

Running Head: Ambiguity and Uncertainty in the last mile: Broadband Adoption in Rural Alberta.

AMBIGUITY AND UNCERTAINTY IN THE  
LAST MILE: BROADBAND ADOPTION IN  
RURAL ALBERTA

by

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## Abstract

Broadband technology has captured the attention of many stakeholders, nations and governments throughout the world and is recognized as a “nation building” infrastructure enabling the future economic prosperity and improved living standards for many communities. In 2005, the Alberta government completed a significant investment into the construction of a unique high-speed, high capacity fiber optic network connecting rural communities throughout the province. The network was the first of its kind in the world in terms of the advantages it represented for rural individuals to benefit from easy access to broadband. Paradoxically, as of 2008, Alberta was ranked last in Canada for rural broadband access. This research examines how ambiguity and uncertainty faced by industry decision-makers and broadband stakeholders has contributed to the state of rural broadband adoption. Interviews were conducted with industry decision-makers selected because of their participation in a rural broadband round table held in Calgary, AB in March 2008. Through the application of Weick’s (1995) Sensemaking framework, the research identifies several areas of ambiguity and uncertainty relating to the question of rural broadband adoption. A primary finding is that several self-fulfilling prophecies have developed through collective Sensemaking processes resulting in an immobilizing effect on the development of rural broadband.

## **1.0 Introduction**

### **1.1 *The Digital Divide***

The Internet, more specifically, the allure of broadband technology has captured the attention of many stakeholders throughout the world. Purported to be the next public good and a utility connecting vast and dispersed populations across time and space, the Internet has evolved considerably over the forty plus years since its creation. Recognized as a “nation building” technology, broadband underpins the future economic prosperity, improved standards of living and education for many individuals. In fact, broadband has been compared to the critical infrastructure of the past such as railways and road networks. More recently the landscape has changed and the Internet now sits increasingly as an “electronic enabler of commerce” with very little attention being paid to how broadband enabled technologies contribute to the formation and development of a society. Michael Gurstein (2004) claims that:

The early promise of the Internet as providing an alternative to centralized concentrations of power and as a means for widely dispersing economic opportunity has faded. It was replaced first by the Dotcom bubble and more recently by the current drive to make the Internet an adjunct to existing commercial interests. The vision of the Network as an enabler of communities; of the isolated; the disabled; those excluded because of location, income or physical capacity; seems to have disappeared along with public efforts supporting the Net as a tool and a resource for all, a democratizer and an equalizer of opportunity. (p. 221)

Gurstein’s claim that commercial interests have overtaken the original focus of the Internet may be accurate however the underlying theme he is referring to is *The Digital Divide*. A term used to describe situations where a particular individual, group, community, etc. does not have the same socio-economic opportunities available as those with access to

broadband Information and Communication Technologies (ICT's). Although the term is flexible in its use it can be understood to mean:

The gap between people with effective access to digital and information technology and those with very limited or no access at all. It includes the imbalances in physical access to technology as well as the imbalances in resources and skills needed to effectively participate as a digital citizen. In other words, it is the unequal access by some members of society to information and communication technology, and the unequal acquisition of related skills. (Wikipedia, 2009)

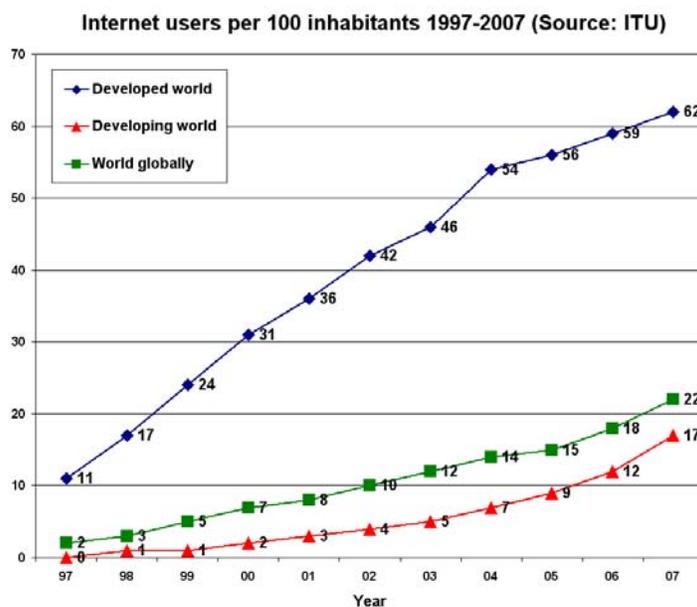
Gurstein (2004) looks toward the “uses” (i.e., participation and content) argument of broadband technology as explanation of the digital divide when he states that “a consequence and sad result of the preoccupation with “access” and the digital divide has been a crowding of any serious attention being given to how the widespread availability of Internet access might be effectively used for self-development by individuals and communities with histories of social and economic inequality” (p. 223). In other words, Gurstein’s is a demand side argument suggesting that by developing a clearer understanding of broadband uses and its benefits within society, the challenges of overcoming access are relegated to technical “details”.

On the flip side, the *National Broadband Task Force (NBTF)* was assembled in January 2000 by the Minister of Industry, Brian Tobin, to investigate the opportunities presented by broadband technology. According to the *NBTF* (2001), “Broadband technology and new content development are inextricably interdependent. Without broadband, the new content will not emerge; but broadband without enticing new content will not attract users’ interest and allegiance” (p. 32). The implications of this statement are that both content (i.e., uses) and broadband technology (i.e., access) must evolve together and that a co-generative relationship exists. Regardless of from which side of this “chicken and egg” argument

people view themselves, the reality is that little progress can be made without the basic infrastructure for connectivity. The *NBTF* (2001) acknowledged this fact when referring to remote communities and remarked, “Today, there is a connectivity gap between Canadians living in these communities and those living in urban settings. In the future, as the performance of both economic structures and public institutions becomes increasingly dependent on access to advanced ICTs, there is every danger that these communities will be left behind and that the QOL (quality of life) gap will widen” (p. 36). The connectivity gap being referred to is largely the focus of this research.

The following chart reveals more clearly the digital divide between the developing and developed worlds and represents the quality of life gap referred to by the *NBTF*. Although the graph is “global” in nature, it represents the magnitude of the overall “gap” between those with access and those without.

Figure 1 - Graph of global internet users per 100 inhabitants between 1997 and 2007



Source: International Telecommunication Union (ITU). (2007). [Graph illustration of global internet users per 100 inhabitants between 1997 and 2007]. Retrieved from <http://www.itu.int/ITU-D/ict/statistics/ict/graphs/internet.jpg>

The importance of bridging this digital divide was considered to be a high priority by the *NBTF* (2001) and they ultimately made an aggressive recommendation to connect every community throughout Canada with broadband capabilities by the year 2004.

