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HARNESSING ICTS: A CANADIAN FIRST NATIONS EXPERIENCE

Introduction to K-Net

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Guelph, Canada
November 2003

IDRC CRDI

This work was carried out with the aid of a grant from Canada´s International Development Research Centre on behalf of the Institute for Connectivity in the Americas (ICA). ICA is a project administered by the International Development Research Centre (IDRC), Canada.

The authors would like to thank the residents of the Keewaytinook Okimakanak communities whose stories give life to this case study series, as well as George Ferreira for video documentation.

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Abstract

This document is an introduction to the work of K-Net, a program of Keewaytinook Okimakanak (KO) tribal council. K-Net is providing information and communication technologies (ICTs) to First Nations communities in remote regions of northwestern Ontario, Canada. In less than a decade, KO communities have experienced a major technological transformation, and this case study series outlines some of the key lessons learned from their experience.

Community vision and need have been the driving forces behind K-Net's development, and the results impact the entire region's health, education and economic opportunities. This Introduction provides an overall explanation of the network's history, key players, partners and accomplishments to date. Based on first-hand accounts from people in the KO communities, print and online resources, and a Sustainable Livelihoods conceptual framework, the authors demonstrate how First Nations people are finding ways to harness these new technologies to strengthen and support the entire community, including their traditions, language and cultural heritage.

For more information and a full multi-media version of this series, including video footage, please see http://www.knet.ca.

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Executive Summary

This case study collection concerns the work of K-Net, a program of Keewaytinook Okimakanak (KO) tribal council. K-Net is providing information and communication technologies (ICTs) to First Nations communities in remote regions of northwestern Ontario, Canada. The network supports the development of online applications that combine video, voice and data services requiring broadband and high-speed connectivity solutions. This case study collection includes an Introduction and four specialized case studies covering Network Development, Education, Health and Economic Development.

The KO communities are part of Nishnawbe-Aski Nation (NAN), located in northern Ontario, across an area roughly the size of France. NAN includes a total population of approximately 25,000 people. The majority of this population is aboriginal and lives in remote communities with 300-900 inhabitants. For many communities, the only year-round access into or out of their area is by small airplane.

What K-Net has achieved in less than a decade in terms of network and technical infrastructure development is impressive: several communities have gone from having one phone for 400 people four years ago, to accessing broadband services from individual homes today. There are few rural communities in Canada – and particularly few remote ones – that have experienced such a dramatic transformation in such a short period of time.

The five case studies capture the rapid development of K-Net's technical infrastructure and services, and its impact on local health, education, and economic development. While the technologies offer new opportunities immediately, the full extent of their impact in these sectors will take some years to become known. The case studies were prepared using first-hand accounts from people in the KO communities, online resources, and a Sustainable Livelihoods conceptual framework. Please see http://www.knet.ca for the full multi-media version of this study, complete with video footage.

This series is entitled *Harnessing ICTs.* Information and communication technologies are powerful, new vehicles that can be controlled and directed by indigenous communities to help them arrive at their own goals. K-Net's case studies offer stories of how people embrace change with modern tools while balancing the traditions and ways taught by their elders.

This series is directed at both Canadian and international audiences, and in particular, readers from indigenous communities in Latin America and the Caribbean who may wish to replicate this effort. The K-Net experience offers "lessons that can travel"; most importantly, that community needs and demands drive technology and network infrastructure development. Any other group around the world wishing to create a similar network will have to respond to its own unique geographic, political, financial and social situation.

1.- BACKGROUND

This is a collection of case studies focusing on K-Net, an aboriginal network that is providing broadband connectivity to First Nations communities in the remote regions of northwestern Ontario, Canada. The network is formally known as the Kuh-ke-nah Network of Smart First Nations. Kuh-ke-nah is an Oji-Cree expression for "everybody" and that is the goal of this network – it is for everybody.

The communities are part of Nishnawbe-Aski Nation (NAN), located in northern Ontario, across an area roughly the size of France. NAN includes a population of approximately 25,000. The majority of this population is aboriginal and lives in remote communities with 300-900 inhabitants. For many communities, the only year-round access into or out of their area is by small airplane, though most have winter road access for five or six weeks during the winter season.

K-Net is a program of the Keewaytinook Okimakanak (KO) tribal council. The communities in focus are linguistically and culturally either Cree, Ojibway or Oji-Cree. Together they form the Keewaytinook Okimakanak tribal council (Northern Chiefs). KO is part of the Nishnawbe-Aski Nation, a regional organization representing the political, social, and economic interests of 49 First Nations in northern Ontario.

This collection of case studies describes the development of the K-Net network and explores how community members harness information and communication technologies

(ICTs) to improve local health, education, and economic development. Based on first-hand accounts and using a sustainable livelihoods framework, the case studies attempt to capture some of the real impacts that the introduction of K-Net's technical infrastructure and services have had on people's everyday lives.

This series is directed at both Canadian and international audiences interested in how the K-Net experience has evolved. In particular, readers from indigenous communities in Latin America and the Caribbean may find important lessons to inform their efforts to harness ICTs. The authors of these case studies have become very familiar with the work of K-Net and have learned a great deal. Our hope is that we are able to capture the lessons that are applicable elsewhere – what we refer to as "principles that travel."

This case study series is entitled *Harnessing ICTs.* Information and communication technologies are powerful vehicles that can be controlled and directed by indigenous communities to help them arrive at their own goals. Finding a healthy balance in the use and development of these communication tools is the challenge that the people of the KO region have undertaken, as we have seen while trying to capture on video a wide range of personal stories from the K-Net communities (see http://www.knet.ca for the full multi-media report with video clips). The K-Net network is a tool: it only provides options that the people must decide how to use. These technologies challenge individuals, communities, leaders, regional organizations and partners to find positive applications and opportunities for all citizens. The question of balance is important for aboriginal people and belongs in all their teachings. These are stories about how people embrace change with modern tools while also balancing this change with the traditions and ways taught by their elders. This story is just a beginning.

> ***"...the political leadership in Keewaytinook Okimakanak has identified telecommunications improvements as a self-determining means for achieving community wellness and development."***[1]

2.- NORTHERN ONTARIO FIRST NATIONS: A WORLD APART

In the context of northwestern Ontario, the word rural has no meaning and must be replaced by "remote". For any remote First Nations community, information and communication technologies provide an opportunity in terms of maintaining and protecting culture. This dilemma is part of the history of media development in northern Canada. K-Net faces challenges that have no parallel in southern Canada with regard to attracting basic infrastructure investments.

The fact that some of the northern communities have received access to the Internet via satellite without first having access to telephones is indicative of the scope of the challenges. Infrastructure expansion in the North does not happen through market forces; regulatory and governmental incentive mechanisms are necessary to provide universal access for people in these communities. While Canada boasts some of the world's highest indexes of well-being and telecommunication access, communities in the North have not equally benefited from these achievements.

3.- AN ABORIGINAL NETWORK

K-Net is an organization that has taken on the challenge of living in 'two worlds' – maintaining and protecting First Nations culture for future generations, while harnessing state-of-the-art communication and information technologies.

[1] Hoshizaki, E. (1999). *Keewaytinook Okimakanak Broadband Network Study.* Unpublished report prepared for K-Net Services, Sioux Lookout.

K-Net Services is a program of Keewaytinook Okimakanak (KO), a non-political tribal council that advises and assists their member First Nations in the Sioux Lookout District of northwestern Ontario. K-Net is a regional information technology and content development organization that supports and manages various local First Nations telecommunication initiatives across this vast and remote region. It connects these northern communities with each other and the world by delivering a variety of broadband services and promoting the development of local electronic indigenous applications.[2]

Approximately 2,800 people live in the Keewaytinook Okimakanak communities. Deer Lake is the largest community with a total population of 850. There are 314 people living in North Spirit Lake, 316 in Poplar Hill, 470 in the community of Fort Severn, and 539 in Keewaywin. The territory where K-Net began is about 200,000 km^2 in size, with approximately 20,000 people from 23 First Nations north of Sioux Lookout (0.1 persons/square kilometre).

The following describes the KO communities in brief:

> Keewaytinook Okimakanak First Nations are members of Nishnawbe-Aski Nation (NAN). They are small, remote, fly-in communities that have struggled for decades with the practical consequences of institutionalized isolation. Hospital and high school access require air travel - with the exception of a 10-week period when 4x4 vehicles can travel along a winter road. Most homes are within walking distance of local services such as education, health and administration buildings. Communities share demographic characteristics. Almost 25% of the total population is under the age of 10 years. An additional 25% are between the ages of 10 and 19 years of age. Fewer than four percent of the total population is age 60 or older. Approximately 36% of the adult population are unemployed or are receiving some form of social assistance. High school completion rates are low, particularly for those 45 years of age or older. All of the communities are located in resource rich areas. Forestry and mining activities are rapidly

[2] Beaton, B., & Fiddler, J. (1999, 13-16 October, 1999). *Living Smart in Two Worlds: Maintaining and Protecting First Nation Culture for Future Generations.* Local Knowledge / Global Challenge: Smart Community Development. Summerside, Prince Edward Island, Canada.

expanding into traditional territories and tourism is a seasonal mainstay for the area.[3]

4.- A BRIEF HISTORY

Since the early 1970s, many communities, organizations and programs (First Nations of Nishnawbe-Aski, Wawatay Native Communications Society, Ontario Network Infrastructure Program) have contributed to the introduction of basic telecommunications infrastructure in the region (two microwave networks and several satellite solutions). During that time, Wawatay was established and became active with media projects across the North, including the Northern Pilot Project High Frequency Radio network which served 25 communities.[4, 5]

This foundation work created the institutional framework for K-Net: between 1994 and 1995, the KO Northern Chiefs' council began mobilizing local and federal funding to establish an electronic bulletin board service, offer training, and acquire computers for each KO First Nation. From the very start, the K-Net organization focused on providing telecommunications connectivity (bandwidth), training, promoting awareness, and, perhaps most importantly, linking the technological demands of the KO communities with various programs offered by telecommunication providers, regulators, academia, funding agencies, and vendors across Canada.

During its expansion phase (1996-1999), the organization began offering a wider range of services and added Internet service provision to KO communities and beyond. This included: providing advice on equipment and configuring it to work in network environments; lobbying efforts and work to establish bandwidth services (narrowband with MSAT/DirecPC solutions, and broadband through a Bell Canada infrastructure upgrade); using Linux open-source software to build routers that can be managed remotely, and including dial-up services for local configurations. In addition, it is worth noting that K-Net is a regional information technology and content development organization. Thus, it serves as a technical service provider, an application provider *and* a content provider.

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[3] Keewaytinook Okimakanak Northern Chief Council. (1999). *The Kuh-ke-nah Network of Smart First Nations* [grant application]. Sioux Lookout, Ontario: K-Net. p. 5

[4] Hudson, H. (1974). *Community Communication and Development: A Canadian case study.* Ph.D. dissertation. Palo Alto, California: Stanford University.

[5] Also see: http://www.wawatay.on.ca

K-Net and its partner organizations have also dedicated efforts to political lobbying, not only on behalf of KO communities, but also throughout many Nishnawbe-Aski Nations communities across northern Ontario. K-Net has played an important role in shaping regulatory decisions of the Canadian Radio-television and Telecommunications Commission (CRTC) that determine the services that are made available to rural and remote communities.

The CRTC is the independent Canadian telecommunications regulator. The 1999 High Cost Serving Area ruling established the requirements for telephone connectivity that all private telecommunication operators must meet in order to hold a license. Wawatay Native Communications Society and subsequently K-Net participated actively in the CRTC's High Cost Serving Area hearings. Their inputs influenced the final ruling that established that 'basic telephone services' for high-cost-service areas would be defined as follows:

- Single-line touch-tone service with local access to the Internet;
- Access to enhanced calling features, including 911, voice message relay service for those with hearing difficulties, and features that protect privacy;
- Access to operator and directory assistance services;
- Access to long distance; and
- A copy of the current local telephone directory.

This ruling gave Canadian telecom companies until 2003 to provide basic service delivery. The above meant that a resident of a rural community with only party-line phones would now be entitled to have digital touch-tone phone service – the same services available to city residents. Rural and remote telephone subscribers would now be able to connect a fax and answering machine to their phone, something which party-line telephone technology did not allow. However, if these subscribers wished to get access to the Internet, their speed of access would be limited to a PC modem that could not surpass phone line speeds of 56 Kbps. This meant that high-speed modems, such as cable modems and digital subscriber line services (DSL) now available in larger cities in Ontario, were not considered a basic service option.

Two issues are significant here:

1) K-Net was involved in shaping a federal policy that made it mandatory for telecommunications operators to improve services – many of which simply did not exist prior to this ruling, and

2) during that same period (1997 to 2000), K-Net succeeded not only in leveraging resources from the Federal Economic Development Initiative for Northern Ontario (FedNor) to get some of the KO communities connected to phones (some for the first time), but on the basis of that platform, K-Net jumped ahead to broadband, providing connectivity far beyond these new 'basic' CRTC requirements.

K-Net achieved these significant impacts because of a vision: the network's organizers understood that the educational, health, and economic development needs of the most remote communities in Ontario required broadband service – they could not be satisfied strictly with what regulators and commercial carriers had agreed to build.

