectivity. They consist of **network**s of submarine fibre optic cables, satellite transmissions, and wireless and terrestrial telecommunications.

Bandwidth - the capacity of an internet service to transmit data. The greater the bandwidth, the more data that can be transmitted.

Basic Service Objective for Broadband (BSO) - A standard set by the CRTC in December 2016. The BSO recommends that minimum speeds of 50 Mbps download and 10 Mbps upload - and an unlimited data option for fixed **broadband** access services - should be made available to everyone living in Canada.

Born Digital Content - Refers to things like digital photographs (such as those taken by your cell phone).

Broadband - Refers to an always-on, high-capacity digital data transmission service. It is provided through different **network** technologies, including fibre optic cables, wireless towers, satellites, and mobile cellular phone services.

Broadband-Enabled Applications - Digital applications that support a variety of activities, such as: accessing online education; making two-way voice and video calls (like Skype); transmitting health data; sending and streaming online videos; using GIS maps; and much more.

Broadband Network - see "Digital Network" below.

Broadband Speeds - A key element of **digital connectivity**. With a high speed connection you can use more applications, or connect more devices. Low speeds can negatively impact internet use. They can cause video and audio files to be choppy or even unplayable, make larger files and certain applications and websites unusable. Many factors affect actual speeds, from connection type and time of day to weather and the number of others users on a **network**. These factors can cause difference between the advertised speeds and actual speeds.

Canadian Internet Registration Authority (CIRA) - "The **Canadian Internet Registration Authority** (CIRA) is a member-based not-for-profit organization, best known for managing the .CA internet domain on behalf of all Canadians, developing and implementing policies that support Canada's internet community and representing the .CA registry internationally. We are building programs, products and services that leverage all the internet has to offer to help build a better online Canada, while providing a safe, secure and trusted online experience to all Canadians." CIRA provided funding to develop this workbook. Learn more here: https://cira.ca/about-cira

Canadian Radio-television and Telecommunications (CRTC) - The federal government agency that regulates Canadian broadcasting and communications activity.

Canadian Broadcasting Company (CBC) - "From where Canada's been to where we're going together, CBC/Radio-Canada is there, informing, enlightening and entertaining, sharing Canada's journey step by step, day by day, with the news, content and commentary and culture that Canadians need today, tomorrow and in the future." Learn more here: http://www.cbc.radio-canada.ca/en/explore/who-we-are-what-we-do/

CRTC Support Centre - The office at the CRTC where you can raise complaints about speed, quality of service, or cost of your internet. See: https://crtc.gc.ca/eng/contact/

CIRA Internet Performance Test - There are many different websites where one can test speeds, but the **Canadian Internet Registration Authority** (CIRA) (which manages the .ca website domains) has a free speed test. The CIRA test not only tests speeds but also records and maps the results of tests. This helps inform everyone about the speed of **digital connectivity** across the country.

Cloud/**the Cloud** - refers to internet applications and services provided on remote servers via **broadband network**s.

Cloud Computing - A form of computing that uses cloud services.

Coaxial Cable - Cable **broadband** sent over cable lines along with cable television signals.

Commercial Rules - Rules that restrict the access, use, reproduction and so on of digital content.

Commission for Complaints for Telecom-Televisions Services (CCTS) - An independent organization that handles complaints about most telecommunication services. The CCTS Complaints Form is available at: https://www.ccts-cprst.ca/for-consumers/complaints/complaint-form/

Community Assets - The many strengths that make up a community - people, organizations, buildings, equipment, technical infrastructure, natural features, and so on. These assets are broadly defined, and guide the development of community **networks** and **broadband** connectivity.

Community Engagement - Central to decision-making around local **broadband** initiatives. By working together to identify development goals through structured planning and dialogue, Northern residents can shape community **broadband** projects to enable widespread

adoption and effective use of this important resource.

Community Investment Program, CIRA - A funding program administered by CIRA that provides support to projects that improve Canada's internet. "The **Community Investment Program** gives back by funding innovative community projects to build a stronger, safer and more accessible internet for all Canadians. The program has built new infrastructure, helped grow Canada's capacity in **media** literacy, enabled non-profits to deliver online services and academic researchers to address emerging digital issues." Learn more at: https://cira.ca/community-investment-program

Community Network - Communication networks built, owned, operated, and used by citizens in a participatory and open manner.

Copyright - The exclusive right given by law for a certain term of years to an author, composer, designer, etc. (or his assignee), to print, publish, and sell copies of his original work. **Copyright** protections are subject to certain exceptions and limitations.