## **1.2 Project Significance**

Broadband, within the context of this research paper, is defined in similar terms to that of the *NBTF* (2001) as a large capacity, two-way connection medium between an end user and network services capable of supporting full-motion, video applications. In more technical terms, the *NBTF* (2001) defined that a minimum transmission rate of 1.5 Mbps symmetrical (i.e., two-way) connection qualifies as broadband (p. 2). Even though the necessary advances in broadband technology have been significant, the undertones and foreshadowing of the *NBTF's* (2001) comments give some indication of the ability to develop a sustainable rural broadband strategy, “For the foreseeable future, in spite of continuing technological progress, the basic facts of Canadian geography and demography continue to mean that it will not be profitable for the private sector to provide broadband service in scarcely populated areas of the country” (p. 3). The following research paper hypothesizes that the complexity of issues around rural broadband adoption not only includes these physical barriers, but that exposure to the ambiguity surrounding the adoption of rural broadband has contributed to the current state of adoption.

Completed in 2005, the Alberta Supernet stood as the critical infrastructure for delivering the Alberta Government’s Rural Development Strategy and the Alberta Advantage as well as addressing *The Digital Divide* local to the province. Presumably, the

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advantages of having access to this type of broadband communication technology were viewed by the Alberta government in a similar fashion as the *NBTF* (2001) years earlier, such as:

- Encourages rural youth to remain and sustain the rural communities.
- Provides an incentive for young professionals to move to rural communities.
- Provides access to information which increases market opportunities.
- Improves quality of life and disperses infrastructure in a more equitable manner.
- Improves safety & addresses environmental concerns via e-commuting.
- Increases available pool of talented workers by enabling rural e-commuting.
- Improves access to health care services and continuing education.
- Enables ecommerce and banking services.
- Facilitates cultural, community capacity and other development.
- Enables access to government services and information.
- Provides access to sources of entertainment. (pp. 19 – 35)

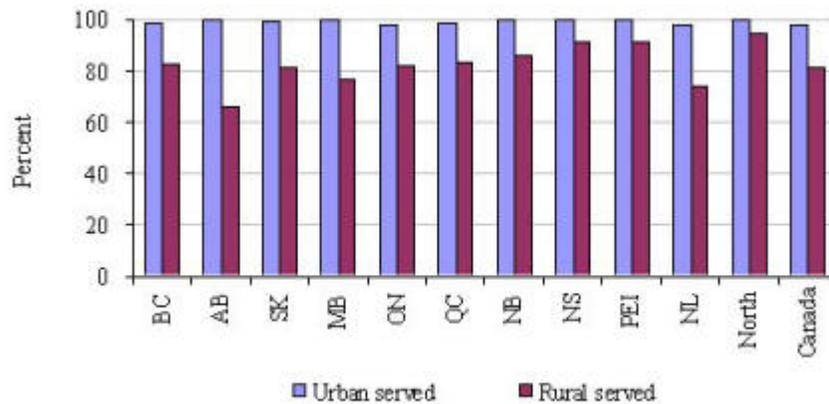
The framework or model for the Supernet is one of reduced barriers to entry and open market competition. In brief, the Government of Alberta (GoA) achieved these objectives by funding the capital necessary to construct the network and then transferred the operation of the network to a semi-disinterested third party – Axia. Axia's role is to provide contractually fair and open access to the network by cultivating a community of local ISP's (local Internet Service Providers – LISP's) that provide connectivity to the Supernet from households and businesses – coined "the last mile". Supernet "bandwidth" is fixed priced at \$50/Mb regardless of your location in the province. In this way, the GoA leveled the playing field for competition. In areas where local ISP's can build a profitable business model for provisioning these services, this model has been extremely successful. In fact, as of December 31, 2007, 242 communities had a local service provider(s) enabling broadband access to their residents. These numbers translate into over 80 percent of Albertans having access to broadband services. In contrast however, these numbers

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represent more than 150 communities in Alberta that do not have access to broadband services. Many of these communities have fewer than 3000 residents and given the small numbers of residents, many local ISP's are unable to develop a profitable business case for providing broadband access. Additional roadblocks include the high cost of capital required and (as the author surmises) that a great deal of uncertainty exists about the future of any investment made by local ISP's in last mile infrastructure (i.e., towers, fiber, wireless).

Recently, industry observers published statistics illustrating that despite the Alberta Government's significant investment in developing broadband technology throughout the province, paradoxically, Alberta is now ranked last in Canada for rural broadband availability (Figure 2). This paradox is significant to this research and will be explored in greater detail as it relates to the effect of ambiguity and uncertainty on rural broadband adoption rates.

Figure 2 - Diagram of Broadband availability in Canada – Urban vs. Rural (Percent of households).



Source: Industry Canada and CRTC data collection

Source: Canadian Radio and Telecommunication Commission. (2008). [Graph illustration of broadband availability in Canada – Urban vs. Rural (Percent of households). Retrieved from <http://www.crtc.gc.ca/eng/publications/reports/policymonitoring/2008/cmr2008.htm#s53>

### 1.2.1 Purpose of study and research questions

The purpose of the research study was to analyse the current environment relating to the adoption of broadband communications technology (i.e., high speed Internet) in rural Alberta. Specifically, the research will identify the forces of ambiguity and uncertainty that underlie the *Digital Divide* which exists in rural Alberta. The research will also attempt to explore how exposure to ambiguity and uncertainty has contributed to the state of broadband adoption in rural Alberta. In this fashion the researcher is considering ambiguity similarly to that of Weick's concept of equivocality, being a phenomenon with multiple interpretations or meanings. Littlejohn (2002) states, "All information from the environment, according to Weick, is equivocal to some degree, and organizing activities are designed to reduce this uncertainty" (p.287). In addition, the research will explore how industry decision-makers describe their strategies for reducing ambiguity and uncertainty in the social and economic context of completing the last mile in rural Alberta. Specifically, the research questions being asked are;

1. What strategies are employed by industry decision-makers for reducing ambiguity and uncertainty in the social and economic context of broadband development in rural Alberta?
2. How has ambiguity and uncertainty experienced by industry decision-makers and broadband stakeholders influenced the speed of rural broadband adoption?

The hypothesis used in this study was that of viewing ambiguity and uncertainty as influential forces and that ongoing exposure to these forces has affected the current state of broadband adoption in rural Alberta.

On March 28th, 2008 a Rural Broadband Access Round Table was held at the McDougall Centre in Calgary, Alberta. This event was hosted by the Van Horne Institute,

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University of Calgary and other members of the Alberta Supernet Alliance Research Project, the group originally formed to study the significance of the impact of the Supernet on Alberta society. A large number of representatives from industry, government, academia and community were present to discuss the current state of broadband in rural Alberta. The significance of the round table session for the research is that by attending the round table, the researcher was able to observe the use of Sensemaking processes by industry decision makers in a formal setting. These observations revealed the interplay of ambiguity and uncertainty referred to in the research questions. By selecting and conducting interviews with specific attendees of the round table, a further exploration was possible into the influence of ambiguity and uncertainty on the current state of broadband.

Other stakeholders considered relevant to this research are:

- Rural communities – towns, villages
- Telecommunications Industry
- Publics – Federal, Provincial, Municipal (e.g., Alberta Association of Municipal Districts and Counties), CRTC, regulatory bodies
- Rural businesses making up the rural economy
- Non-profit organizations

### **1.2.3 Why the Sensemaking framework and why is it relevant to rural broadband adoption in Alberta?**

As people make sense of their environments they create structure and individualized meaning. The Sensemaking process is characteristic of what individuals experience when organizing or “making sense” of equivocal information and new phenomena in the environment. Appendix 3 describes in more detail Weick’s (1995) seven properties of Sensemaking and the structure that is created by individuals interacting with the environment. The following research was conducted through Weick’s theoretical lenses

and enabled the researcher to observe underlying structure which emerged through organizing and Sensemaking activities. This perspective uniquely focuses the research lens by asking the question “what don’t we know?” about the state of rural broadband adoption. More traditional approaches to the research would involve asking “what do we know?” about rural broadband adoption.

