

**Northern Disconnect:
Information Communications Technology
needs assessment for Aboriginal
communities in Manitoba**

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The purpose of this paper is to provide an analysis of the current state of information communications technology utilization by Aboriginal communities in Manitoba, recognizing that despite government pronouncements regarding the Internet's potential for facilitating economic revitalization within Aboriginal communities, little work is being done to improve communications infrastructure in these communities.

Le but de cet exposé est de fournir une analyse de l'état actuel de l'utilisation de la technologie des communications de l'information par les communautés autochtones au Manitoba, en reconnaissant qu'en dépit des prises de décision du gouvernement concernant le potentiel d'Internet pour faciliter la revitalisation économique dans les communautés autochtones, peu de travail a été effectué pour améliorer l'infrastructure des communications dans ces communautés.

Introduction

Information communications technology (ICT) during the last decade has become increasingly important throughout Manitoba, as demonstrated by the steady growth of information-based companies. When combining the growing importance of ICT with the corresponding rise in computer use globally, the ability to create, send, receive, and utilize information for the betterment of both self and community has also greatly improved. However, even though the Internet may be "technically" available to all people in Canada, cost issues and poor communications infrastructure deny many Aboriginal people access to this valuable information source. This paper will provide an analysis of the current state of ICT utilization in Aboriginal communities in Manitoba, focussing specifically on the continued lack of communications infrastructure and Internet support by

government agencies and private industry. This trend continues at a time when multiple government reports clearly indicate the Internet's potential to facilitate economic revitalization and improve educational opportunities at the community level.

Literature Review

Since the mid 1990s, the Manitoba government has been promoting the Internet as an economic enhancement tool. More recently, bureaucratic attention has shifted to promoting the Internet's benefits to the Aboriginal population of Manitoba. The Internet is viewed by some as a way to empower Aboriginal Peoples by permitting increased access to information, giving Aboriginal Peoples "a chance to be, for the first time, on the cutting edge" (Trahan 1996: 17; Ponting 1997). Historically, the schism that existed between those who possess information and those who did not was a direct result of colonialism, which is still an underlying concern among many First Nations leaders (Ponting 1997: 144-145). In today's global economy, where information is equated with power, the existing division between those who are able to access the kinds of knowledge available on the Internet to those who are not could grow at an exponential rate, leaving most First Nations and Aboriginal communities who do not adopt this technology generations behind within a few short years.

At the same time, there are detractors who warn that embracing the Internet too quickly without first understanding the ramifications of doing so could do more harm than good. For instance, Two Horses (1998) argues that the Internet is the most effective tool currently available to promote assimilation and that Aboriginal Peoples must become aware of its effects upon both individual and community:

Indians must develop the kind of self-critical appraisal that is lacking throughout North American society in general. To fail to do so is to risk the loss of identity as Indian people and to finish for non-Indians what they have not been able to accomplish in the five-hundred-plus years of attempted physical and cultural genocide.

There is also concern regarding the Internet's perceived lack of bounda-

ries that allows unlimited access to Indigenous knowledge that was previously available from only elders or people of standing within the community (Smith, Burke & Ward 2000). In her study of news, media, and Aboriginal people in the circumpolar north, Valerie Alia (1999) stated that the Internet has been embraced to "mainstream" traditionally marginalised media, while also picking up where small town meetings left off, concluding that "most of the negative effects of technology are due not to the technology itself, but to the ways people use it" (114). Despite these concerns, there is a sense of urgency at the government level to have Aboriginal Peoples in Manitoba adopt ICT sooner than later (e.g. North Manitoba Sustainable Economic Development: A Place for Action for Northern Manitoba 1991; Telecommunications Policy Office 1997; Industry Canada 1997; Economic Innovation Technology Council 1999) and the province's Aboriginal leadership is beginning to adopt the same stance (Manitoba First Nations Economic Development Strategy 1997). Each of the preceding reports maintained that increased computer utilization could play an integral role in neutralizing significant geographic distances currently being experienced by northern educators and business owners; however, none of these reports clearly indicate potential ICT opportunities within the overall context of either Aboriginal regional or community needs.

Lack of ICT access involves three aspects: costs and lack of funds to obtain the required technology; lack of knowledge of English, which is, for all intents and purposes, the language of cyberspace; and the knowledge required to understand which information is pertinent in order to discard extraneous data (Savard 1998a). The inability to deal with these issues could lead to a two-tiered class society of those "who use the Internet and those who are info-rich and info-poor" (Savard 1998b). Native American broadcaster John Belindo (1997) argues that this type of information sharing leads to alliance-forming, which in turn creates available possibilities to enhance and further Indigenous rights. There are also concerns that despite the Internet's potential role in the "establishment and maintenance of American Indian ethnic boundaries," no one is quite sure how this role will manifest itself (Zimmerman, Zimmerman & Bruguier 2000: 85). All authors cited here, however, did agree that while there is no substitute for a land base to remind people of the unique relationship that exists between the government and First Nations communities (Howe 1998), the Internet's potential is boundless if approached with caution.