Copyright Act - The federal act that governs copyright in Canada. It can be found at: https://laws-lois.justice.gc.ca/eng/acts/c-42/

Copyright Act, Exceptions - A series of exceptions to the rights of the copyright holder defined in the **Copyright Act**. These include fair dealing, non-commercial user generated content, and other specific exceptions for educational institutions, libraries, archives and museums among others.

Copyright Symbol - © - This is the copyright symbol and it is often used to show who the copyright holder is in a work. That said, a work can still be protected by copyright even if the symbol is not included. You don't need to include the copyright symbol to protect your own work. Simply by making an original work in a fixed format you hold the copyright to that work.

Creative Commons Licenses - A popular way to indicate that content is free to be used under certain conditions. Although Creative Commons work is still protected by copyright, it has a licence that grants some uses. All CC licences require others who use the work to acknowledge the original creator, but allow others to copy and view the work. CC licences also allow authors to determine if others can remix their work and sell it or use it commercially.

Cultural Appropriation - When one culture takes material from another culture for their own purposes or benefit, frequently losing the cultural materials' context or significance in the process.

Cultural Rules and Knowledge-Sharing Protocols - Sets of rules grounded in and developed by communities and knowledge holders. For example, transferred rights to share information in Piikani First Nation contexts.

Data - Digital information that is expressed in all kinds of ways - as images, videos, sounds, and more. Most often, this digital language involves the numbers '0' and '1', which are used in alternating patterns to express different values. These patterns organize signals and information in a way that allows them to be expressed in forms including written words, sounds, and images. These patterns of 0s and 1s are read or interpreted through equipment such as computers, USB sticks and digital cameras. These devices read, process, and store a wide range of digital information (data).

Data Cap - Limitations that internet service providers put on users. They limit the amount of internet (usually measured in **Megabyte**s (Mb) or **Gigabyte**s (Gb) that can be used in a given period (usually each monthly billing cycle). Internet service providers often allow users to go over their data caps, but charge fees for additional data used.

Data Overage Fees - High prices are sometimes charged when someone uses up their monthly

data cap. In some cases these charges (often called cap overages) can be very costly, and it is not uncommon to hear of people who have spent hundreds or even a thousand or more dollars a month on data cap overage charges.

Database / **Catalogue** - A collection of digital objects and the records they are associated with. A database/catalogue can contain a number of items that may or may not be presented publicly.

Decolonizing Description - The process of making sure that descriptions of digital content fit the correct and appropriate understandings of the peoples that they involve. This attempts to fix problematic content that was imposed by colonial forces on knowledge and understanding held by Indigenous peoples. The process of "decolonizing" refers to the return of land to Indigenous peoples, and so the term "Indigenizing" is sometimes used instead.

Demand Aggregation - One solution when communities work together so that the overall demand for **broadband** connectivity is greater. Can help communities work out ways to share bandwidth or attract service providers.

Dempster Highway Fibre Line - NorthwesTel is proposing to construct a 775 km fibre optic line from Dawson City, Yukon to Inuvik, Northwest Territories. This redundant fibre link along the Dempster Highway (estimated to be operational in 2021) will improve backhaul connectivity between these regions and Internet exchanges in the south. Three-quarters (75%) of this $79 million project was funded by the federal government and Yukon government.

Demystify Technology - Unpacking how technology works and what it means. Technology can be developed and used in many different ways. It is not neutral - there are many choices and decisions that go into the adoption and use of technology.

Dene Nahjo - **Dene Nahjo** is an organization that seeks to preserve and revitalize Indigenous cultures in **Denendeh** while connecting to the land. They advocate for sustainability and the inclusion of Dene values into all aspects of community life. Their mission is to "advance social and environmental justice for northern peoples while promoting Indigenous leadership by fostering emerging leaders." Visit their website at www.denenahjo.com for more information.

Dene People - Dene people are also known as Athabascan and are the largest linguistic group in North America. Some of these groups (not necessarily all) refer to themselves as Dene: Denésoliné; Tłı̨chǫ; **Dinjii Zhuh**; Deh Cho; Deh Gah Got'ine; Sahtúot'ine; Shuta Got'ine; Northern and Souther Tutchone; Dane-zaa; T'atsaot'ine; Kaska Dena; Tsek'ehne; Tsilhot'in; and Dakelh. 27, 430 people identified their Dene ancestry in the 2016 census. The traditional territories of the Dene peoples include central and northwest Canada. In the NWT, this is often referred to as **Denendeh**, which means the "Land of the People."[6]

Dené Tha - a northern Athapascan language that is spoken by several Dene groups in the Northwest Territories.

