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Appreciating the Contribution of Broadband ICT With Rural and Remote Communities: Stepping Stones Toward an Alternative Paradigm

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This article challenges conventional policy development and evaluation approaches that emphasize the instrumental side of technology. There is a growing gap between conventional planning and evaluation approaches for rural broadband ICTs that seek to demonstrate a direct link between investments and results on the one hand, and on the other, with evidence that the contribution of ICTs to rural economic, social and cultural wellbeing is increasingly difficult to demonstrate beyond short-term measurable indicators. The article proposes an alternative paradigm based on sociotechnical systems, stakeholder engagement, an acknowledgment of the multiple dimensions at play, and the growing evidence of unpredictability of ICTs. The article emphasizes a perspective based on "contribution," not attribution; policymaking that is both adaptive and inclusive of multiple perspectives; methodological testing of emerging evaluation methodologies; and projects as learning experiments. This alternative theoretical and policymaking paradigm is encapsulated in a metaphor based on the management of natural resources where stakeholders track their own indicators of impact by *reading how the system responds* to a project intervention.

Keywords broadband, evaluation, ICTs, impact, metaphor, rural and remote, systems thinking, unpredictability

This article addresses the challenge of appreciating the impact of broadband information and communication technologies (ICTs) with rural and remote communities, drawing on examples mostly from experiences in industrialized settings.[1] Broadband ICT, or always-on, high-speed connectivity, is starting to be included as part of basic infrastructure in some countries. This is indicative of the fact that the benefits of these services and technologies are generally understood as positive and worthy of continued expansion, and that government support for areas with poor market potential is generally accepted. The extent to which such policies are derived from hard evidence, however, remains difficult to ascertain (Sawhney, 2001).

The terminology in the title of this article is purposefully selected. I refer to *appreciating* rather than *measuring* or *evaluating* to emphasize the thesis underlying this article: that the contributions of ICTs, beyond the short-term measurable dimensions, are increasingly unpredictable; they are emergent and negotiated, and rather than measure them we will do best to appreciate them. To appreciate is to "set high value on, be grateful for, estimate rightly" (*The Little Oxford English Dictionary*, 6th ed.). I do not use *impact* as it denotes effect or influence, but rather the verb form for *contribution* that means to "give jointly with others." I refer to appreciating "with communities," rather than "on communities," to underline the necessary engagement with local actors that is required for an appreciation effort.

Broadband information and communication technology[2] has the potential to reduce the friction of distance that rural and remote communities experience. E-government, distance education, and telemedicine applications, which are particularly promising, require high-speed connectivity, and are economically least viable in areas with sparse populations (Hudson, 1998, 2006). Government programs have concentrated on developing incentives to promote the expansion of telecommunication networks and services to high cost serving areas (Sinclair et al., 2006). In Organization for Economic Cooperation and Development (OECD) countries, these efforts have been underway for more than a decade and the results of those programs remain difficult to ascertain (Sawhney, 2001).

The purpose of this article is to signal a growing gap between conventional planning and evaluation approaches for rural broadband ICTs that seek to demonstrate a direct

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link between investments and results on the one hand, and on the other, with evidence that the contribution of ICTs to rural economic, social and cultural well-being is increasingly difficult to demonstrate beyond short-term measurable indicators (Myers, 2004). While conventional planning presumes a causality that is most often not established in pilot project evaluation reports, the planning of subsequent programs continues unabated as if the hard evidence were there. In other cases the original results are disregarded.

> Strong empirical results that provide compelling evidence that economic and community development goals are realized through programs of computer and Internet access are lacking. If one broad social goal in the US over the past 10 years has been to facilitate access, the more important goal of ensuring that access is meaningful for communities and individuals has slid off the agenda. (Strover et al., 2004, p. 467)

The predicament I am signaling is one of unexamined assumptions: While evaluation should be the basis for learning and adjustments in program design, it is more often used to justify decisions made on the basis of overall policy directives.[3] It is in this context that Sawhney (1996, 2001) signals *metaphors* as the drivers of these decisions. In an attempt to overcome this predicament, this article seeks to reconcile the gap by exploring existing theoretical insight and methodological experiences. The overall aim of the article is to narrow the gap between current rural and remote broadband ICT policy frameworks on the one hand, and the means to appreciate the contribution of broadband technology to fulfilling the goals of individuals and organizations in those communities.