The push is on within Manitoba to have Aboriginal Peoples adopt ICT. There is also consensus in many cases within Aboriginal communities regarding the importance the Internet could one day play. In 1991, commissioners for the North Manitoba Sustainable Economic Development report heard from more than 300 Manitobans from northern communities who made it clear in written and oral briefs that "communications technology is particularly relevant to residents of the more than 100 northern communities, as well as other measures to enhance contact and communicate with groups outside of the community" (76). Similarly, The Royal Commission on Aboriginal Peoples (RCAP) (1996) reported that the "Information Highway is an invaluable resource to counteract the isolation which Aboriginal communities continue to experience" (record 72,963). The Manitoba Information Highway Advisory Council (1997) was created soon after RCAP's release to advise on policy matters pertaining to promoting ICT and determined that since 96 per cent of Manitobans had toll-free access to Internet providers, it was then logical to conclude that there was no structural or technological component preventing the vast majority of Manitobans from being able to access the information highway.

Clearly the Advisory Council overlooked the importance ICT could play in northern Manitoba communities. Of equal concern is that their response indicates northern Aboriginal communities do not fall within the purview of "vast majority" when it comes time to evaluate communications infrastructure. This is important to note, especially at a time when the Internet is being promoted as an economic development tool and one that Aboriginal communities in Canada are more frequently considering to promote environmentally safe business opportunities. The North Manitoba Sustainable Economic Development committee reported that in public hearings, "northerners provided considerable criticism to barriers to economic development created by governments" in addition to the lack of "useful information about available government assistance for economic initiatives, program criteria appropriate for the north, frequent changes in government programs and funding and dependence by some communities" (1991: 39). Sydney McKay of the Manitoba Metis Federation (MMF) stated that accessibility to the Internet would "allow us to start businesses and sell our own training programs" which in turn would encourage community members to remain instead of migrating to urban centres in search of employment" (RCAP 1996: community interviews).

Marguerite Sanderson of the Northern Women's Resource Centre concurred, further indicating a need in northern communities for tools that would allow for teaching computer applications and computer network technology that could in turn be transferred to the community (RCAP 1996: community interviews).

Upon its release in 1996, the RCAP report also indicated that Aboriginal communities were not utilizing ICT to its fullest extent. It was recommended the establishment and implementation of "a national Aboriginal resource network system and centre for the collection, housing, distribution, and networking of culturally based information controlled by and for Aboriginal Peoples" (1996: record 111,390). The commissioners went on to state that a centre of this type would allow community members to "use computer technology to link with regional centres or communities all over the country to help them gain access to important cultural information" (record 111,390). This recommendation has yet to be implemented even though the federal government asserted in 1999 that the "information and knowledge infrastructure" would be accessible to all Canadians by the year 2000, boasting that "a connected nation is more than wires, cables and computers. It is a nation in which citizens have access to the skills and knowledge and information infrastructure. It is also a nation whose people are connected to each other" (The Community Access Program 1999: 1).

Methodology

Personal interviews with officials and educators from various Aboriginal communities in Manitoba as well as government agencies and private industry were utilized as the primary information gathering method. Winnipeg-based Raven Innovations Network initiated the research which was made possible by funding provided by Agriculture Canada, Aboriginal Business Canada, and the Economic Innovation Technology Council of Winnipeg. Between November 1999 and February 2000, telephone and personal interviews were conducted as researchers travelled throughout northern Manitoba gathering data. From the outset, the goal of this project was to present a community-based account of the primary issues and difficulties regarding Aboriginal computer utilization in Manitoba. Whereas the interviews conducted with Aboriginal community representatives were designed to elicit responses specific to computer use and pos-

sible future implementation (APPENDIX A), all interviews conducted with government and private industry officials were utilized to obtain information on the success of ICT-related government programs and initiatives (APPENDIX B). The methodology employed was designed to allow for an evaluation of First Nation, Aboriginal and Metis community concerns while also reflecting the concerns of representatives from urban, rural, and more remote Aboriginal communities in Manitoba. Contacted communities were selected according to region as were a number of Community Futures Development Corporations, First Nation Tribal Councils, Community Councils, and various educational organizations which included public schools and education authorities. Finally, a literature review of government reports, academic literature, as well as magazine and newspaper articles was conducted regarding computer use and ICT promotion within Aboriginal communities in Manitoba.