Denendeh - the "Land of the People." Dene people will often call the NWT **Denendeh**.

Department of Culture and Heritage, GTC - "Gwich'in Social and Cultural Institute (GSCI) was established as the cultural and heritage arm of the GTC in response to concerns about the decline of Gwich'in culture and language and the need to implement heritage resource issues identified in the land claim Legislation and Policy. In the fall of 1993, the Institute began operation with the mandate to 'document, preserve and promote Gwich'in culture, language, traditional knowledge and values.'... On April 1, 2016, the GSCI became a department under the Gwich'in Tribal Council called, the Department of Cultural Heritage." To learn more, see: https://www.gwichin.ca/about

6 Link: https://www.thecanadianencyclopedia.ca/en/article/dene.

Device-Driven Metadata - Along with capturing and storing digital content, our devices can tell us a lot about that data. In fact, our devices capture a lot of information about our digital content - as well as other activities. It is important to be aware of the kind of information that our devices are collecting from our activities. Device-driven **metadata** is automatically captured or embedded in digital objects such as photographs.

"Dig Once" Policy - Local governments can adopt a "dig once" policy, which means that conduits that house fibre optic cables are installed at the same time as other municipal infrastructure (road, water, and sewer). Adding fibre conduits as part of another construction project costs only a few cents for every dollar spent - dramatically reducing the cost of building **broadband network**s. Dig once policies can also be coordinated with building codes and development plans so that fibre is put in place in new communities and business parks.

Digital Camera - A camera that takes digital photos, such as your mobile phone.

Digital Connectivity - The system that transfers digital data and content, such as the internet.

Digital Content - a kind of technology language that is expressed in all kinds of ways - as images, videos, sounds, and other forms of data. Digital content is expressed in forms including written words, sounds, and images. It is read or interpreted through equipment you will be familiar with such as computers, USB sticks, and digital cameras.

Digital Data - a wide range of digital information (sometimes known as 'data'). Data can include images, videos, sounds, numbers, and words.

Digital Footprint - the trail of data left behind through our online activities. Our digital footprint can be made larger or smaller, but can never be completely eliminated

Digital Infrastructure - The system supporting digital content and **digital connectivity**. This includes physical networks (fibre optics, **DSL**, satellite receivers), devices (computer, mobile phones), and the software programs and applications that we use (**social media**, Microsoft).

Digital Innovation - The process of working with digital resources (computers, **social media**, digital photos, etc) to create something.

Digital Innovator - A person who uses digital resources to create something like a video, photo, website, or Internet Service Provider.

Digital Library - Collections of digital content online. In some cases the content of digital libraries are freely available, while other digital libraries require you to pay to access their content.

Digital Literacy - The range of knowledge, skills, and behaviours used with digital devices such as smartphones, tablets, laptops and desktop computers. This term includes the ability to locate, organize, understand, evaluate, and analyze information using digital technology. It involves a working knowledge of current digital technologies and an understanding of how they can be used effectively.

Digital Networks - The **networks** of wires and wireless connections that make up **broadband networks** and the internet. Digital data passes through digital **networks**, much like cars on a highway (hence the term "information highway", which is sometimes used to describe the Internet.

Digital Object - A data file stored in digital format. For example, a sound file or photograph that is stored and organized in a website.

Digital Rights - Your rights as a user of digital resources. This includes things like ensuring you have adequate, affordable access to internet services, and that your privacy is protected when you go online.

Digital Subscriber Line (**DSL**) - This kind of **broadband** technology uses a telephone connection and transmits data as sounds, which are interpreted by a receiver that re-interprets the sounds into data.

Digital Technology - The wide range of digital resources we use, including computers, phones, internet **networks**, and **social media**.

Digitizing Techniques - Ways to create digital objects. For example, translating a printed photo into a digital object by using a device like a scanner (which transforms hard copies of photos, or prints, into digital formats) or a digital camera (which takes a photo using a digital format). The different ways this process takes place are called digitizing techniques.

Dinjii Zhuh - translates to "Indigenous peoples" in **Dinjii Zhuh Ginjik** (below). **Dinjii Zhuh** have recently become known as "Gwich'in" throughout our modern land negotiations process.

Dinjii Zhuh Ginjik - the Indigenous language of **Dinjii Zhuh**, or Gwich'in peoples. There are several dialects.

Drone - A small, radio-controlled flying device that is often used to take photos or video.

