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A model for rural and remote information and communication technologies: a Canadian exploration

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Abstract

While Canada boasts one of the most advanced information and communication technology (ICT) infrastructures, its rural and remote areas are lagging behind. Rural and remote ICTs development is presented as an uncharted domain. A model for rural and remote ICTs is proposed describing the interrelationships among policy, organizational, community, and technological dimensions. The model served as a guide to prepare three case studies that are briefly described. Several principles are described as strategic policy and organizational insights into how rural and remote communities can harness ICTs. The article concludes with a hypothesis highlighting the role of mediating organizations to secure affordable and relevant ICT services and applications for rural and remote communities. © 2001 Published by Elsevier Science Ltd.

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1. The Canadian context

Canada boasts an aggressive information infrastructure policy that seeks to make it the most connected country by the year 2000 (Government of Canada Information Highway Advisory Council, 1997). The policy framework is reflected in a broad range of provincial and federal funding grants to stimulate infrastructure upgrades, inform and train citizens, and enhance new services and applications across most sectors of the economy. Being the ‘most connected country’ is a political goal open to interpretation through undefined indicators. According to at least one measure, Canada’s overall telecompetitiveness is only second to Singapore’s, and ahead of the United States (Hubert, 1996). According to other measures, such as Internet hosts per 1000 inhabitants, it comes fourth after the United States and three Scandinavian countries (Paltridge,

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1999). It is clear that on a global scale, Canada boasts a very advanced information and communication technology (ICT) infrastructure. It is certain too, however, that rural and remote communities lag behind urban ones with regard to ICT infrastructure, services and human resources. While some Canadian statistics suggest that the gap in information infrastructure and use between urban and rural sectors may be shrinking (Thompson-James, 1999), the task of servicing rural and remote areas remains relevant. This challenge constitutes a part of a growing global infrastructure gap that is very significant (Hudson, 1998; UNDP, 1999; Mansell & Wehn, 1998). The gap is not only between rural and urban populations; it is also closely associated with education and income levels (Bruce & Gadsden, 1999).

Telecommunication investments are perceived as strategic tools for economic development of rural areas of OECD member states (Ullman, Williams, & Emal, 1996; United States Department of Commerce & United States Department of Agriculture, 2000; Bryden & Sproull, 1998; USDA Economic Research Service, 1998; Richardson & Gillespie, 1996; Reimer, 1997; Parker & Hudson, 1995; Cronin, McGovern, Miller, & Parker, 1995). Their reach into rural and remote areas, however, is limited by weak demand (Bollier, 1988), partly as a direct result of their sparse populations. In other words, the very areas that stand to gain the most from telecommunications are the last ones to be serviced by the market.

A major challenge for Canadian telecommunication regulators is the fact that while on the one hand market liberalization is a goal, on the other hand so is universal access. Managing these two policy driving forces is particularly challenging when it comes to regulating services in remote areas, as was the case with a recent ruling on high-cost serving areas (CRTC, 1999). Canadian telecommunication infrastructure is increasingly owned by large corporate interests that compete on a global scale. “In place of national policy-making, a global telecom and media policy regime is emerging.” (Abramson & Raboy, 1999, p. 775) At the same time, a factor of central concern in Canada is unity, national economic viability and cultural identity, all of which are tightly linked to communication policy (Ganley, 1979). Today cultural and communication policies in Canada are confronted with emerging global regimes that place economic and competitive pressures on the sector (Science Council of Canada, 1992; Globerman, Oum, & Stanbury, 1993; Abramson & Raboy, 1999).

2. From a ‘business case’ to a ‘developmental case’

Telecommunication infrastructure expansion and upgrading depend on compelling proposals demonstrating a business case in the eyes of investors. Aggregating demand from different sectors is a mechanism to attract private sector carriers that shun further investments in rural areas (Sawhney, 1992; McMahon & Salant, 1999). In remote settings, the business case will often not be there, and infrastructure upgrades are only possible through regulatory mechanisms, governmental support and partnerships (Schmandt, Williams, Wilson, & Strover, 1991; Dymond, 1998). In such contexts, there are other objectives that create a *developmental case* for the investments. In other words, while economic development remains high on the list, the purpose of harnessing ICTs lies beyond merely a demand and supply rationale. Sustaining and improving opportunities in those communities is a worthy goal (Wilson, 1992; Bryden, 1994). A community development approach to rural and remote ICT development calls for the integration of economic and social

development goals (Richardson & Paisley, 1998). In other words, while the benefits of ICTs must be presented as economically feasible, at the same time they must engage social and regional development policy dimensions.