Findings

The general assumption prior to initiating contact with Aboriginal community leaders and government officials was that Aboriginal communities in Manitoba lagged behind non-Aboriginal communities when it came to computer utilization. The mood of the project was heightened following the literature review of government reports and policy directives, in addition to private and public industry statistics obtained, all of which indicated that computer use among Aboriginal Peoples in Manitoba was on the rise. Manitoba Telecommunications System (MTS), for instance, reported that in 1997 upwards of ninety-six per cent of all Manitobans had toll-free Internet access through telephone landlines that connected each provincial community (Telecommunications Policy Office 1997: 23). The report also concluded that satellite and wireless transmission technologies were readily available for the sole purpose of providing ICT access to the remaining four per cent of the communities listed (23). Furthermore, the report went on to indicate that Manitoba was among the leaders in Canada in terms of the percentage of households with personal computers (25.7 per cent) and homes that currently access the Internet (24.8 per cent) (23). According to these statistics, it appeared as though all Manitobans, including those Aboriginal, Metis, and First Nations populations, had equitable Internet access. Unfortunately, the enthusiasm experienced during the literature review was tempered following

personal interviews and the data collection stage, which indicated that Aboriginal computer utilization in Manitoba was, in fact, lagging behind when compared to provincial statistics regarding non-Aboriginal ICT application.

Currently, the majority of the First Nations communities in Manitoba have but a single classroom designated within a local school where computers are visible. In many cases, with the exception of limited residential household access, these computer labs are often the community's only Internet access site, indicating that government initiatives designed to "make information and knowledge infrastructure accessible to all Canadians by the year 2000, thereby making Canada the most connected nation in the world," were somewhat optimistic (Industry Canada 1999a: 1). Thirty of Manitoba's sixty-two First Nations communities do not have toll-free Internet access, and with the exception of a few communities, all First Nations and other rural Aboriginal communities do not have access to high-speed Internet services. This issue was first highlighted in the 1995 Manitoba Education Research and Learning Information Network report, in which it was concluded that telecommunications infrastructure upgrades in most if not all Aboriginal communities in Manitoba were required before adequate Internet access could be established (Industry Canada 1995: 2). The author was clear in his assessment that only once these upgrades were completed would it be possible to utilize the Internet's technology in northern Aboriginal communities in Manitoba through access to high-speed data services. Six years later, while computer use has increased exponentially throughout Canada, low-speed data service and long-distance Internet toll charges remain generally unchanged and prohibitively expensive for the majority of Aboriginal communities in Manitoba.

The northeast region of Manitoba is an ideal example of how poor communications infrastructure limits ICT use. In all, this region is home to thirteen First Nation communities and five community councils representing an overall population of 20,000. Of this total, ninety-eight per cent are of Aboriginal descent. ICT utilization within this region is near impossible due to the out-of-date analogue, radio-based telecommunications system currently in place, a situation that is unlikely to change without significant equipment upgrades. Until this occurs, most Internet users will continue to be limited to text-based applications and extremely slow download capacities. In the case of the northeast region, as is the

case in most northern Aboriginal communities in Manitoba, each community has but one telephone line which is the main Internet connection source, a system that is both extremely unstable and unreliable, resulting in continual disconnections.

High cost for Internet access is a common theme in northern Manitoba. For example, the Swan Valley Regional Secondary School is required to spend in the neighbourhood of \$5,600 per month to maintain a high-speed Internet line that costs a Winnipeg school \$40 (Culbert 1999). The majority of Aboriginal communities in Manitoba are located north of this region and the costs increase accordingly. At War Lake First Nation, Internet access was discontinued due to high costs. And just to the east at Fox Lake First Nation, a community official commented that prohibitively high long distance charges for Internet access was the primary reason his Band was not on-line (Smith 1998).

While poor infrastructure and high costs are partially to blame (current long distance rates can result in a northern Internet user being charged upwards of \$12 per hour for Internet access), the most debilitating factor to increased Aboriginal computer utilization in Manitoba is the lack of local computer expertise at the community level. Percy Barnaby, president of Winnipeg-based Abenaki Associates, a leading Aboriginal-owned ICT consulting and training firm in Canada, estimates that upwards of eighty per cent of Aboriginal communities in Canada require technical support, reflective of the current Manitoba situation. A number of project participants complained that many communities have not a single person available for local system maintenance, which at times has resulted in many of these communities remaining offline for as long as three months at a time (Barnaby 2000, Bursten 2000). According to Shane Smith of the North Central Community Futures Development Corporation, "In many cases, a local schoolteacher familiar with computers is often designated the local computer instructor, which requires of them additional knowledge to keep the system running and time out of their schedule to do so." It is estimated that only twenty per cent of all teachers in Aboriginal communities in Manitoba have sufficient working knowledge of computer applications, rendering this computer education method ineffective (Bursten 2000).

