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Communicating Visually: Videoconferencing and Remote and Rural First Nations

Susan O'Donnell
National Research Council of Canada
susan.odonnell@nrc.ca

Brian Walmark
Keewaytinook Okimakanak Research Institute
brian.walmark@knet.ca

Brecken Rose Hancock
University of New Brunswick
brecken.hancock@unb.ca

Abstract: Videoconferencing is usually perceived as something useful for institutional reasons – primarily telehealth and distance education. First Nations are using videoconferencing not only for health and education but also in other ways for community, economic and social development. This paper discusses findings from a SSHRC-funded study of First Nations organizations that are supporting the use of video communications by rural and remote communities. The discussion explores why visual communication is important for First Nations, the prevalence and purposes of videoconferencing in non-institutional settings, and the challenges the communities experience using this technology. The central theme of this paper is that videoconferencing is a vital tool for remote and rural First Nations and in order for it to become widely used, the technology has to be a part of everyday life in communities and not just restricted to telehealth and distance education. Further, if we can find ways to increase the use of videoconferencing in non-institutional settings by everyone in First Nations communities, the technology will be used more often for institutional applications. Thus, increasing the non-institutional, everyday use of videoconferencing will have a positive impact on its use for telehealth and distance education. The paper includes recommendations for policy makers to support the more widespread use of this powerful communication technology by remote and rural First Nations.

1 Introduction

Videoconferencing technology was invented more than 80 years ago and was first introduced to the public in the early 1960s. Recently it has grown in popularity due to the increased availability of digital networks and the decreased price of videoconferencing systems. Videoconferencing technology has also improved - however we are only beginning to understand the technical and social possibilities for real-time visual and audio exchange among people separated by distance.

Videoconferencing offers many benefits to individuals, organizations and communities. Obvious benefits include saving travel time and money and reducing fossil fuel consumption when choosing videoconferencing over travel (Molyneaux et. al, 2007). Another important benefit is allowing people living in different places to communicate face-to-face in real time. This gives more options for people living in remote and rural communities and people living in urban centres to access resources and services available only in the distant location.

Our research has highlighted examples of how remote and rural First Nations use videoconferencing to support sustainable development. First Nations are using videoconferencing not only for distance learning and telehealth but also for increasing for their participation in a range of social, economic, political and cultural activities (O'Donnell et. al, 2007; O'Donnell, Beaton, McKelvey, 2008).

Videoconferencing has obvious advantages for remote and rural First Nation communities but a significant impediment to its more widespread use is the lack of a coordinated national plan to build, maintain and support the necessary digital infrastructure. There are plans and policies for videoconferencing for telehealth, and for education, but they are in separate silos and not aimed at increasing videoconferencing for other purposes in communities. In addition, policy and program initiatives to develop broadband across Canada, including in First Nations, do not generally distinguish between "high-speed Internet" and broadband networks capable of sustaining real-time audio and video communication. High-speed Internet allows fast email and Web browsing but does not guarantee the quality of service required for reliable videoconferencing. In contrast, broadband networks that support videoconferencing have the capacity for rich visual and audio interaction (Perley & O'Donnell, 2006).

The network infrastructure that allows many schools in remote and rural First Nations across the country to use videoconferencing is supported by First Nation SchoolNet, a program of Indian and Northern Affairs Canada (INAC). To deliver the SchoolNet program, INAC contracts six non-profit Regional Management Organizations (RMOs) to account and provide support for First Nations school connectivity in their respective regions. The six RMOs are: Atlantic Canada's First Nations Help Desk, providing services in Atlantic Canada; the First Nations Education Council (CEPN-FNEC) in Quebec; Keewaytinook Okimakanak (K-Net) in Ontario; Keewatin Tribal Council (KTC) in Manitoba; Keewatin Career Development Corporation (KCDC) in Saskatchewan and Alberta; and the First Nations Education Steering Committee (FNESC) in British Columbia. The work of the six RMOs has expanded to develop partnerships

and connectivity solutions for the First Nation communities in their regions and develop models for community-based connectivity. However the First Nations SchoolNet program itself faces an ongoing struggle for sustainability. Since 2006 the federal funding to RMOs from SchoolNet has decreased significantly and there are no guarantees that the program will continue to be funded after 2009 (O'Donnell, Beaton & McKelvey, 2008). Without the networks supported by SchoolNet, many of the videoconferencing activities in First Nations are in jeopardy – including telehealth, distance education programs, and the wider range of community-based activities using the technology.