3. Rural and remote ICTs in Canada: an uncharted domain

Information and communication technologies (ICTs) create new services and business practices across many sectors of the economy. Transportation, professional services, electronics manufacturing and broadcasting are examples of sectors that have been transformed by information and communication technologies. Mansell and Wehn (1998) provide a framework to show the interrelationships across these sectors, and highlight the new professional services that emerge. Melody (1996) provides two additional frameworks that describe the demand and supply side of the information infrastructure and the major components of the information society. This second framework is particularly useful in displaying the infrastructure requirements that are needed before new services and applications can emerge. Pacey (1999) provides a complementary framework on ‘technology practice’ that integrates the human and policy perspectives.

The frameworks are useful maps to locate the interrelated dimensions of an information society. They are heuristic tools to enhance our understanding of a complex and dynamic context. However, they fall short in reflecting the specific predicaments faced by rural and remote areas. They also fail to describe the actual processes by which organizations in rural and remote areas generate demands for ICTs that lead to affordable and relevant applications.

Melody (1996) and others suggest that ICT development, especially in the services and applications side, must be demand-driven: “The analysis of users’ needs is essential as is consideration of the factors that may exclude them from participating in the design and implementation of applications. User representatives must be involved in all stages of ICT application development if the users themselves cannot be involved directly. The range of capabilities among potential users must be taken into account in the process of designing and implementing new applications.” (Mansell & Wehn, 1998, p. 95) For rural and remote contexts in Canada, several questions arise from the above analysis: Who is able to coordinate demand analyses in rural and remote communities? What policies are conducive to generating this demand? What is the nature of the organizations that take on this challenge?

4. Research approach

The above discussion points to the Canadian experience—and the province of Ontario in particular—with ICT expansion in rural and remote areas as a research opportunity. The research began with a consultation with stakeholders from across the province on priority topics to investigate. The consultation and a review of the literature revealed that there were no theories or common frameworks on rural and remote ICTs that would allow researchers, practitioners or policy makers to explore and analyze issues of concern.

The focus of this research is on the human and organizational side of rural and remote ICTs. The methodology is informed by grounded theory as an approach to research that seeks to

Table 1
Summary features of the three case study organizations

Name	K-Net services	COIN	LCN
Region	Northwestern Ontario	Southwestern Ontario	Eastern Ontario
Population density (area)	0.1 people/km ² (200,000 km ²) ^a	50 people/km ² (2030 km ²)	19 people/km ² (2938 km ²)
Teledensity (no. of phones per 100 people) ^b	5.8	52.3	69.1
Headquarters	Sioux Lookout	Beachville	Perth
Organizational identity	Keewaytinook Okimakanak Northern Chiefs Council	Information Access Oxford, Oxford County Library	Independent not-for-profit corporation
Period covered in case study history	1975–March 2000	1985–March 2000	1993/94–March 2000

^aThis is a general estimate of the area where the Keewaytinook Okimakanak communities are located as well as many other First Nation communities that have benefited from support by K-Net.

^bEstimates based on data received from: K-Net using INAC statistics, Bell Canada, North Norwich Telephones (independent telephone company operating in Oxford County), Statistics Canada, County of Oxford LRIS, County of Lanark Community Development.

generate theory rather than test hypotheses. This paradigm is appropriate to a subject matter that is characterized by multiple actors with different perspectives and no clear definition of goals across the different interest groups. The methodology also integrates elements of systems thinking, soft systems methodology (Checkland, 1981; Checkl & Scholes, 1990), case study research and participatory action-research.

Three community-based networks were selected for case study development on the basis of the following criteria:

- They exhibited accomplishments that can be observed and analyzed.
- They had an organizational entity that has existed for more than five years; they have an identity that is recognized and referred to across the province of Ontario.
- They covered three distinct geographical areas, two rural and one remote.
- They constituted three different models.

