Digital Content and Connectivity with Gwich'in Contexts

-Workbook-

Digital Content and Connectivity with Gwich'in Contexts Workbook

This workshop is a joint pilot project between the Gwich'in Tribal Council (GTC) and the University of Alberta's Faculty of Extension to explore digital literacy in the North. The partners and workshop participants will be discussing concepts related to digital content (digitization, archiving and preservation) and connectivity, in relation to the GTC's work in the Northwest Territories.

This workshop was made possible through funding support from the Government of the Northwest Territories Department of Education, Culture & Employment and Department of Industry, Tourism and Investment, and from GTC. We also acknowledge and thank UAlberta North and the School of Library and Information Studies at the University of Alberta for their support for this project.

First implementation of workshop was conducted **June 12, 2017** in Inuvik.

Workbook and workshop materials were jointly developed by the project team:

Dr. Rob McMahon, Assistant Professor, Master of Arts in Communications and Technology Program, Faculty of Extension, University of Alberta
Hanne Pearce, Master of Library and Information Studies, Master of Arts in Communication and Technology Candidate, University of Alberta
Sharon Snowshoe, Executive Director, Department of Cultural Heritage, Gwich'in Tribal Council
Alestine Andre, Heritage Researcher, Department of Cultural Heritage, Gwich'in Tribal Council
Ingrid Kritsch, Research Director, Department of Cultural Heritage, Gwich'in Tribal Council
Tony Devlin, Director of Communications, Gwich'in Tribal Council
Suraj Chhetri, IT Administrator, Gwich'in Tribal Council

Graphic design and layout of this workbook, including cover, by Hanne Pearce.
Photos on page 8 are copyright Keith Billington.
Map of the Mackenzie Valley Fibre Link complied by Trish Fontaine.

Creative Commons Attribution-NonCommercial 4.0 International License.

ISBN 978-1-7750507-0-4

Northwest Territories

UNIVERSITY OF ALBERTA
FACULTY OF EXTENSION

Contents

PART I: CONTENT

Part II: Connectivity

PART I: CONTENT

What is digital content?

The term digital originates from the word "digit" which refers to both the fingers on our hands and numbers. The term digit was adopted and modified to refer to technology that processed information in the form of numbers. According to the Oxford English Dictionary, digital technology includes "signals, information, or data: represented by a series of discrete values (commonly the numbers 0 and 1), typically for electronic storage or processing."

Digital content can be either be born digital or created from non-digital content. Digital content can be found in many different formats:

An Image http://www.gwichin.ca/images/traditional-dancers

A Sound http://www.gwichin.ca/how_we_speak/days/monday

A Video https://youtu.be/K0hEs4m1jNI?list=PLmDMFqIvzwE-Pi4alRJ_IvqHq86mLozbaK

Making content digital

Most digital content has an origin elsewhere. In oral or physical form, or in another media format. For example:

- A story known and told by an Elder is stored within their memory and shared verbally.
- A book is written by someone and printed for others to read.
- A wood carving or painting is a work of art, its meaning expressed image and shape.

How does physical content become digital?

Sound can be recorded digitally via a microphone

Images can be captured with a digital camera

Print documents can be digitized with a scanner device.

Mass digitizing techniques

Video: Stanford Digitization Labs

What are some of the devices or resources/tools/supports you need to digitize content ?

Can you think of examples of how digitization might be helpful to you on a smaller scale, as at home or in your work?"

Digitizing content changes the content

Discussion

How is digital content different than non-digital content?

What are some of the benefits of digitizing content at home and in your work?

What may be some of the challenges or problems with digitizing content?

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 pay to access their content. Digital libraries are different than other websites, in that they seek to preserve and grant access to users interested in exploring. In many ways digital libraries are like physical brick and mortar libraries.

What is the mission of physical brick and mortar libraries?

Activity: Examples of Digital Libraries

Blackfoot Digital Archive	www.blackfootdigitallibrary.org
Indian Peoples Of The Northern Great Plains Digital Collection	http://arc.lib.montana.edu/indian-great-plains/
First Nations Info. Connection	http://bit.ly/FNICImages
Internet Archive	https://archive.org/index.php
New York Public Library	https://digitalcollections.nypl.org/
Bodleian Library Oxford	http://digital.bodleian.ox.ac.uk/

Making digital content accessible

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

Digital content requires the use of some form of technology 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.