This article is organized into three sections. In the first section I outline the features and limitations of the current ICT policy design and evaluation frameworks that are dominated by assumptions of predictability. In the second section I provide a conceptual framework to justify an alternative paradigm for rural and remote broadband ICT policymaking. In closing section I explore possible elements to make the new paradigm palatable to policymakers and bureaucrats.

THE STATUS QUO

Over the last decade, the author has been involved with a range of projects to expand broadband ICT infrastructure and services across in northern communities in Canada. During these years a number of programs have come and gone under the Connecting Canadians policy umbrella, including the Community Access Program (CAP) and the Smart Community Demonstration Projects. Many of the programs were implemented through grants that were offered on a competitive basis. As with many federal programs, the bids were required to include a "logical framework analysis" (LFA).

An LFA is based on a logical hierarchical sequence linking the overall purpose or long-term impact that is sought, all the way to each specific activity to be programmed. While there is variation in terminology in general terms, at the lowest level of the hierarchy there will be specific activities (e.g., training sessions) that lead to a measurable output (e.g., *X* number telehealth coordinators trained per community), which in turn will lead to outcomes (e.g., dollars saved from reduced medical travel for specialist consultations through telehealth). Several outputs will often be needed to enable the outcomes to be evident (e.g., a coordination of equipment, financing, human resources, community and practitioner buy-in, etc.)—in other words, for the "effective use"of an ICT-enhanced service (Gurstein, 2003). Lastly, it is expected that the outcomes will lead to the overall purpose, often worded in terms of long-term results or impact (e.g., improve the health status of a population using telehealth services).

It is common for pilot projects that last 2–3 years long to yield evidence of activities completed and outputs, and to some extent of outcomes. It is therefore not surprising that evaluation reports often confirm outputs being achieved in quantitative terms, as well as a number of outcomes through a combination of qualitative and quantitative findings. However, the extent to which results may become measurable in the longer term is tempered by the short duration of the projects combined with the inevitable influence by other factors. In other words, the direct causality between the project investments and the overall results is elusive. At best the *contribution* of the investment is evident, rather than its *attribution*.

The "unexpected outcomes" section of many evaluation reports tends to be rich with anecdotes, but they appear as secondary to the logic frame as the overpowering "theory of change." The unexpected, the emergent, the socially constructed innovations seem to be, to a large extent, off the radar screen, and yet they often contain relevant evidence of how people embrace technology and how they innovate once they discover its potential. While practitioner evaluation literature on ICTs and other communication for development approaches have already recognized these challenges, especially in international development contexts (Figueroa et al., 2002; Myers, 2004; Parks et al., 2005), a means of reconciling this gap remains unresolved in the context of rural and remote ICT planning in industrialized economies (Ramírez & Richardson, 2005).

A CONCEPTUAL FRAMEWORK TO CHALLENGE THE STATUS QUO

The proposed framework advances a set of interrelated ideas: the importance of sociotechnical systems that place attention on human-technology dynamics; the need for stakeholder engagement throughout the project cycle; the

acknowledgement of the multiple dimensions at play; the growing evidence of unpredictability of ICTs; and the experience with other fields that have already embraced a systems thinking perspective.

Technology-Based Assumptions About Innovation

Much planning and evaluation of telecommunications is predominantly based on technologically based assumptions. Critics claim that the prevailing planning mentality addresses only half of the realm of the sociotechnical system by ignoring to a large extent the human elements (Simon, 2004). There is a need to shift our thinking from the instrumental to the communicative processes that emerge: "ICTs are what they are in relation to our use of them, their relation to one another and in relation to the particular situation or context in which they are used" (O'Donnell & Henriksen, 2002, p. 92). The notion of sociotechnical systems is not new; it emerged in the 1950s from the realization that it is through the interaction between people and technology where innovation can take place; the two do not work in parallel (Trist, 1981). Some telecommunication specialists have come to the same conclusion: "Technological infrastructure should be regarded as both society shaping and socially constructed" (Andrew & Petkov, 2000, p. 79).