Hypothesizing that the equivocal environment of rural broadband organization has contributed to the current state of broadband adoption allows the theory of Sensemaking to be expanded. Taking a micro view, the researcher views the individual processes which contribute to organizing and the creation of structure. Even though this research provides a launching off point for investigating the effects of ambiguity, the research stops short of developing a useful measure for levels of ambiguity. This would remain an avenue for future research and, in the researcher’s opinion, contribute to the study of Sensemaking. However, the research will illustrate how Sensemaking occurred in relation to rural broadband adoption and will surface the observed hierarchical categories of ambiguity and uncertainty. In addition, the research assumes that the technical challenges for developing rural broadband have largely been overcome and that the causal forces remaining exist at a social level of organizing as Weick (1979) defines. Therefore, Sensemaking is a very appropriate tool for this voyage of discovery.

As a starting point, the following list provides examples of potential contributors to ambiguity and uncertainty around the question of rural broadband adoption. They are:

- The introduction of new broadband technologies. It is curious whether the *NBTF* (2001) realized the potential for advances in broadband technology to influence ambiguity when they recommended maintaining technological neutrality (i.e., not showing preference for any one form of broadband technology) if the government were to take an active role in developing rural broadband (p. 5).

- The high capital cost associated with the necessary broadband infrastructure adds to the uncertainty and risk around return on investment.
- Identifying the actual demand and perceived benefits of broadband technologies within rural communities produces ambiguity. Although, it is difficult to find evidence of comprehensive market surveys, a recent Washington Post article by Kang (2009) is a case in point. Are the benefits perceived attainable? Does the number of perspectives and disagreements over benefits within rural communities have an immobilizing effect on the development of rural broadband?
- The ISP subscriber model is the primary business motivation for providing services. It is uncertain that ISPs can obtain an adequate number of subscribers to be profitable. In addition, competitive threats, changing technology and the high cost of entry are contributing factors.
- Regulatory processes and public sector participation. What role will the government play, if any? Given the uncertainty around the government's intervention plans (i.e., grants, loans, infrastructure arrangements) it is conceivable that private enterprises would delay investing in rural broadband due to the financial risks associated with competition or interference from the public sector.

Ambiguity can serve a useful purpose through its ability to stimulate creative Sensemaking and provide a mechanism for individuals within a society to “internalize” meaning about a new technology or phenomenon. For example, Mitchell (2009) points out that “the primary stage of information gathering is important because historical studies of technological innovation has taught us that regularly the use the designers imagine for their innovations to accomplish have little or no relationship to how they are eventually taken up in social use” (p. 9). The relevance of this statement in the context of Sensemaking is that the social and communicative processes employed to make “sense” of a given technology typically result in enacting an environment (i.e., uses) different from what was originally conceived. As Henfridsson (2000) explains, “the co-existence of meanings makes it difficult for organizational actors to relate the phenomenon to his or her daily (working) life” (p. 89).

## **2.0 Literature Review**

### ***2.1 Rural Broadband as organizing (emergent structures)***

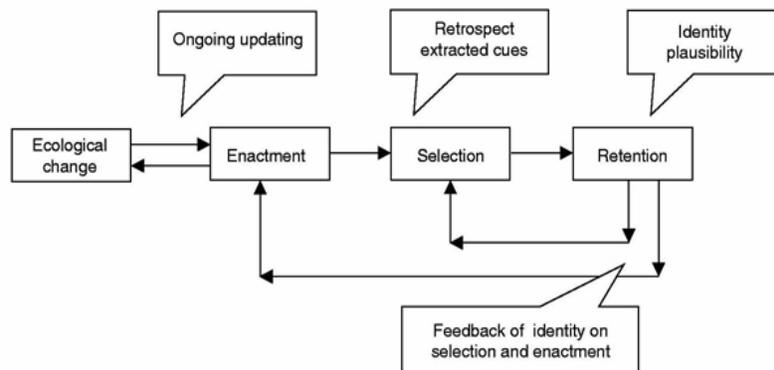
The research study employed the use of Weick's (1995) Sensemaking framework to identify themes of ambiguity and uncertainty surrounding the topic of rural broadband. Sensemaking is the process through which individuals make sense of and create their environments. As such, Weick (1979) provides the entry point for which to begin a review of literature through his definition of organizing. That is "a consensually validated grammar for reducing equivocality by means of sensible interlocked behaviors" (Weick, 1979, p. 3).

Through his definition, Weick (1979) claims that information from the environment is persistently equivocal to some degree and hands us the theoretical lens with which to view the environment encompassing rural broadband. Expanding on this concept, Weick (1979) goes on to explain that "organizing is like a grammar in the sense that it is a systematic account of some rules and conventions by which sets of interlocked behaviors are assembled to form social processes that are intelligible to actors" (p. 3). In this sense, the sets of interlocked behaviors and social processes are developed through intersubjective communication processes as individuals form recognizable structure through discursive, social interaction. In other words, the social processes are individuals' Sensemaking experiences that result in the creation of structured environments. Weick (1979) elaborates that these activities are focused on making sense of information or ecological changes encountered in the environment by asserting, "Organizing is directed initially at any input that is not self-evident. Happenings that represent a change, a difference, or a discontinuity from what has been going on, happenings that seem to have more than one meaning (they are equivocal) are the occasion for sizable collective activity" (p. 4). Individuals

collectively make sense of their worlds through social interaction. As they interact, individuals influence each other's Sensemaking processes and new "shared" meanings develop. In addition, Weick (1979) offers that, "there is a shared sense of appropriate procedures and appropriate interpretations, an assemblage of behaviors distributed among two or more people, and a puzzle to be worked on" (p. 4). In the context of this research project, the puzzle being worked on is the rural broadband environment. Taylor and Van Every (2000) expand Weick's organizing as ongoing and mediating in the way it frames the material world and provides the necessary inputs for its reconstruction (p. 163). Because of this relationship, it is ultimately through reconstruction that individuals come to understand and make sense of changes in their environment. Figure 3 illustrates the relationship between individual Sensemaking processes and organizing activities as reconstruction occurs. Organizing activities (i.e., enactment, selection, retention) embody Sensemaking processes (i.e., noticing, bracketing, identity construction, focusing on extracted cues and plausibility) which occur retrospectively in an ongoing, reciprocal interaction with the environment (Weick & Sutcliffe & Obstfeld, 2005).

Figure 3 – The relationship between individual Sensemaking and organizing activities

Figure 1 The Relationship Among Enactment, Organizing, and Sensemaking



Source. Jennings and Greenwood (2003; adapted from Weick 1979, p. 132).

Source: Weick, Karl. E. & Sutcliffe, Kathleen, M. & Obstfeld, David. (2005). Organizing and the Process of Sensemaking. *Organization Science*, 16 (4), p. 414.