Making a collection of digital content into a digital library requires planning and consideration of how the content will be organized and accessed. Digital content also differs in type and format quite extensively, as different software and computer developers are constantly developing new ways to store digital content. Therefore each piece of digital content requires that we also attach information to it.

What is Metadata?

The Oxford English Dictionary describes Metadata as: "data that describes and gives information about other data." Recording information about digital content is extremely important, as it will influence how people access and make use it.

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

Activity: What is the Photo About?

What are these photos about? Write down the first things that come to your mind. Think about words that might help categorize / organize these images.

What did others think the photos were about?

Describing what something is about is one type of metadata. **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 they are different formats or types of content.

The metadata describing the **format** of these artefacts will be different: photo, map, book. The **subject** metadata, however, would be the same.

By describing these artefacts with the same subject, we make them findable and accessible. Our earlier activity demonstrated subject metadata is a very subjective thing, so most digital libraries adopt standards to make their metadata consistent.

What might be problematic with using just one type of standard for metadata?

Who owns digital content?

Content that has been digitized and made available online will eventually be found by others who may be interested in using that content. Most 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 there has been culture.

Examples of Remix

Mob Bounce

https://youtu.be/qVo-DJkh3t4
https://soundcloud.com/mob-bounce/cree-dance-clearwater-revival

Leanne Betasamosake Simpson

https://youtu.be/dp5oGZ1r60g

The idea that someone can own an idea, a piece of art or song is relatively new from a historical perspective. Content created in the modern legal context of most countries is now protected by **Copyright**. Copyright is **"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."**

The law balances copyright with the law of fair use, which states, **"…copyrighted material may, under certain circumstances, be quoted without the permission of the copyright holder for purposes such as private study, research, or criticism".**

Generally, copyright lasts for the life of the creator, the remainder of the calendar year in which the creator dies, and for 50 years following the end of that calendar year. Therefore, protection will expire on December 31 of the 50th year after the creator dies.

50 years following the creator's death, content falls into what is called the "Public Domain". Content in the public domain is free to be used or remixed by anyone with out permission.

The copyright symbol signifies content that is protected by copyright. This means that to reuse the content, one must have permission from the copyright holder.

The "Trademark" symbol signifies a unregistered brand mark or logo. The owner uses this sign to mark what they believe is their brand mark, but their mark has not been officially registered.

The "Registered" R symbol signifies a registered brand mark or logo. The owner uses this sign to mark a logo or image to indicate it is their proprietary brand.

Some authors, however, are not interested in keeping their work under copyright and prefer to let others reuse it. Creative Commons licenses are a popular way to indicate that content is free to be used under certain conditions.

Authors of content can assign a CC or Creative Commons License to their work indicating whether they wish those who reuse the content to give credit (attribution) to the original author, whether it can be reused for commercial purposes or if reused content should be made reusable as well.

Activity: Can you use it?

Form groups of 2-3 people. You will be given a collection of materials that includes information necessary for you to determine if it is in the copyrighted, public or open access domain.

Copyright and culture-rights

Copyright is intended to protect creators of content against copying and re-sale of their work. Copyright enables creators to make a living from what they create, to sell and be compensated for the fruits of their ingenuity and hard work. Copyright is, however, designed specifically towards protecting individuals. This can be 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 terms of 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."

Dr. Marie Battiste in *Indigenous Knowledge: Foundations for First Nations*

How do creators benefit from copyright?

How is copyright problematic in terms of cultural / Indigenous content?

What is fair use and why is it important?