Dublin Core Metadata Initiative - A major standard for **metadata** that uses 15 different **metadata** categories.

Economic Benefits of Broadband - Demonstrate how **broadband** is an enabler for economic development and tele/remote-working. Local businesses use connectivity to make their products or services available to the world. Tourism and cultural industries are supported by **broadband** connectivity - think of everything from virtual reality tours of the Mackenzie Delta, to talented young people building websites and editing videos or photographs that feature the vibrant cultures and scenery of the North.

Educational Rules - These rules include guidelines for users, such as Traditional Knowledge labels developed by Local Contexts, which were developed to help communities manage their digital heritage.

Eetsii tthak t'agwahii getr'ootanahchàh - learning about the machine that does it all, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect, translation provded by Anjòo Agnes Mitchell).

Ehdii Tat Gwich'in - the people of the timber/ willows or Aklavik people, **Dinjii Zhuh Ginjik** (Gwichyà and Teetł'it Gwich'in dialects). Under the Indian Act, the **Ehdiitat Gwich'in Band** is a political institution located in Aklavik.

Ehdiitat Gwich'in Band - also known as the Aklavik Indian Band, this is a political organization under the Indian Act.

End User Licensing Agreement - A legally binding agreement that is provided by software companies to the users of their products. End users are bound, by law, to the terms of agreement. As such it is important to read and understand the terms and conditions of use.

Fair Dealing - **Copyright**ed material may, under certain circumstances, be quoted without the permission of the copyright holder for purposes such as private study, research, or criticism. These kinds of uses are considered fair dealing.

Fibre - **Fibre broadband** signals travel through fibre optic cable as flashes of light, which are must faster than sound signals. The speed of fibre **broadband** is generally 1 Gbps (1000 Mbps), though some communities in the U.S. are now deploying 10 Gbps networks. **Fibre** allows symmetrical (equal) upload and download speeds, but most implementations tend to be asymmetrical. The speeds of fibre connections are limited by the electronics attached to the end of the fibre optic cables, not by the network infrastructure itself.

File Types - formats that are used by devices and software to save, find and display digital files. For

example, .doc (Microsoft Word) and .pdf (Adobe PowerPoint) are both file types.

FirstMile.ca - An online hub focused on Indigenous-led technology development. The website was set up by a national association of First Nations and Inuit technology organizations that operate in rural, remote and Northern regions of the country.

First Nations Information Governance Centre (FNIGC) - A national organization focused on data collection and analysis with First Nations. It is the home of the First Nations principles of OCAP®, which the website notes are a set of principles that guide how research with First Nations people should be conducted and how that information should be stored.

Fixed Wireless Access (FWA) - This **broadband** technology should not be confused with mobile wireless. FWA is a system that transmits information via radio waves from towers to fixed points (not mobile phones).

Floppy disk - An old, now obsolete, storage device used in early computers.

Front End - the public-facing part of a website. What we see when we visit a website. This is set up and controlled by a website designer to show information in a certain way.

Fur Trade Economy - during the early 17th to the mid-19th centuries, fur traders sought to meet European demands for felt hats and a widespread commercial industry developed across what is now Canada. Indigenous peoples were key players in the fur trade and if it was not for them, the system would have been unsuccessful and collapsed. The main product for the fur trade economy was beaver pelt.

Future Uses of and Demand for Broadband - Over the last two decades demand for **broadband** capacity has grown steadily as more devices and uses have become available. Think about your own use of **broadband** - which has probably changed over the past few years from sending email and visiting simple web pages to demands for multiparty video-conferencing and high definition streaming video.

Geographic Paradox of Telecom Development - Urban communities currently have the best telecommunications infrastructure and the best 'brick and mortar' public services (health care, education and so on). Residents often have a low need and low appreciation for digital **broadband** services delivery because they can choose to access their services in-person. In contrast, remote and Northern communities have the same needs for public services but much lower ability for accessing these services in-person: In many of these communities there are no hospitals, high-schools or training facilities. As a result, these communities have a higher need for, and appreciation of, tele-services. However – and this is the paradox – small Northern and remote communities also have much more limited telecommunications infrastructure.

Gigabyte - a unite of measure for data. A gigabyte is 1,000 **megabyte**s.

Goes Viral - Digital content can be very easily copied and widely shared - think about a video or photo that goes viral on **social media** - it can be harder to control than analogue **media**.