The case study for K-Net Services (www.knet.on.ca) is an example of a network in the remote northwest. The other two case studies are in rural areas serviced by the County of Oxford Integrated Network (COIN) in the southwest (www.county.oxford.on.ca), and by the Lanark Communications Network (LCN) in the eastern part of the province of Ontario (www.thelcn.on.ca). Table 1 summarizes the geographic coverage of each site, their headquarters location, their organizational identity or affiliation, and the years of work described in this research.

5. Major findings: a model and three case studies

The research led to the development of a framework as a heuristic model to understand and analyze rural and remote ICTs. The model addresses the interrelationships across four major

dimensions: policy and regulation, organizational development, community, and infrastructure. The model was applied to three case studies. In turn, the case studies shaped the final model.

5.1. Case study findings: a focus on organizational dimensions

The organizations in question defy traditional descriptions; they change roles often, they encompass multiple partnerships and relationships; they offer a range of services to different clients or partners; they mold to circumstances much as consulting organizations do. These attributes make them good examples of learning organizations (Senge, 1990; Stiglitz, 1999; Morgan, 1997). They are all community-oriented and have a sense of location. They all see technology as a vehicle to improved economic, social, and cultural renewal of rural and remote communities.

Lotz (1998) suggests that all effective community development organizations require people who can take on the following roles: a prophet, visionary, one who scans the scene; a manager, bookkeeper; and a marketer, facilitator. During the interviews with case study organization managers, they were asked whether they identified with these roles in terms of helping other communities recognize the complementary roles required of leaders or ‘champions’.

The case studies reveal that all organizations studied have leaders who are visionary, able to scan ‘the large picture’ and determine where ICTs and community needs may come together. They are all experienced mediators among three dimensions:

- community needs;
- technology and infrastructure;
- government grants and incentive programs.

They have gained experience in juggling the three elements, and this makes them effective as ‘mediating organizations’ that broker between communities and governments (Lotz, 1998; Berger & Neuhaus, 1977). Their experience may be described as the *curriculum* of rural and remote telecommunication. It can also be described as ‘social learning’, a term used by authors who analyze organizations that manage complex natural resource systems (Glasbergen, 1996; Jiggins & Röling, 2000; Woodhill & Röling, 1998) and is now appearing in information and knowledge management literature (Stiglitz, 1999). The major features of the case study organizations are summarized in Table 2. Table 3 provides examples of the mediating actions that the case study organizations have pioneered.

5.2. A heuristic model for rural and remote ICTs

Fig. 1 describes a heuristic model to capture the different dimensions of the ICTs in the context of rural and remote settings. The model is organized around four dimensions and all—except the infrastructure one—are based on guiding questions that address at the policy level, the organizational level, and at the community level. The embedded ovals describe the elements that are analyzed within each dimension.

Table 2
Major features of the case study organizations

Site	K-Net	COIN	LCN
The formal identity of the organization	A service organization of Keewaytinook Okimakanak (KO) Northern Chiefs, a First Nation's organization	A project of Information Access Oxford (IAO), a division of Oxford County Libraries, County Government	A not-for-profit corporation
The model	A First Nations aboriginal government service	A public County library-based service	A non-profit, private corporation representing private and public partnerships
The governing authority	Northern Chief's Council	COIN Board of Directors	LCN Board of Directors
How each organization describes itself	A regional information technology and content development organization (Beaton & Fiddler, 1999, p. 1)	A broad bandwidth community network designed to span the County of Oxford and provide network and Internet connections to all municipal offices and libraries... other partners may join the network and share in the cost of operation and maintenance (Brown & Moore, 1999, p. 1)	A not-for-profit corporation whose mission is to create and promote a telecommunications infrastructure that will facilitate application solutions, enhance quality of life, and improve economic development (adapted from Brohman & Parent, 1997)
What they describe as their main job	Helping communities improve the services they have	Delivery of information services. Helping people in communities	A community facilitator and catalyst in terms of using ICTs to transform, also advocates
The major 'drivers' (in terms of services and technology)	Enabling access Help-desk Training	Bandwidth Public sector network Training	Applications Enabling affordable access Training
The champions' roles	Prophet, visionary Manager, book-keeper Marketer, facilitator	Prophet, visionary Manager, book-keeper Marketer, facilitator	Prophet, visionary Manager, book-keeper Marketer, facilitator
Can afford to take risk	Yes	Yes	Yes