This paper has three main arguments: first, that the *visual* aspect of real-time communication over digital networks is important for remote and rural First Nations; second, that First Nations are using videoconferencing not only for the well-known activities of telehealth and distance education but also for a range of non-institutional *community* activities; and third, that in order for videoconferencing to be more widely used by remote and rural First Nations, the technology must become a part of everyday community life and not just restricted to telehealth and distance education applications. Further, if we can understand the everyday barriers to using videoconferencing and find ways to overcome them and increase the use of videoconferencing as part of daily life, the technology will then be used more widely for institutional applications. Thus, increasing the non-institutional, everyday use of videoconferencing will have a positive impact on its use for telehealth and distance education. Given that this paper is written primarily for an audience of policy-makers, we then develop some recommended policy directions to increase the use of everyday videoconferencing in remote and rural First Nations.

2 Social presence and videoconferencing in everyday life

Our first argument – about the importance of the visual aspect of videoconferencing – needs some background discussion. Some readers may wonder: Why use videoconferencing to communicate? Why not use telephones, or email? What is unique about videoconferencing that other types of technologically-mediated communication cannot offer?

Social science research on videoconferencing began with attempts to understand why the visual is an important component of communication. A core theory from this early period is *social presence*. Social presence theory was developed originally by John Short and colleagues more than 30 years ago (1976) to understand the social psychology of videoconferencing. According to this theory, videoconferencing is

richer in social presence than other non-visual media and communication channels – such as telephone conversations - because it can convey information important for good interpersonal communication.

Based on an analysis of research, Short et al. (1976) distinguished seven visual elements important for communication and social interaction: general functions of non-verbal signals, proximity and orientation, physical appearance, dynamic non-verbal signals from the trunk and arms, facial signals, direction of eye-gaze, and mutual gaze. The first – general functions of non-verbal signals – is further divided into six functions: mutual attention and responsiveness; channel control (head nods and eye movements that determine who shall speak and for how long); feedback in the form of non-verbal signals; illustrations such as hand gestures and pointing for emphasis; “emblems,” a term referring to gestures used in place of words; and interpersonal attitudes conveyed by non-verbal cues to indicate the status of and changes in a relationship between people communicating. The second element of the visual – proximity and orientation – refers to the distance people keep from each other when communicating and how they position themselves vis-à-vis the other person. Physical appearance, the third element, is important because initial judgements are largely based on overall physical appearance. Dynamic non-verbal signals from the trunk and arms include posture which can transmit information about personality and mood. Facial signals, the fifth element, can be the source of considerable information among people communicating because they can project so much about how a person is responding to what is being communicated. Finally, direction of eye-gaze and mutual gaze are both important for sending and receiving cues about when to speak and when not to speak, and conveying information about levels of trust and intimacy (Short et al, 1976).

More recent research in this area has highlighted three themes that make up social presence: 1) being together, including co-presence, co-location and mutual awareness; 2) psychological involvement, including saliency, immediacy, intimacy, and making oneself known; and 3) behavioural engagement, the immediacy behaviours through which social presence is realized (Rettie, 2003). Other recent research argues that social presence is facilitated by observation of visual cues such as facial expressions and body movements. Social presence and media richness theories suggest that increased richness of the media leads to increased social presence. Video with its greater ability to support visual cues, such as facial expression recognition, will give people a greater sense of social presence than audio alone (Roussel & Gueddana, 2007).

Technology research and R&D on videoconferencing has focused almost exclusively on improving the social presence and media richness of the experience, for example by creating higher-definition images,

better camera placement and multiple cameras for increased eye-contact, and larger screens for an immersive experience. In 1992, two researchers from the Bellcore labs in the US published an influential paper, *Beyond Being There* (Hollan and Stornetta, 1992). They highlighted that technology research has been aimed at improving the sense of *being there*, by increasing the experience of social presence for people communicating at a distance. In their paper, these researchers argued that instead, videoconferencing should aim to be better than in-person communication, by adding functionality to the communication experience that is not possible in an in-person setting. Their research is based on their belief that videoconferencing will reach a critical mass of users only when it is used widely for everyday communication. Further, they argue that unless videoconferencing is better than in-person communication, it will not be used on a daily basis and thus will remain limited as a form of communication.