Taylor and Van Every (2000) contrast Weick's views explaining how organizing actually emerges from the discursive process based on the conversations and texts occupied by organization members. Taylor and Van Every (2000), claim that there are two ways in which communication is related to knowledge. One way is through the use of communication in the transmission of information and the other is "not in the transmission of knowledge, but in its collective development to produce an understanding that is properly that of the community of conversationalists rather than any single one of them" (p. 32). They claim that this is what can be referred to as "collective intelligence". And "it is in the translation of this shared (or distributed) knowledge through its voicing by some socially legitimated agent or spokesperson that creates the structuring of the community of work into what we usually think of as "the organization" (Taylor & Van Every, 2000, p.32). Rogers (1995) supports this view with his concept of an opinion leader. Collective intelligence is the outcome of ongoing group Sensemaking and the community of work the final organizational structure. A further reference to the idea of a community of work, can be seen in Wenger and McDermott and Snyder's (2002) definition of a community of practice as, "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (p. 4). Taylor and Van Every (2000) expand further the concept of and ongoing social discourse and interaction of individuals by referencing Michel Foucault (1972):

It is rather, he is arguing, that the things we deal with in our lives are "objects that emerge only in discourse," formed by practices, generated by a body of rules that "constitute the conditions of their historical appearance." Language, he is insisting, is consequential: It is in discourse that organization comes to exist. (p. 20)

Taylor and Van Every's (2000) view is that of the emergence of organization found in the texts (i.e., structure) and conversations (i.e., transmission) used by individuals through their discourse. Text structures and materializes language as symbols and rules, whereas conversation is the utterance or transmission of texts, but not the texts themselves, as conversation evanesces (p. 31). If human experience is existentially equivocal (as Weick, as well as Derrida believe), then it is in language that organization is to be found. It is language that constructs the structure of the rural broadband organization (its categories, its hierarchies, its logical processes and "good reasons"). As the individual actors within the community of rural broadband come together to discuss issues, brainstorm ideas and share stories, they create the conversations and common vision of an organization. Having accomplished this, they couple themselves together through the process of communication. As Taylor and Van Every (2000) remark:

Communication takes the form of a talking out in which there are two outcomes: (a) a situation is talked into being through the interactive exchanges of organizational members, to produce a view of circumstances including the people, their objects, their institutions and history, and their siting in a finite time and a place; and (b) a body of discourse is generated through the talk, such embodied discourse accounting for the ongoing reproduction, historically speaking, of the kind of enveloping discursive formations Foucault's work sensitized us to. (pp. 33 – 34)

It is in this way that the researcher views rural broadband as organizing and as "organization".

Bruner (1991) broadens this view claiming that "we organize our experience and our memory of human happenings mainly in the form of narrative – stories, excuses, myths, reason for doing and not doing, and so on" (p. 4). In addition, Bruner (1991) explains the

narrative feature of hermeneutic composability as text or related instruments that enable conveyance and interception of meaning between two individuals or interlocutors (p. 7).

The Sensemaking process ultimately transpires through the use of narrative and story telling. By placing complexity into the context of a story it allows individuals to synthesize meaning and develop shared understandings.

The implication for the use of the term “extraction of meanings” has a connection with the combined work of Daft and Weick (1984). Daft and Weick (1984), view organizations as open systems and claim that “building up interpretations about the environment is a basic requirement of individuals and organizations” (p. 284). In addition, they claim that organizations are always seeking more information upon which to base decisions and actions (p. 285). In particular, the individuals within an organization are ultimately where Sensemaking “occurs” and the individuals, “are talented at normalizing deviant events, at reconciling outliers to a central tendency, at producing plausible displays...and at translating equivocality into feasible alternatives” (Weick & Daft, 1984, p. 294). Weick (1979) refers to this interaction with the environment in his reference to loose coupling as being “when two separate systems have few variables in common or when the common variables are weak compared to the other variables that influence the system” (p. 111).

Taylor & Van Every (2000) explain that a loose coupling of communication among organization members permits a local or site specific coordination of activity and an autonomy relating to the creation of the local representation of the environment (i.e., enactment) (p. 147). The concept of localness equates to the ability for each locale to retain its identity and autonomy for pursuing divergent goals at the same time as allowing a collaborative interaction through Sensemaking. Taylor and Van Every (2000) referencing

Poole and McPhee (1983) state that “on the one hand, that which is real is the immediate task of Sensemaking, first as individual cognitions, and second as shared understandings among people who interact with each other on a regular basis” (p. 147). Expanding this view Taylor and Van Every (2000) reference Weick (1985), “Nevertheless, he says: A loosely coupled system is not a flawed system. It is a social and cognitive solution to constant environmental change, to the impossibility of knowing another mind, and to limited information-processing capabilities” (p. 147).

For his part, Scott (1992) provides insight into the ideal form of organizational structure for dealing with high levels of environmental equivocality and suggests that building a “networked organization” to manage the decentralized nature of the flow and discontinuity of information. Referring to studies employing Bavelas networks Scott (1992) informs of studies that have found a more decentralized or equalitarian organizational arrangement is better suited in circumstances when processing ambiguous information or dealing with other complex tasks. Scott (1992) remarks, “Such studies show that as tasks become more complex or ambiguous, decentralized nets are usually superior to centralized structures” (p. 161). In comparison to the networked organization, Taylor & Van Every (2000) use the flatland perspective to describe an organization created within and among the relationships of individuals, through their “talking into existence” and through their “laminated Sensemaking activities” (p. 33). It is an organization “which is invariably situated, circumstantial, and locally realized in a finite time and space, involving real people” (Taylor & Van Every, 2000, p. 143). Adding to this work is Senge’s (1990) concept of the learning organization in which he describes the situation of localness being “especially vital in times of rapid change. Local actors often have more current information on customer

preferences, competitor actions, and market trends; they are in a better position to manage the continuous adaptation that change demands” (p. 288). The rural broadband organization can easily be described as a decentralized network of individuals collaborating about the question of rural broadband development.

Furthermore, organizational patterns develop as a result of the transformations that come about from an adaptation to change. Orlikowski (1996) echoing both Weick (1995) and Senge (1990), explains this adaptation as a transformation over time when she explains “organizational transformation is grounded in the ongoing practices of organizational actors, and emerges out of their (tacit and not so tacit) accommodations to and experiments with the everyday contingencies, breakdowns, exceptions, opportunities, and unintended consequences that they encounter” (p. 65). Orlikowski (1996) explains, “organizational transformation is seen here to be an ongoing improvisation enacted by organizational actors trying to make sense of and act coherently in the world” (p. 66). Rogers (1995) builds on this through his diffusion theory highlighting the influence of individuals over one another and explains the influence of organizing and Sensemaking processes on the development of organizational patterns:

In deciding whether or not to adopt an innovation, individuals depend mainly on the communicated experience of others much like themselves who have already adopted a new idea. These subjective evaluations of an innovation flow mainly through interpersonal networks. (Rogers, 1995, p. 331)

The garbage can model of organization developed by Cohen, March and Olsen (1972) more aptly describes how organizing activities relate and explains how collections relate to one another. “An organization is a collection of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for

issues to which they might be the answer, and decision makers looking for work” (March and Olsen, 1972, p. 2). The relevance of this model to Sensemaking is the implication it has for the interpretation of meanings over time and how actors deal with equivocal information from the environment. In the case of the garbage can model, Cohen, March and Olsen (1972) explain, “such a view of organizational choice focuses attention on the way the meaning of a choice changes over time. It calls attention to the strategic effects of timing, through the introduction of choices and problems, the time pattern of available energy, and the impact of organizational structure” (p. 2). Supporting this view, Weick (1995) refers to this form of organization as organized anarchies (p. 160) and claims that, “Their Sensemaking is continuous, current and unencumbered by tradition or overlearned routines” (p. 161). By addressing the cultural reality and values base of organized anarchies, Weick (1995) states, “One reason anarchies are not anomic may be that their form generates considerable meaning” (p. 161).