Table 3
Examples of mediating actions by the case study organizations

Cultural

The K-Net website (www.knet.on.cat) demonstrates how aboriginal groups can ‘live in two worlds’: oral histories from elders can be read and heard, both in English and in Oji-Cree, and the syllabic alphabet fonts can be downloaded

Cost and infrastructure sharing

COIN representatives liaise regularly with a large automotive manufacturing plant, with health authorities and with the education sector to ensure their needs are serviced and their partnership helps cover the cost of the county-owned high speed telecommunication network

Matching needs with technology and prices

The LCN assisted local doctors in their analysis of needs and costs surrounding teleradiology applications. While technology was available for transmission of X-rays in seconds, the option was expensive. LCN helped determine a balance between functionality (a ‘tolerable speed’ of 7 min) and costs

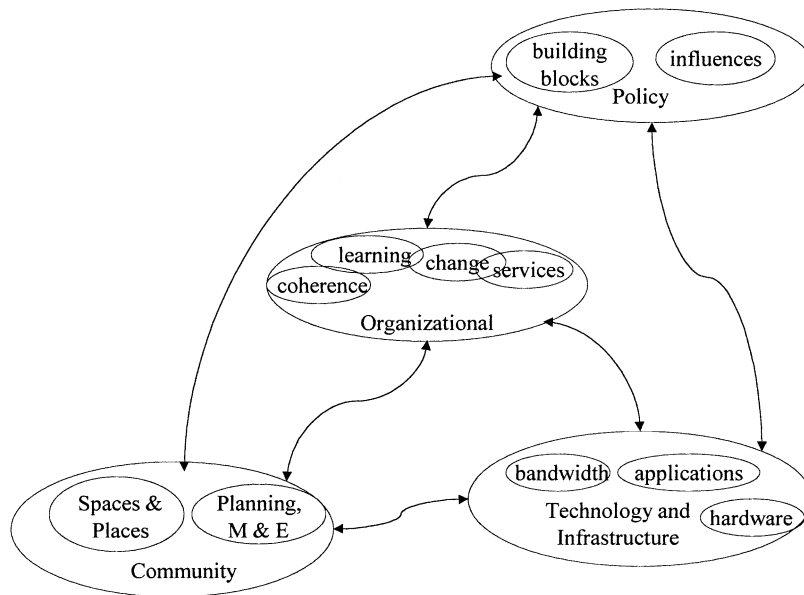


Fig. 1. A model for rural and remote ICT development.

5.2.1. The policy dimension

This dimension is explored through the following guiding question: *Do policy and incentive programs create building blocks that stimulate local ingenuity?* This statement stems from the literature on value co-production (Ramirez, 1999; Normann & Ramirez, 1994) and interactive policy-making (Lindquist, 1992; Driessen, 1995; Glasbergen, 1995; Bernard & Armstrong, 1997). The question addresses policy and governmental funding programs as ‘building blocks’.

The policy dimension of the model focuses on determining the policies and regulations that are available, their scope and orientation, and the process by which they undergo adaptation or adjustment. The first element addresses policy incentive programs as ‘building blocks’ to stimulate

local-level community electronic network organizations. The second one addresses the impact and influence from the experiences by the local organizations on the evolution of the policy incentive programs. The two elements are complementary: the first addresses the impact of policies on field level experience and the second addresses the reaction from field experience on the policy-making process.

The conditions by which grants are awarded constitute the conditions that simulate local initiative. One example is the requirement by some grant providers to only fund applications that come from partnerships across community agencies; another is the condition that awards are only given to groups in the not-for-profit sector. In this analysis, as the community organizations capture grants over the course of their evolution, the grants work like building blocks that shape the services and nature of the organizations that use them. The organizations, however, assemble them to respond to local needs. The underlying assumption is that ICT policies cannot fit every context equally, and that user involvement adds value to the policy purpose.