> It is acknowledged by many contributors to studies of innovation in the science and technology field that behavioural and cognitive outcomes associated with the use of new technologies often diverge substantially from those that were "planned" or "intended" by participants in the technological design process or by those implementing digital applications and services.. . . This may occur because individuals resist the initially 'intended' uses of the new technologies and services. People may find ways of integrating the new technologies and services into their daily activities, or they may opt for non-use. Alternatively, even when the technologies are used in ways that appear to be consistent with initial expectations, the users themselves may have a variety of interpretations of their own behaviour and its consequences for themselves and others (Silverstone, 1994, 1999; Silverstone and Haddon, 1996). (Mansell, 2002, pp. 4–5)

The process of innovation is not easy to predict, especially as each stakeholder is likely to perceive the process differently and in turn, develop their own interpretations of what the overall intervention is all about. If the stakeholders are not consulted during the design of the project, then the contrast between intentions and impacts may be even wider.

In international development, the following practical difficulties in evaluating information and communication for development (ICD) projects are listed in guidelines developed by the UK Department for International Development:

- It is difficult to define a specific target audience for initiatives that have an effect over a wide area (For example broadcast campaigns)
- In some sectors (like farming), change happens slowly. So it is hard to measure impact over a short period
- It is not always clear that an ICD programme—rather than political, social or economic factors—has been responsible for change
- Some communication goals—good governance, social gain, empowerment—are difficult to measure objectively or put a value on
- If developing-world audiences have little media choice, it can be hard to find out their opinions on the quality of ICD programmes
- If is difficult to evaluate communications in highly politicized areas or places of conflict
- Finally, the fast-changing nature of new technologies makes it difficult to measure their impact. (Myers, 2004, p. 7)

In the particular context of broadband technologies, several of the preceding points are relevant, especially the last one. This signals the challenge of defining exactly *what* it is that is sought*, for whom,* and how we will ascertain that it has been achieved.

> The experiences of [these] 36 communities substantially expand the usual notion of public access, and raise the fundamental question of how to define the "success" of public access. There are no authorities on this question even though the commonplace notion of success might refer to number of users who visit such sites. Is success a matter of meeting overall demand, or meeting specialized demand? Can using public access in order to save money on prescription drugs ordered online be deemed a more significant social use of public facilities than playing computer games in a library? Beyond this, how are communities defining public space? (Strover et al., 2004, p. 481)

Stakeholder Engagement

The quote from Strover and her team suggest the need for information and knowledge management initiatives that are based on local needs and circumstances (Ballantyne et al., 2000; Heeks, 2002).

> Local communities need to be involved in the design of universal access programs by participating in decisions about particular information access outlets. Indeed, most studies find that the most effective way of ensuring the economic success of ICTs in rural areas is to encourage local participation and create social institutions in support of the new technologies. This can be achieved through a participatory approach, to complement technical and economic calculations of telephone placement. (Kenny, 2001, p. 10)

In a study prepared for the United Nations, Mansell and Wehn (1998) make this point clear: "ICTs have many revolutionary implications, but in order to achieve their full potential benefits it is necessary to focus on user-oriented and cost-effective applications rather than on technology-driven applications" (Mansell & Wehn, 1998, p. 95). Further,

> 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)

The point that deserves attention is that the involvement of multiple stakeholders means that different "languages," intentions, expectations, and indicators need to be embraced. The call for a participatory approach in project planning is not new, but as Andrew and Petkov (2002, 2003) suggest, it is quite novel for conventional telecommunication planners.[4]