The argument made by Hollan and Stornetta (1992) - about the lack of technology research on videoconferencing for everyday communication – can also be made for social science research on videoconferencing. Such research has concentrated almost exclusively on institutional uses of videoconferencing - videoconferencing at work, videoconferencing for health (telehealth) and videoconferencing for education (distance education) – and not on videoconferencing in everyday life. Similarly, most of the research on videoconferencing and First Nations has focused on using the technology for improving health and education (for example, see Care, 2001 and 2003; Downing, 2002; Health Canada, 2001; Masum, Brooks and Spence, 2005; Muttitt et al., 2004). Aside from our own research (O'Donnell et. al, 2007; O'Donnell et. al, 2008; O'Donnell, Beaton and McKelvey, 2008), there has been no research exploring non-institutional uses of videoconferencing in remote and rural First Nations, for example events such as family and community get-togethers or using videoconferencing equipment originally meant for distance education and telehealth for other social and community purposes.

3 Research focus, questions and methodology

This paper explores three main questions: Is visual communication important to remote and rural First Nations? What is the prevalence and purpose of videoconferencing in non-institutional settings? What are the challenges for First Nations using videoconferencing?

Our VideoCom research project began in 2006. VideoCom (<http://videocom.knet.ca>) is a partnership between two research institutions and three Aboriginal organizations. Developing and maintaining partnerships and conducting participatory research is as crucial for research on technology issues with Aboriginal

communities as it is for Aboriginal research generally (Perley and O'Donnell 2005 and 2006). The two research organizations in the partnership are the National Research Council Institute for Information Technology (NRC-IIT) and the University of New Brunswick (UNB), both in Fredericton, New Brunswick. The three Aboriginal organizations are all RMOs in the First Nations SchoolNet program. The three are: Keewaytinook Okimakanak – including both K-Net (the Kuhkenah Network) in Sioux Lookout and KORI (the Keewaytinook Okimakanak Research Institute) in Thunder Bay, Ontario; Atlantic Canada's First Nation Help Desk in Membertou First Nation, Cape Breton, Nova Scotia; and the First Nation Education Council (FNEC) in Wendake, Quebec. K-Net, KORI and the Atlantic Help Desk were partners from the project start in 2006, and FNEC joined as a partner in 2008. The current paper reflects research conducted from 2006 to 2008 with the two original partners in Ontario and Atlantic. The research participatory approach is adapted to the vast Canadian geography. Regular in-person contact among the partners is prohibitively expensive, given the vast distances between us and the high cost of travel. The monthly research meetings are by multi-site videoconference and communication in-between meetings is by email and via the project website. The partners seek to find consensus on study direction, activities and goals.

For the research discussed in this paper, a mixed methods approach was used. Methodologies included a content analysis of a random sample of 100 videoconferences from the 293 videoconferences archived on a K-Net server in October 2006, a traffic analysis of the K-Net videoconference bridge log for a nine-week period ending early 2007, and 15 in-depth interviews with staff and associates of K-Net and the Atlantic Help Desk conducted during fieldwork visits to partner organizations in April 2007. In July 2007, the project organized and supported two national public multi-site videoconferences connecting remote and rural First Nations with researchers and policy-makers in urban centres to discuss videoconferencing issues. Transcripts of these two sessions were analyzed along with the 15 in-depth interviews to understand the videoconferencing experiences of a wider range of participants.

More information about the participatory methods used in this project and the details of the interviews conducted are described in other publications from this project (O'Donnell et al., 2007, 2008a, 2008b; Simms, O'Donnell and Perley, 2008). The research methods and instruments were developed in consultation with the research partners. The research follows ethical guidelines¹ developed by KORI in consultation with Elders, youth, women and other community members. The project and methodologies

¹ To see the guidelines, go to: http://research.knet.ca/images/upload/06-12-11_Community%20Consultation%20Guidelines.pdf

were reviewed and approved by research ethics boards at the two research institutions – the National Research Council and the University of New Brunswick.

4 Research findings

4.1 Importance of visual communication for First Nations

Earlier we discussed the link between visual communication and social presence and how a high degree of social presence is important for effective interpersonal communication. In this section we discuss the research findings on the importance of visual communication to First Nations people.