This cumulative experience led K-Net to compete for Industry Canada's Smart Communities Initiative, a national competition for a CAD $5 million grant that had to be matched with an additional $5 million from other sources. K-Net succeeded and was selected in April 2000 as the only Aboriginal Smart Community Demonstration Project for all of Canada. Among the requirements of this program, two elements stand out as major challenges – a demonstration of community engagement, and a demonstration of "smart results."[6,7] In other words, Industry Canada wanted to ensure that the services were developed *with* the communities, not *for* them, and that the impact was documented for others to learn from the demonstrations.

The summary below describes, in a very general manner, five stages in the evolution of the K-Net telecommunications investments:

1975-1994: foundation work towards basic telephony infrastructure development

1994-1995: establishment of K-Net within KO as a specialized service

1996-1999: major expansion in roles and services, multiple funding in parallel

1999-2003: beyond infrastructure to harnessing ICTs and documenting results

2003-... : developing a business case to maintain the network and services

[6] Government of Canada. (1998). *Smart Communities: Report of the Panel on Smart Communities*. Ottawa: Industry Canada.
[7] Keewaytinook Okimakanak Northern Chief Council. (1999). *The Kuh-ke-nah Network of Smart First Nations* [grant application]. Sioux Lookout, Ontario: K-Net.

Industry Canada has been a strategic partner throughout K-Net's history. The chart below documents the funding agencies that have supported K-Net over the past few years, in order of significant investments.

Major Funding Sources for K-Net
Federal Economic Development Initiative in Northern Ontario (FedNor) – Industry Canada (since 1998)
SMART Communities – Industry Canada (2001-2004)
SchoolNet – Industry Canada (since 1996)
Indian and Northern Affairs Canada – INAC (1995)
Community Access Program (CAP) – Industry Canada (since 1996)
Office of Learning Technology, Human Resources Development Canada (since 1999)

5.- CHANGE THAT SUPPORTS COMMUNITIES

The connectivity that K-Net has made possible is strengthening links among people, and between communities and the outside world; it is reducing a sense of isolation and separation for remote communities. This experience:

- supports community members who have left the community because of sickness, schooling, or work to **keep in touch** with their community and know what's happening (videoconferencing, homepages with local news, photos)
- makes it easier for those who have left **to return** (more access to information and the "outside world", less "boring" and isolating)
- supports members within the community to **keep in touch** with family members, children who are away at school
- supports people to stay in the community longer and still have their needs met (e.g. people needing medical or psychological treatment, children receiving more time to mature before going away to school)
- provides opportunities for community members to see what's going on in other areas (in North or further) and offers ideas for new things they'd like to promote in their own lives

Community members are recognizing and using the K-Net network as a tool that offers both benefits and challenges for their local and cultural issues, including education,

health, and economic development. Local people have been directing the implementation and application of the network since its beginning, and this needs to continue if the tool is to be applied to its full potential by the communities.

5.1.- Health

The K-Net services that provide telehealth and telepsychiatry are giving people in KO communities new choices. A pilot project has demonstrated that one-quarter of all medical consultations can be carried out effectively using telemedicine. This makes it easier, especially for elders, to get quality medical care without the discomfort and high expense of flying out of the community.[8] The telediagnostics facilities also make it easier for care providers to provide services: local health workers have access to information sources, nurses can get specialized advice immediately, and doctors are finding the technology to be a useful support rather than a replacement for their services.

5.2.- Education

By improving access to ICTs, K-Net is having significant impacts on the education of remote First Nations communities. Until recently, in order to continue their education after Grade 8, KO children were forced to leave their families and communities to attend secondary school hundreds of kilometres away. For many young people, this involved major culture shock and a loss of social support, and often resulted in students quitting school. Now, youth have the choice of staying in their community longer to attend Grades 9 and 10 online using the Keewaytinook Internet High school (KiHS). Thanks to programs like SchoolNet, the children are quickly learning new skills and sharing this information with their elders.

K-Net's technologies allow people of all ages in KO communities to participate in government programs, university courses, and online education in a more equitable and timely manner. Community members are actively harnessing the information and communication tools available to them, feeling empowered to both influence and be influenced by what they are learning on the Internet, in chat rooms, and at their local e-

[8] A typical round-trip flight from Fort Severn to receive medical services in Thunder Bay costs over CAD $1,000.

Centre.[9] They are educating themselves while also sharing their cultural heritage and traditions with a global community. Young people are staying in their communities longer while learning powerful communication skills. K-Net is leveling the playing field so that KO community members can also participate in the Information Age.

5.3.- Economic Development

The technology is changing the way people communicate, access information and link to the outside world. Web portals allow each remote community to connect with a wealth of resources and people from around the world. New skills and jobs have been created at public access e-Centres in each community to support and maintain the network, and provide services to different customers in the community. The technology allows a global audience to access the communities: local handicrafts and eco-tourism potential are now more readily available. Most significantly, the new generation is acquiring a computer literacy level that is on par with kids in any urban centre in Canada, giving them a new image of themselves and a new platform to reinvent their society. It is all about balance for aboriginal youth: celebrating their culture while harnessing the tools of tomorrow.

5.4.- Network Development

The above services and opportunities are possible thanks to a sophisticated technological network that K-Net has built from the ground up. The K-Net broadband network provides support for band office programs, health and education services in each participating First Nation. The network supports the development of online applications that combine video, voice and data services requiring broadband and high-speed connectivity solutions. The long-term objective is to establish a wide-area network of local community networks linked across the country to other networks that share and distribute broadband services and programs benefiting local communities.

[9] For example, the e-Centre in North Spirit Lake has 5 public access computers with broadband service, located in an "overnight" cabin used by Health Canada staff and other community visitors. North Spirit's e-Centre boasts the community access site, a videoconferencing suite, a staff office and a fledgling library begun with book donations from the local school. Four staff work with the community to help people make use of the available technologies and also work to keep the entire network running throughout the community and in the different buildings. The e-Centre is the community data network hub providing direct access services to all the services available on the high-speed data network.

What K-Net has accomplished in less than a decade in terms of network and technical infrastructure development is incredible: communities have gone from one phone for 400 people four years ago to accessing broadband services from individual homes. There are few rural communities in Canada – and particularly few remote ones – that have experienced such a dramatic transformation. For groups wishing to replicate K-Net's work, the main message is this: pay close attention to the *process*. The technology and network infrastructure have grown from a vision and are the result of the community's unique needs and demands. The technology is directed by and for the community.

6.- BALANCE

Information and communication technologies are notorious for increasing gaps within some environments, be they economic (digital divides) or social (such as generation or gender gaps). In aboriginal communities in particular, the introduction of these technologies has profound consequences for people's everyday lives. For the elders, the change is sometimes difficult to comprehend; for the young, it is taken for granted, and for everyone, the challenge is always to find that balance which ensures that *everyone* benefits. These technologies offer opportunities to strengthen and protect cultural heritage. The video material that accompanies these case studies includes statements by community leaders saying:

- "We can't go back to the old ways."
- "This must come to pass."
- "People have to be more vocal in how they want to use this technology and the decision-makers need to respond."

The technology is a tool offering new power and paths, but it is the people, especially the younger generations, who will harness it and put it to work to find meaning for their own cultures. This technology brings the world to remote areas, with the risk of making everyone seem the same, but it also holds promise by allowing cultures with unique identities to celebrate their legacy and renew it. These case studies tell a story that is just beginning.

K-Net Network Development

7.- INTRODUCTION

In the late 1990s, two of the Keewaytinook Okimakanak (KO) communities only had a single public phone to serve 300-400 residents.

> *"...there were no phones here. So many times I had to make a phone call, I had to go to the Band Office – there was always someone on the phone. I had to wait, wait, wait... Because my call was important, I had to wait till the phone was available – sometimes I had to wait for an hour."*
>
> – Lawrence Mason, Mental Health Coordinator

What K-Net has accomplished in less than a decade in terms of network and technical infrastructure development is incredible: communities have gone from one phone for 400 people four years ago to accessing broadband services from individual homes.

There are few rural communities in Canada – and particularly few remote ones – that have experienced such a dramatic transformation.

The K-Net network that we see today is the result of several key factors that have come together in the development process:

- An organization made up of **champions/visionaries** working on behalf of the communities;
- **Constant evolution** of the organization to keep pace with technology, policies and community demands, *while at the same time* influencing how the technology is adapted, how policies are formulated, and how community demands are channeled;
- A significant number of **government programs** have been harnessed by K-Net to achieve a multiplier effect in terms of technology, costs and skills development;
- An **ongoing advocacy effort** to lobby federal regulators to develop policies that serve rural and remote communities;
- The **private sector has expanded infrastructure** as a direct response to the above pressures.

These factors are the building blocks that have created the K-Net network and services now in existence. For other groups wanting to replicate this effort, this foundation is key; community needs and demands drive technology and network infrastructure development. Of course, the K-Net experience merely reflects how the above building blocks have come together in this particular part of Canada – any other community around the world that wishes to create a local network will have to respond to its own unique geographic, political, financial and social situation.

What K-Net is, and what it means to the remote communities it services, can best be explained through examples and stories about how it has affected people's lives. The Wawatay News has profiled several such stories about K-Net on their website, http://knews.knet.ca/modules.php?op=modload&name=News&file=article&sid=528.

K-Net servers receive more than 20 million hits in October
Posted by: Brian Beaton, brian.beaton@knet.ca on Saturday, November 01, 2003

Personal web pages at MyKnet.org continue to be the most popular on-line space for the Nishnawbe Aski to browse. In October there were over 13 millions hits on this K-Net server (an additional 2 million hits from the previous month)!

All together there were over 20 MILLION hits occurring on the six most popular monitored K-Net servers throughout September. Specifically, on these six servers with traffic graphs, there were a total of 20,619,828 hits made to these on-line services provided by Keewaytinook Okimakanak. The six servers include myknet.org, knet.ca, webmail.knet.ca, hosting.knet.ca, highschool.knet.ca and photos.knet.ca.

Most of the K-Net servers that are being monitored for hits, visits and usage statistics using the webalizer program again showed an increase during the month. But http://myknet.org rose by another 2 million hits to demonstrate the rapid take up of these communication tools among users across the north.

(Source: http://knews.knet.ca/modules.php?op=modload&name=News&file=article&sid=721)

8.- BASIC INGREDIENTS: COMMUNITY PROCESS DIRECTS THE TECHNOLOGY

One of the important lessons from the K-Net experience has been to pay close attention to the community **process** that directs technological development. The network itself is a reflection of the people who create it; therefore, it is essential to become familiar with the people who built K-Net, understanding their vision and appreciating the close, dynamic relationship they have developed with the KO communities.

The "people" involved in building a network include those who have a vision, those who can talk common sense, and the technical partners. No single individual generally has these three skills. The TEAM that delivers this set of skills works together to deliver the vision that the community leaders direct. The technical team needs to work from the vision, not from the latest fad in a computer magazine. The common sense team members (often also the visionaries) needs to write proposals and have input from the technical side. And finally, the technical people need to learn and adapt, working as part of a team rather than as the driver. All members of the team need to learn to work as a team, something that is often easier said than done.

K-Net began operating in 1994 with an electronic bulletin board (BBS). This was a direct response to the local education directors who saw the need to provide children in the KO communities with computers and links to information resources. The Chiefs agreed and supported the initiative. This is how K-Net started, by bringing in staff who were already involved in related projects to respond to a perceived need.

K-Net assembled a team of champions and began working on behalf of the KO communities. It negotiated with policy makers, telecommunication carriers, equipment vendors, and other governmental departments with a stake in rural telecommunications and service delivery to First Nations. In a study done by the University of Guelph, the role of K-Net was described as a "mediating organization", one that works on behalf of communities and ensures that the services they receive are appropriate, technologically sound, and sustainable.[10]

9.- EXPERIMENT, LEARN, ADAPT

One of the key accomplishments of K-Net has been to harness any funding opportunity offered by government agencies and put this to work to meet the needs of the communities. By 1997-98, K-Net was installing links using DirecPC[11] units through Industry Canada's SchoolNet initiative. The basic phone infrastructure at the time quickly became a limitation, so they decided to use MSAT[12] technology to create an outbound channel. As this was happening, they also trained community technicians and started to use a Wingate proxy server to create school networks. When they found limitations with the Wingate/Win95 system, they decided to go with Linux. The K-Net technicians quickly learned how to set up networks, and in a very short time, were stringing blue cable to connect other buildings and residences. People acquired computers and modems and began communicating by email from their homes before they had a residential phone.

[10] Ramírez, R. and Richardson, D. 2000. "PACTS for rural and remote Ontario: Research Report Year 1 and Case Studies." *Partnerships, Accessibility, Connectivity Transformation Strategies*. School of Rural Extension Studies, University of Guelph. http://www.uoguelph.ca/~res/pacts

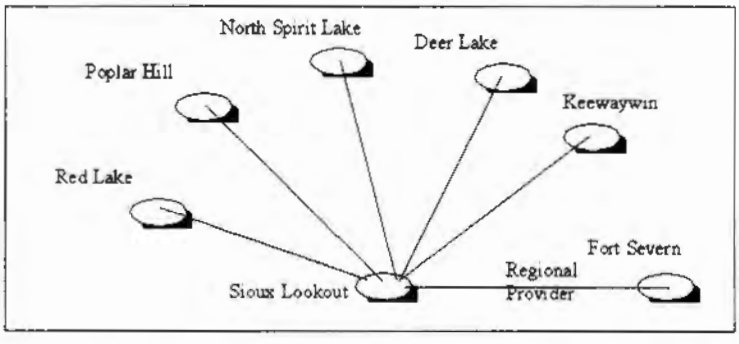
[11] **DirecPC** - the first one-way satellite Internet access developed in 1996. The subscriber connects upstream to the Internet via dial-up modem and an Internet Service Provider (ISP) and receives the downstream

[12] **M-SAT** - mobile satellite services that use geo-stationary satellites that have been optimized to serve fixed or portable terminals.