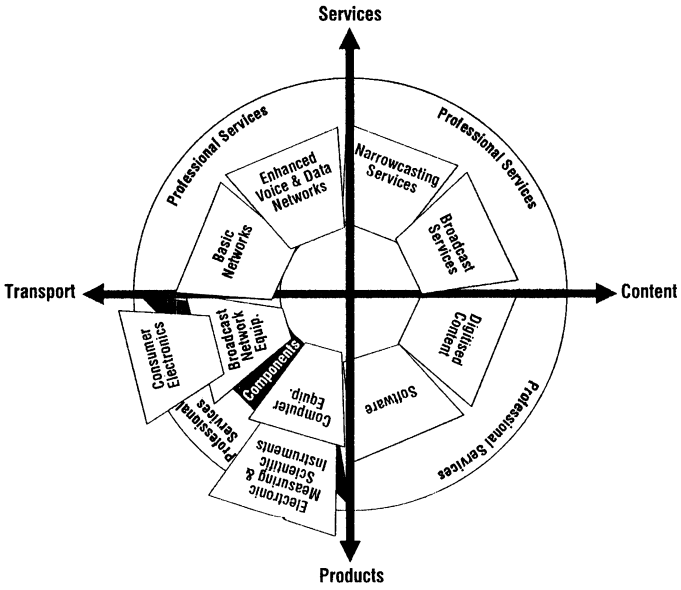

FIG. 1. The multiple dimensions of ICTs. From Hawkins et al. (1997) and Mansell and Wehn (1998, p. 14), with permission of Oxford University Press, Inc. and authors of the SPRU report.

Multiple Dimensions, Variables

A major challenge when different parties are consulted is the fact that they each come to the table with their own, unique worldviews. People perceive technology and services on the basis of their intentionalities and expectations (Richardson, 1999; Ramírez & Richardson, 2005, Ramírez, 2003, Richardson & Ramírez, 1999). To complicate matters further, communication and technology projects have multiple, interrelated dimensions that lie along the intersect between services and products, content and transport (Figure 1).

It comes as no surprise then that the language of a telephone engineer and that of a rural nurse using telemedicine are often foreign to each other. Each will choose indicators that best capture their intentions, within the quadrants (of Figure 1) that they are familiar with. Beyond the four quadrants, however, there are regulatory and policy dimensions as well. As these are added on, we face a very complex context to work with each stakeholder coming to the table with a unique mix of indicators.

"Readiness frameworks" have been developed to acknowledge the many dimensions involved. Each dimension is seen as contributing a relevant set of indicators. Indicators are grouped into families and a linear continuum is presented along each indicator grouping, suggesting a progression toward an ideal scenario. Some online tools allow the user to upload the relevant data for each indicator along this continuum and get a relative ranking on the state of development of their country's e-readiness (see for example www.readinessguide.org). While it is beyond the scope of this article to describe readiness frameworks in detail, their central message that deserves attention is that multiple indicators are constantly at play in any setting.[5]

It is important to signal that the e-readiness frameworks are very much part of a predictive, linear mindset. Furthermore, what is lacking in readiness frameworks is the process of negotiation among stakeholders by which they may come to agree on a common set of actions and indictors by which to track their performance. By being linear, these frameworks are also unable to embrace unpredictability. However, what is not surprising in the context of Figure 1 is the fact that multiple dimensions are at play; hence the odds of unexpected outcomes increases: "a systems approach to evaluation can help in approaching an issue from various crucial angles, the links between which is more important than their sum" (Simon, 2004, p. 495).

Growing Evidence About Unpredictability

"It is, methodologically speaking, extremely difficult if not impossible to isolate the contribution of communicative intervention" (Leeuwis, 2004, p. 317). Myers (2004) indicates some problems behind theory. Communication initiatives can be divided into two approaches, each with its own problems: Behavior change initiatives use messages to change individual behavior, but they are limited by the fact that human behavior is not always a logical response to a held belief, and hence the indicators we use to measure change may be flawed. On the other hand, social change initiatives try to inspire community action, yet the reality is that the social context is often too complex, dynamic, and difficult to measure.

In addition to the theoretical problems for measurement in the field of communication for development,[6] in practice there is growing evidence that ICTs are used in ways that were not foreseen. In developing countries, cell phone users are finding ways to send remittances using phone-card numbers to relatives. Simple consumer tools such as digital video camera recorders are being used to document and advocate against human right abuses—a use that its designers never dreamed of (Cizek & Wintonick, 2004). New knowledge-sharing patterns are emerging thanks to the convergence of computers with voice data networks (Berra, 2003; Denning, 2002). When it comes to the Internet, analysts suggest that to a great extent the applications that will emerge in the age of always-on broadband Internet are not predictable (Bar et al., 2000). Others warn that despite the promise, the technology may lead to the further marginalization of those already least able to engage in social and economic development (Castells, 1999).