In the interviews, we asked specifically about the visual aspect of videoconferencing. In their responses, all the interview participants said that having visual communication is important when communicating at a distance. Many of the participants in the national public multi-site videoconferences also mentioned the visual aspect of videoconferencing. They want to see the other person in a discussion, seeing that people are paying attention when they are speaking. With visual communication people take the meetings or gatherings more seriously because others are watching them. Several interview participants said the visual communication allows them to build or maintain relationships with people they cannot meet in person.

Three quotes illustrate the importance of visual cues:

"We're visual people, as humans, in general, and Native culture is even more so. I think there's a misconception when we talk about oral traditions. We tend to think only about sound, but I believe that oral traditions are audiovisual. When the granddad was telling those stories, and you were sitting around the campfire you were thinking thoughts that had images attached to them. It's very definitely audiovisual... it's not just sound." (interview participant in Atlantic region)

"It's just more personable. You see the person and their reaction, you know they're not working on other things. It gives you that closeness to that person... After a while, it's just like meeting the person, so I think when you see them on camera, and when you see them in person, you kind of already feel that they're familiar." (interview participant in northern Ontario)

"You see. It's like you're there, you see everyone, and you see expressions on people's faces. You can see reactions to people as they're discussing, so you can engage and understand what they're presenting much, much better than only through audio." (interview participant in Atlantic region)

"The benefit of videoconferencing is that we don't stop meeting face-to-face completely ... face-to-face meetings are very important by videoconferencing compared to telephone." (multi-site videoconference event participant in Ottawa)

Some want visual communication primarily to be able to show things to the person they are speaking with, as illustrated in the quote below:

"You can point the unit at the whiteboard and you can do a drawing and explain things, which otherwise, are really hard to do by emails going back and forth. Emails are second, if your try to explain something, even worse than the telephone." (interview participant in northern Ontario)

Figure 1 is a "screen shot" illustrating the image participants will see in a typical large multi-site videoconference with the participants and their meeting rooms visible. (Note that the image in Figure 1 is a blurred representation of the sharp image available in a high-quality videoconference). The image will be as large as the monitor - usually the size of a large-screen television. The image can also be configured so that only the person speaking is visible in the whole screen, which allows more visual information from the one site to convey many social presence aspects of communication.



Figure 1: Screen shot of a multi-site videoconference connecting First Nations in the Atlantic region.

Several of the interview respondents highlighted the particular benefits of the visual for communicating at a distance with First Nations people with disabilities, or the frail and elderly, who are staying in urban hospitals. Friends and relatives have used videoconferencing to see for themselves how these people are doing. Videoconferencing has also been important for Native-language speakers who want a visual connection with each other. Regular Elders videoconferences in which many participants speak Native languages take place both in the K-Net and the Atlantic Helpdesk communities. There are several examples where the only contact some Elders have with speaking Mi'kmaq is during these videoconferences, because

there are no other Native language speakers in their communities. For them it is not necessary to make a speaking contribution to these gatherings - hearing the language and seeing the facial expressions and gestures are enough to help them feel connected to their language and culture. Recognizing the importance of the technology for family events, in December 2008, K-Net offered a seasonal service: “Meet your family for the Xmas holidays using videoconference” – the opportunity for families living in different communities to meet via real-time audio and video exchange over the holidays.

4.2 Prevalence and purpose of videoconferencing in non-institutional settings

The second research question addressed a different theme: videoconferencing used by remote and rural First Nations for non-institutional purposes. Exploring this question primarily involved the analysis of the videoconference bridge logs and the content analysis of archived videoconferences. The research findings in this section are also discussed in our recent publication (O’Donnell et al., 2007).

The bridge log analysis and content analysis of the content analysis of the archived videoconferences are described here in more detail. K-Net and the Atlantic Help Desk both have a videoconference bridge, equipment that allows the organizations to connect two or more sites (geographical locations) by videoconference for simultaneous audio-visual exchange. The researchers analyzed the bridge logs (the records of all scheduled videoconferences) covering a nine-week period from November 2006 to February 2007 excluding the December holidays, a typical period.

Some of the videoconferences between communities connected with the bridge are archived on a K-Net server. Archived videoconferences can be accessed on the Internet and viewed after the event.