5.2.2. Organizational dimension

This dimension is built on the basis of the following guiding question: *Can communication/network organizations be described as mediating/learning organizations?* This question stems from the realization that the community electronic networking organizations mediate between the community needs, the telecommunication infrastructure providers/investors, and the policy and grant providers at the federal and provincial levels. In doing this, they have created a *curriculum* of experience over the last five or six years, and this is evidence of their capacity to learn. The three organizations for which case studies were prepared in this research have all received requests for advice from other communities. Determining what parts of their experience is applicable elsewhere is a challenge they all face: one of the case study site representatives mentioned the need to understand what part of their experience ‘travels’ elsewhere, and what part is unique to their own circumstances.

The organizational dimension is analyzed through four complementary elements that address major features of these ‘community electronic networking organizations’: (a) the internal coherence of the community electronic network organizations; (b) the extent to which these groups can be described as *learning* organizations; (c) how these organizations learn to adapt and change, with particular attention to the personal attributes of their managers (or ‘champions’) and to how they seek to transfer their experience; and (d) the range of services they offer. Much of this research is based on management theory that seeks to describe organizations through several complementary perspectives—or ‘metaphors’—at the same time (Morgan, 1997).

5.2.3. Community dimension

The community dimension is built around the following guiding question: *Do ICTs create spaces and places for community innovation and problem solving?* This question stems from community development literature, and from the narratives gathered in the field. It suggests that the value of ICTs be found in community-owned activities and communication spaces where issues of importance to the community are addressed. In other words, this is an ICT adaptation of rural Canada’s experience with the Farm Radio Forum—that ran from the early 1940s to the 1960s—where communities debated local issues around kitchen tables after hearing radio broadcasts on a relevant topic (Waldron, 1998; Nicol, Shea, Simmins, & Sim, 1954; Baker, 1957).

The corollary to this question is that ‘failure’ refers to ICT developments that do not create such spaces and places, and/or that destroy those that were working. An example given in Sioux Lookout, in Northwest Ontario, was how cable television reduced the number of community gatherings where people in the recent past came together to view videos and films.

In his insightful book about community development in Canada, Lotz (1998, pp. 179–180) suggests that “Community development is about solving problems together that cannot be tackled by one individual. . . . And the record of achievement in this field is very mixed. Only too often government ‘help’ has proved to be the kiss of death.” The organizations researched in this project all stem from the community, and have become mediating structures between the community and government. Lotz puts it like this: “They . . . offer spaces and places where different people can discuss ideas and options for action.” (Lotz, 1998, p. 235) What is unique is that the ICT that they provide can extend those spaces to remote places formerly kept off the loop because of geographic, social, economic, or cultural barriers.

This dimension is addressed through two elements: (a) identification of examples of new ‘spaces and places for innovation’, ranging from the community electronic networking organizations themselves to the electronic bulletin boards they have created for their users and (b) the sector- and project-specific initiatives that communities pursue.

The first dimension suggests that the community network organizations provide services to communities that constitute new spaces and places to learn about and explore ICTs, much as the Farm Radio Forum did through radio for rural families. In this case, however, the applications of ICTs are much broader than radio, so experimentation with the technology is a pre-requisite before people are in a position to innovate and put the technology to work. The services offered by the community organizations—the demand side—should respond to community demands.

5.2.4. *Infrastructure dimension*

No guiding question was developed for this dimension. In the literature there are fewer gaps in this area as a great deal of the research has been done on the technological and economic dimensions of ICTs. This fact justified less attention to this dimension at a theoretical level while the technological dimension of each case study organization was fully documented.

The three case studies that were developed constitute examples of community network efforts that aim primarily at attracting ICT infrastructure. Hence, the technology and infrastructure dimension is truly a contextual one more than an analytical one. However, the model and the case studies include descriptions of three elements of infrastructure: (a) bandwidth, (b) applications, and (c) hardware. In some instances, communities have succeeded in reducing the cost of bandwidth upgrades thanks to a pooling of applications into business plans that demonstrate the viability of additional investments (Brohman & Parent, 1997). In others, pilot projects that offer expanded bandwidth have allowed people in communities to explore the potential applications and necessary hardware that the technology offers.