Fink and Kenny (2003) argue that the impact of ICTs in the context of the digital divide is difficult to forecast. Equally difficult to predict are the economic development impacts and overall quality of life changes resulting from broadband networks, both in rural areas of industrialized countries (Mitchell, 2003; Sawhney, 1996, 2001) and in developing countries (Andrew & Petkov, 2000, 2003).

In the absence of a mechanism to acknowledge unpredictability, ICT program design and evaluation expectations have stubbornly remained based on the logical framework as its central theory of change.[7] In this vein, Leeuwis (2004) refers to fundamental problems with conventional evaluation: the lack of attention to innovation trajectories that steer away from predetermined paths; the tendency to focus on these objectives that matter to the predominant (funding) organizations; the dominance of quantitative measures when in fact the achievements refer to qualitative dimensions. Unpredictability is not a feature that bureaucracies readily embrace: "We refuse to accept ambiguity and surprise as part of life because we hold onto the myth that prediction and control are possible" (Wheatley, 1992, p. 101). Sawhney (2001) goes further to say that "The conceptual shift brought about by the new technology is not perceptible to analysis, no matter how thorough it is, within the older paradigm" (p. 37). However, there is reason for hope in that the systems-thinking perspective has made inroads into some sectors and may yield relevant ideas to challenge the status quo.

Systems Thinking

Systems thinking embraces complex and messy problems. It emphasizes the importance of the interrelationships among parts. In systems thinking, the notion of emergent properties is embraced. Telecommunication engineers are becoming familiar with this notion (Andrew & Petkov, 2000, 2003; Bennetts et al., 2000) as well as ICT planners (Simon, 2004). In addition there are calls for other sectors to follow suit, ranging from capacity development (Morgan, 2005), to community economic development (Bryden, 1994; Bryden & Sproull, 1998), to health (Chapman, 2004). As a whole, this shift signals the need to review the prevailing mechanistic assumptions underlying ICT policymaking.

Rural and remote communities tend to be complex, dynamic, and subject to multiple policies and influences, often beyond the comprehension of urban-based policymakers. Conventional policy development follows a rationalistic linear direction, with simple objectives and top-down decision making, but it is unable to respond to ill-structured or messy problems. It is characterized as focusing on "hard systems thinking." In contrast, "soft systems thinking" takes into account uncertainty, and conflict, and emphasizes consultation with different sources of knowledge and perspectives (Geurts & Joldersma, 2001).

ICTs are not the only fields facing the complex set of issues described in the first section. Other fields have already faced a comparable predicament where multiple dimensions, evolving outcomes and different stakeholders must be embraced within a systemic mindset. Some existing experiences in the management of complex natural resources are relevant. A bridge between these two disciplines is possible thanks to several characteristics that are shared between natural resource management (NRM) and ICTs, as illustrated in Figure 2.

Among the characteristics, the reader's attention is drawn to the planning and policy processes in particular. The emphasis on interaction is noteworthy. An ongoing process of interaction suggests the need for negotiation, for learning and for adaptation.

In the management of large, complex natural resources, there is experience whereby different stakeholders negotiate through indicators (Lee, 1993, 1995). In other words, indicators are seen as a "common currency" that each stakeholder can use to illustrate priorities. Indicators can become communication tools in that they allow each group to appreciate how another perceives the potential of the system. In Lee's experience, as stakeholders came to understand the indicators that mattered to others, they began to use them, and in doing so they developed a new common language. In the world of ICTs, there are few cases where such a process has been achieved; at the very least, the lack of a common language has been reported (Ramírez, 2001).

MAKING THE NEW PARADIGM PALATABLE

In this closing section I explore possible elements to make the new paradigm palatable to policymakers and bureaucrats. My assumption here is that the arguments presented

Characteristics	NRM context	ICT context
Nature of truth	Multiple perspectives, diversity	Multiple perspectives, diversity
Goals	Multiple, often contradictory	Multiple, often contradictory or competitive
Systems perspective	Acknowledging that reality is best appreciated as a system with different hierarchies and emergent properties	Soft system: learning path to reach a situation in which collective action can be taken
Planning	Interactive process	Sometimes interactive, other times top-down
Policy process	Emerges from interaction among stakeholders at different levels	Emerges from interaction among stakeholders at different levels; or is developed centrally
Role of research	Active partner in societal sense making	Active partner in societal sense making
Nature of science	Biophysical and social sciences both contribute to adaptive perspectives and action	Information and communication technologies, economic and social sciences contribute to adaptive perspectives and action
Nature of extension	Facilitation of learning processes	Facilitation of learning processes