Weick’s (1979) concept of enactment explains how organized anarchies are the output of the combination of organizing activities and interpretations of meanings (i.e., Sensemaking). Weick (1979) states that, “Enactment is the only process where the organism directly engages an external environment. The external environment literally bends around the enactments of people, and much of the activity of sense-making involves an effort to separate the eternality from the action” (Weick, 1979, p. 131). In other words, individuals create their environments through their organizing activities, and because this activity produces additional equivocality these environments consequently influence their organizing activities (Weick, 1979, p.133). The organizing process is continuous and the interplay with the environment is “directed toward reducing the perceived level of

equivocality judged to be present in enactments that are taken seriously by the organization” (Weick, 1979, p.133).

### **2.1.1 A Systems View of Rural Broadband**

Understanding the organization from a systems perspective is important for developing a structural context. Littlejohn (2002) defines a system as a set of interdependent objects that have an affect on one another within an environment and that create a pattern different from the individual parts (p. 37). “Social systems are anchored in the attitudes, perceptions, beliefs, motivations, habits and expectations of human beings” (Katz & Kahn, 1966, p.33). An open system interacts with its environment by both giving and receiving matter and energy (Littlejohn, 2002, p. 37). Weick’s (1979) concept of organizing is fundamentally grounded in systems theory as he views organizations as being comprised of multiple independent “subassemblies”. These subassemblies are the building blocks which give an organization its complexity and are the characteristics of the system which explain how “the time required to create a large organization from simple components depends critically on the numbers and distributions of potential intermediate stable forms” (p. 110).

Furthering this systems view of the organization, Weick (1979) states:

The notion of stable subassemblies implies that when sets of subassemblies are aggregated, there will be strong ties within the subassembly and weaker linkages between subassemblies. The bonds among most subsystems, in most organizations, should be relatively loose. (p. 110)

In Weick’s (1979) view, the organizing process is representative of systems theory because as organizations receive information from the environment (e.g., technology, regulatory compliance, competitive trends) they process or make sense of the information

which results in activity or enactment. The following sequence resembles an organizational systems perspective; input (environment or phenomenon)>process (Sensemaking)>output (enacted environment) producing a continuous feedback loop that results in modified input from the environment. Taylor and Van Every (2000) discuss Weick's concept of loose coupling as characteristic of the interactions (i.e., processes) among a system's subassemblies while enacting structure and a resulting environment. Acting as the input to a system, Weick (1979) explains, "Enactment is action that produces the raw materials which can then be made sensible" (p 133). And Scott (1992) elaborates that "the concept of enactment emphasizes the role of perceptual processes but also recognizes that organizational members not only selectively perceive but also directly influence the state of their environments through their own actions" (p. 91). Scott (1992) highlights the fact that members of an emerging rural broadband organization would modify their environment through collective Sensemaking activities.

Contrasting this view, Katz and Kahn (1966) caution even though the organization may function as a system producing a product or outcome that goal congruence among the individual members may not exist (p. 15). This highlights the diversity and dynamics of many organizations. The diversity of organization members creates goal discrepancies and differences of perceived importance. On the other hand, Katz and Kahn (1966) make the assertion that "all social systems, including organizations, consist of the patterned activities of a number of individuals. Moreover, these patterned activities are complimentary or interdependent with respect to some common output or outcome; they are repeated, relatively enduring, and bounded in space and time" (p. 17). In other words, it is through the activities involved in the pursuit of common aims that organization structure forms.

Complementing systems theory, structuration theory explains how the patterning of relations within collectivities is constituted by interrelated, but politically asymmetrical, practices reproduced across time and space in various locales (Cohen, 1989). With respect to an emerging rural broadband organization, structure forms amid systems patterns generated by these interrelated practices while enabling local decision making and autonomy (i.e., within a group or community). The basics of Giddens's theory of Structuration are that as human actors socialize, interact and communicate, the effects of their activities create a form of social structure (i.e., rules, norms, behaviors). As this "structure" develops, it exerts a formative influence on the individual actors responsible for the creation of the structure itself (i.e., Sensemaking). Cohen (1992), referencing Giddens, remarks that a duality of structure exists in "the essential recursiveness of social life as constituted in social practices: structure is both medium and outcome of the reproduction of practices. Structure enters simultaneously into the constitution of ... social practices, and 'exists' in the generating moment of this constitution" (p. 42). Giddens (1984) refers to structure as the properties that enable the binding together of social systems which make it possible for similar social practices to exist across time and space (p. 17). Combining Weick's (1995) and Giddens' (1984) theories and applying it to the rural broadband organization suggests that in essence, structure forms through the Sensemaking activities undertaken between heterogeneous groups of individuals regardless of time or physical location.

## **2.1.2 The Individual as Sensemaker**

Individuals are the most essential components in the processes of organizing and Sensemaking. As individuals make sense of their worlds they simultaneously influence each other in a circular relationship immersed in an environment where leadership and culture play an essential role.

### **2.1.2.1 Leadership**

Weick (1995) describes the role of leadership to the Sensemaking process as itself equivocal given that leaders must lead others when they themselves are unaware of where they are going (p. 55). Weick (2002) subsequently elaborates that leaders must encourage others not to give up when confusion is complex through providing the necessary resources to take action (p. 31). Rogers (1995) contributes to an understanding of the influence of leadership on Sensemaking with his concepts of opinion leadership and homophily in the context of diffusion networks. Leadership is viewed by McColl-Kennedy and Anderson (2002) as the force that orchestrates the collective will toward achieving the strategic objectives of an organization and mobilizing individuals toward common goals. Berson and Avolio's (2004) concept of transformational leadership and its link to the emotive, values-based aspect of leadership, provides an explanation for the potential to influence individuals' Sensemaking. Henfridsson (2000) explains that the intended outcomes of IT adaptation can be explained by looking for signs that are more social or organizational in nature (p. 98). In particular, Henfridsson (2000) notes the significant influence that group leaders and managers' perceptions have on the overall Sensemaking process (p. 98). Berson and Avolio's (2004) "idealized influence" of transformational leadership follows the process of projecting an over-arching shared mental vision of the organization and then

encouraging individuals to develop ambiguous meanings as well as providing opportunities for sense-building to occur. Ambiguity is used here as Henfridsson (2000) uses it to mean multiple meanings assigned to the same phenomenon (p. 89). Berson and Avolio (2004) elaborated on the necessity of transformational leaders to create agreement over goals (p. 641). Competing ideas and creative concepts among individuals can result in what Leonard and Sensiper (1998) termed creative abrasion, “intellectual conflict between diverse viewpoints” (p. 118). Leonard and Sensiper (1998) go on to point out that “the creation of such intellectual ferment is important to innovation” (p. 118) and to the Sensemaking process given their similar characteristics.