Blue Ethernet cable in the snow

The first years of experimenting with different technical options gave K-Net a sense of what was possible; it also gave the team a foundation for their vision. By 1999, they knew they wanted to get broadband service in the communities. They started with a simple plan: to aggregate the needs of each community by finding the main community users and their immediate bandwidth requirements.

Community User	Bandwidth required (Kbps)
Band Office	56
Community School	56
NAPS Office (Police)	128
Community video	384
Nursing station	128
Aggregate bandwidth	**768 Kbps**



Having determined their broadband needs and planned applications, K-Net drafted a proposal in 1999 with which to approach potential funders. Their proposal stated:

> "The model we are suggesting will have an expanded community integrated network that will tie into the community wide area network. Depending upon the

traffic generated from the community, the inter-community connections can be designed up to T1 capacity."[13]

The KO communities began approaching potential partners of all sorts with their proposal, and in discussing options, they learned more about the technology and its suitability to their geography, as well as the key partners who would be able to make broadband happen.

10.- EMAIL BEFORE PHONES: USING THE TECHNOLOGY TO JUMP AHEAD

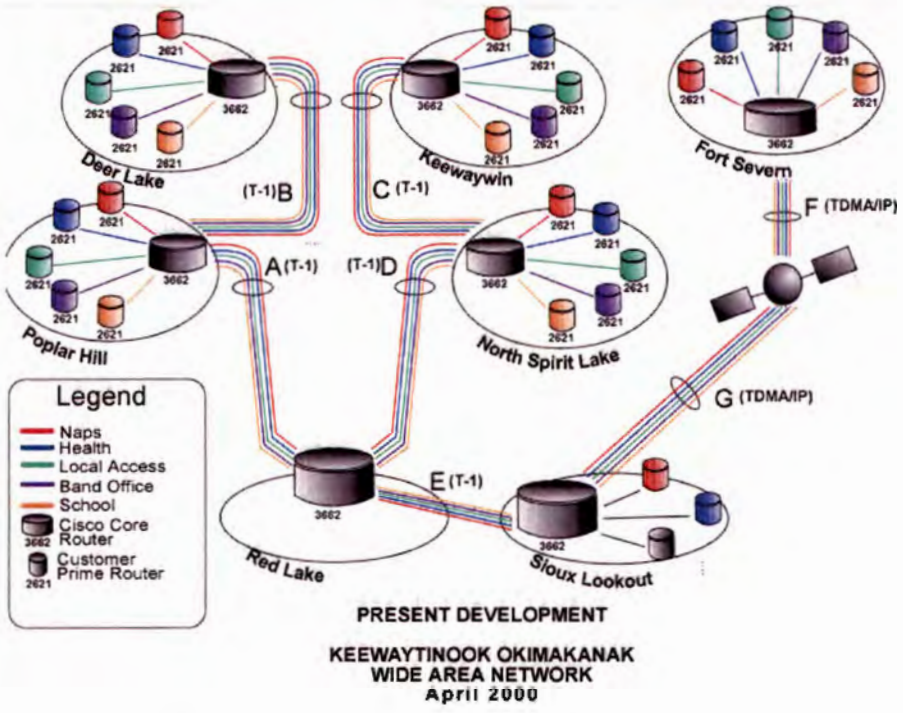
The technological pole-vaulting experience of the KO communities is impressive: as described above, some people ended up using email in their homes before they had a telephone. It is likely that this process will also happen elsewhere, considering the current lack of telecommunications services in many rural and remote communities around the world. The table below summarizes the major developments of the Internet over the past 30+ years – generations that K-Net bypassed **in less than a year.**[14]

Internet Generation	Period	Characterized
1st	Late 1960s to early 1990s	A network of social engineering prototypes of interest to military and research organizations
2nd	1990s to today	Mass adoption and commercialization of narrowband access; Dial-up modems providing intermittent low-bandwidth connections; Took advantage of telephone network and universal access policies (some countries)
3rd	Today (in some places)	Always on, high-speed; Impossible to predict what applications will emerge

[13] **T1** is 1.5 Mbps. Source for this quote and diagram below: *Keewaytinook Okimakanak Broadband Network. Summary of Applications, users, traffic and preliminary network design*. November 1999. http://smart.knet.ca/archive/documents/NETWORK%20SUMMAR.html

[14] Bar et al., 2000. "Access and Innovation Policy for the Third-Generation Internet." *Telecommunication Policy*, 24, 489-518.

By April 2000, the K-Net network had grown significantly and was proposing to provide T1 connectivity to Keewaywin, Deer Lake, North Spirit Lake and Poplar Hill through Bell Canada's infrastructure, configured with Cisco routers; and to Fort Severn via satellite. The diagram below is from the Keewaytinook Okimakanak January 2000 Smart Communities business plan.[15]



Since April 2000, the network has expanded further (for more details, see http://services.knet.ca/network_overview.html). K-Net emphasizes the importance of community investment and ownership over the local network, combined with a collective aggregation across the different communities. Each community owns their own infrastructure, paying for their "pipes" and a portion of the shared pipe. Although each has had the option of operating their network alone, they soon discovered that individual communities are too small to make the situation economically viable. Sharing the network among all the K-Net communities has given everyone more leverage to negotiate preferential prices for bandwidth.

[15] Source: http://smart.knet.ca/archive/graphics/konetwork5.gif

The knowledge and expertise gained by K-Net are being employed to assist other First Nations communities. For example, the Kativik Regional Government in Quebec's Nunavik arctic region is working closely with K-Net staff to plan and implement network and traffic management systems for 14 C-Band satellite sites. In the health sector, K-Net and Health Canada are planning to extend telehealth services to all 28 First Nations communities in the Sioux Lookout Zone of northwestern Ontario. Industry Canada has engaged K-Net to deploy Telesat C-Band satellite capacity to some 30 remote communities across Canada. Industry Canada also has agreements with K-Net to deliver the SchoolNet program and provide help-desk services to over 100 First Nations schools in Ontario.

K-Net's commitment to assisting other First Nations, rural and remote communities across Canada is evidenced by its work in helping catalyze and facilitate discussion among members of the National C-Band Public Benefit Working Group. The objectives of this Group include sharing regional satellite information concerning communities (existing infrastructure, plans, proposals, etc.), examining network management models that make the best use of C-Band services for public benefit, and developing a consortium of partners of regional networks to support the goal of delivering broadband connectivity to every First Nations, rural and remote community in Canada by 2005.

11.- MAKING IT HAPPEN: GOVERNMENT AND PRIVATE SECTOR INPUT

In 1999, K-Net assembled a bid to become one of Industry Canada's Smart Demonstration Projects.[16] K-Net's Kuh-ke-nah proposal won the national competition for the Aboriginal category.

[16] For full proposal, see http://smartcommunities.ic.gc.ca/demoprojects/demoprojects_e.asp

K-Net's winning proposal emphasized the following themes:

- Community engagement efforts in all communities to ensure the network is developed on the basis of people's visions and needs.
- A portfolio of 'Smart Services' including: a data warehouse, an Internet portal, electronic centres in each community open to the public, a broadband network, an internet-based high school and a number of telemedicine applications.
- Training for staff in all of the above services on how to use the technology, how to maintain the network and equipment on-site, and how to help others learn to use the new services.
- An evaluation process to track how the technology changes livelihoods in the First Nation communities.

The Smart Demonstration Program provided a competitive grant worth CAD$4.65 million and required the same amount to be sourced from other partners. K-Net was able to bring on board a large number of partners, including the private sector, to come up with the additional funding bases. K-Net has learned to bring these different partners to the table; they have created alliances that did not exist before. These alliances have built a network of trust that is K-Net's most valuable social capital.

K-Net has been implementing the Smart Demonstration project since 2000 and will continue until 2004 – but the services and infrastructure will continue to operate after the project is complete. The investment and documented accomplishments have allowed K-Net to leverage additional resources. For example, K-Net has recently been selected as one of the Regional Managing Organizations for Industry Canada's First Nations' SchoolNet initiative, serving as a help-desk for aboriginal schools all across Ontario.

12.- BUSINESS CONCERNS: FINANCIAL SUSTAINABILITY OF THE NETWORK

Among other things, K-Net is a network provider that pays for transport services using Bell Canada's existing network, and satellite services from Telesat. As of October 2003, each community was paying CAD$2,675 per month to K-Net. From this amount, K-Net pays Bell Canada a monthly fee per community of $2,075 for bandwidth. The balance of

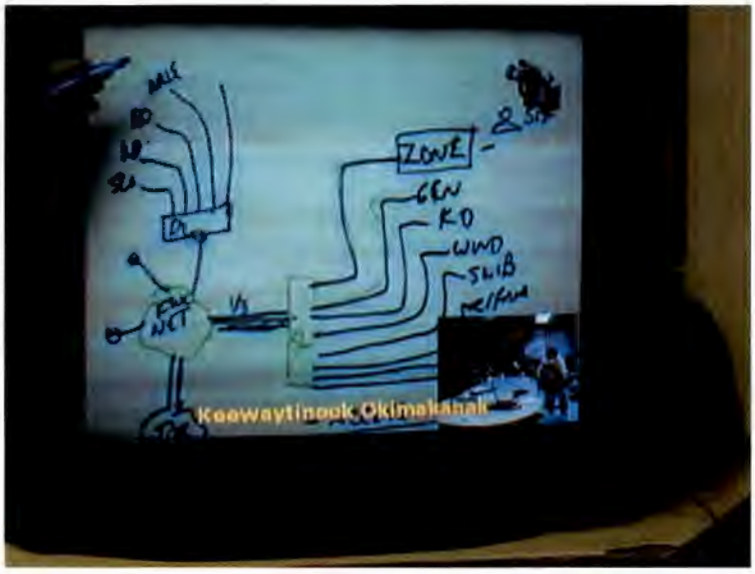
$600 is made up of $300/month for the T1 (1.5Mbps) Internet access which K-Net buys in bulk, $200 for the shared portion of the Toronto linkup, and $100 for service support that includes service support/programming routes/maintenance. The community monthly fee is paid for by a variety of community customers including the Keewaytinook Okimakanak Internet High School (KiHS), Telehealth, the Band Office, cable fees, and other programs. Those private residences with cable TV and cable modems pay a monthly fee to the local cable operator.

In November 2002, K-Net prepared a Network Sustainability Strategy. The business case was prepared with financial projections over five years using three different scenarios. These scenarios range from servicing 21 communities and 20 agencies, to 55 communities across Canada and 20 agencies. The strategy addresses issues of scalability where it established that the current network could accommodate four times the current bandwidth without further capital investment. It highlights technical components where additional investments could lead to increased efficiencies, and it also signals other dimensions such as competition, maintenance, staff turn-over and community network insolvency scenarios. This document is a testament to the sophistication of the K-Net network and the planning that is taking place to insure its sustainability.[17]

The pricing that K-Net offers is possible because of its current size – but it started small. Dan Pellerin, K-Net's Network Manager, draws an analogy of the first rope that is thrown across a river before building a bridge; this provides the anchor. After that first rope, more "lines and then beams" can be added as the need for applications becomes evident and as needs demand more bandwidth. The K-Net network has had significant dollar amounts invested in it, but the network did not start with those dollars in mind – it started with a vision of improving the communities' livelihoods.

The K-Net vision literally began with drawings on paper napkins. Today, they still draw, but the tools are different and they can share the drawings with communities using videoconferencing.

[17] K-Net. 2002. *Kuh-ke-nah Network Sustainability Strategy*. Available on request.