In many cases outdated equipment is all that is available in these communities, which is equally restrictive to those who choose to pay the high connection costs. Connie Baudry of Indian Birch stated that in her

community most of the computers that are currently in use at the school are old and lack the capacity required to handle the Internet. "The majority of the computers we have at the school do not have modems and those that do have external modems, which are at the best of times unreliable. We're looking to install a computer lab that would be up to date, but the plans like everything else take some time to initiate. Future plans include trying to replace the old computers with new ones." Baudry further explained that once the schools have the proper computers and a decent Internet package, students could use it as a resource tool, similar in scope to an "electronic encyclopedia." As for office applications and improving bureaucratic capacity, the goal would be to utilize the Internet to connect with head office located in Winnipeg. "Right now if we want to contact people at our office in Winnipeg, we either have to dial long distance, which costs us enough, but if we want to send a document we have to do so by mail. We can fax sometimes, but if the document is too large, we just mail it out. But this takes a few days for it to arrive at the office in Winnipeg." Baudry stated that this can be troublesome, especially when it comes to issues of obtaining a status card or arranging health care in Winnipeg, all of which could be facilitated via email.

With this in mind, there appears to be a clear "disconnect" between the ambitions of the federal government's ICT initiatives and what is currently occurring in Aboriginal communities in Manitoba. Government computer promotion programs fall short of their stated goals due to a lack of understanding of what these programs represent at the community level, even when these programs are offered at no cost to the communities. Lori O'Brennan of Industry Canada stated that the Computers for Schools Program run by Industry Canada proposed to have 9,600 computers placed in Manitoba's non-Aboriginal schools and libraries by 2001; to date, more than 10,000 have been collected and installed. In comparison, program administrators also sought to obtain and install 2,450 computers in Manitoba's First Nations schools by 2001; as of January 2000, 885 computers were in place, only 36 per cent of the target number. Computers for Schools administrators expressed frustration at not being able to entice First Nation representatives to apply for program support from Industry Canada. At the same time, when First Nation school officials were interviewed and later informed by researchers that Pentium-grade computers were available through this program, they were interested in obtaining further information about the program. For example,

when Connie Baudry of Indian Birch was notified of this possibility, she wanted more information from the researcher conducting the interview. This suggests a breakdown in communication from policy development to community program application.

Despite the breakdown, there are currently two federal programs in place that promote the Internet's relevance to improving economic and educational initiatives that, if properly utilized, could effectively counteract the lack of Internet access. The first is the Community Access Program (CAP), launched in February 1995. CAP was designed primarily to provide all Canadians with Internet access in addition to providing northern educators an accessible distance education tool. The ultimate goal was to have all Canadians connected by March 2001 by establishing close to 10,000 public access sites throughout Canada in communities whose populations numbered less than 50,000 (Industry Canada 1999b). These sites were to be located in schools, libraries, government offices and hospitality areas, thereby allowing a knowledge-based economy to evolve in the more isolated northern communities by providing unobstructed, community-wide Internet access.

There are currently one hundred and thirty-six CAP sites in Manitoba; however, only nineteen are located in First Nation communities (Myers 2000). In each case, these CAP sites, including the majority of the First Nation community sites, are located in Manitoba's southern region where Internet access is cheaper and more readily available. Most of these sites are often not available to community members due to their usually being located in a local school serving educational needs by day, which limits community members' access to the computers. Of the nineteen Manitoba First Nation sites currently in operation, only three are located in northern First Nations communities (Nelson House, Moose Lake, and Chemawawin) with an additional three sites located in communities accessible only by air (Little Grand Rapids, Poplar River, and Bloodvein). It may be somewhat misleading to state that none of the remaining one hundred and seventeen CAP sites located in non-Aboriginal communities are not being utilized regularly by Aboriginal individuals aware of its presence. Regardless, these numbers are minimal when compared to the lack of northern access currently being experienced and the lack of government promotion regarding this technology.

Developed in conjunction with CAP, SchoolNet was designed to provide all Manitoba students with Internet access, including those students

attending schools in the sixty-two Manitoba First Nation Communities. As of the end of 1998, SchoolNet was being utilized by each of the seven provincial tribal councils totalling twenty-nine communities, as well as four unaffiliated First Nations communities (Myers 2000). Recent statistics also indicate that there are currently fifty First Nations communities involved with the SchoolNet program, albeit to various extents (Myers 2000). However, what became apparent during the interview phase of this project was the lack of government promotion in Aboriginal communities in Manitoba about SchoolNet, resulting in the correspondingly slow ICT adoption rate which continues even today.