#### **2.1.2.2 Culture**

Relative to the organizing process, Weick (1979) describes culture as a collective, convergent structure of norms shared by a group (p. 90). Weick (1995) describes a culture as being enacted by the activities of an organization (p. 189). Culture is considered a significant force which impacts the organizing process. Beebe and Masterson (2003) define culture as, “the learned system of knowledge, behavior, attitudes, beliefs, values, and norms that is shared by a group of people” (p. 146). Weick (1995) considers “shared experiences” as the “glue” of organizational culture. Weick’s (1995) emphasis is placed onto shared experience played back (i.e., in retrospect) through which equivalent meanings may develop. Senge’s (1990) mental models can be interpreted as a product of an organization’s culture (i.e., shared beliefs, norms, values). Establishing a shared purpose and a shared presence for the organization engages individuals in the process of collective Sensemaking. Individuals require a clear sense of purpose and a shared vision for the organization. Through this shared mental model interpersonal relationships strengthen and a mutual trust

develops. Beebe & Masterson (2003), point out that the development of a shared vision can be explained by the symbolic convergence theory and that over time a collective consciousness develops with shared meanings and emotions. Weick (1979) refers to this as the means-convergence phenomenon. Essentially, a basic agreement develops among players creating the structure for achieving diverse ends through common means as Weick (1979) explains, “The diverse ends remain, but they become subordinated to an emerging set of shared ends” (p. 92). In other words, the culture that develops reflects the converged focus toward achieving common or organizational goals.

## ***2.2 The Social Construction of Technology***

Through the process of Sensemaking, members of the rural broadband organization interact to develop and apply meaning to new technologies (i.e., broadband) encountered in their environment which results in a view of the world that is socially constructed. Bijker’s (1995) “interpretive flexibility” is characteristic of collective Sensemaking processes and contrasts Weick’s (1995) idea of retrospect and Wynne’s (1995) reflexivity (i.e., technology as a conduit for society’s values, identities, etc.) (p. 21). Bijker (1987) describes the importance of the social creation of meanings to technological development when he states:

The meanings attributed to an artifact by members of a social group play a crucial role in my description of technological development. The technological frame of that social group structures this attribution of meaning by providing, as it were, a grammar for it. This grammar is used in the interactions of members of that social group, thus resulting in a shared meaning attribution. (p. 173)

Bijker (1987) explains the social interaction of this process is responsible for the creation and destruction of technological frames (p. 173). Specifically, Bijker's (1987) concept of a technological frame which develops through the interaction with a specific artifact is similar to that of Weick's (1979) bracketing or focused attention being applied to specific situations or characteristics. Bijker's (1987) view of the role of social interaction and use of grammar echoes that of Weick's grammar (1979), Taylor and Van Every (2000) and Bruner's (1991) narrative to create meaning and understanding. Further, Bijker's (1989) view of technological artifacts being socially constructed illustrates Weick's (1979) concept of enactment:

The organizing model is based on the view that order is imposed rather than discovered, on the grounds that action defines cognition. The basic sense-making device used within organizations is assumed to be talking to discover thinking. (p. 165)

Rip, Misa and Schot (1995) discuss the importance of constructive technology assessments for developing a balance between the perceived benefits of a technology and the true implications for society. Overtones of Weick's (1995) collective Sensemaking can be observed as Rip, Misa and Schot (1995) remark, "Therefore, even if clear values are present and shared, it is often impossible to identify and optimum strategy beforehand. This implies that experimentation and societal learning must be an integral part of management of technology in society" (p. 4).

Finally, Rogers (1995) explains that technological innovations diffuse via multiple communication channels, over time and through a social system. The social systems Rogers (1995) describes resemble diffusion networks which are comprised of interpersonal relationships through which new innovations are discussed and Sensemaking occurs (p. 331).

## **3.0 Research Methodology**

### **3.1 Data Collection**

The primary data collection method used in this research was 4 semi-structured interviews which involved a total of 5 participants from various professional backgrounds. Other than participants being considered stakeholders of rural broadband in Alberta no other demographic considerations were made or deemed necessary. The main criteria for consideration to participate in this research study were a level of involvement with or participation in, the rural broadband environment in Alberta. Each selected participant was considered to have a significant stake, either personally or professionally, in the topic of rural broadband access and availability in rural Alberta. The method with which the research participants were identified as stakeholders of rural broadband was by either their direct attendance at, or being affiliated with an organization or individuals that attended, the Rural Broadband Access Round Table held by the Van Horne Institute in Calgary on March 28<sup>th</sup>, 2008. The characteristics of the sample participants were required on the basis of the research question and the theories of Sensemaking (i.e., reducing levels of ambiguity and uncertainty in the rural broadband environment) and that of organizing. That is, analyzing the network of stakeholders or “collectives” collaborating over the question of rural broadband through Weick’s (1979) organizing lens. Within the population from which the sample was drawn, a high degree of awareness of the Alberta Supernet exists. Although direct knowledge of the Alberta Supernet was not a criteria for involvement in this study, the atmosphere surrounding the Supernet’s development has been extremely controversial. Often the term “Supernet” is used synonymously in reference to rural broadband. Since the Supernet was completed in 2005, 150 of the 429 communities that

have a Supernet POP site are still without prolific broadband access (as of 2008). In other words, the initial expectations of the Supernet to bridge The Digital Divide in rural Alberta have not been fulfilled. Given these factors, it is anticipated the term “Supernet” could be used synonymously with rural broadband technology and influence the opinions of the sample participants. This is not the focus of the research, but a necessary factor to consider in the context of studying ambiguity and uncertainty in the last mile, especially given the pervasiveness of the subject.

The researcher was present at the round table session which provided the means for identifying potential research candidates. Potential candidates were semi-randomly chosen from the list of attendees distributed to round table participants, with an effort made to choose 5 participants from a cross-section of backgrounds. The rationale for this was to improve validity scales with respect to analyzing responses from individuals with a diversity of backgrounds. The resulting sample of research participants were contacted by email and provided with a consent letter (Appendix 1) informing them of the research topic and asking for their participation. The letter was also provided in print format at the time of the interview in order to collect participants’ signatures. The participants included; 1 individual owner representative of a private ISP with a history of operations throughout rural Alberta (i.e., incumbent) that did not participate in the round table but with a large stake in rural broadband initiatives; 2 participants from a Toronto-based wireless communications company that did not attend the round table, but are working on a broadband proof-of-concept project in rural Alberta jointly with an Alberta start-up ISP organization that did participate at the round table; 1 individual representing the Alberta start-up ISP organization conducting the proof-of-concept project just mentioned and that

did have representatives at the round table; 1 individual representing the Van Horne Institute and other private research interests in a consultative capacity on the subject of rural broadband access in Alberta. Table 1 shows participants by profession and by participation in the Van Horne Institute’s round table.