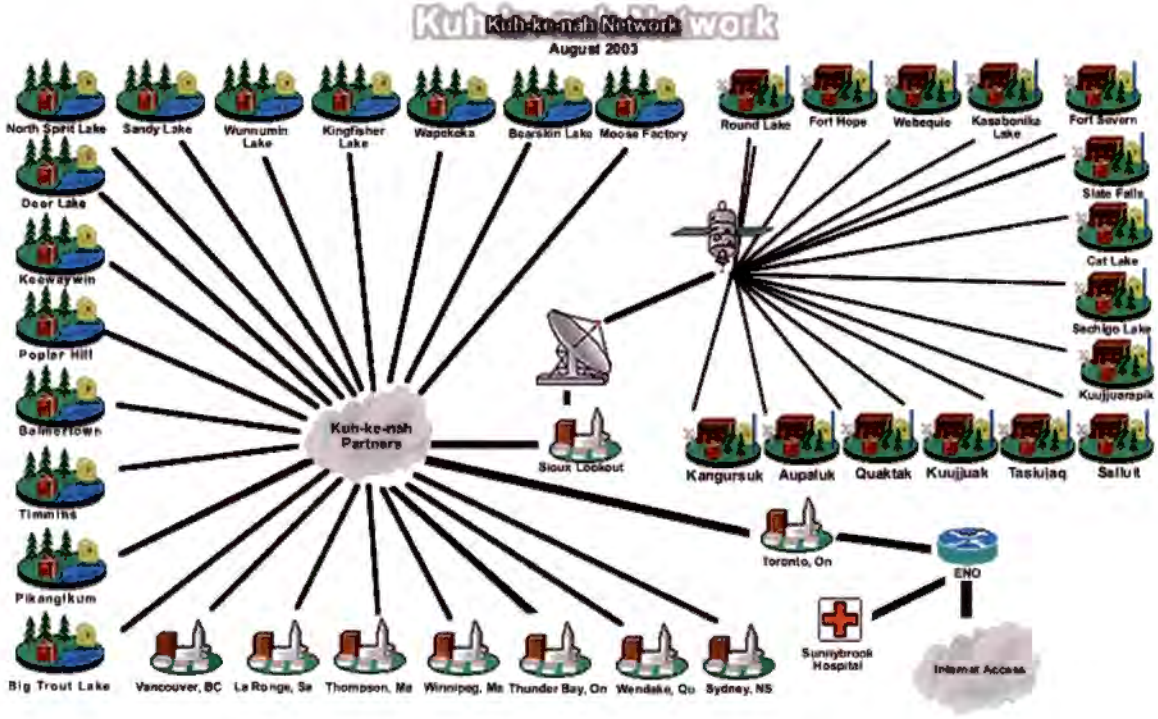
Dan Pellerin explains how the network works – from Sioux Lookout – live, during a community engagement workshop in Deer Lake, 2001.

13.- GOVERNMENT SERVICES: A KEY CUSTOMER

For government agencies, K-Net is an attractive network provider because it reaches a remote and high-risk population that has difficulty accessing essential government services, particularly health and education services. K-Net's website is also an important content provider – its portal includes templates to create websites, as well as a number of other tools such as open-source platforms for online learning. This range of services makes K-Net quite unique in that it combines content with transport, as well as being a non-profit organization that works on behalf of First Nations' interests.

K-Net provides a wide-reaching, cost-effective platform for the delivery of government services. For example, Health Canada (HC), the federal agency that provides medical services to Canadian aboriginal communities, has access to the network and services for CAD$1,600 per month per community. HC can channel a variety of their programs through this network, rather than each program individually establishing a separate arrangement for connectivity. K-Net already has 24 nursing stations connected across the region, so it makes sense for Health Canada to use the existing network to deliver their programs. No other service provider can offer the government a more comprehensive deal. The same applies to schools: K-Net works with the community networks to offer SchoolNet-supported schools access to a shared T1 broadband at $300 per month per school. There are 140 schools all across Ontario that are working to access similar services.

K-Net's philosophy is to make the technology as easy and as affordable to these government service agencies as it has to the communities themselves. Coverage is therefore growing: there are 13 communities accessing the Internet high school program, 8 communities using the C-band satellite link-up in northern Ontario (with 4 more to be added), and 8 communities in Nunavik in northern Quebec (with 6 more soon to be added).



In 2002, K-Net brokered a partnership with Industry Canada and Telesat to deliver affordable access to the most remote communities using C-Band transponder space that Industry Canada has available.

> "As part of its commitment to enhance communication services to rural and remote communities, Telesat made two channels on its new Anik F3 satellite available for the federal government to use to serve public institutions in remote areas of Canada. The two channels, or transponders, are able to provide enhanced multimedia connections for remote communities. In advance of the

launch of Anik F3, Telesat has made one C-band channel available today on the existing Anik E2 satellite."[18]

14.- SHARING LESSONS

The K-Net managers have shared some key lessons for other communities wishing to establish their own network:

- There is no bad point in time to start – just do it.
- Learn about the technology – if you don't learn it yourself, you will become dependent on consultants and vendors.
- Start by linking those who share a need; use the technology that is available, and build from that.
- Train people in the community and give them a profile.
- Establish two-way communication to mentor the community technician as you become more knowledgeable.
- Listen to the community – find out how they have communicated in the past. Did they use HF radio? Is there a tower you can still use? Can you send them an antenna and a laptop and get them connected – even through a narrow bandwidth? That first connection is the key; from then on, the challenge to bring more bandwidth has to do with dollars, skills and management.

15.- K-NET AS A MODEL FOR ICT DEVELOPMENT

The K-Net network is an impressive achievement, but as Dan Pellerin reflects, "It is easy after a few successes to let it get to your head and then you try to do too much, bite more than you can chew, lose sight of the vision and concept." This is why there is always the need to maintain community participation and stay focused, especially as the network develops and needs to be sustained with paying customers.

Recent efforts by the Food and Agriculture Organization of the United Nations and the UK Department for International Development (FAO/DFID 2001) to integrate Communication and Information dimensions into the context of the sustainable livelihoods framework suggest that:

[18] Source: http://smart.knet.ca/satellite/information Also see http://smart.knet.ca/satellite for more information about this

> Communication and information are critical components of the livelihoods framework, essential for linking and informing decision-making processes at every level: 1) to facilitate the acquisition and exchange of information by the poor necessary for developing livelihood strategies; 2) to improve communication within and between the institutions responsible for making decisions that affect livelihood options; and 3) to empower communities to participate in the decision-making processes. [19]

The following is an integration of principles proposed by FAO/DFID and by the International Development Research Centre (IDRC):[20]

- Offer concrete solutions and use realistic technologies
- Move forward at the pace of the community
- Learn from mistakes
- Localize globalized communication
- Work with a gender perspective
- Let people speak with their own voice
- Generate new knowledge and promote local content
- Address info costs: who pays?
- Ensure equitable access
- Strengthen existing policies and systems
- Build capacity
- Build knowledge partnerships

It is noteworthy that K-Net has followed these principles rather closely while establishing its network and technological applications. K-Net provides a real-life case study to examine how these principles have been put into practice in remote communities in Canada.

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resource and the press release making K-Net an IC agent for supporting the use of this resource.

[19] Source: http://www.fao.org/waicent/portal/outreach/livelihoods/model-en.html

[20] Gómez, R. and Casadiego, B. 2002. *Letter to Aunt Ofelia: Seven proposals for human development using new information and communications technologies*. IDRC/PAN Américas, Raíces Mágicas and ITDG: Ottawa. http://www.idrc.ca

K-Net Case Study on Health

16.- IMPROVED HEALTH SERVICES: A COMMUNITY PRIORITY

In 1998, Keewaytinook Okimakanak (KO) chiefs visited a hospital in Ottawa where they observed a videoconference between a cardiologist and a patient in the Northwest Territories. They saw firsthand how the doctor could listen to a heart beating in a clinic thousands of kilometres away – and they knew that this was something they needed for their communities.

Although each of the KO communities has a medical facility, professional medical services are often provided by doctors and nurses who fly into the communities on an occasional basis. Medical emergencies usually require a medical evacuation ("Medivac air ambulance"), where the patient is transported by air to the closest hospital hundreds of kilometres away. An emergency air ambulance flight from Fort Severn costs in excess of CAD$6,000 per flight, while return airfare for a medical visit in a larger community costs more than CAD$1,000.

When K-Net coordinated a First Nations telecommunications consultation in 1999 to explore how the communities wanted to use broadband technologies, all of the KO communities agreed that improved health services were highest on their list of priorities.

> "The common priority for broadband development and implementation was health care services. The need for distributed health informatics was expressed across sectors and was described in several forms. Most often, people talked about the tele-consultative opportunities that network access could bring. Another aspect of service was access to continuing medical education. Similarly, health care professionals and community people identified ways that broadband services might let them share best and local practices with other communities."[21]

This photo is from a planning session in Keewaywin in 2001 where health stakeholders came together to brainstorm on goals and services.

The objectives appear in large circles: "community awareness"; "healthy children"; "nurse present at all times"; "non-violence in homes". The small circles outline programs to reach those objectives. The yellow notes show the indicators that will confirm that the objectives have been met.

[21] *Keewaytinook Okimakanak First Nations Telecommunications Consultation Report*. May 1999. http://smart.knet.ca/archive/documents/CONSULT.html

17.- LINKING WITH THE TELEMEDICINE NETWORK

In early 2001, KO entered into a partnership with the Northern Ontario Remote Telecommunications Health (NORTH) Network, a telemedicine initiative that had been underway in other larger northern centres that already had the technical capability to deliver health services through a broadband network. Working with the NORTH Network and other partners, KO developed the Northern Ontario Telehealth pilot project, funded by Health Canada, the Federal Economic Development Initiative for Northern Ontario (FedNor) and other partners.

The KO telehealth project uses telemedicine workstations and cameras to improve First Nations access to health professionals and health programming. The specific objectives of the telehealth project are to:

1. Improve access to specialty care
2. Reduce costs associated with long-distance travel
3. Increase access to continuing medical education and reduce professional isolation
4. Program evaluation to aid in planning a provincial telehealth network[22]

As the KO communities gained access to high-speed Internet, they also acquired the ability to participate in an expanded NORTH Network. This has allowed them to link with medical professionals at regional facilities like the Sioux Lookout Zone, Thunder Bay Regional Hospital, and the Winnipeg Health Sciences Centres. They can also access specialists as far away as the Sick Children's Hospital in Toronto (about 2,000 kilometres away).

The network that makes these new community-based services possible is state-of-the-art. (See also *Network Development Case Study*) Keewaytinook Okimakanak Telehealth "...boasts an integrated IP environment for dynamic (data/voice/video) health services delivery. The telehealth initiative is delivering a variety of telemedicine applications with more planned over the next two years... A three-year business case to expand the KO Telehealth demonstration project and its services *to other remote First Nations across*

[22] For more information, see http://telehealth.knet.ca

the Sioux Lookout Zone region in Northwestern Ontario was recently approved under the Health Canada Primary Care Health Transition Fund."[23]

In each of KO's remote fly-in communities, there are now telehealth workstations linked to a private and secure network. They have remote diagnostic tools like a digital stethoscope; an otoscope to examine ears, eyes and throat; a document camera for sending x-rays for diagnosis; a patient microphone; a video monitor; as well as the videoconference unit which is used for consultations and telepsychiatry sessions. An uninterruptible power supply (UPS) unit provides up to one and a half hours of use in the event of a blackout.

Community members have been trained to be the telehealth coordinators, and although they do not have formal medical training, they have been trained to use the tools to link patients with medical experts in hospitals in urban centres. In some cases, these telehealth coordinators have received assistance from younger people in their communities on using computerized equipment, and technical staff from the K-Net e-Centres[24] are essential resource people to ensure that the network operates efficiently.

[23] 2002-03 Annual Report for the Kuh-ke-nah Network of Smart First Nations Project

[24] E-Centres provide public access to networked computers. E-Centre staff work with the community to help people make use of the available technologies and also work to keep the entire network running throughout the community and in the different buildings. The e-Centre is the community data network hub providing direct access services to all the services available on the high-speed data network.

The local youth have been learning about computers and the Internet in their classrooms and through their own experimentation with the new technologies, and they are teaching the older generations how to use these tools.

> *"One of the biggest obstacles I have is computer skills because I never really worked with computers before – but I am very lucky in that capacity because my daughter and my friend's daughter who is eleven years old have been able to help me with it. When I am stuck, they come to the office and they show me how. They are more like my teachers on the computer... We are just getting trained on the stethoscope for the cardiac machine and... I am still not up to it because it is computerized too – I am not too comfortable with the computer. I am scared I may make a mistake and then what I send out there will be all mumble jumble."*
>
> – Julie Meekis, Telehealth Coordinator

Local health workers have new roles as intermediaries between sources of information, medical doctors, and community members' needs. They are key players in the telehealth system because of their strong community links, their understanding of the realities facing their people, and their communication skills. For the most part, the elders in the KO communities do not speak English, and they are often the most in need of medical care. They are also least willing to travel by air to receive medical treatments. Although they stand to benefit the most from telehealth, community elders are also least familiar with modern technologies, and do require support and opportunities to experience it in a safe and secure environment.