For example, in 1996 every Manitoba First Nations school was offered Pentium PCs, DirecPC equipment (satellite uplink equipment), and approximately one year of free satellite time by Industry Canada. With few exceptions, most schools applied for and received this equipment, although few of these schools reached the expected level of functionality (March, personal communication, 2000). Derrick Quil, Technical and Information Technology Coordinator for the Assembly of Manitoba Chiefs, claimed that four years after the program began, there were "still reports that computer equipment is still in its original packaging and, in those cases where the community truly wanted to participate in the program and become hooked up to the Internet, improper satellite alignment of DirectPC equipment ended with community people becoming frustrated with the program." The satellite systems installed at Pukatawagan, Shamattawa, Split Lake and Tadoule Lake, for instance, will only accept dial-up support that is insufficient to ensure effective Internet connectivity (Smith 1998). In sum, it appears that all attempts to get Aboriginal communities in Manitoba on-line to date have been a failure.

ICT promotion and models for study

Data gathered for this study indicates that Aboriginal communities in Manitoba are quickly falling behind in ICT utilization, a situation that continues despite the fact that this technology, when specifically applied, can act as a strategic "tool" to enhance delivery of high priority services. At the regional level, some degree of computer technology promotion takes place, but the overall failure of government to encourage the use of this technology results in community leaders unable to make an informed decision. Combined with the fact that computers and other newer applications remain a relatively scarce commodity in Band offices, nursing

stations, individual residences and other administration buildings, promotion of computer use is an almost moot point due to the lack of circulating information.

As Internet and computer use begins to slowly proliferate in the north, there are instances where communities that currently have toll-free access are hesitant to adopt this new technology. This slow adoption rate often has to do with the crippling poverty associated with Aboriginal communities of northern Manitoba and that money simply is not available for purchasing computers. From a technical standpoint, the main factor in determining community-regional toll free Internet access is based on whether the local telecommunications system can adequately handle increased traffic without a corresponding negative impact upon normal and basic telephone use. According to Manitoba Telephone Systems (MTS) representative Wilbur Coates, since most northern systems are considered remote systems built only for minimal telephone traffic, provisioning of toll free Internet access (with the expected increase for Internet services) would "constrain an already constrained" telephone/facsimile system. At Moose Lake, where toll-free Internet access is available, very few households, businesses, or administrative personnel currently take advantage of the local telephone exchange services with The Pas (Belanger & Hart 2000). According to the Economic Innovation Technology Council (EITC) of Winnipeg, overall Aboriginal awareness of computer-related careers is extremely limited in Manitoba due primarily to the absence of an ICT learning culture (EITC 1999). This lack of awareness also contributes to the shortage of Aboriginal role models, which in turn further impedes the ability of program administrators to effectively legitimate these professions to the young. What many Aboriginal leaders and government officials who were contacted during the course of this study failed to indicate was personal knowledge of other Aboriginal communities in Manitoba, or in Canada for that matter, that are currently utilizing ICT. Two models for these leaders to study are the Kuh-ke-nah Network (K-Net), based in Sioux Lookout, Ontario, and the proposed Keewatinowi Network (KN) wide area network slated to connect the four Island Lake First Nation Communities in Manitoba.

K-Net¹ is a First Nations computer conferencing system developed and managed by the Keewatinook Okimakanak Tribal Council based in Sioux Lookout. In these remote regions of northern Ontario where telephone connections are limited and local Internet service providers are

non-existent, regional First Nation communities banded together in 1994 to enhance regional Internet communications to provide free e-mail to community members. This came about after a number of community leaders voiced displeasure at their inability to take advantage of this new technology due to poor communications infrastructure, despite repeated guarantees from Industry Canada officials that all First Nations schools under federal jurisdiction would eventually become connected following implementation of the SchoolNet program. K-Net staff became proactive, initiating contact with Industry Canada officials to develop a solution, resulting in K-Net providing support for schools in the development, installation, and maintenance of satellite service to provide Internet connectivity for the schools staff and students.

To date, more than twenty regional First Nation schools are now utilizing this technology and users are able to network with family and friends in other remote communities, as well as with people in urban centres who still maintain northern familial ties electronically. Post-secondary training and employment programs are also now being delivered through K-Net. This project and the partnerships that continue to evolve will definitely impact distance learning programs and economic development opportunities in those areas where telecommunications infrastructure is limited. As well, where user computer skills may be underdeveloped, distance may well become the only barrier to hurdle.