Videoconferences are archived when the content is public and of potential interest to others. Other types of videoconferences are not archived, including informal meetings, meetings where personal or confidential information is discussed and clinical appointments. The analysis of the bridge logs suggest that 26% of videoconferences are archived. In September 2006, the server held 293 archived videoconferences averaging an hour in length. A random sample of 100 of these archived videoconferences was selected for content analysis. The videoconferences in the random sample were viewed and coded for variables in 11 categories including: total number of participants in the videoconference, the male/female ratio, the number of locations participating in the videoconference and their geographic range, and the main purpose of the videoconference and main topic of discussion. There was high inter-rater reliability, and our videoconference content analysis has a 95% confidence level with an error rate of 8%.

The analysis found that both the K-Net bridge and the Atlantic Help Desk bridge are used to support two-way videoconferences, multi-site videoconferences, and web streaming for simultaneous audio-visual exchange. In addition, K-Net, the Help Desk, and the community sites on their networks, also initiate point-to-point (two site) videoconferences within and outside their networks. Our findings suggest that K-Net supports about 1,000 videoconferences and multi-site videoconferences a year, in addition to telehealth sessions. The findings suggest that the Atlantic Help Desk supports about 150 videoconferences and multi-site videoconferences a year.

These videoconferences connect people in many different locations (sites). Of the videoconferences we analyzed, only 3% connected two sites and the rest connected more: 44% of the videoconferences connected six to 10 sites, 28% connected three to five sites, and 15% connected more than 10 sites. Most often videoconferences connected people located in the same province (73%) but some videoconferences were inter-provincial (7%) or international (1%). Most of the videoconferences (66%) had more than 10 participants, 14% had six to 10 participants and 5% had three to five participants. Overall the analysis of the gender ratio of participants suggests that videoconferencing is used more often by women.

To understand the wide geographical range possible with multi-site videoconferencing, see Figure 2 below. This is a map excerpted from a forthcoming publication about multi-site videoconferencing as a public sphere for First Nations (McKelvey and O'Donnell, forthcoming). The map illustrates the geographical locations of one of the public multi-site videoconference events organized in July 2007 as part of the VideoCom project, and referred to in the methodology section of this paper. The event demonstrated how multi-site videoconferencing technology allows remote and rural First Nations to connect with each other and with key resources in urban locations in one meeting space for simultaneous audio-visual exchange. The meeting brought twenty-two different communities from across Canada into one mediated space, with seven sites in the Atlantic region, thirteen sites in Ontario, one site from Alberta, and one site from British Columbia.²

² The complete list of sites: Atlantic Helpdesk, Membertou First Nation, NS (2 sites); Chapel Island First Nation, NS; Wagmatcook First Nation, NS; Waycobah First Nation, NS; Elsipogtog First Nation, NB; National Research Council, Fredericton, NB; Ottawa, ON (3 sites); Wikiwemikong First Nation, ON; M'Chigeeng First Nation, ON; KORl, Thunder Bay, ON; Sioux Lookout, ON (2 sites); Lac Seul First Nation, ON; KO, Balmertown, ON; Poplar Hill First Nation, ON; Nibinamik First Nation, ON; Bearskin Lake First Nation, ON; Edmonton, AB and Salt Spring Island, BC.



Figure 2: Map with locations of participants in the July 2007 multi-site videoconferencing event (from McKelvey and O'Donnell, forthcoming)

The content analysis of the videoconferences archived on the K-Net server allowed us to develop statistics about the basic purpose of the videoconferences: 62% were for learning related to personal, professional or community development. For 14% of the videoconferences, the main purpose was a meeting. For 14%, the main purpose was a community get-together; examples are the popular ongoing Elders' videoconferences to link Elders in different communities who communicate in their Aboriginal language. Finally, 9% of the videoconferences were streaming a large meeting to virtual participants; an example was a meeting in British Columbia about information and community technology in First Nations, with participants joining by videoconference from two other provinces, and streamed on the Web to other participants across the country.

The content analysis found that the most common topic of the videoconferences (59%) was health and wellness. Note that these were not clinical telehealth videoconferences but rather other kinds of sessions discussing health and wellness – a typical example was a multi-site interactive seminar for community health professionals on diabetes prevention. For 14%, the topic was education and learning. For 9% the topic was culture and language. For 6% the main topic was information and communication technology; in addition, 32% of the videoconferences overall discussed information and communication technology as part of the other main topic of discussion. For 5% the topic was economic and community development.