Graduate Program on Communications and Technology (Faculty of Extension, University of Alberta)

Gwich'in Alpha App - this app encourages uses to learn **Dinjii Zhuh Ginjik** through lessons, practice, games, and quizzes in areas that relate to everyday life. It was developed by the Department of Education, Culture and Employment, Government of the Northwest Territories, Yamozha Kue Society, and the Gwich'in Teaching and Learning Centre.

Indigenous Connectivity Summit (ICS) - An annual event focused on including Indigenous voices in the decisions and solutions that shape the internet. The ICS website includes a number of resources that may be of interest to readers

who want to learn more about Indigenous peoples and digital technologies.

Indigenous Data Sovereignty - A way of reclaiming the practise of gathering data to benefit Indigenous peoples. The US **Indigenous Data Sovereignty Network** defines Indigenous data sovereignty as "the right of a nation to govern the collection, ownership, and application of its own data" (US **Indigenous Data Sovereignty Network**, 2018, para. 2).

Indigenous Forms of Data - These include: "any facts, knowledge, or information about a Native nation and its tribal citizens, lands, resources, programs, and communities. Information ranging from demographic proles to educational attainment rates, maps of sacred lands, songs, and **social media** activities are all data" (Rainie, Rodriguez-Lonebear, & Martinez, 2017).

Information and Communications Technology Courses (Aurora College)

Infrastructure - A **network** of connected devices, people, organizations and supports.

In-Private or Incognito browsing modes - A setting you can use in your Internet Browser to protect your privacy (since it does not record your internet or web history). However, browsing modes are quite limited in the degree of protection they provide.

Intellectual Property - The name for a series of legal protections for various kinds of intellectual works. Notable kinds of intellectual property include patents, trademarks, copyrights and industrial designs.

Intellectual Property Issues in Cultural Heritage (IPinCH) - An international interdisciplinary research project working to explore and facilitate fair and equitable exchanges of knowledge relating to heritage. The IPinCH website offers teaching resources, including university-level course syllabi and video presentations.

Internet Browser - A program used to explore the Internet, such as Google Chrome, Firefox, or Safari.

Internet Protocol (IP) - A specific address for every communication on the internet. While an IP address is just a set of numbers (of the form 123.456.78.90) and doesn't include your name, it can be linked back to your personal identity.

Internet of Things (IoT) - The IoT describes an environment where individuals connect to the internet through computers and smartphones, while billions of networked 'smart' devices are simultaneously exchanging information. Some of these devices are already available, such as smart thermostats that can be managed remotely. While the IoT offers opportunities for **broadband** to simplify many aspects of our lives, these technologies will also bring important privacy considerations.

Internet Service Providers (ISPs) - Organizations set up to distributed **broadband** connectivity to organizations and homes inside communities. These organizations can be set up as private businesses, non-profits, cooperatives, or public services.

Inuvialuktun - the langauge of Inuvialuit, especially spoke in the western arctic. There are three dialects: Natsilingmiutut, Inuinnaqtun, and Siglitun.

Kaiitreh - shoes or moccasins, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

K'eejit - young person, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

Knowledge Management - The process of managing information and knowledge within an organization from creation and distribution to use and retention.

Last, First or Final Mile Networks - The local **networks** that connect individual households and businesses within a community. This connection serves to link buildings inside a

community with one another and with the backhaul infrastructure that connects to the broader internet.

Legal Rules - Include laws such as **Copyright** and **Fair Dealing** as well as Creative Commons licences. Software and website **Terms of Use** and **End User Licensing Agreements** are legal contracts that also govern information use.

Local Contexts - An organization that supports Native, First Nations, Aboriginal, and Indigenous communities in the management of their intellectual property and cultural heritage in the digital environment. The organization, which is a partnership between Indigenous communities and researchers, provides legal, extra-legal, and educational strategies to help navigate copyright law and the **public domain** status of valuable cultural heritage.

LOCKSS Rule - This stands for: "lots of copies keeps stuff safe."

Mackenzie Valley Fibre Link (MVFL) - An $81 million project led by the Government of the Northwest Territories that also involved NorthwesTel, Ledcor Developments Ltd. and LTS Infrastructure Services Limited Partnership (a consortium known as the Northern Lights General Partnership). Completed in June 2017, the MVFL intends to provide fibre optic telecommunications for communities in the Mackenzie Valley and Beaufort Delta regions. At present, seven communities are directly served by the fibre link. An extension to Tuktoyaktuk was planned following the completion of the all-weather highway extension from Inuvik, although that project has not been completed at present.