FIG. 2. The characteristics of NRM and ICT contexts. Adapted from Ramírez (2003).

so far are legitimate but that the mechanisms to turn them into accepted practice are missing. Management experiences from other sectors and the use of metaphors may provide some potential. The stepping stones to the new paradigm include: a theory of change based on "contribution," not attribution; a policymaking approach that is both adaptive and inclusive of multiple perspectives; methodological testing of evaluation methodologies such as outcome mapping and most significant change; and an emphasis on policymakers becoming part of projects that are approached as learning experiments. This alternative theoretical and policymaking paradigm is encapsulated in a metaphor based on the management of natural resources.

Theory of Change: Contribution

A theory of change is compatible with the notion of a paradigm or worldview in that it encompasses a set of assumptions. When it comes to community economic and social development in rural and remote settings, ICTs constitute tools that can contribute to achieving those goals. The key word in this theory of change is *contribution*, as opposed to *attribution*. Contribution suggests that ICTs will be part of strategies where the broadband services and applications may enhance, enable, and provide options that were not there before. The term suggests an assumption that the intervention has good odds of contributing to the goals but that efforts to prove causality will not be a priority. Moreover, it embraces the sociotechnical interaction between people and technology as a source of innovation, often leading to unexpected outcomes.

Policy Approach: Interactive Policymaking

If the rural and remote ICT context is complex, ever-changing, and open to multiple interpretations, then a policy developed in a distant capital city is likely to need adaptation. Indeed, if projects are understood as *policy experiments*, the opening for adaptive management becomes more realistic (Rondinelli, 1993). This is particularly useful for pilot projects that are used to try out new ideas.

In systems thinking the notion of emerging properties is embraced; one expects things to arise and evolve in ways that were not considered before. In other words, getting the policy and its operational instruments *right* the first time is highly unlikely, and planning to adjust is warranted. The notion of *adaptive management* has been developed in natural resource management (Lee, 1998), and planners in the Netherlands have adapted it for the design of complex decision support systems for large infrastructures. They refer to this approach as *interactive policymaking* with an explicit acknowledgement that policies need to be adjusted as stakeholders negotiate options for implementation (Driessen et al., 2001).

As detailed in Figure 2, there is room to translate some of the adaptive management dimensions into the ICT field. The notion of *adaptive management* in ecology comes from efforts to manage complex systems like the massive, unpredictable Columbia River basin (Lee, 1998). In essence, the different stakeholders reached agreements over how they would use different indicators to monitor how the river responded to their interventions. The different parties came to realize that they could jointly adapt the management of the resource on the basis of a common understanding of how the "system" was responding.

The notion that the river *responds* is consistent with the notion that ICTs tend to be used in unpredictable ways. The notion that stakeholders can track how the system responds, using the (negotiated) indicators, suggests that each stakeholder group can choose to measure the changes they care about, while acknowledging that others will do the same as per their own intentions or goals.

In other words, there is scope for using a complex river as an analogy for a communication system. The analogy deserves some explanation. A river is a dynamic, evolving, and complex system that provides resources and services to different stakeholders. It can be managed, but often the way it responds to an intervention leads to unpredictable outcomes. A communication system is very similar—although it is human made. It evolves, and as people learn to use it, they find new meanings and applications. As they put the applications to work, the system responds in ways that were often not predicted. In both cases, people perceive the system on the basis of how it responds to their own needs and expectations. However, as Lee emphasizes, they also gain a sense of others' priorities and acknowledge their relevance.

Stakeholders can jointly appreciate the fact that some parts of the system may behave in unpredictable ways, but that they can monitor those through the indicators. As they "read" the behavior of the system, they can agree to modify their management. The essence of adaptive management is the acknowledgment that one cannot fully predict the system's behavior, but one can track it and modify the intervention strategies accordingly.