Analysis of the interview transcripts found that videoconferences are used by First Nations primarily when an in-person meeting or gathering would be appropriate but impossible. The realities of remote and rural

communities mean that traveling is often too costly and time consuming to be a realistic consideration. Alternatively, a tiny community may not be able to host a gathering because of a lack of food or appropriate accommodation for a large number of visitors. This quote below from illustrates one example of family use of videoconferencing.

"The biggest thing is the reduction of travel costs. Patients don't have to leave home. They don't have to leave their families. They don't have to leave work. We also use it for family visits when high school students go out to school. They're able to visit their families here at home." (participant in multi-site videoconferencing event from northern Ontario)

In early 2008, the VideoCom research team conducted an action research activity that supported two community-led multi-site videoconferences. These events were designed, conducted and supported by First Nations people and hosted in remote fly-in First Nations communities in northwestern Ontario. The topics chosen for these events were a *Women in Leadership Forum* and an event to share information and resources on Oji-Cree language: *Anihshiniimowin: Our Language Of The Past, Now And Tomorrow*. In another publication, we analyzed these two events as examples of videoconferencing used by communities for sustainable development (O'Donnell, Beaton and McKelvey, 2008). We also created videos about these events available for viewing on the VideoCom website <http://videocom.knet.ca>

4.3 Challenges for videoconferencing in remote and rural First Nations

The final theme of our paper – the focus of the third research question – is challenges for First Nations using videoconferencing. The data from the transcripts of interviews and public multi-site videoconferences were analyzed to answer this question; our research findings are also discussed in our recent publication (O'Donnell, Perley and Simms, 2008). The challenges we identified were guided by a framework we developed for analyzing video communications for social interaction (O'Donnell, Molyneaux and Gibson, forthcoming). The four categories in the framework are: technical infrastructure, the interactions of the users with the technical infrastructure, the production and reception of audio-visual content, and the organizational and social relations.

Our analysis found that the primary challenge for technical infrastructure in remote and rural First Nation communities is network and bandwidth constraints. Videoconferencing requires much more network bandwidth than exchanging text data. Across Canada the bandwidth available in urban communities is significantly greater than in rural and remote communities; in small communities, the commercial telecom

providers are often not interested in providing network infrastructure; if they do it is expensive and can take considerable time to acquire. Some of the remote communities serviced by satellite have enough bandwidth for only one videoconference at a time. The limited bandwidth has to be managed to ensure that videoconferencing sessions are not degraded by other uses of the network, such as downloading and sharing large music and video files. Managing the network involves providing quality of service (QoS) for videoconferencing, requiring human and technical resources that need to be maintained and sustained.

Figure 3 below is a photograph illustrating one example of the kind of technical infrastructure required to support videoconferencing in remote First Nation communities. This solar powered tower and radio equipment installed in 2008 will provide Koocheching First Nation residents with access to the K-Net network that will support the community's use of videoconferencing, IP telephones and high speed data connections. The antenna will connect to K-Net at the site of the new cellular telecom tower located in Keewaywin First Nation.



Figure 3: Photo of the solar-powered cellular tower and radio equipment erected in Summer 2008 at Koocheching First Nation, Ontario (photo from the K-Net Media archive <http://media.knet.ca>).

Another infrastructure challenge is ensuring a critical mass of quality videoconferencing units in First Nation communities. In the Sioux Lookout district of Ontario, the communities usually have three

videoconferencing units: in the school, health centre and band office. In the Atlantic region, the communities with a school usually only have one, in the school, although more Atlantic First Nation health centres are acquiring videoconferencing units, and in a few communities the band office has one. The need for QoS implies using good quality set-top videoconferencing systems. Although the cost of these systems is dropping, they are still expensive compared to desktop videoconferencing systems using webcams. Currently desktop systems do not consistently provide the visual quality necessary for successful multi-site videoconferencing sessions, although this may change in the future.

Moving on to the topic of community members interacting with the technology, a major challenge is the lack of awareness in communities that the technology is available and useful. Low levels of awareness and understanding remain after more than six years of introducing videoconferencing equipment in these remote and rural communities. Sometimes, staff working in community organizations with the necessary capacity to use videoconferencing are not aware that it exists and that they can use it. Either organizations in First Nations need to change their work processes so that videoconferencing fits, or else videoconferencing does fit their current work processes and they need to know how to make it work for them. This will involve basic training to use the equipment; in some organizations, staff turnover is high, compounding the challenge.