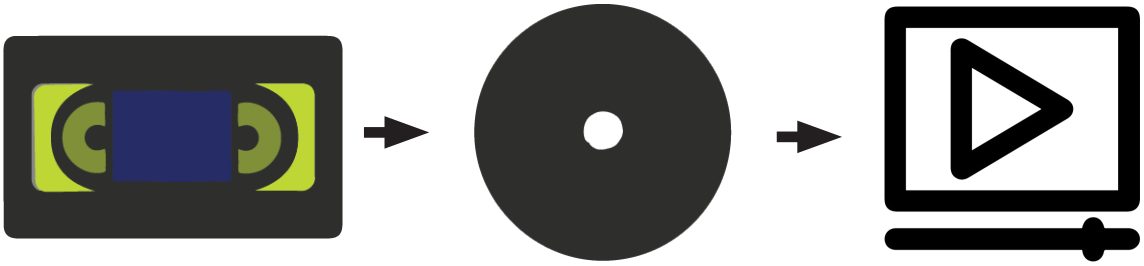
Why might a content creator want to use a creative commons license ?

How might copyright of Gwich'in or local digital content support local jobs?

What might be the benefit of making some Gwich'in content available through a creative commons license?

Preserving Digital Content

Digital content continues to evolve as new technologies and methods of encoding information are discovered. The storage devices and file types we used 10-15 years ago are already obsolete. For example, most people no longer watch films on VHS tape 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.



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

What kind of digital content might a community want to preserve from today?

Part II: Connectivity

With so much content being digital in our time, connectivity to the Internet has become a critical resource for communication, education and discovery. In 2016 the Canadian Radio-television and Telecommunications Commission (CRTC), the government agency that regulates Canadian broadcasting and communications activity, ruled broadband Internet as a basic 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 Gwich'in communities, 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.

There are many different ways that these broadband services can be developed – including through local and regional organizations. The recent development of the Mackenzie Valley Fibre Link and the Dempster Highway project provides new options for NWT residents to review these options and choose the most effective solution.

In this part of the workshop we will be discussing what broadband is, the benefits and potential negative impacts and some information about how communities in the north are building fibre optic broadband networks. The goal is to provide resources and information to support Gwich'in community members in choosing the broadband development option that best meets their needs.

There are many things to consider, including issues of affordability, access, quality of service, long-term operations and management, and the potential for broadband development to support local organizations and jobs. 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 the Gwich'in context.

What is Broadband ?

Broadband refers to an always-on, high-capacity digital data transmission service. Broadband has become the main way that we access the Internet – but the connectivity it provides also allows for a range of applications, including accessing online education, two-way voice and video calls (like Skype), transmitting health data, using GIS maps, and much more.

Types of Broadband Connection Technology

There are a number of different types of broadband technology, each is a little different in terms of how it sends signals and the speed of connection it provides.

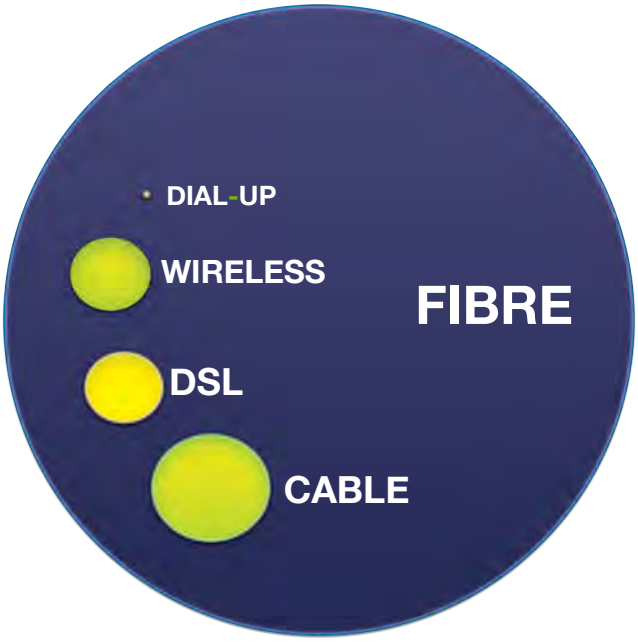
Connection Type Comparison

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 require wired connections with each home/ business	Requires line of sight to receiver; 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 connection types; performance declines with distance
Coaxial Cable	Transmission over coaxial cable	Requires access to coaxial cable lines	Fastest of legacy wired connection 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 ends of fibre cables	Fastest of all connection types; allows symmetrical connections (same upload and download speed)	Expensive to deploy at first (compared to fixed wireless towers)

Fixed Wireless

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 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).