Mash-Up - When a creator combines digital content to make things like photo collages or songs made by sampling from several other songs (hip-hop and rap music uses this technique a lot).

Media - Content (either digital or analogue) that shares information in some way. Examples include photos, sound and video, as well as clothing such as moccasins and many other things.

Megabyte - a unite of measure for data. A **megabyte** is 1000 kilobytes, or 1/1000th of a gigabyte.

Mesh Networks - A type of fixed wireless technology that uses a network of wireless access points distributed in a point-to-point manner that looks like a mesh net or a spider web. By 'meshing' together a number of wireless links, mesh networks can interconnect with one another to send and receive data.

Metadata - Simply put, information about information. **Metadata** is very useful in organizing and managing digital content. It can be a powerful way to organize, share and apply digital content in a range of contexts.

Metadata, **Objective** - This describes the fixed characteristics of something, and refers to things like the format, or the time and place the digital object was created. The **metadata** describing the format of objects will be different: for example a photo, map, or book.

Metadata, **Subject** - This describes what something is about, and changes depending on who is describing it. This is very important in digital collections because it describes "about-ness" in one consistent way, so we can collect content together, even if it is different formats or types of content.

Misinformation - false, inaccurate or misleading information that is spread either intentionally or unitentionally.

Mukurtu - A freely available and open-source digital library system designed by and for Indigenous communities. It can be used to create a community archive or digital library.

Music Recording Contract - An agreement set up by an artist (musician) and an organization like a publishing company that records,

promotes, and sells the musician's recordings.

Nan - land, in **Dinjii Zhuh Ginjik** (Gwichyà and Teetł'it Gwich'in dialects).

Network - a system that connects at least two people. A telephone system is a **network**; the internet is often called a '**network** of **network**s' since it interconnects many computers and other devices around the world.

Ninaa'ịh - bushmen, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

Nits'ǫǫ tr'igwindàih - culture, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

Nìvèh t'ah'ii - hunter, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

Non-Digital Content - This can be digital content created from other formats, such as scanned versions of photographs taken by older cameras that use film and prints. This is also sometimes called Analogue Content.

NorthwesTel Customer Care Centre - NorthwesTel suggests that all complaints about its services should be directed to the NorthwesTel Customer Care Centre at 1 888 423-2333, where you can speak to one of its Customer Service Representatives. If your concern is not addressed, you can escalate to the Customer Service Manager or Associate Director, and ultimately to the Office of the President Form: http://www.nwtel.ca/about-us/contact-us/office-president-form

Object - A digital item, such as a file, audio recording, photo, or video.

Objective Metadata - Describes the fixed characteristics of a digital object, like the format (e.g. photo, map, book) or the time/place something was created.

Obsolescence: Technological changes can make it so that devices (like phones and computers), software programs (like **Mukurtu** or Instagram) or file formats (like .JPEG or .MP3) no longer work. This is called obsolescence.

OCAP® - A set of First Nations data management principles that stands for ownership, control, access, and possession. It means that First Nations control data collection processes in their communities and that First Nations own, protect and control how their information is used. Access to First Nations data is important, and under **OCAP®** First Nations determine how and when external researchers are allowed to access and use their information. **OCAP®** is an important expression of First Nations jurisdiction over its information.

Oksuk - bearded seal oil, **Inuvialuktun**.

PoP (Point of Presence) - Inside a community, a PoP is the physical location and infrastructure where the **backhaul network** is available for interconnection with the local **network**.

Preservation - Storing items or information for future generations.

Public Record - something that is part of the public discussion. It is important to put information on the **public record** so that people, including government, are aware of it. For example, information about the cost, speed and quality of internet services in NWT communities should be part of the public record.

Public Domain - **Copyright** protection expires on December 31 on the 50th year after an author dies. At that time, the content becomes part of the **Public Domain**. Content in the **public domain** is free to be used or remixed by anyone without permission. (Note, this rule may be adjusted to 70 years, due to trade deals such as United States-Mexico-Canada Agreement, or USMCA).

Publishing Agreement - An agreement between an author and an organization that in involved in activities like publishing, promoting, and selling their work.

Quality of Service - A description of the quality

of **broadband** services, covering measures such as speed, latency ('lag time' during a data transmission), and so on.

Record - Documents information about a digital object - the **metadata**.

Redundant Network - a **redundant network** is a backup **network** that protects users from issues such as system overloads or **network** breaks due to cut cable or fibre optic lines - which sometimes happens in the North.