The proposed Keewatinowi Network will network Manitoba's four Island Lake First Nation communities. KN is a one-hundred per cent digital, wide-area-network (WAN) that will support three innovative ICT applications. Each application will then be applied as a strategic regional economic development "tool" to assist the four communities toward meeting common economic and educational needs, goals, and objectives. The three applications are:

- Interactive Instructional Television (IITV) services
- Provision of a regional television broadcast system
- Provision of a regional Internet service provider (ISP)

The main benefits to the four communities will be improved education and training services, more reliable and affordable Internet access, and enhanced public information networks and regional organizational capacity. The Keewatinowi Network will serve as a unique model of part-

nership between remote communities in Canada, striving to achieve economic and political self-determination by effectively utilizing information and communication technologies.

Education and E-Commerce

According to study participants, education and training are among two of the top five priority issues at any one time in any of Aboriginal communities in Manitoba. Following an Assembly of Manitoba Chiefs (1997) pronouncement that its greatest asset is high human resource capital potential, it is apparent that education and training will play an integral role in creating an overall economic development strategy in each of Aboriginal communities in Manitoba. Currently, in most of these same communities, approximately fifty per cent of each community's population is under eighteen years of age, a percentage of the population that is expected to remain relatively young during the next twenty years. The result of this youth demographic will be that most Aboriginal communities (especially the more rural and remote) will require improved access to quality teachers and instructors in both basic and advanced programs from kindergarten to the senior level four. At the same time, Aboriginal education administrators struggle to recruit quality teachers at an affordable cost, resulting in poor success rates among Aboriginal high school students in career related disciplines such as mathematics, sciences, and computer science.

One of the main obstacles toward improving K-S4 educational levels is making available relevant curriculum-based content in the aforementioned disciplines for both rural and urban students (EITC 1999). An underlying theme when evaluating the low rate of Aboriginal ICT utilization is the lack of government program development accountability to what community leaders desire. Similarly, northern educators complain of a comparable situation regarding current education initiatives. Thompson-based Frontier College's Flora Zaharia stated her position quite eloquently when she informed RCAP commissioners, "in matters concerning Aboriginal education, the views and aspirations of the local community are often not sought. Programs are often imposed on the people without much thought to local conditions and interest of the learners" (RCAP 1996: record 189,186).

There is also a high priority in Aboriginal communities to provide

education and training programs locally for students who choose to stay within the community while pursuing their education. Community-based initiatives are vital to help maintain existing support networks that allow those students the time needed to focus on their studies, resulting in higher academic achievement in education and training programs. There is also an overwhelming need to increase available opportunities to meet high need/high demand areas such as adult education, community-based training, professional development, and life-long learning initiatives. Yet issues peripheral to the current lack of resources at the community level continue to plague the overall advancement of ICT in northern Aboriginal communities. Rob Fisher, principal at Nelson House High School, expressed his dismay at his high staff turnover rate, which in turn adversely affected the continuity and the efficiency (advocacy, support, maintenance) of the school's computer-related programs. It was also pointed out to project researchers a number of times that the majority of Aboriginal communities currently do not have access to resource materials required to support education programs and specific research initiatives. One of the main obstacles at Indian Birch is that there is little time available for support staff to take part in workshops that would enable this knowledge. According to Connie Baudry, "even with access to information, knowledge about how to use this technology and the time involved to learn these skills is a factor, especially when you stop to consider that we have limited staff and resources and that it takes time and money to send these people away to workshops and other forms of training."

There are currently a number of inexpensive ICT applications available specifically designed to meet many of these fundamental and common educational needs, such as Interactive Instructional Television (IITV). Already implemented by a number of Manitoba school divisions, IITV is a classroom, video-conferencing system that enables schools to combine classroom enrollment rates while also cost-sharing in the hiring of teachers/instructors. The Kitayan Community Futures Development Corporation is currently promoting the use of IITV in the remote Island Lake region of northeastern Manitoba. Internet applications are also being used in a number of areas where distance education is the main education delivery system by providing online curriculum along with increased student interaction with teachers via e-mail, chat rooms, and computer-to-computer video-conferencing.

Despite the poor state of current community communications infra-

structure and the corresponding lack of government promotion in Aboriginal communities in Manitoba, it is evident that this populace has long been aware that ICT might one day play an integral role in both their economic and cultural development. Oral and written briefs submitted to the North Manitoba Sustainable Economic Development committee in 1991 indicated that communications technology was "particularly relevant to residents of the more than one-hundred northern communities, as well as other measures to enhance contact and communicate with groups outside of the community" (76). This is not an isolated occurrence as the authors of the RCAP (RCAP 1996) report recognized the proliferation of ICT throughout Canadian society and the noticeable lack of similar utilization on the part of the Aboriginal population of Canada as a major concern. The commissioners went on to state that "Aboriginal governments and organizations will need to be alert to changing technological capabilities and maintain an active presence in the discussions that affect telecommunications services in their local areas" (record 69,708).