It is typically not as fast as wired connections; however, in some cases wireless can out-perform DSL. For most spectrum bands, the receiver must be within line-of-sight of the tower to connect. Towers connect to backhaul infrastructure either through wireless



Internet Speed Comparison Chart

Adapted from the New York State Broadband Strategy Toolkit

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.

DSL

DSL stands for Digital Subscriber Line. It uses a telephone connection and transmits data as sounds, which are interpreted by a reciever 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). It 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 televison signals. It has a speed up to160 Mbps in the aggregate, which can decline with concurrent users. The mode separates the Internet signals from the 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.

Why broadband?

What are the benefits of broadband Internet at home, at work or in communities?

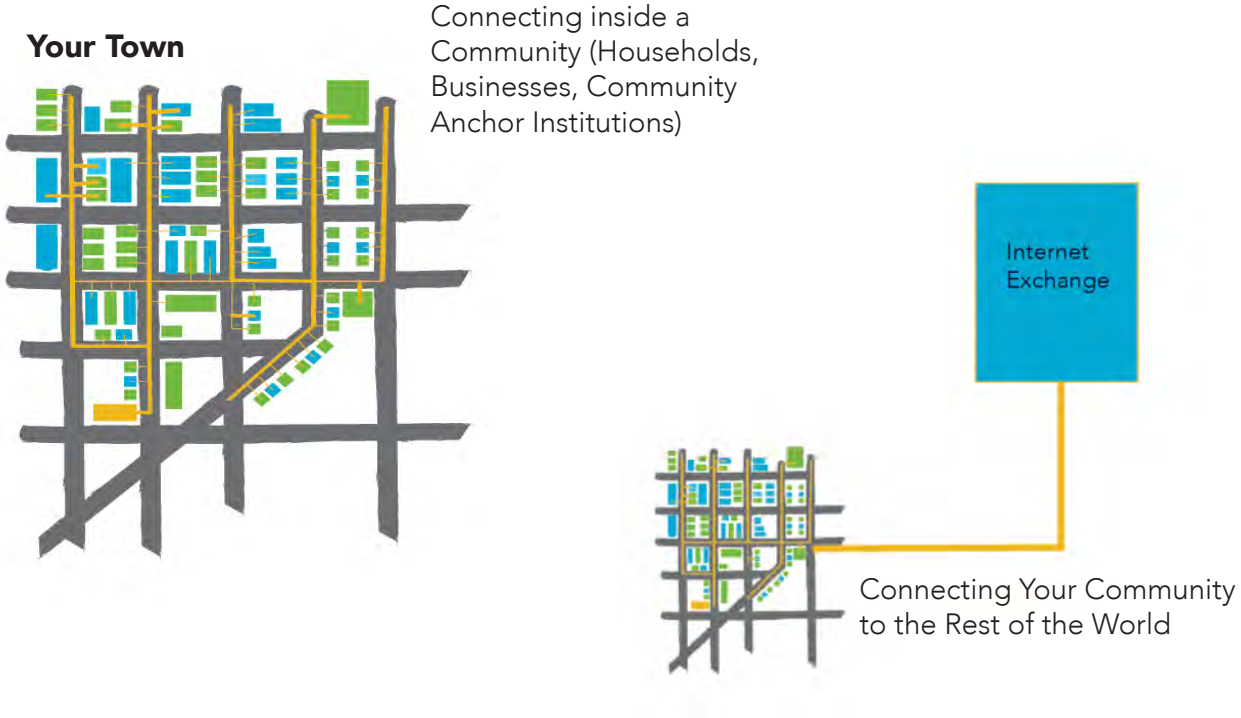
What may be any negative impacts of broadband Internet at home, work or in the community?

Last / First Mile vs. Transport / Backhaul

There are two important connections that a community must consider as part of an overall broadband solution.

Firstly a 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 the community and the rest of the world.