Methodology

The preceding proposal does not suggest getting rid of the logical framework analysis (LFA) that links activities, with outputs and outcomes. Rather, it suggests that these three dimensions tend to be the ones that can be tracked with conventional evaluation methods over the duration of typical pilot projects. What is added here is an explicit acknowledgment that the gap between outcome and purpose (or results or impact) will be addressed through a *contribution* theory of change. Second, because of the adaptive management approach, the LFA will need to be adjusted as policies and implementation mechanisms evolve, which is already standard practice in the status quo.

Recent communication and ICT evaluation literature (Myers, 2004; Parks et al., 2005) mention new methodologies that merit attention, namely, outcome mapping (Earl et al., 2003) and most significant change (Dart & Davies, 2003). Outcome mapping places attention on "boundary stakeholders": those individuals who have been directly involved in an activity. For example, after participating in a training event, boundary stakeholders should be able to demonstrate new skills, knowledge, and attitudes. The extent to which the actions by those boundary stakeholders lead to project results is explicitly given less importance, due to the realization that results or impacts tend to be long-term and the consequences of multiple factors are beyond the control of the project. The boundary stakeholders may, for instance, return to a work environment where their new expertise is not welcome, etc.

The authors of outcome mapping observed that:

> Longer-term outcomes and impacts often occur a long way downstream from program implementation and may not take the form anticipated. These longer term outcomes depend on responsiveness to context-specific factors, creating diversity across initiatives.... These characteristics make it difficult for external agencies to identify and attribute specific outcomes to specific components of their programs or to aggregate and compare results across initiatives. (Earl et al., 2003, p. viii)

If long-term results are difficult to correlate to project activities and outcomes, then an important way to capture how people perceive the contribution of these events is to ask them to comment how they have witnessed change. Even if final, definitive results may not be evident, people will form opinions on processes of change. People's perceptions about a project or technology can integrate a number of dimensions that are otherwise difficult to discover. Today there is renewed emphasis placed on the integration of qualitative methods, and narrative tools in particular, as a means of capturing context-specific interpretations from stakeholders who have witnessed and shaped an intervention (Bennett, 2003; Leeuwis, 2004; Lincoln et al., 2003).

The "most significant change" methodology is centered on the premise that people can integrate and communicate their own valuation of significant changes (Dart & Davies, 2003). For example, capturing and communicating how people perceive the benefits of broadband services in northern Canada has been done using digital video (Ferreira et al., 2004b). The policymaking potential of video, especially as a component of evaluation, is currently being explored (Ferreira et al., 2004a). The significance of this work lies in the realization that policy-level decisions rarely wait for evaluation of project impacts.

STEPPING STONES FOR A PARADIGM SHIFT

In the preceding section I have detailed the features of broadband ICT policy development and evaluation that merit attention and in the last section I have assembled the components of the alternative approach. In this conclusion I seek to create the "stepping stones" toward a paradigm shift through a planning and evaluation metaphor and a call for a learning approach to policy development.

Sawhney (1996) suggests that metaphors are midwives for new perspectives. They have the power to inspire and help *induce* a shift in thinking. Metaphors have driven the

development of major ICT networks in North America based on their promise even when there is little hard evidence on which to develop business plans (Sawhney, 2001; Mitchell, 2003). In North Carolina, the political support for an ICT network was anchored on the metaphor of Wright brothers' first flight as way to bring people closer together, just as the new statewide network would do; in Iowa the commitment was based on the public education heritage and the network was promoted as a further expansion of that ideal (Sawhney, 2001). We need a metaphor to convey the notion that ICT broadband evaluation can focus both on short-term outputs and outcomes, while the long-term results can be documented under the understanding that other factors will have contributed to their achievement, and that individual stakeholders' goals can still be tracked. This is not a simple message to convey.

The experience described by Kai Lee in the Columbia River basin points toward the importance of different actors agreeing on indicators, on a range of intentions or goals, on a number of actions or interventions, and finally, on *reading* how the system responded to the interventions. This notion of *reading system feedback* became an acceptable way of doing, planning, and evaluating. The notion can work as a metaphor for an alternative evaluation approach; it communicates how the stakeholders could not predict how the complex, massive river would respond to a change in water levels (by adjusting dams) or the introduction of more salmon fingerlings, and yet they were able to track impact. Many of the stakeholders were engineers, water biologists, and other such technical, hard-systems professionals. Equivalent "hard system" professionals prevail in the ICT world. Getting them to work with adaptive management would be a significant accomplishment in that the process embraces unpredictability and emphasizes course correction dimensions that are not comfortable in their world. However, some have come to realize that an impact that was not predicted need not be seen as a mistake, but rather as an emerging property for which a different management approach is needed (Andrew & Petkov, 2000).