On a Canadian scale, and especially at the consumer level, these three factors are in constant play: as one aspect of technology becomes economically promising, the other factors rush to fill the market space. Bandwidth is likely to become increasingly inexpensive as multiple technologies compete to supply businesses and homes with high-speed connectivity.

Technological, regulatory and market forces are shaping the services that community electronic network organizations can attract. In case of the County of Oxford Integrated Network, the

organization purchased its own network hardware and now competes with large corporations in the resale of bandwidth. In contrast, in the case of the Lanark Communications Network, they lease lines from major carriers. Buying or leasing decisions were based on costs of the day. Each situation is a ‘photograph’ of a particular time characterized by technology and costs that change, almost, on a daily basis.

6. Lessons learned

6.1. Principles that travel

In this kind of research there is often the expectation that the so-called ‘best practices’ can be extracted from case studies on existing experiences to assist other communities that are also seeking to harness ICTs for community development purposes. This motivation drives the funding behind this research; essentially, it comes down to one question: What experience is transferable, and which elements simply do not ‘travel’? In other words, can one develop a ‘transfer of technology’ strategy, as was commonly attempted with standardized agricultural or industrial technological applications? If the hope is to transfer complete models, the simple answer is no. What *may* be transferable are principles and major steps, and the essential characteristics of the process (Melody, 1996). Norms of best practice may be identifiable, but the need for context-specific flexibility makes it difficult to sustain the notion of best practices as universally applicable (Swan, Newell, & Robertson, 1999). Community development is not a linear process, nor is community development aided by ICTs. This begins to explain why even ICT engineers looking at expanding infrastructure into rural and remote areas are switching their methods towards systems approaches (AndAndrew & Petkov, 2000).

It may, however, be better to reframe the question: How can other communities accomplish as rich a *learning process* as the cases reviewed in this study? The learning accomplished by all case study representatives has to do with their skill and confidence in negotiating with grant providers, with community needs, and with technology. They have become ‘jugglers’ of the three dimensions on an ongoing basis. The challenge is to capture the stimulating elements that enabled them to develop those skills, and retain local support. The model and case studies signal some of the stimulating elements, or ‘principles that travel’:

1. *A continuum of policy incentive programs* (in terms of funds and the degree of sophistication required from applicants) that a community group/partnership can access as their capacities and need evolve;
2. *A team of champions* who together can offer visionary, effective management, and facilitation roles; these champions can afford to take risks either because they are skilled enough to be in demand, or because they have an existing separate source of funding. The champions tend to have a rooting in the community; they are there to stay.
3. *Workable informal relationships* between the champions and the policy makers, allowing each to learn from the other, and adapt accordingly. This is the champions’ social capital, and they have spent time building this up. This is an important element that has escaped attention in the past and is not formally recognized.

4. *Community-based electronic network organizations* that: (a) respond to a community vision and serve their interests; (b) are flexible to change; (c) are able to take on risks; and (d) are willing to review their service offerings regularly especially with regard to the need to compete with the private sector or complement it.
5. *Community trust* in a local organization (a ‘space and place’) where the benefits and limitations of ICTs can be explored. This trust is earned, but it also nurtures the networking organization (Reimer, 1997). ICTs may function as a (positive) Trojan horse in that they bring different individuals together to explore the potential of the technology (Richardson, pers. comm.).

The above elements cannot be imported; they have to be ‘grown’ locally. These steps cannot become recipes, especially as policies, technologies, prices and peoples’ awareness and skills today are radically different than in the early 1990s when K-Net, COIN, and LCN started off. They can, however, signal *how* the organizations responded to the challenges of the day. It can be concluded that regardless of their differences, the three case study organizations have a common perspective to recommend to others.

There seems to be a common sequence of events when it comes to making ICTs relevant to communities:

1. make access possible, through public places;
2. let community members experiment with the technology;
3. allow community members to dream up how to use the technology;
4. plan around those aspirations, aggregate demand, develop a business and developmental case for infrastructure upgrades; and
5. organize to make the aspirations a reality in terms of infrastructure, applications, and skills.