> *"With the elderly, I find that I really have to coach them to come in, but once they realize what goes on, they say like the other people that it is good that we do not need to go out of the community. A lot of those elders, I think the only time they go out is for surgery, but other than that, they get seen here by the nurses or by telehealth with the doctor in Sioux Lookout."*
>
> – Julie Meekis, Telehealth Coordinator

18.- TELEHEALTH OR TRAVEL

> *"We had a middle-aged female patient come in with a diabetic ulcer on her leg that wasn't healing. We used the telehealth to let the doctor have a look at the leg and actually see what was going on, and he was able to prescribe a course of treatment that was effective in healing it. It took a while, but it did work and prevented the client from having to travel out, wait, see a doctor, come back, and then start treatment."*
>
> – Bonnie Hodgson, Nurse

One of the main benefits of telehealth is the reduced travel burden on individuals and families. Rather than having to fly out on a milk run[25] for a diagnosis or follow-up care, the telehealth tools can link patient and doctor to assess the patient's condition and determine whether there is a real need for flying out. During the year between April 2001 and March 2002, over 60% of all patient flights out of KO communities to the Sioux Lookout Health Zone were for consultations and follow-up procedures. Although telehealth is not the solution for all medical needs, research by the Ontario Heart Institute, NORTH Network in 2002 determined that 15-20% of those patient consultations and follow-ups could be conducted by telehealth.[26]

Even with the important contribution of telehealth, however, medical transportation costs in the North are expected to continue rising due to several factors:[27]

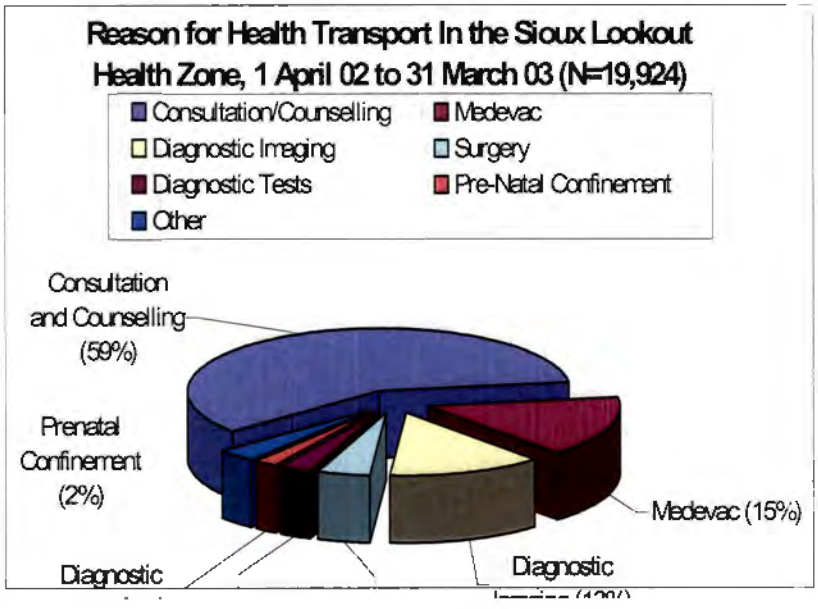
- growing population in the First Nations communities
- a lower overall health status in this population
- higher rates of hospitalization due to lack of access to primary health care services
- prevalence of chronic diseases and disorders (diabetes, fetal alcohol syndrome)
- increasing transportation costs
- increasing retention and recruitment costs for health care workers

In 2001, First Nations Inuit and Health Branch (FNIHB) reported patient and escort transportation costs of more than CAD$8.3 million for the Sioux Lookout Health Zone (SLHZ). In the 2001-2002 fiscal year, this cost increased by more than 30% to $12.2

[25] "Milk run" is a colloquial expression for a trip that involves many stops in many places, and refers back to the days of home milk delivery.
[26] "The KO Telehealth Vision", KO Telehealth Migration Workshop, Oct.23, 2002 Presentation.
[27] Source: Dr. Brown's presentation on the NORTH Evaluation.

million. NIHB costs stabilized in fiscal year 2002-2003 at $12.5 million. By the end of the third year of the regional telehealth initiative, it is estimated that telehealth will be used for up to 20% of all client sessions. Statistics from Health Canada First Nations and Inuit Health Branch indicate that annual transportation savings because of the increased use of telehealth will be at least $2.44 million.[28]

The chart below shows that the bulk of transports for medical appointments are to meet with specialists and general practitioners. The NORTH Evaluation report indicates that patient satisfaction for telehealth services was 94%. [29]



19.- TELEPSYCHIATRY

"We need to find ways to use telehealth more. We have a Mental Health Consultant who's hired to come in here to the community every month and it's costing us a lot of money to bring her in... There's a waiting list, and when she comes in, she sees about 45-50 clients in 5 days."

– Daisy Kabestra, Health Centre Director

[28] *The KO TeleHealth/North Network Partnership Expansion Plan Proposal.* May 23, 2003
[29] NORTH Network, 2000. *Evaluation of the Demonstration Project 1998-99: Northern Ontario Remote Telecommunications Health Network.*

The telehealth pilot project includes a telepsychiatry component for all the KO First Nations. The rationale for this program is the following:

> "The recent increase in the demand for mental health care among remote northern First Nations communities has overwhelmed existing services to the extent that long waiting periods must be endured before counseling can be provided. A telepsychiatry program was conceived as a means to overcome the economic and geographic barriers to accessing mental health care imposed upon rural and remote First Nations communities. Its purpose was to supplement existing mental health services and thereby reduce the long periods spent awaiting care. The pilot project was undertaken to test the viability of such a program. Video, telecommunication and digital information technologies were combined to create live-time audio-visual links between First Nations clientele within their home communities and a psychiatrist in Winnipeg, Manitoba. During 1.5 hour videoconferencing sessions, the psychiatrist provided assessment, treatment and consultation services."[30]

The telepsychiatry project has involved a lot of planning between the chief, council and staff in each of the KO First Nations, staff at Keewaytinook Okimakanak, the project coordinator, and psychiatrists. The following is a brief list of the activities that have occurred:

- community orientation
- community education and awareness
- determining effective structures, procedures and protocols
- screening clients for appropriateness of the telepsychiatric consult medium
- organizing and implementing the video consultations
- evaluation of acceptance by clients[31]

To appreciate the cost-effectiveness of such a program, it is important to understand how much psychiatric services cost, and who pays for them:

> While considerable savings would accrue through the implementation of a telepsychiatry program, there would also be significant transfers of economic burden within the overall system. Savings of $2,148 per client-session, in the form of travel and accommodation no longer required by the client and escort, would be realized by Health Canada.

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[30] *Evaluation of the Keewaytinook Okimakanak Telepsychiatry Pilot Project*, 2002. Centre for Health Services and Policy Research, Queen's University, Ontario. http://knet.ca/documents/KO-Telepsychiatry-Report-2002-12-21.pdf (pp. i-ii)

[31] http://health.knet.ca/telepsychiatry.html

> However, the client's home community could expect its share of the overall cost to increase, from about $170 to between $305 and $580 per client-session, depending upon whether service organizers determined whether the services of a Mental Health Consultant would continue to be required, or that much of this work could be undertaken by a community's Mental Health Worker. It is also possible that, in either case, a considerable portion of this direct cost might be offset by the re-allocation of already budgeted resources.[32]

The K-Net system is also being used in many informal ways to improve the mental and emotional health of KO communities. The ability to access information and discuss personal issues in confidence with a professional outside the community has widened individual support networks, and people are developing new coping skills. This society is dedicating enormous effort to healing the effects of abuse in residential schools.[33] In the past, elders recount that the traditional society dealt with problems "openly" through communal problem-solving. Today, many people prefer a combination of tools; sometimes the traditional healing circle is complemented with individual counseling with an outsider using chat groups or email, and sometimes online supports are used, such as the Turning Point site (http://www.turning-point.ca).

> *"A youth was going through a crisis in her own life and she wasn't sure how to handle it, so she met this other person who lived in Poplar Hill... on K-Net chat, they were able to have their own conversation, and that person was able to encourage her to keep on living and always do the best she can."*
>
> – Darlene Rae, e-Centre Manager

20.- BENEFITS TO HEALTH PROFESSIONALS

K-Net's specialized telehealth facilities assist health professionals in providing more responsive and specialized health services. Another benefit, however, comes from their access to broadband services in general, which allows them to link with other medical practitioners and specialists, as well as friends and family. Reduced isolation for the KO communities has proved to be a factor in both recruiting and retaining staff. The ability

[32] Adapted from: Evaluation of the Keewaytinook Okimakanak Telepsychiatry Pilot Project, 2002. Centre for Health Services and Policy Research, Queen's University, Ontario. http://knet.ca/documents/KO-Telepsychiatry-Report-2002-12-21.pdf (p.iii)

[33] For background on the residential schools and their impact on First Nations, please refer to http://www.turning-point.ca/index.php/article/frontpage/1

to communicate freely through email and videoconferencing has allowed health care workers to build a support network, which helps them both professionally and personally.

Better and faster access to information has also been important for health care professionals affected by K-Net. Mental health practitioners have discovered that they can search the Internet for advice, insights and information that they can apply quickly and efficiently to assist them in their work. Primary health workers have found much needed information on nutrition, diabetes prevention and prenatal care, as well as a myriad of other topic areas to support the effective delivery of their programs.

These online tools are offering more opportunities for health professionals to stay in touch, share information and advice, and improve their knowledge. A new *virtual* medical school for the whole of Northern Ontario, the Northern Ontario Medical School (NOMS) is a joint venture of Laurentian University in Sudbury and Lakehead University in Thunder Bay (see http://www.normed.ca). NOMS will have multiple teaching and research sites distributed across northern Ontario, including large and small communities. The KO communities are well-positioned to benefit from any programs or improved health outcomes initiated by NOMS thanks to K-Net's technical and organizational infrastructure.

21.- INFORMATION AND COMMUNICATION FOR COMMUNITY HEALTH

Family ties in the North are strong, as in most traditional societies. In the recent past, family members who traveled away from their community for medical treatment or long-term care would have been limited to radio communication and, in some cases, phone calls to stay in touch with family members. Now, even when people cannot travel due to old age or high costs, they can stay in contact over great distances using K-Net tools like videoconferencing, email and chat. Families in times of stress can connect with loved ones. Among the most popular K-Net sites is http://hosting.knet.ca/~mothers/fortsevernpage.htm where photos are uploaded of new mothers and their babies.

"The computer to me is vital – there is all kinds of information, teaching and learning programs...If you want to know anything about stress, it will be on the Internet...A couple of days ago, I had a youth come into the office. We used the computer to look up treatment homes... like what programs the treatment home had to offer. Anything you want to know, you can get from the Internet...from anger management, depression, stress, different kinds of phobias, your research is on the computer."

– Lawrence Mason, Mental Health Coordinator

By improving access to health information, K-Net is having significant impacts on these remote First Nations communities. Community members are actively harnessing the information tools available to them, conducting research, educating themselves and sharing this knowledge with others. The long-term impacts of this influence will take time to measure, but from personal accounts, much is being learned.

22.- MIGRATION OF TELEHEALTH SERVICES TO OTHER FIRST NATIONS COMMUNITIES

The telehealth initiative is set to expand to more First Nations communities in northern Ontario, and the growing coverage of the services will make it increasingly attractive to Health Canada to invest in the system as a means of providing improved medical programs and services to the North. The Keewaytinook Okimakanak Health team, working with K-Net and other partners across the region, is now pursuing the following activities:

- Expand the telehealth sites to include all the First Nations in support and development of the Sioux Lookout Health Zone (a comprehensive business plan has been submitted to Health Canada for funding and is now being considered under the Primary Care Health Transition Fund - the aboriginal envelope)
- Work with the provincial government Integrated Network Project (INP) to ensure Smart Systems for Health (SSH) is able to purchase connectivity services from K-Net
- Development of the Centre of Innovation for First Nations IT Services and Research in Red Lake to ensure ongoing research and development resources for the operation of these broadband services and projects including telehealth.[34]

[34] K-Net. 2003. *The Kuh-ke-nah Network of Smart First Nations Demonstration Project Annual Report* (p.13)

Clearly, the K-Net services that provide telehealth and telepsychiatry are giving people in KO communities new choices. The people are learning about what is possible and how to apply these tools to benefit their lives. Having been faced for so long with a lack of access to health programs and services, it may be a challenge to integrate so many new technologies so quickly, but the K-Net communities are adapting well.

K-Net Case Study on Education

23.- INTRODUCTION

The remote location and small populations of the Keewaytinook Okimakanak (KO) communities are a challenge to the provision of basic education services. The need to improve local access to such services has helped drive the development of K-Net's broadband technologies and appropriate educational applications, such as the Keewaytinook Internet High School, online Grade 8 supplementary courses, online tutorials, an Online Training Centre, and other services for these small, fly-in communities of northern Ontario.

Until recently, in order to continue their education after Grade 8, KO children were forced to leave their families and communities to attend secondary schools hundreds of kilometres away. For many young people, this involved major culture shock and a loss of social support, and often resulted in students quitting school. Many First Nations parents and grandparents are still reluctant to send their children to high school in other communities because of the devastating experiences they faced in Indian Residential Schools. According to former Grand Chief of the Assembly of First Nations, Matthew Coon Come, this state-sponsored system amounted to genocide: "Basically, the goal was to take the Indian out of the Indian," he says.[35]

> *"Kids were leaving the community at a very young age. I went out when I was 12 years old. It was very difficult. A lot of our kids were dropping out because of cultural shock, homesickness. We wanted to keep them longer in the communities so they could mature before they go out. We've always been a part of the land. It was the biggest thing I missed when I went out to school."*
>
> – George Kekaspam, Community Programs Coordinator

[35] Indian Residential Schools Survivors Society: History http://www.prsp.bc.ca/history.html

24.- KEEWAYTINOOK INTERNET HIGH SCHOOL (KIHS)

In 2000, KO began an experiment to pave the way for what has become a model of innovation in distance-education. Driven by community need, individual commitment, and persistence in overcoming technological and financial challenges, the Keewaytinook Internet High School (KiHS) pilot project was launched. This pilot project linked 36 Grade 8 students in Deer Lake, Fort Severn, Keewaywin, North Spirit Lake and Poplar Hill. Students were based in a local classroom setting in each of the communities with their own teacher-mentor. The students also interacted online with each other and with a Native Studies instructor who was based 2,000 kilometres away in Kingston, Ontario.