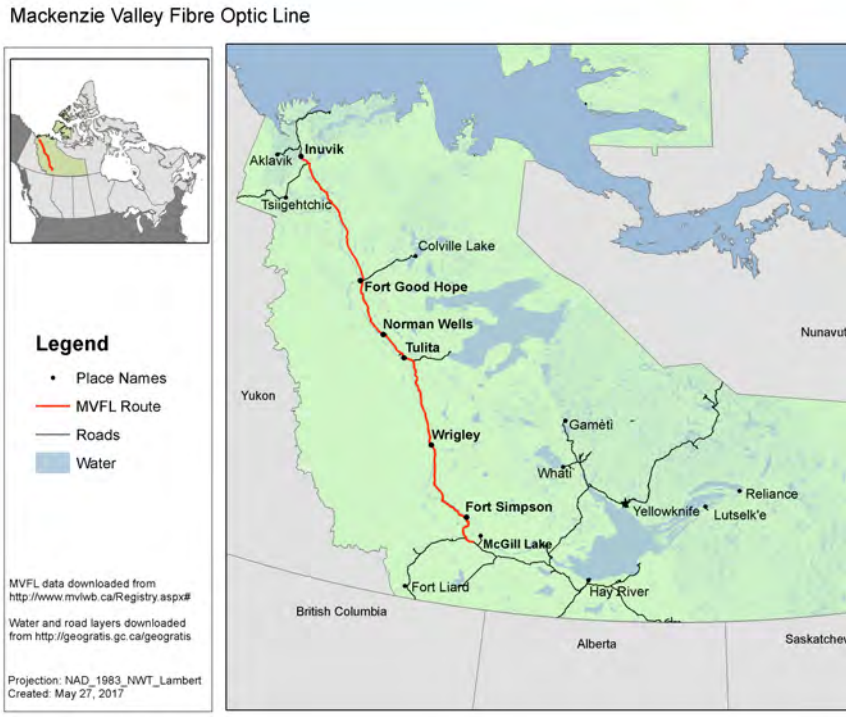
Secondly a community will also need a means of connecting the individual households and businesses within the community – also known as the last or final mile. This connection serves to link buildings inside a community with one another and with the backhaul infrastructure that connects to the broader Internet.



Regional and Local Broadband Projects in the Gwich'in Territories

The Mackenzie Valley Fibre Link (MVFL) project is a Government of the Northwest Territories. It is an initiative to provide state-of-the-art fibre optic telecommunications for communities in the Mackenzie Valley and Beaufort Delta regions. The MVFL project involves the installation of 1,154km (717 miles) of high-speed fiber optic telecommunications cable from McGill Lake in the south to Inuvik in the North.

Seven communities will be directly served by the fibre link, bringing high-speed telecommunications capabilities for the benefit of education, health and industry. An extension to Tuktoyaktuk is planned following the completion of the all-weather highway extension from Inuvik (http://mvflproject.com/project-details/)



Map compiled by Trish Fontaine

Northwestel is proposing to construct a 775 km fibre optic line from Dawson City, Yukon to Inuvik, Northwest Territories. This fibre optic line project is currently on hold.

Building for Broadband in your Community

Community engagement is central to decision-making around local broadband initiatives. Through a "whole community" approach to broadband decision-making, 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, e-learning, etc.

Broadband Best Practices

Adopt a "dig once" policy whereby fibre conduits are installed at the same time as other municipal infrastructure (road, water and sewer) projects are undertaken. Adding fibre conduits as part of another construction project results in cost increases of a few cents for every dollar spent. 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.

To avoid the cost of trenched fibre, consider aerial deployments (such as on utility poles). Depending on ownership and 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, engage in exercises to determine demand. Always consider what neighbouring communities and regions are doing. A choice of a specific type of broadband solution in one community may have impacts on its neighbours – how can communities collaborate on a regional basis?

K'atl'odeeche First Nation fibre optic network

K'atl'odeeche First Nation (KFN) is a Dene community near Hay River in the Northwest Territories. Until KFN undertook its own networking project, the community could only access ADSL operated by Bell Canada's northern subsidiary, Northwestel. Although the company managed fibre optic infrastructure that ran alongside the borders of reserve there was no way for the community to connect to it. KFN also lacked local infrastructure to connect community services. The copper infrastructure available to the KFN community had several drawbacks: it was slow, expensive, required high maintenance and provided limited bandwidth at high prices.