In other words, it is necessary first to have people using the technology. Only then it is appropriate to brainstorm on community needs and how ICTs may be part of the strategy to fulfil those needs; thereafter careful planning is required. This observation suggests that conducting a need assessment in a community that is not ICT ‘literate’ may lead to confusion and anxiety.

6.2. *A hypothesis as a conclusion*

It may seem unusual to conclude two years of research work with a hypothesis. In inductive research, however, this is to be expected as researchers learn to ask better questions as they generate theory. Indeed, it would have been rather difficult to pose this hypothesis without the work reported in this article. The hypothesis is: rural and remote ICT initiatives need a local learning space to flourish, where a ‘local learning space’ may be a mediating organization united by a vision of a desirable community future. The organizations may integrate not-for-profit goals with some commercial behavior. ‘Failure to flourish’ will be evident in uneconomic service access (only available to powerful institutions in the community) that widens income and information accessibility gaps and reduces opportunities for broad citizen participation (Gygi, 1995).

The above analysis suggests that ICT projects will fail if a local learning space does not flourish—which is often the case when outside agencies try to parachute models in from the outside (Robinson, 1998). The role and identity of mediating organizations will no doubt shift in the near future, especially as infrastructure and bandwidth becomes more available and

affordable. For the coming months and years, however, their brokering role and trustworthy space for community innovation will remain strategic for the communities they serve. Their accomplishment will remain relevant to communities in terms of having a place for community-oriented learning about harnessing and adapting communication technologies. For other Canadian communities starting off on this path, the key is to find the right champions to stimulate local ingenuity and community-level planning, and to exploit government funding as the organizational capacity evolves.

7. Open questions

As rural and remote communities begin to enjoy access to ICTs at affordable prices (a major achievement in its own right), their attention shifts to the applications and new or improved services. These changes will also need to be matched at the policy level. A number of open questions remain.

7.1. *Adaptive policy networks*

This model suggests that innovation happens across networks of community, organizational and policy-making actors, where no single actor holds the key to success. The predominant top-down policy-making process, however, seems to lie outside this context. The apparent lack of system feedback from real world experiences back to policy makers begs for evidence to respond to the question: How do policy makers actually learn? The informal links they enjoy with the managers of community mediating organizations appear to be an important mechanism. However, beyond end-of project reports and evaluations that highlight funds spent and short term outputs, there seems to be no set mechanism for policy learning and adaptation.

7.2. *Mediating organizations in evolution*

As infrastructure becomes increasingly available and affordable, the incentive for community organizations and individuals to invest time in creating local organizations may wane. It is expensive, in terms of money and people's time, to create a mediating organization like the LCN. A great deal of funding and creativity are needed. The lure of an information infrastructure, the 'positive Trojan horse' that brought communities together, may become something that is taken for granted. A school board, or a large firm in need of broadband connectivity, will no longer need to lobby for basic service provision. Their interest will lie in upgrading equipment, obtaining applications that respond to their business needs, and training staff to provide enhanced services with the use of ICTs. Their 'spaces and places' for innovation will likely become specific to their business or sector. The evidence from the literature on software adoption is that professional organizations fill this need. They provide neutral spaces where colleagues can exchange experiences about one software over another (Swan et al., 1999; Mahler & Rogers, 1999). The future roles and transformation of community mediating organizations remains an open question.

7.3. Sustaining communities

In rural and remote contexts, an electronic bulletin board or e-mail system creates a new environment, a new space for interaction. This is bound to have an impact on a community. The question remains, however, about whether ICTs will accelerate the demise of rural and remote communities, or aid in their transformation. The same question is posed with regard to the technology's propensity to centralize or decentralize economic activity; there is evidence of both and it remains unclear which of the two will dominate (Wilson, 1992). A community defines what it wants to be, where it wants to go, and ICTs are tools to be harnessed towards those agreements. ICTs are part of a context, along with global markets, jobs, interest rates, tariffs, regulations, political parties, families, weather, and disease. They can be harnessed and put to work to reaffirm where a community wants to be. What is true, however, is that they create a new environment that was not there before, and one that will certainly transform the options that rural and remote communities have at hand.

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