The KiHS project faced numerous challenges. At the beginning, bandwidth and Internet connection speeds were slow. Some of the communities did not even have telephones when the pilot started. As well, teachers had no previous experience in this method of mentoring students in a local classroom while also acting as a subject specialist/instructor to students in the other distant communities. A curriculum for high school distance-education appropriate for remote First Nations learners still had to be developed. And because computers and the Internet were fairly new technologies being introduced as key learning tools, both the students and teachers had a lot to learn.

The KiHS pilot project proved that the model could work, and that there is a viable alternative to the disruptive, painful and often futile option of flying students away to residential schools. With financial assistance from the Federal Economic Development Initiative for Northern Ontario (FedNor) and Industry Canada's Smart Communities Demonstration Project in 2001, and with the increasing participation of other First Nations communities, KiHS has evolved and developed the necessary technical infrastructure, curriculum, and institutional support for a successful distance-education facility.

> *"The KiHS service that KO sponsors is probably one of the best things that's happened to this community. It's helping those students who are unable to stay in school down south, and they have a choice to stay a little longer in the communities with their parents."*
>
> – Matthew Kekaspam, Band Office Manager

By the fall of 2003, KiHS included classrooms in thirteen northern communities, with a full selection of twenty Grade 9 and 10 courses. Students attend school for six hours per day, working on one course in the morning and another in the afternoon. Their lessons are available online and accessible anytime after school.

Much of the driving force behind the ongoing development of KiHS has been a strong community commitment to keeping young people at home while starting high school. There is a strong consensus among the KO residents that young people need to remain with their families and in their communities as long as possible to help them mature and establish life skills. Youth are often unprepared socially and psychologically to succeed at high school in an unfamiliar setting far from their family and friends. In addition, ties to their unique culture, language and the land itself can be strengthened by keeping young people closer to the community for a longer time.

> *"We had a young man who decided to stay in the community when KiHS first started. He stayed in the community because he hunts almost every day. It gives him the opportunity to stay behind... in the community an extra two years. He was able to go school, and also go out on the land after school, which is a good thing."*
>
> – Madeleine Stoney, e-Centre Manager

The project funders, too, recognized the negative impacts of flying such young people out to residential schools, and supported the commitment of project organizers and community members to build a local solution through KiHS.

> *"You wanted to have an Internet high school to keep the kids in the communities rather than having them fly out. From here, the closest high school is about 700km away. So some kid 14 years old would have to fly that far and board in school. It just doesn't work very well."*
>
> – Carl Seibel, FedNor

Philosophy of KiHS

Our youth need the opportunity to continue strengthening their family and community bonds as well as their linguistic and cultural knowledge, while completing their secondary school education at home. Secondary school course delivery via telecommunications will capitalize on the technological capabilities of the participating First Nations to ensure that our youth fully utilize their potential, and that of the technology available to us in the twenty-first century.

Source: http://kihs.knet.ca

KO students working online from their local classroom

When KO youth finally do leave their communities to finish high school or pursue post-secondary education, the communication tools facilitated by the K-Net network provide an opportunity for students to stay in close contact with their family and friends back home using email, chat or videoconferencing. These tools enrich the lives of both the students and their parents who can continue to offer support and guidance when their children are away for long periods of time.

> *"We had a couple of parents that were at the clinic, and we made arrangements for them to see their children that were studying at Pelican Falls, and they visited, I'm not even sure how long – for over an hour. It was something that they enjoyed. They were able to see their own child, using the video equipment that we had set up in our community."*
>
> – Darlene Rae, e-Centre Manager

25.- GROWTH AND EXPANSION

The success of KiHS has drawn the keen attention of other First Nations communities facing the same challenges of educating their youth beyond Grade 8. From the start, the K-Net organizers were committed to extending the "Smart" experience to other First Nations communities. At the beginning of 2002, KiHS made a formal invitation to other communities to establish their own KiHS classroom, offering fully accredited Grade 9 and 10 courses. To participate, a community must provide a building or space that can serve as a KiHS classroom. They must also have a teacher-mentor with local accommodations and support resources to instruct one subject area over the Internet and serve as a mentor to the students in the community classroom.

Keewaytinook Okimakanak has started Keewaytinook Internet High School because the Chiefs know that KiHS is *needed* and *"do-able"*.

The chiefs also know that the best community high school program will allow students to be in touch with their peers from *many* northern communities, and will include expert teachers in *many* subject areas.

The chiefs of Keewaytinook Okimakanak are saying,
"Let's share a good thing."

Join us in creating a positive and meaningful high school experience for our leaders of tomorrow.
Become a partner community in KiHS.

KiHS Brochure:
http://kihs.knet.ca/brochure.html

Support has been provided by Industry Canada's FedNor program to upgrade a school's Internet connection, and from K-Net Services to assess the technical needs and help complete the application. Indian and Northern Affairs is a partner, too, providing funding to KiHS to deliver the program, and to communities for classroom operation and maintenance. In December 2002, the minister of Indian and Northern Affairs announced a five-year pilot project status for KiHS (please see http://knews.knet.ca/modules.php?op=modload&name=News&file=article&sid=411).

> *"Now after four years, their grammar has improved dramatically for the English language and they can keyboard without even looking at the keyboard. They're really fast and it's one of the things they've picked up. They can do a lot more stuff than I can, and they're only ten to fourteen years old."*
>
> – George Kekaspam, Community Programs Coordinator

26.- FIRST NATIONS SCHOOLNET

Since the late 1990s, Industry Canada has been supporting and promoting the use of ICTs in Canadian elementary and secondary schools through a program called SchoolNet. The First Nations component of the program, First Nations SchoolNet (http://www.schoolnet.ca/aboriginal) has the additional mandate of providing Internet connectivity and computer hardware assistance to participating schools. KO has been the northern Ontario SchoolNet help-desk since 1996, and this expanded to cover all of Ontario in January of 2002.

In October 2002, K-Net won the bid for providing technical assistance and help-desk services to First Nations schools as one of the Regional Management Organizations (RMO) for an expanded SchoolNet program. The selection of K-Net was based on its previous SchoolNet experiences, its success in building, sustaining and expanding the KiHS, and its commitment to increasing educational opportunities for First Nations and remote communities. In February 2003, the First Nations SchoolNet program provided special one-time funds for K-Net to develop a national IP (Internet Protocol) videoconferencing network connecting the six First Nations RMOs sites across Canada.

As the Ontario RMO, K-Net provides assistance to schools to help them overcome their connectivity and hardware challenges, in addition to help-desk services for troubleshooting local area network and connectivity problems. The first steps to providing these services are completion of a survey of school needs, and signing a Memorandum Agreement between the school and K-Net. Three other special projects included in this SchoolNet work include:

- supporting the development of the First Nation schools portal service at http://firstnationschools.ca;
- the videoconferencing pilot project which will add at least 15 more FN schools across Ontario to the Kuh-ke-nah network; and
- an online content development initiative with six First Nation organizations across Ontario.

One example of the content development initiative under the First Nations SchoolNet RMO program is the "G8 Program" (http://www.g8.firstnationschools.ca). The main goal of this initiative is to provide supplementary courses to Grade 8 students in First Nations communities. Schools that choose to participate in G8 gain access to complete supplementary courses, including all lessons, tests and course materials, provided online in Science, Math and English. Similar to the KiHS schools, the G8 schools must be able to provide each student with access to a computer with a high-speed Internet connection, which K-Net can assist with as well, both in terms of technical assistance and advice on securing funding. Students must be able to spend one hour per day

completing assignments on their computers. Teachers must be in place to oversee students. Early feedback has shown that students in isolated communities value the ability to reach out and learn with people outside through their Internet-supported courses.[36] Teachers appreciate the access to online course materials that enrich their curriculum.

All First Nations schools can receive a free email account through K-Net and create their own homepage on the Internet using open-source web-building tools.

> *"When the Smart project started, we equipped each classroom with a computer. They had two computers in each classroom as well as a printer. We established a computer lab at the school, so all the kids right from K4 were able to use the computer. I think they picked up their computer skills quite easily... I would say most of the students at the school now have web pages, where they're also picking up web design skills - they're able to use those frequently."*
>
> – Madeleine Stoney, e-Centre Manager

27.- EDUCATION FOR THE ENTIRE COMMUNITY

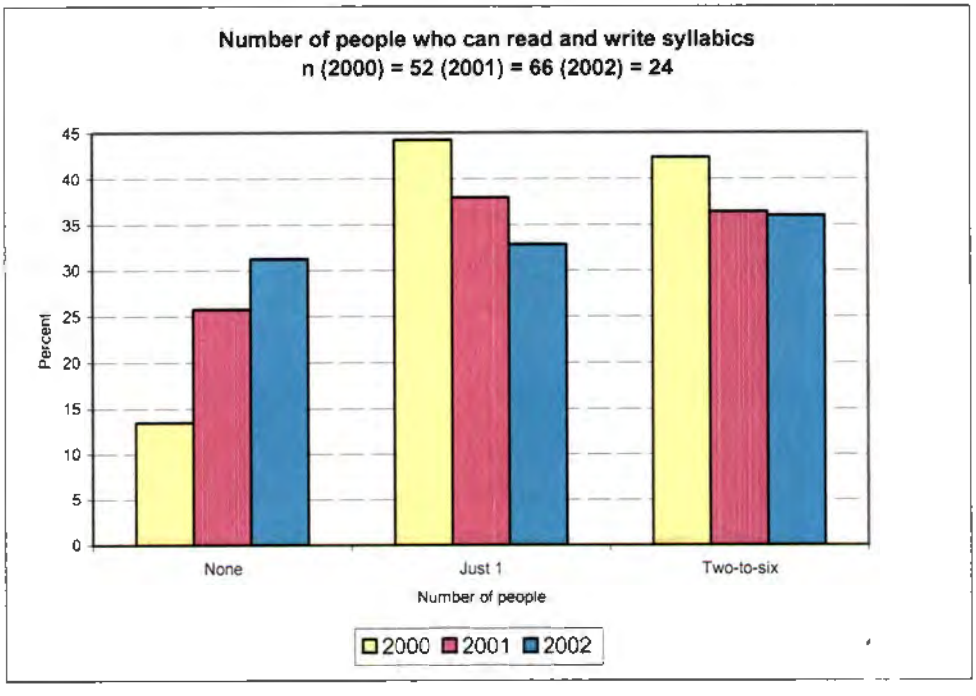
While young students have benefited from programs formulated to help them learn, access resources, and communicate with other learners and instructors outside their communities, it is not just the youth who have discovered the educational potential of the Internet through K-Net. People of all ages in the KO communities have become adept at using the Internet for informal and formal education to enhance their personal and professional lives. Formal training sessions have been developed and delivered using the KO e-learning platform to create an online training centre at http://training.knet.ca. Computer and network technical skills development training sessions have been delivered for several years with funding support from the Sioux Lookout Area Aboriginal Management Board.

> *"You can do research on a computer. If you want to know anything about stress, you just press stress.com. It'll give you information, links for where else to go for information on stress... Anything you want to know, you can get it from the Internet."*
>
> – Lawrence Mason, Mental Health Coordinator

[36] Full pilot project evaluation report is available online at http://knews.knet.ca/modules.php?op=modload&name=News&file=article&sid=594

Mental health practitioners have discovered that they can search the Internet for advice, insights and information that they can apply quickly and efficiently to assist them in their work. Primary health workers have found much needed information on nutrition, diabetes prevention and prenatal care, as well as a myriad of other topic areas to support the effective delivery of their programs. Individuals have researched new hunting and trapping equipment, eco-tourism opportunities, and ways to sell their art or handicrafts. Research is a function of the Internet that has quickly become valued as a benefit of connectivity, and those with an enquiring mind have adopted the technology with a passion.

Preservation and renewal of the indigenous language, Oji-Cree, is important to people in the KO communities. Most can speak and understand the language, though reading and writing the language is not as common. K-Net has developed online multi-media tools to help build a repository of Oji-Cree vocabulary and script, known as "syllabics," along with audio files of the spoken language. On-going project monitoring has tracked community knowledge of literacy in Oji-Cree and noted an increased competency in Fort Severn.



"I think that having syllabics online, and teaching others that don't know how to speak their language, or write their language...I speak it, but I don't know how to write it or read it. So it would be a benefit for me if I could just take something online to teach myself how to write this stuff."

-- Madeleine Stoney, e-Centre Manager

28.- NEW TOOLS, NEW SKILLS

Local capacity-building in computer and Internet skills presented a challenge for people in the K-Net communities at the outset, though both formal and non-formal training have provided solutions. E-Centre managers received formal training in computer use, networking, installation and maintenance, as well as general program management. Multi-media producers learned web-building, digital photography, and communication techniques. Technicians were trained to ensure that the telehealth, education and cable-to-home services run efficiently. In 2003, the e-Centre staff and other community members received training in video production to enable them to capture stories of the impact of the Smart Community initiatives and other activities in their communities.

Health practitioners required technical training to enable them to operate the sophisticated remote diagnostic and videoconferencing equipment which are essential tools for the telehealth and telepsychiatry program. Teachers and students have gained familiarity with computers and the Internet, both for KiHS and at the elementary level.

For the most part, young people have acquired computer skills effortlessly, and in many cases, they have been mentors to older people.

"One of the biggest obstacles I have is computer skills because I never really worked on computers before. But I'm very lucky in that capacity because my daughter and my friend's daughter have been able to help me with it. They're more like my teachers on the computer. At work, I'm being trained on the stethoscope for the heart – I'm still not up to it. It's computerized, too; you have to work with a computer. I'm not very comfortable with a computer. I'm scared I might make a mistake and whatever I'm going to send over there is going to be all mumble jumble".