Redundancy - Sometimes an accident or an event can destroy data, particularly if it is housed in only one place. In cases where there is no backup for your digital data, there is a lack of **redundancy**. This is one challenge that cloud computing, which stores digital data in a 'cloud' of networked places, attempts to solve.

Remix - It is simple to edit and alter our digital content. A digital photo can be cropped or given a visual effect (e.g. changed to black and white); audio and video files can be easily cut and edited. You can apply Instagram or Snapchat filters to adjust how your videos and images look.

Rights Holder - If you create content while working as an employee of an organization, the employer gets the copyright (or is the "**rights holder**"). Just because you author something doesn't mean you end up with the copyright in the long run. Finally, when you die, copyright is transferred to your heirs. This means you may be the "**rights holder**" for some of your relatives if they have passed away.

Rights-of-way - While telecommunications is regulated by the federal government, local governments do have some important regulatory powers, particularly around rights-of-way, which can be used for shared infrastructure.

Routing Protocol - By automatically selecting transmission routes between any two nodes on the **network**, mesh networks can be adapted and grown as new participants join, new areas are reached, and more capacity is added to links and internet gateways. This work can be done much more cheaply than traditional wired or wireless networks.

Scanner - A device that can 'scan' analogue content and turn it into digital content. For example, a scanner can scan a print photo to make it digital.

Shahanh - mother, **Dinjii Zhuh Ginjik** (Gwichyà and Teetł'it Gwich'in dialects).

Sheejįį - older cousin, **Dinjii Zhuh Ginjik** (Gwichyà Gwich'in dialect).

Social Benefits of Broadband - These include better access to education, telemedicine and health services, increased access to online government services and programs, improved communication for public safety and emergency services, and greater means to share and access entertainment and cultural content.

Social Media - An online platform designed to store, curate and share digital content that is uploaded by its users. Examples include Facebook and Twitter.

Spectrum License - ISED Canada creates band plans for its managed frequency ranges, and allocates licenses within these ranges in designated "blocks". For example, the 700 MHz range is divided into frequency blocks labeled A through E, C1 and C2. In auction winner information[7], each licence is identified by a service tier, a geographic area, a frequency range and a block.

Standards - Sets of rules that guide and shape how digital content is organized.

Storage Devices - Devices that store digital content, such as computer hard drives and mobile phones. Storage devices change over time, and can become obsolete. An example of an obsolete storage device is a floppy disk.

7 Source: Joseph, K. (2018): https://crtc.gc.ca/eng/acrtc/prx/2018joseph.htm

Streamed online/streaming - a form of accessing of content over the internet. Unlike downloading, after streaming content the end user does not have a copy of the streamed content.

Subject Metadata - Describes what something is about, and can change depending on who is describing it. Standardized subject **metadata** is very important in digital collections because it describes "about-ness" in one consistent way, so we can collect content together, even if it is different formats or types of content.

Symmetrical (equal) Upload and Download Speeds - This refers to the speeds of sending and receiving data (information) over internet connections. When speeds are 'symmetrical' it means that they are the same.

Technical Rules - ways that we can use devices and software to create barriers around our work, such as the **Mukurtu** access rules. Another example is Technological Protection Measures (also known as digital locks) that can prevent users for accessing or copying content.

Technical Skills - Deploying and operating a **network** requires a broad range of expertise. Some of these skills will be technical, related to telecommunications infrastructure management. Others will include identifying those who can be involved in the deployment and maintenance of the physical **network** (e.g. fibre trenching and splicing skills, installing antenna for sending/receiving data). Often, people involved in telecommunications planning and delivery note that social and business elements make up three-quarters of the work!

Technological Protection Measures - Also known as 'digital locks' are pieces of software that prevent users from accessing or copying the materials. An example includes the software on some DVDs and CDs which prevents you from copying the material.

Terms of Use - An agreement provided by websites and other internet services/applications that outlines what users of the service can or cannot do. Users are bound, by law, to the terms of agreement. As such it is important to read and understand the terms and conditions of use.

Traditional Knowledge Labels - Developed by Local Contexts, TK Labels were developed to help communities manage their digital heritage. As described by the **Local Contexts** website: The TK Labels are a tool for Indigenous communities to add existing local protocols for access and use to recorded cultural heritage that is digitally circulating outside community contexts. The TK Labels offer an educative and informational strategy to help non-community users of this cultural heritage understand its importance and significance to the communities from where it derives and continues to have meaning.

Tr'iinjoo - woman, **Dinjii Zhuh Ginjik** (Gwichyà and Teetł'it Gwich'in dialects).