Each interview was recorded using a digital voice recorder (Olympus digital recorder VN-4100PC) and a back-up voice recorder (GE micro-cassette recorder), and lasted an average duration of approximately 50 minutes. Interviews were chosen as the method of data collection to allow for an in-depth discussion of the topic area. The interviews were conducted in private locations (i.e., hotel room, private offices) in order to provide security and comfort and allow the participants to provide candid responses. Anonymity of research participants was also maintained using this format. The interviews were transcribed into approximately 60 pages of text.

Table 1 – Research Participants

<i>Profession</i>	<i>Attended Round Table</i>	<i>Did Not Attend Round Table</i>	<i>Totals</i>
<i>Alberta Incumbent ISP</i>		1	1
<i>Wireless Communications (Ontario)</i>		1	1
<i>Wireless Communications (Ontario)</i>		1	1
<i>Private Research/Rural Broadband Consultant</i>	1		1
<i>Alberta ISP Start Up</i>	1		1
<b>Totals</b>	2	3	5

Each participant in the study is considered to have a high or above-average understanding of broadband technology and its potential applications. More specifically, the participants are considered to be experts in their fields and possess a shared vision for the benefits of broadband within rural Alberta. As such, the series of open ended questions (Appendix 2) used to conduct the interviews sought to obtain each participants perspective

in four topic areas: the role of broadband in rural Alberta; factors affecting the rate or speed of adoption of rural broadband; perspectives around their participation/non-participation in the Van Horne Institute round table; and options for extending the last mile.

### **3.2 Data Analysis**

During the preliminary stage of analysis, a coding framework was developed (Appendix 3) to serve as an instrument through which to identify occurrences of Sensemaking. The coding framework (Appendix 3) was derived from Weick (1995) and based upon his seven properties of Sensemaking. Appendix 5 includes an email correspondence between the researcher and Professor Karl E. Weick, validating the use of Sensemaking in this manner. Applying this framework to the transcripts provided a method with which to categorize and reduce the volume of data and create meaningful groupings. As discussed below, Sensemaking is the “outcropping” or observable process individuals employ when attempting to reduce levels of ambiguity or uncertainty. In other words, through identifying various Sensemaking patterns, the researcher is identifying structures of ambiguity and uncertainty below the surface. Encapsulating these patterns are the words and assumptions used by the respondents as Sensemaking occurs. Observing these words and assumptions, the researcher identified an emerging hierarchical structure. The preliminary findings after the initial stage of interviews identified a number of occurrences of Sensemaking and suggested that ambiguity and uncertainty are present in the last mile:

1. Within the context of a sustainable and economic business case supporting rural broadband initiatives.
2. Within the context of a complex and often bureaucratic system of regulations and oversight.
3. Within the context of the perceived benefits of broadband to rural Alberta and remote communities.

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4. Within the context of the Government's role in funding/supporting rural broadband strategies.
5. Within the context of the current and future broadband technology development and solutions.
6. Within the context of the marketplace (competition, subscription rates, etc).

After the preliminary stage of analysis, the interview transcripts were analyzed in an iterative fashion alternating between the analysis and refinement of theory/codes to apply in subsequent iterations. See Appendix 4 for a more thorough discussion of the data analysis.

## **4.0 Findings**

### ***4.1 Making Sense of the Last Mile***

The results of this study provide an excellent starting point for exploring the use of Sensemaking by industry decision makers to manage the ambiguity and uncertainty surrounding broadband adoption in rural Alberta. The five themes that emerged as a result of applying the coding framework (Appendix 3) can be found in Figure 4. Within the context of this study, the themes identified are considered to be the primary sources of ambiguity and uncertainty relating to the topic of rural broadband and help to answer the question “what don’t we know?” about rural broadband adoption. The first theme relates to the sustainability and economics of the business case for rural broadband and includes two additional themes related to the business model for delivering broadband access in rural Alberta. The second theme refers to the role of government and regulatory processes and includes three additional themes including the process followed by regulatory bodies. The third theme considers trends relating to technology and internet service providers and includes four themes encompassing the role of technology, availability of expertise and infrastructure and wireless spectrum. The fourth theme relates to the role of broadband within rural communities and includes three additional themes relating to community involvement and awareness of the benefits of broadband. The fifth and final theme relates to the expectations of broadband in rural Alberta and includes two themes dealing with community and socio-economic development and the delivery of expected services as well as the anticipation of the timing of rollouts and broadband availability.

Figure 4

<i>Emergent Themes Identified in the data</i>	
1. Currently, a sustainable business case for rural broadband does not exist.	<ul style="list-style-type: none"><li>• Market awareness</li><li>• Subscribership and profitability</li></ul>
2. The role of government is unclear to stakeholders.	<ul style="list-style-type: none"><li>• Regulatory approvals, access to towers</li><li>• Spectrum availability</li><li>• Funding programs</li></ul>
3. The pace of technological change influences broadband participation.	<ul style="list-style-type: none"><li>• Availability, types and evolution of technology</li><li>• Wireless spectrum dependency</li><li>• Infrastructure</li><li>• Availability of technical expertise</li></ul>
4. Broadband currently plays a limited role in rural Alberta.	<ul style="list-style-type: none"><li>• Community Activism and involvement</li><li>• The role of broadband and awareness of its benefits</li><li>• Education and knowledge</li></ul>
5. The expectations for rural broadband have changed very little over time.	<ul style="list-style-type: none"><li>• Community development</li><li>• Rollouts and penetration</li></ul>

#### **4.1.1 Currently, a sustainable business case for rural broadband does not exist.**

- market awareness

Over the duration of the interviews respondents provided specific evidence and offered opinions regarding the level of demand for broadband in rural Alberta. This largely included respondents providing anecdotal evidence that supported the notion of a perceived level of awareness for broadband demand in rural Alberta. In certain cases, the respondent's experience played an integral role in their ability to provide insight into the nature of the demand for rural broadband. One respondent, recalling from memory,

discussed the results of a study that had been undertaken to measure the interest in rural, high speed internet. The respondent indicated:

We did a market survey, I believe Dan, don't quote me on this, I believe it was the close of 2006, beginning of 2007, it indicated from the people that 85% wanted high-speed internet, 15% weren't interested. If anything it's increased and, you know, sometimes you're always worried about market shrinkage because you take the time. We're really concerned about providing Albertans with a good product, a really solid product and sometimes you think, "Am I compromising my timing to my delivery? Just get it to market." But I think you always... You can move quickly and effectively but you have to do your homework and you have to build a sound, sound base.

The response was evidence of bracketing (i.e., the development of concrete meaning) as the respondent claimed that the demand for rural broadband is relatively high. The significance of this observation is the respondent's point of reference indicates the belief that a high degree of interest in rural broadband exists. In other words, this is the context from which the respondent makes sense of the ambiguity around market awareness. Following these comments, and in a semi-contradictory way, the same respondent asserts that, even with the knowledge of such a high degree of relative interest in rural broadband, a slow, methodical and thoughtful process for development is preferred over expediency.

Continuing in this vein, respondents extended the view that the demand for rural broadband is important, by providing a commercial perspective. One respondent claimed that:

And what we've really found, and just as an added side to that, is that broadband isn't anymore an option for these locations, it's a requirement and so when people are doing their planning, for building new facilities, one of the first things they start to discuss is, "how will we get broadband into that area" and that's been a real change in the way things have been done in the last five years.