– Julie Meekis, Telehealth Coordinator

K-Net has been committed to facilitating the rapid adoption of Internet technology. To this end, they have conducted workshops, and provided one-on-one mentoring and

online training tools to the communities. Through the K-Net website, users can learn Internet basics, as well as computer design and website production. Simple-to-use online tools allow users to create personal websites, which has enabled over 8,000 K-Net subscribers to build their own websites on "MyKnet.org". This has become one of the most popular functions of the Internet throughout KO and other First Nations communities.

> *"Everything falls into the computer. My job involves computers – everything I do. We have Internet access, we have homepages; we have a new homepage that we are making right now. Basically we're just teaching ourselves and training ourselves to understand these new tools that are being brought to us."*
>
> – David McKay, Multi-media Coordinator

29.- DIRECTING THE FUTURE

> *"We have a new medical school [Northern Ontario Medical School (NOMS)[37]] that's going to be a **virtual** medical school, and the emphasis is going to be on rural medicine, training doctors to practice in these rural sectors. That's because the infrastructure exists. This type of medical school has never been built and developed. It tears down a lot of these walls and makes it possible for institutions to reach out and be part of the community, instead of always having people leaving to participate in an institutional environment."*
>
> – Brian Beaton, K-Net Services Coordinator

K-Net's technologies allow people in KO communities to participate in government programs, university courses, and new initiatives like NOMS in a more equitable and timely manner. By improving access to ICTs, K-Net is having significant impacts on the education of remote First Nations communities. Community members are actively harnessing the information and communication tools available to them, feeling empowered to both influence and be influenced by what they are learning on the Internet, in chat rooms, and at their local e-Centre. They are educating themselves while also sharing their own cultural heritage and traditions with a global community.

[37] A new medical school for the whole of Northern Ontario, the Northern Ontario Medical School (NOMS) is a joint venture of Laurentian University, Sudbury and Lakehead University, Thunder Bay. With main campuses in Thunder Bay and Sudbury, NOMS will have multiple teaching and research sites distributed across Northern Ontario, including large and small communities. NOMS will contribute to improving health outcomes in Northern Ontario - http://www.normed.ca

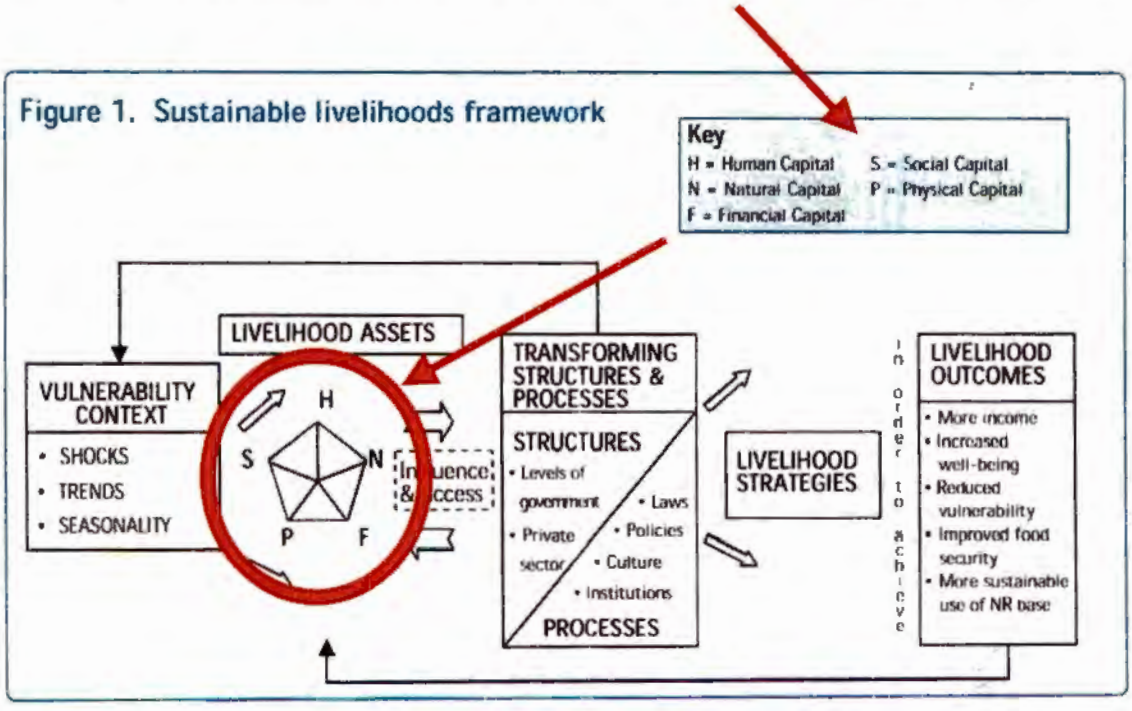
Young people are staying in their communities longer but being given the same communication skills and information as urban students. K-Net offers a tool to help people direct their own development, and in this case, the people themselves are deciding where and how to apply this technology for everyone's benefit.

K-Net Case Study on Economic Development

30.- INTRODUCTION

While there is no doubt that infrastructure upgrades bring positive change in the form of new opportunities for remote communities, it is not so easy to show how such upgrades drive economic development. Economic development is a catchy phrase that often means different things to different people, and for very remote communities with low population density, it has its own implications. Perhaps it is best to begin by framing economic development in the context of Keewaytinook Okimakanak (KO) communities.

The information and communication infrastructure and services facilitated by K-Net are contributing to the development of these five "livelihood assets" in KO communities:



This K-Net case study is presented within a Sustainable Livelihoods (SL) framework (Figure 1)[38]. The SL framework is used in many countries to capture the various

[38] For more details on the SL framework, please consult http://www.livelihoods.org

interrelated issues that affect people's livelihoods. Clearly economic development means more than just financial growth. Within the SL framework, economic development includes an analysis of financial changes within the study area, but also considers the human, social, physical and natural dimensions of economic development, as well as the relationship between all five components.

Human capital refers to the people within a community, their skills, personal well-being, self-esteem, and ability to take initiative to enhance their own and their community's lives. **Social capital** refers to people connecting to people, recognizing the importance of networking and exchange, of creating and strengthening links of trust. **Physical capital** looks at the technical aspects of economic development – which, in the case of the KO communities, focuses on the installation and application of state-of-the-art information and communication technologies (ICTs).

Natural capital is an important, though often overlooked, aspect of economic development. Natural resources, the land and environment, and their relationship to culture, language and heritage are aspects of the natural capital of communities. **Financial capital** is more commonly understood in terms of economic development. Jobs, income generation, financial growth and cost savings can be measured over the long term. Under the sustainable livelihoods framework, however, the dynamism and relationships between all five components are studied, resulting in an understanding of the contribution of each to the economic health of the community.

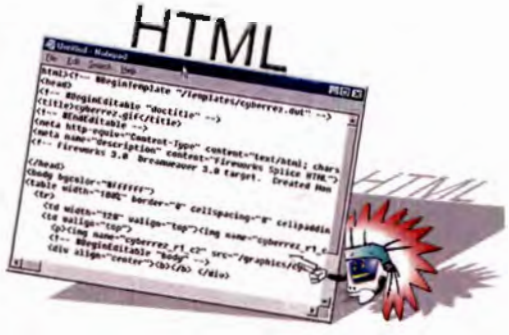
In the particular case of the K-Net communities, it is obvious that the technical services and infrastructure of the network are indeed affecting the sustainable livelihoods of the people. There is evidence showing that individuals are becoming more empowered and thinking in new ways, taking on new roles, accessing information to improve livelihoods, and exploring ways to make the investment economically sustainable after the Kuh-ke-nah Smart Demonstration Project. These accomplishments alone are impressive for communities as remote as the KO ones.

31.- HUMAN CAPITAL

People in KO communities are **now connected** with one another and with the outside world. This connection is two-way: they can receive information, but more importantly, they

can send messages and post content that is important to them using email, chat and personal websites. These communication tools reduce the sense of isolation that remote residents experience, and that youth are especially concerned about. These communities are only accessible by airplane, yet people are now connected by television and Internet to the rest of the world. The emphasis that K-Net has placed on uploading content significant to the KO communities is an important component.[39] Being able to contribute local and culturally relevant content begins to balance the overwhelming volume of information and messages from the Internet and especially from television.

Being able to **contribute to the World Wide Web** with content that is locally relevant is a conduit for building self-esteem, especially among the youth.



www.MyKnet.org has more than 8,000 sites built by (mostly) young people in the Nishnawbe-Aski Nation region of northern Ontario. In most local e-Centres, half of the computers are on MyKnet.org. In other words, young people are creating and participating in uploading their own content rather than accessing the world of other web resources. **Somewhere in this process are the seeds for recreating culture among the new generation.**

Email communication is the key to the success of the technology. People's familiarity with this tool began in 1994 when K-Net established its first electronic bulletin board. In some communities, people learned to do **instant messaging before they had a phone**. This experience made them ready adopters of email, having experienced its power. According to Dan Pellerin, Network Manager, the K-Net email server has more than 12,000 active email accounts from a population of 20,000 in northwestern Ontario, of which 10,000 are directly in the north. This is a **50% email penetration rate**, one that Microsoft, AOL and Sympatico would be envious of. To put this into context, the national Canadian average for the year 2000 was approximately 40% Internet

[39] People in KO communities have been watching television for some time – a medium that is notorious for shaping attitudes on the basis of global commercial interests.

penetration (Statistics Canada emphasizes that there are large differences among income groups[40]); while the average for rural areas was 30%.[41]

People have acquired the **technical skills** and are now able to solve many of their own problems with the network and the computers. The network managers in Sioux Lookout receive fewer calls about problems because **technical problems are mostly handled at the community level.** Maintaining the network is possible thanks to trained community technicians. Pellerin explains: "When they do call, they have already checked their router to see if their end is functional...when they call, we know that the problem is with the circuit itself." The e-Centre staff are multi-skilled; on any one day, they may help people with content, software, hardware or network maintenance.

The e-Centre managers are now concerned with sustaining the infrastructure and services. They are preparing proposals to attract funding agencies and partners to keep the network operational. This is a sign of **empowered professionals** in communities where a few years ago, these sets of skills and confidence could not be found.

Local people know how to log-on to the videoconferencing unit, they get in touch with family, they have a sense of accomplishment, and they are using the technology to communicate and share. The **sense of satisfaction** that comes from these activities is a good sign of human capital in the making.

> *"This technology is leaping ahead really fast for us, and everybody's just starting to grasp this technology. The more they grasp, the more they want."*
>
> – David McKay, Multi-media Coordinator

32.- SOCIAL CAPITAL

Social capital refers to people connecting to people. It recognizes the importance of networking and exchange, of creating and strengthening links of trust.

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[40] Sciada, G. 2002. *The Digital Divide in Canada*. Statistics Canada. http://www.statcan.ca/english/research/56F0009XIE/56F0009XIE.pdf

[41] Sciadas, G. 2002. *Unveiling the Digital Divide*. Statistics Canada. http://www.statcan.ca/english/research/56F0004MIE/56F0004MIE2002007.pdf (p. 7)

Family ties in the North are strong, as in most traditional societies. In the recent past, family members who traveled away from their community for school or medical treatment would have been limited to radio communication and, in some cases, phone calls to stay in touch with family members. Now, even when people cannot travel due to old age or high costs, they can stay in contact over great distances using the K-Net tools. Families in times of stress can connect with loved ones. This **coming together through the technology** is especially important when so many families have children studying in schools far away from the community. Among the most popular K-Net sites is http://hosting.knet.ca/~mothers/fortsevernpage.htm where photos are uploaded of new mothers and their babies.

People in the KO communities are talking to each other, be it by email, chat, through their websites or by videoconference. The text box below appeared as a news item on the K-Net website; **the numbers speak for themselves**.

K-Net servers receive more than 20 million hits in October
Posted by: Brian Beaton, brian.beaton@knet.ca on Sat. November 01, 2003

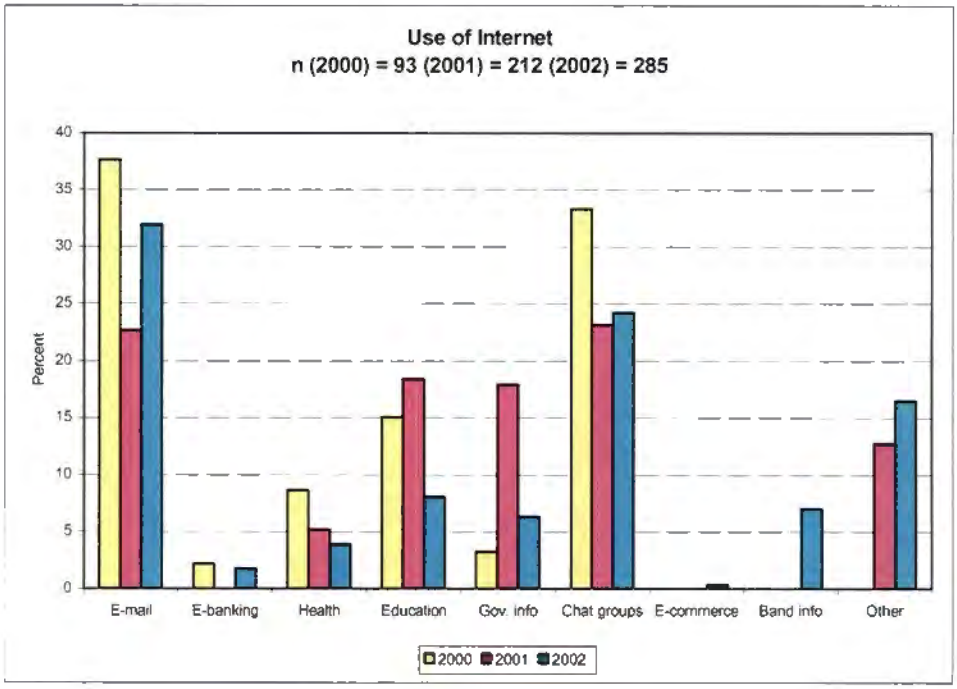
Personal web pages at MyKnet.org continue to be the most popular on-line space for the Nishnawbe Aski to browse. In October there were over 13 millions hits on this K-Net server (an additional 2 million hits from the previous month)!