It is clear that many Aboriginal community leaders anticipate computer technology eventually becoming incorporated into their lives as teaching and learning aids for the purposes of distance education; as a means of fostering the development of communication networks permitting frequent discussion and the exchange of ideas; and, as a tool allowing northern business owners to become competitive beyond existing community boundaries. As mentioned above, Sydney McKay of the MMF viewed increased ICT access as a means to promote new business initiatives and sell their own training programs which, in turn, would encourage students to remain within the community due to these increased employment opportunities. Current technology would also allow training programs to be delivered via the Internet, promoting the development of e-commerce within Aboriginal community confines. E-commerce-based companies, or businesses that promote and sell goods and services electronically, are able to develop products, receive orders, communicate with suppliers, and arrange production and delivery of goods all the while maintaining positive relationships with customers. The result is lower production and inventory costs and corresponding improvements in overall efficiency and customer service.

Developing northern Aboriginal e-commerce opportunities is crucial due in part to the baby boom currently occurring in Manitoba, mirroring a country-wide trend. Increasing at a rate of 1.87 per cent annu-

ally, the Aboriginal population in Manitoba is growing six times faster than the rest of the provincial population (Manitoba Bureau of Statistics 1998). The economic survival of this growing population means the communities themselves may in fact become dependent upon an economy based on ICT applications. In the twenty-first century, for example, sixty per cent of all jobs in the United States will demand basic skills in computer and network use (in Warner 1998: 78). As Canadians historically adapt to technology quicker (Kirbyson 1999), it stands to reason that a similar trend will evolve in Manitoba, meaning that any student who does not know how to perform basic computer functions, "to use word processors, spreadsheets, data bases, networks, and operating systems will be at a distinct disadvantage" (in Warner 1998: 78).

There are a number of factors that impede increased levels of Aboriginal employment at the community level, including the widespread mismatch in geographical job distribution and Aboriginal people (RCAP 1996), low levels of educational attainment in the fifteen to twenty-four age group, and Manitoba's accelerated Aboriginal growth rate (Manitoba Bureau of Statistics 1998). As a result, many Aboriginal economic development practitioners believe that in order to improve long-term employment opportunities and outcomes in Aboriginal communities, significant investment is needed in innovative and sustainable Internet-based business ventures. Recognizing the need for increased Internet promotion, the City of Thompson Chamber of Commerce passed a resolution calling for the availability of high-speed Internet access and improved communications infrastructure within northern Aboriginal communities in Manitoba to promote local business development. Following suit, the North Central Community Futures Development Corporation (2000) recently initiated a program in which computers were installed in the representative band and community council offices. According to Shane Smith, "we realized that most of the communities we represented were lacking Internet technology and the information required to effectively integrate it into business ventures. Then we decided to install computers in the communities we represent so that community members would have the tools to research what was required to successfully open and sustain a business in this region." Smith also acknowledged that these computers are also available for general community use, acting as unofficial CAP sites, "but that was something we were anticipating happening" (Smith 2000).

Swampy Cree Tribal Council executive director Phillip Dorion indicated that there is also an obligation on the part of these communities to become informed and involved with the adoption of the Internet and computer technology as well as the promotion of community-based business initiatives. Dorion stated, "we have plenty of social workers and teachers. What we are really going to need are people with MBAs, accountants, people with business knowledge and experience, something that we're lacking in right now" (Dorion 2000). It was apparent that Dorion believed training must begin at the community level to ensure the ability to adapt computer technology once it becomes affordable:

Right now the issue is not that we're not interested in the Internet. It's just there's so much more happening that needs our attention. But when you consider the potential of the Internet for business, more time should be spent trying to promote it to build business and improve social conditions. In The Pas we're lucky because connection fees are affordable. For a community without access like we have in The Pas, it would be difficult to use the internet just due to the cost involved.

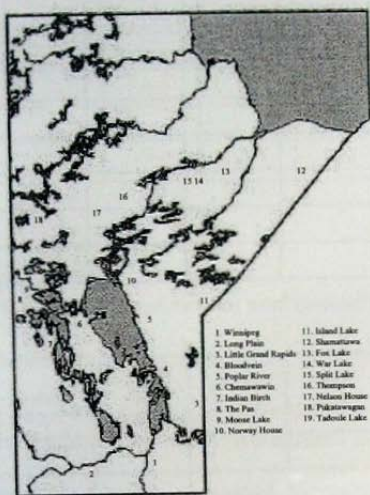
A. Dumont of the MMF stated that increased Internet and computer use and promotion at the regional level has been mandated and that computers have since been provided for installation in regional offices located in Thompson, The Pas, Dauphin, and Brandon. Installed to increase inter-office communications and access to information, these Local Area Networks will eventually be networked to the MMF homepage through fibre-optic cabling. Once all offices are on-line, the next stage will see these steps repeated with computers installed and networked in community offices to help inform all Manitoba Metis people of educational and employment opportunities. According to Dumont, "This will give all our community members the chance to find job opportunities on one web site. Access to this information is important and will only become more important in the next few years." Although this project is in its foundational stage, the MMF is anticipating total connectivity within a few years with the hopes of entrenching computer and Internet technology at the community level (Dumont 2000).