Ts'ii dęįį - according to Heine et. al., ts'ii dęįį means "the oldest days of the land. These were days when animals and people were equals. Animals had the power of speech and could assume animal or human shape or form."[8]

TV/Film/Movie Contract - See Publishing Contract. An arrangement between an author and a company involved in managing the products of their work.

UAlberta North - UAlberta North is an office at the University of Alberta that builds partnerships with northern governments, including Indigenous governments, communities, colleges and agencies; supports students through grants, awards, training, and summer internships, including the Engage North program; supports faculty researchers; amplifies the voices of northern knowledge-holders and focusing attention on key research and policy issues; and represents the University in relevant national and international organizations. Learn more here: https://www.ualberta.ca/north/about-us

Understanding Community Broadband: **The**

8 Heine et. al., 403.

Community Broadband Toolkit - This resource was designed for use by Alberta communities to assist in developing **broadband** solutions. The toolkit is organized into three general sections - learning about **broadband**, thinking about **broadband**, and planning **broadband**. Together these sections aim to identify the key knowledge and actionable steps that a community and its leaders can use to develop and achieve local **broadband** solutions.

Users of Broadband - These include homes, businesses and community anchor institutions. A **network** cannot be successful without users. As illustrated in the whole community diagram, a community is made up of many different types of **broadband** users - from larger institutions like schools and hospitals to business of all sizes and individual homes.

Uutsik - dry fish, **Dinjii Zhuh Ginjik** (Gwichyà and Teetł'it Gwich'in dialects).

Website Access Rules - Considerations that people and organizations think about when they are building a website, which illustrate different ways to protect and share digital content. Separate the 'back-end' and 'front-end' of a website.

Website - Back-End - The private side of a website that is only viewable by web designers and the users that provide access to.

Website - Front-End - The public-facing side of website that is viewable by anyone who visits it.

Whole Community Approach - An approach to **broadband** decision-making that local leaders and administrators can engage to discuss and decide how bandwidth is paid for, distributed and managed in each community. This approach to **broadband** planning enables local residents to make decisions on how infrastructure and bandwidth is made available to deliver essential services such as e-health and online education.

Wired Networks - These networks send signals through various types of wires (copper, coaxial cable or fibre). They tend to be faster than wireless networks, but require every user to have a wire entering their house/business to connect them.

Wireless Mesh Networks - Wireless Mesh networks are a specific type of fixed wireless technology that use a **network** of wireless access points that are distributed in a point-to-point manner that looks like a mesh net or a spider web. By 'meshing' together a number of wireless links, mesh **network**s can interconnect with one another to send and receive data.

Wireless Networks - These networks send signals through the air using the radio-spectrum. Wireless **network**s need both antennas to send information (towers or satellites) and receive information (satellite dish, home antenna or a cell phone). Wireless **network**s have some advantages in that they don't require wires, but also have limitations in that they tend to be slower. Wireless **network**s are also, generally, more complicated to operate (though mesh **network**s are helping to solve this challenge).

List of Acronyms

APTN - Aboriginal Peoples Television Network

BDEC - Beaufort Delta Education Council

BSO - Basic Services Objective

CBC - Canadian Broadcasting Corporation

CC - Creative Commons Licences

CCTS - Commission for Complaints for Telecom-television Services

CEO - Chief Executive Officer

CIRA - **Canadian Internet Registration Authority**

CRTC - **Canadian Radio-television and Telecommunications Commission**

CTI - Connect to Innovate

FNIGC - **First Nations Information Governance Centre**

GB - **Gigabyte**

GIS - Geographic Information Systems

GSA - Gwich'in Settlement Area

GSCI - Gwich'in Social and Cultural Instititute

GTC - Gwich'in Tribal Council

IP - **Internet Protocol**

iPinCH - **Intellectual Property** Issues in Cultural Heritage

ISED - Innovation Science and Economic Development Canada

ISP - Internet Service Provider

KFN - Kátłodeeche First Nation

LOCKSS - Lots of Copies Keeps Stuff Safe

MB - Megabyte

MVFL - Mackenzie Valley **Fibre** Link

NCS/NCS-NWT - Native Communicatios Society of the NWT

NFB - National Film Board

NWT - Northwest Territories

OCAP® - Ownership, Control, Access and Possession

OER - Open Educational Resource

PoP - Point of Presence

TSN - The Sports Network

TV - Television

UC - University of California

USB - Universal Serial Bus

USMCA - United States-Mexico-Canada Agreement

VHS - Video Home System

VPN - Virtual Private Network