All together there were over 20 MILLION hits occurring on the six most popular monitored K-Net servers throughout September. Specifically, on these six servers with traffic graphs, there were a total of 20,619,828 hits made to these on-line services provided by Keewaytinook Okimakanak. The six servers include myknet.org, knet.ca, webmail.knet.ca, hosting.knet.ca, highschool.knet.ca and photos.knet.ca.

Most of the K-Net servers that are being monitored for hits, visits and usage statistics using the webalizer program again showed an increase during the month. But http://myknet.org rose by another 2 million hits to demonstrate the rapid take up of these communication tools among users across the north.

Since 2000, K-Net has been tracking **what the Internet is used for and by whom** (age group and gender) to have an idea of how people's use of the technology evolves in

each community. The graph below shows the data from Keewaywin over the past three years.[42]



While this data is far from conclusive, it does suggest some **general trends**. For example, in this case, the use of Internet for chat groups decreased from 33.3% in 2000 to 24.2% in 2002 while the number of users (n) increased significantly. At the same time, email remained the main application and is used by close to one-third of all the respondents. Does this mean that people are migrating to other applications? It is too soon to tell, and the data from other KO communities does not always show the same trend.

Using broadband 2 weeks after getting phones for the first time

The phones were finally installed in Keewaywin in December of 2000. Two weeks later, in January of 2001, K-Net installed a videoconferencing unit and got it to work. People were using broadband two weeks after getting their first phones. People kept coming to see this...it was a very special day.

Beyond numbers of hits and uses of the Internet, however, lies a more profound question: how is the technology changing social capital? More specifically, **how is this technology changing the traditional ways of First Nations in Canada?** K-Net

[42] TeleCommons Development Group, 2003. *Community of Keewaywin: Preliminary Results for the*

managers are keenly aware that the technology is changing the ways of the North. It is important to add that this was, from the start, an effort mandated by the First Nations Chiefs who supported educators who saw an enormous opportunity to broaden the horizon for their children. In other words, the initiative came from within.

A researcher at MIT recently quoted a 13-year-old boy who said to her that when you are with a computer, "...you take a little piece of your mind and put it into the computer's mind...and you start to see yourself differently." (p.27)[43] Children's skills in the KO communities have improved: keyboarding and English grammar have improved; and we are only beginning to appreciate how the computer is changing the way First Nations youth see themselves.

The way people deal with personal problems is changing. For a society that is dedicating **enormous effort to healing** the effects of abuse in residential schools, being able to talk to someone that one trusts is extremely important.[44] Some individuals find useful support through professional counseling, while others have found support from people they meet in chat groups and email. The Turning Point website (http://www.turning-point.ca) "offers cyber-space for Aboriginal and non-Aboriginal people in Canada to have open and direct communication with each other." The technology makes it easier for people to contact outsiders.

This website, and the experience of counseling across the North, indicates a significant change in the make-up of communities. In the past, elders recount that the traditional society dealt with problems "openly" through communal problem-solving. Today, many people in their middle age

Household Survey Period 2000 – 2002.

[43] Coutu, 2003. "Technology and Human Vulnerability: A Conversation with MIT's Sherry Turke." *Harvard Business Review 81 (9)*: 43-40.

[44] For background on the residential schools and their impact on First Nations, please refer to http://www.turning-point.ca/index.php/article/frontpage/1

prefer a combination of tools; sometimes the traditional healing circle is complemented with individual counseling with an outsider, while other times a virtual tool like Turning Point may be used. As some leaders have noted, there is no going back to the old ways; **the challenge is finding a balance** between the values that are central to a culture and the new tools that are being introduced.

33.- PHYSICAL CAPITAL

The Keewaywin website (http://www.keewaywin.firstnation.ca) has a message at the very top: **A place to come home to**.

The technological infrastructure transformation that Keewaywin has undergone in the last few years makes it a much more attractive place to come home to. This also applies to the other KO communities: youth will tell you that when they left, the place was boring – nothing happened there – but now they can come back to a community that is connected to the world via the Internet with services that are starting to improve the standard of living.

(Photo: planning meeting in North Spirit Lake)

What K-Net has accomplished in less than a decade in terms of network and technical infrastructure development is incredible: communities have gone from one phone for 400 people four years ago to accessing broadband services from individual homes. There are few rural communities in Canada – and particularly few remote ones – that have experienced such a dramatic transformation in such a short time. The physical infrastructure that we see today in the form of networks, computers, buildings and satellite dishes is a telling story about physical capital. What is less evident is the human capital that made it happen.

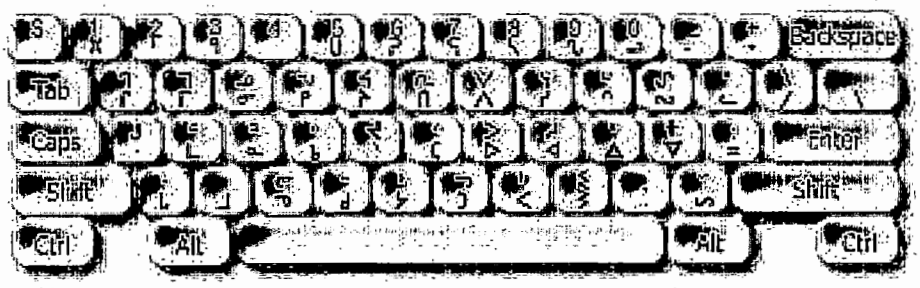
34.- NATURAL CAPITAL

"We've always been a part of the land... Whenever you go, you want to come home. It is who we are, I guess."
– George Kekaspam, Community Programs Coordinator

The sustainable livelihoods framework makes reference to natural capital, and in the North, this type of asset is closely linked to culture. The Ojibway, Oji-Cree, and Cree people are very close to the land, and their relationship to natural capital is cultural.

The traditional culture is embedded in that relationship to the natural world. The K-Net website celebrates culture in many ways, for example by sharing traditional legends (http://legends.knet.on.ca) passed on orally by the elders which can be heard in English or in Oji-Cree.

Visitors to the K-Net website can learn more about the traditional language by downloading the fonts to write in syllabics, with three different layouts to choose from. An Oji-Cree Translation Dictionary, which is under development, is also accessible online. A prototype can be accessed at http://www.knet.ca/webdata.



The local culture and its relationship to the land provide a unique opportunity for KO communities to explore eco-tourism. There is significant economic development potential as the global tourism market seeks new and remote destinations for travelers.

The new tools are opening up natural capital opportunities for the North:

- Resource management tools have the potential to enhance local development and employment opportunities;
- Geographic Information Systems (GIS) are being used for collecting and plotting traditional knowledge and archiving historical and local developments. One model that is being expanded upon can be seen at http://firstnationschools.ca/index.php?module=RMO&meid=19
- Traditional water routes are now being mapped and archived in partnership with Voyageurs North so communities can further develop their eco-tourism opportunities.

35.- FINANCIAL CAPITAL

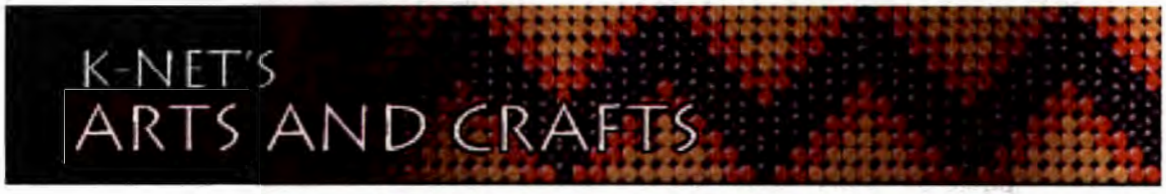
The KO communities have invested cash from their own resources into this effort. For the Smart Demonstration Project that began in 2000, each of the communities committed to contribute up to CAD$1million. These are significant amounts of money, especially for small, remote communities facing massive social and economic challenges, including unemployment rates of over 80%.

One immediate impact has been job creation: the e-Centres have created jobs. The same is true for the telehealth program and the Keewaytinook Internet High School, KiHS. The technicians that have been trained are from the community – there is a real effort to **create job opportunities** in the community and avoid dependency on outside experts. For

example, at the time of writing this case study, the website for Deer Lake First Nation announced three job opportunities:

- Medical transportation driver
- Homemakers (three)
- Half-time NNADAP workers

The infrastructure is also providing some income-generating opportunities by making traditional arts and crafts known to a world market (see http://arts.knet.ca).



In other areas, the benefits have been felt in reduced costs of services over a short period of time. **The cost of broadband has dropped 8 times**, from an initial monthly cost of CAD$14,000 (USD$11,000) for a T1 line (1.5Mb) to less than CAD$2,000 today (USD$1,500), and it can still be reduced. While these are not Toronto rates, they are approximating them. In future, as roads are built, fibre-optic technology will lead to further price reductions.

Economic impact goes beyond the jobs created directly by the Smart services in the form of **spin-off effects**. The Poplar Hill e-Centre has a hotel associated with it as well as an office. The Internet High School has led to additional accommodation for teachers. There are opportunities to circulate dollars within the community as teachers and visitors bring dollars to pay for services and goods provided by the community. Some of the infrastructure is being subsidized by fees for service, especially the cable system for televisions and modems.

Cable TV: Generating income

It wasn't that long ago, that the community of Deer Lake, Ontario was without cable tv. In the late 90s a man named Ennis A. Meekis had a lot to do with cable tv building being established and the signal being transmitted to the homes in Deer Lake. The Ennis A. Meekis Memorial T.V. Station was named in his memory.

Today the community members have access to their own community channel (21) and make good use of it by holding live TV auctions, tv bingos twice a week, and gospel nights on Wednesdays and Sundays of each week. The cable station is managed by the Cable Manager and TV Committee.

The TV Committee is in charge of running the TV station which includes the collection of cable payments, posting of daily announcements, and organizing TV Auction sales on a monthly basis, and also cable hook-ups and disconnections.

(http://www.deerlake.firstnation.ca)

The K-Net partners, namely government agencies, are finding that the network is the most cost-effective means for delivering services. The Internet High School and the telemedicine efforts are spreading to other communities in the North beyond the five KO communities, making the infrastructure more economical by economies of scale.

Telehealth is also leading to significant savings by reducing the number of patients who have to be flown to larger cities for treatment. This new approach to medical services has played a key role in the establishment of a new medical school in and for the North, with heavy emphasis on telemedicine. Without K-Net's pilot experience, the investment by the medical community in a new infrastructure would not have been possible.

It is important to mention that, in many cases, the savings are being made by the external funding agencies (see below). The extent to which these savings will be translated into improved and continued support to the communities remains to be seen.

"It has been demonstrated that the cost of delivering this service as an ongoing program, with 2 to 3 clients drawn from all of the Keewaytinook Oldmakanak First Nations Communities being seen during weekly 1.5-hour teleconferencing sessions, averaging 4 per month over 12 months, is estimated to be as much as $985 per client-session (and potentially, even less). This estimate is significantly less than the overall cost of delivering this service by flying clients out to the regional First Nations counseling centre in Sioux Lookout, estimated to be $2,716 per client-session in this study." (p. 49)

Evaluation of the Keewaytinook Okimakanak Telepsychiatry Pilot Project, 2002. Centre for Health Services and Policy Research, Queen's University, Ontario
http://knet.ca/documents/KO-Telepsychiatry-Report-2002-12-21.pdf

36.- CONCLUSION

Economic development happens when human connectivity increases and when the sense of isolation and separation is reduced. In the North, "economic development" is what happens when:

- community members who have left the community because of sickness, schooling, or work keep in touch with their community and know what's happening (videoconferencing, homepages with local news, photos)
- there is more potential for those who have left to return (more access to information and the "outside world", less "boring" and isolating)
- members within the community keep in touch with family members, children who are away at school
- people stay in their community longer and still have their needs met (e.g. people needing medical or psychological treatment, kids have more time to mature before going away to school)
- community members see what's going on in other places (in the North or further) and gather ideas for new things they'd like to promote in their own lives

As with all things in traditional societies, nothing changes easily. The challenge when introducing new technologies is to address the many small, locally relevant needs without disrupting the existing social fabric too drastically. K-Net communities are learning to apply ICTs to their unique situation in innovative ways and direct their own economic development.