The Band applied to the Canadian Northern Economic Development Agency (CanNor) for a Broadband Proposal Grant. Their proposal outlined a plan to build a robust Wi-Fi network. In 2009, CanNor approved this proposal, providing the Band with $215,000 over two years. The Band used the funding to purchase equipment. They set up a robust and secure Wi-Fi network on top of the existing copper. The Band also used their funding to build a new community website (http://www.katlodeeche.com) and purchase videoconferencing equipment. They established internal technlogy practises to streamline software, recycle computer hardware and they cancelled unnecessary phone lines and DSL Internet accounts. The Band trained and hired a local IT Manager, who began managing the Wi-Fi network.

Finally, the Band conducted a feasibility study to develop its own fiber network. In 2011, the Band received a ttwo-year grant from CanNor for $275,000. This 48-strand dark fibre network replaced the Band's Wi-Fi system, interconnecting facilities like the First Nation Band administration office, school, health clinic, adult education center, day care center, and Elder care facility.

In summary, the KFN Community Network project established First Nation ownership of a local broadband network for the next 40 years. Band expenses for communnications and Internet services dropped significantly. The network supports culture, language preservation aswell as health and wellness of KFN community members, education for youth and adult learners. KFN's Network can also support local economic development opportunities and keep skilled technical jobs, revenues and profits inside the community.

Conclusion

Discussion

How can we house Gwich'in knowledge appropriately online?

What do you need to keep learning?

What barriers do you face?

How to do you think you could interest friends and family in these issues? What would help you stay motivated to learn?

What other technology projects / training opportunities would you like to see?

Sources & Further reading

Battiste, M. (2005). Indigenous knowledge: Foundations for first nations. *World Indigenous Nations Higher Education Consortium-WINHEC Journal*. Retrieved from http://142.25.103.249/integratedplanning/documents/IndegenousKnowledgePaperbyMarieBattistecopy.pdf

Brown, M. F. (2004). *Who owns native culture?*. Cambridge, Mass. : Harvard University Press, 2004

Creative Commons. (n.d.) Retrieved rom https://creativecommons.org/

Corlett, Bracken Hanuse (2016, June 11). *Mob Medicine*. [Video File]. Retreived from: https://youtu.be/qVo-DJkh3t4

Dahl, M., Banerjee, K., & Spalti, M. (2006). *Digital libraries : Integrating content and systems.* Oxford [England] : Chandos Publishing, 2006

Ledcor Group. (2017). *Mackenzie Valley Fibre Link.* Retrieved from http://mvflproject.com/

Marcaria.com. (2017). *What is the difference between TM, SM, ® and other symbols?* Retrieved from https://trademark.marcaria.com/hc/en-us/articles/211141106-What-is-the-difference-between-TM-SM-and-other-symbols-

Mob Bounce (2016). *Cree Dance Clearwater Revival*.[Sound File]. Retrieved from https://soundcloud.com/mob-bounce/cree-dance-clearwater-revival

McMahon, R. and L. Fabian (date?). *Indigenous community networking in Canada's Northern territories: A case study from K'atl'odeeche First Nation.* (Published?)

McNally, Michael, R. McMahon, D. Rathi, H. Pearce, C. Prevatt and J. Evaniew. (2016). *Understanding Community Broadband: The Alberta Broadband Toolkit*. doi: https://doi.org/10.7939/R3H41JR36

Papy, F. (2016). *Digital libraries : interoperability and uses.* London, UK : ISTE Press/Elsevier, 2016.

Simeone, Tonina (2004). Indigenous Traditional Knowledge and Intellectual Property Rights. [Report] Parliamentary Research Branch, Library of Parliment. Retrieved from http://www.iwantalevel4.com/uploads/1/6/7/4/16743666/indigenous_traditional_knowledge_reading_for_activity_4.pdf

Simpson, Leanne Betasamosake. (2016, November 28). "How to Steal a Canoe" [Video File]. Retrieved from https://youtu.be/dp5oGZ1r60g

StanfordDigitalLib (2012, October 31). *Stanford University Libraries' Digitization Labs*.[Video File] Retrieved from https://youtu.be/RdLcrNeWjIs