Another primary challenge in this category is technical support. In urban government, institutional and corporate offices there are trained technical contact persons who assist staff to use computer and videoconferencing equipment. Conversely in remote and rural communities, these persons may not exist, and funding for such a position is always in short supply.

Another challenge is the difficulty of accessing the videoconferencing equipment in remote and rural communities. The videoconferencing unit is generally there for a specific purpose, such as health, education or band office administration. It can be a daunting task to find out where and how to access the videoconferencing unit in the community. In band offices, the units are often in meeting rooms that are heavily booked. The equipment in schools and health centres are usually not set up for community uses and when it is the rooms with the videoconference units are often not available after 4pm and on weekends.

Our analysis found several challenges related to organizing videoconferencing events. In many First Nation communities, there is a perception that people prefer to travel to meetings outside the community rather than use videoconferencing to attend the event. This is not always the case but unless the videoconference

option is widely known and appreciated people will not have the option. There needs to be someone in the community willing to organize the videoconference, and until this skill becomes as much a part of everyday life as making a phone call, there will be few volunteers. People will be hesitant to participate in videoconference events until they become familiar with basic videoconference etiquette and good practices. Some people are not sure of what to do for a videoconference, where they should sit and so on – and they will not get this experience unless videoconferencing is more widely used.

Finally the analysis identified two main challenges related to broader organizational and social relations outside the community. The first was the need for outside funding to develop the community capacity to maintain and run the equipment, to train people how to use it, and to support its use. Most funding sources do not have a community or social development focus or provide for sustainable development in communities. As a result, funding is generally unavailable for most communities themselves to sustain videoconferencing.

The final challenge is the low level of videoconferencing activity by urban organizations. The interview respondents and participants in the multi-site videoconferencing event identified a general lack of awareness, by professionals and institutions in urban centres, of the communication needs of rural and remote communities and the importance of videoconferencing as a tool for connecting with community residents. In some cases, government and other partner organizations in urban areas do not have adequate support for videoconferencing in their own organizations and need K-Net and the Atlantic Helpdesk to support their use of the technology.

5 Conclusions and policy implications

Videoconferencing – high-quality real-time visual and audio exchange among people separated by distance – offers real benefits for people living in remote and rural communities. The visual aspect of videoconferencing is important for remote and rural First Nations because the increased social presence - compared to other non-visual modes of communicating over a distance - allows more effective interpersonal communication. People using it can experience the type of connection that builds trust and social relationships. Broadband networks that support videoconferencing are found in many remote and rural First Nations across the country, most set-up through the First Nations SchoolNet program and maintained by a national network of six RMOs. Our research with two of these RMOs – in Ontario and the Atlantic region – found that communities are using videoconferencing not only for education and telehealth

but also for many other community, social and economic development purposes, and that non-institutional uses are limited. Our research identified significant social and organizational constraints that limit the more widespread diffusion and use of videoconferencing in communities.

The main conclusion we draw from this investigation is that videoconferencing is a powerful communication technology with the basic infrastructure to support it in place in many remote and rural First Nations. The technology meets clearly articulated needs to have a visual component in communicating with First Nations people. However videoconferencing will not be widely used for community, social and economic development until it becomes a part of everyday life in communities.

Many researchers have studied how technologies over time have become part of everyday life. An obvious recent example is the Internet – most people did not have an email address 10 years ago and searching the Web only became possible around 1995. Today it would be difficult to find anyone who does not use email or instant messaging and the Web – either by themselves or through a friend or relative who exchanges email or messages or searches the Web for them.

How can videoconferencing become more a part of everyday life in remote and rural First Nation communities across Canada? Making this happen will require changes and developments on many levels; this paper will make three recommendations on a national policy level. These recommendations are premised on the researchers' belief that if the everyday barriers to using videoconferencing can be overcome, and videoconferencing becomes a part of daily life, then it will be used not only for everyday social reasons but more often and more widely for institutional applications. Therefore, increasing everyday use of videoconferencing in First Nations will have a positive impact on the take-up of telehealth and distance education in communities as more people become comfortable with this alternative option to expensive and time-consuming travel.