Replicating the Columbia River Basin experience in the ICT world is a challenge. At the very least it will require a number of partners willing to experiment with planning and evaluation approaches. It will also require a policymaker able to create an action-learning project where planning, adjusting and evaluation are focused on learning rather than *auditing*. For rural and remote communities that are building broadband services, such conditions are rare, especially as the norm is a funding deadline that needs to be met with little or no room to alter the request for proposals (RFP), let alone to consult different future users.

Policymakers could establish the conditions for this shift by creating spaces for experimentation. "Embedding and situating 'people's participation' at the heart of policy decisions, organizational procedures and resource allocation has... become a fundamental challenge" (Pimbert, 2004, p. 2). Participation in the context of policy formulation can be understood *through the processes* that it supports:

- Recognise multiple perspectives and the political game;
- Get people to the negotiation table;
- Making space to disagree and experiment;
- Learn from experience, get organized and fire up policy communities. (Pimbert, 2004, p. 24)

"Participatory (policy) research" aims to provide four complementary functions: (1) an informational channel; (2) a stimulatory factor for self-mobilization; (3) a key to setting up new relationships "broadening the epistemic community"; and (4) a process of critical reflection through the direct experience of policymakers in research (Brock & McGee, 2002). The last point is particularly important: Involving policymakers in a research and learning process is critical (Simon, 2004; Glasbergen, 1996).

Geurts and Joldersma (2001) call for a *participatory policy analysis* (PPA) process. In their analysis, the mainstream, analytic methods underlying policy development cannot cope with the complex, multidimensional, and dynamic contexts so common in today's problems. Instead they emphasize the importance of social interaction, and adopt a "soft systems thinking" approach that seeks platforms for multistakeholder negotiation (Geurts & Joldersma, 2001). To date there have not been many spaces in the ICT world to experiment with alternative policy directions outlined earlier in this article. This article sets some exploratory steps as an effort to begin creating the conditions required for such a policy experiment. Interactive ICT policy development holds some promise, and will require experimental spaces within bureaucracies where risks can be taken and policymaking innovations may be embraced—a rare combination indeed.

By engaging multiple stakeholders in planning and tracking change, the process will be one of negotiating worthiness, or *appreciating* rather than evaluating. By acknowledging multiple factors that contribute to impact, I am emphasizing the "contribution" of broadband technologies, and by emphasizing working *with* rural and remote communities I am suggesting participatory, learning, and adaptive policy approaches. Lastly, by using the *reading system feedback* metaphor I am conveying the notion that impact can be tracked, but that to a large extent, the sociotechnical interactions of broadband ICTs are not predictable. As governments invest in ICT projects to provide broadband connectivity to the rural and remote regions, such a metaphor may help design projects with a more coherent set of assumptions and a explicit strategy for community engagement in planning their own future.

NOTES

1. The author is also familiar with developing country contexts and at times includes relevant observations from developing world literature.

2. Defined as a minimum of 1.5 Mpbs symmetrical connectivity (Mitchell, 2003).

3. Obtaining hard evidence of this claim would require insider knowledge of decisions in agencies to which the author has had very limited access. However, the assertion is made on the basis of exposure to decision makers through a number of events and interviews in the context of nine years of research and evaluation work in the sector.

4. It is worth noting that there are also calls for caution in the use of participatory approaches, in order not to forget the political and cultural contexts, to acknowledge the vested interests by different parties, and to be realistic on who is being consulted and cognizant of who is being left out (Heeks, 1999).

5. Today there is a plethora of e-readiness frameworks (Bridges.org, 2001; Kirkman et al., 2002; McConnell International & Witsa, 2001). However, no single framework provides "an objective" measure of readiness *because it all depends on the need of the assessment at hand* (McBean, 2004). For a comprehensive review of existing frameworks to embrace multiple indicator dimensions, refer to Ramírez and Richardson (2005).

6. Previously referred to as "development communication."

7. See examples of this notion at http://www.theoryofchange.org/

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