Conclusion

As demonstrated, Internet connectivity in Aboriginal communities of Manitoba is a difficult proposition even though the Canadian government aspires to become a global leader in ICT. There is concern at the community level that the information age is quickly passing them by and that, in the process, economic and educational opportunities are being missed. In 1995, the Manitoba Keewatinowi Okimakank (MKO) made a formal submission to the CRTC with respect to low quality and high-cost Internet services. Representing more than 45,000 registered Indians, of whom 33,000 live on reserves, the MKO expressed their concern at the lack of attention being paid to northern Internet users, adding that upgrades to the existing telecommunications infrastructure was needed before improved Internet access could occur (Smith 1998). Despite this plea for improved services, MTS has no current plans to upgrade existing telecommunications capacity at this time, claiming prohibitive costs as the main stumbling block. Aboriginal people at the community level realize the importance of using the Internet as a business-development tool for a number of reasons. Initially, the Internet permits economic development that relies upon non-renewable natural resources for the creation of a product, a natural choice for communities looking to promote environmentally-friendly economic development. Second, a quick scan of the Internet indicates that there are ample business opportunities that are not geographically specific. A growing number of companies currently utilize call centres and help desks, provide basic transaction services, act to resolve customer complaints, while also using the Internet as a sales tool through direct client interaction, all without being located close to a head office. These new businesses also do not require the traditionally large sums of start-up capital, a trend that has resulted in "virtual" businesses proliferating all aspects of the new economy (see Belanger & Hart 2000).

Further aiding business owners are ICT applications designed specifically to eliminate the geographic disparity that exists in most of the Aboriginal communities in Manitoba. Online support resources are now available for business students, emerging entrepreneurs, as well as support for business owners that help eliminate the need for the extensive travel that is often required to visit bank representatives or to attend finance workshops. The North Central Community Futures Development

Corporation recognized that information is readily available for those looking to write effective business plans, to conduct market research via surveys and questionnaires, while fostering the development of tangible marketing plans. Furthermore, learning the basics in bookkeeping and financial management, finding case studies and best practices in Aboriginal business development and information about suppliers by category such as location and type of product are also available. Expanding a community's market potential through Internet use can occur simply through the development of an interactive e-commerce site to match suppliers and manufacturers with provincial, national and international buyers. The development of innovative, community-based enterprises such as modest Internet Service Providers (ISP) or regional ICT support, installation and maintenance enterprises are all feasible.



Map of Manitoba - Area of Study

APPENDIX A

Community-based Interview Questionnaire: Guidelines

1. Does your community utilize computers?

	Band Office	Nursing Station	School(s) High School	Homes	Other
Where					
How Many?					
Types?					
Since when?					
Future Plans					
LAN's					
WAN's					
SchoolNet					
Other					

2. Does your community have Internet Access?

	Band Office	Nursing Station	School(s) High School	Homes	Other
Where					
How Many?					
Types?					
Since when?					
Future Plans					
Web sites?					
CAP site(s)?					
Other					

3. Does your community have computers in the schools?

	K-8 School				
Where					
How Many?					
Types?					
Since when?					
Future Plans					
LAN's					
WAN's					
SchoolNet					
Other					

Comments:

APPENDIX B

Government/Industry Research Questionnaire: Guidelines

- 1) Do you see a need for infrastructure improvement prior to being able to access the Internet in Aboriginal communities in northern Manitoba?
- 2) What current applications are run available for communities to access the Internet?
- 3) Describe current partnerships that allow for ease of Internet access at the community level.
- 4) Would you recommend communities enter into partnerships with industry or private business owners to reduce the cost of Internet connectivity? Please explain.
- 5) Are you aware of any available government programs or policies promoting Internet use and connectivity? Please explain.
- 6) Are there available funding opportunities for promoting increased

- Internet utilization? Please explain.
- 7) Are there any communities you would suggest are leaders in the field of Internet utilization that you could recommend for a "Best Practices" standing?
 - 8) In your experience, what are some of the more innovative solutions and/or experiences you have witnessed in other regions that resulted in increased Internet connectivity or reduced costs making the Net available to more people.

Notes

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1 K-Net sponsors its own website. The information for this section can be found at <http://www.knet.on.ca>.

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