Here are three recommendations at the federal government level developed from our research:

1) All federal departments and agencies with a public service mandate need to review their own department's videoconferencing capacity. The long-term goal should be that all federal public servants who communicate now by telephone with the public should in future be able to communicate by videoconference. In many departments it is likely that the internal computer support and technical service teams lack the expertise or are reluctant to use videoconferencing. They may not know how to properly

manage their videoconferencing traffic within their own internal networks. This may be due to a lack of training or experience with videoconferencing on the part of network managers. The only way to become comfortable with videoconferencing is to use it often.

As federal government departments develop more sophisticated means of integrating public input into the policy-making process, policy-makers will want to use videoconferencing to reach out to community leaders and champions in remote and rural First Nations. At the 2007 public multi-site videoconference analyzed for this study, several government participants said that many bureaucrats in Ottawa and other urban centres are not aware of videoconferencing and that the government lacks champions to promote videoconferencing to reach out to First Nations. One participant, a policy-maker in Ottawa, said:

"I think what is missing in Ottawa is maybe champions at the federal government departments to promote the videoconference capacity in reaching out for policy development, not to miss out the First Nations that are in remote communities that often can't come in to Winnipeg or Ottawa to provide their views on future policies. So for consultation purposes, videoconferencing is most important, to make sure that we get the views of all those concerned by the policy and the programs that will be developed."

2) Federal departments with programs involving regular communications with people living in remote and rural First Nations need to work together on the infrastructure challenge. It makes little sense to have a patchwork quilt of broadband infrastructure development and support programs – one for schools, one for health, one for justice, and so on - when the same infrastructure will support many program areas. Further, if the support is for the infrastructure itself and not for specific uses of it, it frees up First Nation communities to dream up innovative ways to use the infrastructure for their own community, social and economic development purposes. A common-purpose infrastructure with no program-specific strings attached will go a long way toward the goal of having videoconferencing become a part of everyday life in communities.

Infrastructure refers to more than cable, satellite and wireless connections and the hardware and software that makes it usable. Infrastructure includes the capacity to use it. This means that the federal departments using this infrastructure need to ensure that they themselves have the capacity internally to use it. They also need to ensure that the remote and rural First Nations also have the capacity to use it. The goal should be to provide to the communities the same level of technical support available to the federal government partner.

Working together on the infrastructure will mean continuing to work with the RMOs currently funded by the First Nation SchoolNet program. They are the organizations nationally with the capacity to understand videoconferencing and the needs of the communities they work with. The six RMOs have all expanded beyond supporting broadband connectivity in First Nation schools. They are the community-based organizations best positioned to work with the federal government and with the communities in their regions to develop partnerships and connectivity solutions with a range of players from large telecommunications companies to local connectivity solution providers.

3) There should be a federal fund available to communities who want to increase their community capacity to use videoconferencing for everyday non-program specific purposes, such as social networking and a wide range of community develop initiatives. The fund would cover building community awareness, community skills training, and community-based technology support, as well as organizing multi-community events connected by multi-site videoconferencing. The funding should also be available for communities that want to take the lead to develop resources to share good practices for community videoconferencing.

Finally, as researchers we would be remiss if we did not suggest a focus for future research on this topic. The mechanisms by which technology becomes a part of everyday life have been explored by many communications and sociology researchers – examples include work by Roger Silverstone about television (1995) and about the Internet by Wellman and Haythornthwaite (2002) and Bakardjieva and Smith (2001). To date there is no published social science research to our knowledge about how videoconferencing can become more a part of everyday life. Our research team has made inroads on the topic of video communications in First Nations communities – we have analyzed key issues and established research approaches but many areas remain unexplored. We note also that the videoconferencing technology is evolving. The use of desktop-computer based videoconferencing is increasing and will create additional challenges for managing limited bandwidth as well as new opportunities for increasing the use of videoconferencing in communities. There are many interesting opportunities for technology researchers to explore in the area of web-based interfaces with set-top videoconferencing systems with a goal to making these technologies more adaptable and useful for everyday applications.

Videoconferencing will continue to be used by remote and rural First Nations. The big challenge raised in this paper is for all the partners in this process – the RMOs, their funders and government partners, their research partners, and the local technology and infrastructure providers - to work together to develop

solutions that support innovative uses of this powerful technology by all members of remote and rural First Nation communities.

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