The significance of this comment indicates beliefs about the increased role of rural broadband for business purposes or to support industrial activity. In addition, the respondent's direct experiences with rural broadband availability influencing the design and location of field facilities have changed significantly over time from it being something of low importance to something of high importance. In other words, respondents have developed shared meanings that broadband technologies are integral to business operations which have created a "self-fulfilling prophecy". Respondents that believe rural broadband has a deterministic influence on industrial operations and locations would expect to find evidence of this within their realm of observations.

Rural communities and municipalities were identified as having "woken up" to the benefits of broadband, which indicates a significant factor in market awareness. Some respondents in particular provided the opinion that rural communities were making broadband a political issue by choosing who to vote for based on their broadband promise:

So, we can't overlook the key role the municipalities play and Parkland County plays into that picture as well but probably Parkland County is good example of the municipality reflecting the local populations of frustrations and desires and electing a Mayor on the promise of rural broadband, so, the municipality is playing a key role but it isn't the leader of the processes when citizens actually get the municipality to the point of acting.

The comment directly acknowledges the role of the municipality in developing rural broadband and points out that currently local government is not taking a leadership role (i.e., the community had to resort to influencing through the electoral process). These observations validate the level of uncertainty surrounding the role of government discussed below. The reference to "high" emotions such as frustration can have an influence on the Sensemaking process by acting as an interruption in the normal flow of events or activities.

According to Weick (1995), emotions have an arousing effect and that “the perception of arousal triggers a rudimentary act of Sensemaking” (p. 45). In addition, the evidence suggests that coordinated decision making (i.e., voting) is taking place within the community and has resulted in creating a structure within which members of the rural broadband organization can make sense of the rural broadband environment. Structure facilitates the reduction of ambiguity as individuals direct focus toward a common vision and agreement of the importance of broadband.

Certain respondents provided contradictory evidence and indicated unfamiliarity with the level of interest in rural broadband and offered a differing view that either the desire for broadband was not well known or potentially that broadband is considered unnecessary by rural residents due to their lifestyles:

I guess in terms of information that we would have liked to have received or would be very interesting is for the people that are in the rural areas, how many people are actually interested in service. I think getting a lot of the marketing information, like, ##### was talking about the entrepreneurs in the business case, if it was well known that, 60% or 70% of the community is interested in high speed service, they have currently got dial-up or satellite and they are paying X number of dollars for that service, that kind of information is great for putting together some sort of business case for the community.

And:

Also, just on a lifestyle as a choice for these people, most of it is agricultural or farming communities or native communities in the rural areas, and culturally and socially they are not putting as much emphasis on access to broadband that we do, if you're living in the cities and very used to having it when you go to Tim Horton's. It just doesn't exist the same way. People aren't that concerned about being connected. Now, some are, of course, I mean you're always going to have the people that are into that but, overall, you don't have that many people.

These responses are further examples of the subtlety between ambiguity and uncertainty and represent specific approaches to making sense of market awareness. On the

one hand, respondents indicated that they required additional information to increase understanding over potential subscribership. In Weick's (1995) eyes this is classic uncertainty indicated by the need for more information due to ignorance or the absence of knowledge – "if it was well known that 60% or 70% of the community is interested in high speed service". At the same time, respondents were equivocal in their interpretation of the need for rural broadband and mused that the lifestyle enjoyed by rural communities is uncomplicated and relaxed and that broadband may not be perceived as a high priority. Connecting these comments one can begin to see a pressure build up developing between the "lack of information" perspective and the "perceived need" perspective which in turn influences individual Sensemaking processes.

- subscribership and profitability

During the interviews, respondents moved from the perspective that the equation for a profitable business case does not exist, to identifying specific barriers preventing rural broadband development such as the cost of infrastructure and access to land, to the impact that multiple competitors in a given market could represent, to a much more optimistic view of the cost of developing rural broadband being low enough to facilitate a business case in even the most sparsely populated regions. For example, several different respondents offered the following:

It's exactly the math doesn't work out. So, a good example is that it may cost you four or five hundred dollars a year to put a subscriber on, just on a services level. Just from the fact that you have to go out and deal with problems, take phone calls, all of that. Subscribers don't want to have to pay more than forty to fifty dollars a month for a service. Well, you've only got six hundred dollars a year to play with and you haven't even taken into account the equipment costs yet. So, without having a real critical mass of people buying your service, which of course then also increases your support costs, you can't make a business case for it.

What it is, in my opinion, is simply the cost. In order to build out to these areas it's expensive. Tower infrastructure, for example, in the case of wireless broadband is expensive. Fiber infrastructure is expensive. Getting access to land, to right of ways, to municipalities giving development permits, all of this is time consuming, which means costs, and, really, the overall adoption of it comes down to how can it get paid for.

That's right. There won't be any barriers to them. To give you an idea, our analysis and our research tell us that we will reach over 90% of the density as it relates to both industrial, residential, and small business.

If we look at regions where we think there is potential revenue to come out of there, we know other players are looking at it as well. So then the question becomes, "Do we have the ability to win customer loyalty in those areas? Do we have a foot in the door somehow? Do we have a better service offering or do we have the ability to... Are there enough customers in there, even if we do invest in there and somebody else comes in, can we still support our business case based on the fact that we might only have twenty or thirty percent of those customers available to use?"

So from a community like Big Valley or Trochu, to get to the nearest community, it would be a single hop. So it's not an expensive proposition for service providers to actually reach your community and the service providers will determine what they charge at the end of the day. I think any hamlet or village with at least 50 people will be a legitimate business opportunity.

Taken together the above comments range in terms of the Sensemaking taking place.

Certain respondents claimed a profitable business equation does not exist and did so from experience and yet others made the claim from opinion or suggestions made by others. A common belief among these respondents is that a critical number of subscribers must be "signed up" in order to make a profitable business case. Consistently shared beliefs exist among these respondents as far as the definition of a profitable business (i.e., enough revenue being generated to cover the costs of doing business with some left over for return on investment) and shape the Sensemaking process toward managing uncertainty. The end result of these shared beliefs manifests in the view that adequate Subscribership is the answer (i.e., a demand side view). In other cases, respondents focused on the cost and

access variables of the profitable business model equation with respect to infrastructure and land. Building infrastructure and accessing land stood as a major barrier to providing economical rural broadband services. The respondents are attempting to manage the ambiguity around the type of infrastructure required to deliver broadband services (i.e., wireless towers, fiber optics, satellite, etc) and the land (i.e., access to public and private space in order to deploy services) which has further implications for the type of infrastructure chosen. In fact, the interplay among these three dimensions can be seen as causing a high degree of ambiguity based on the observed Sensemaking of the respondents. If a series of questions could have been observed as arising from the respondents in order to manage this ambiguity they could have been; What does the choice of technology mean to me? What does deployment mean to me in terms of the type of infrastructure I require? At what cost? What type and how much land do I need? How can I obtain access to this land? Several respondents focused on the uncertainty around competitive elements and market share as aspects of concern for building a profitable business case. In these cases, elements such as service offering and loyalty were discussed and interpreted as key components to success, and specifically address the need to manage the uncertainty around sustainable Subscribership. Finally, from an historical perspective, respondents were observed as interpreting the ability to deploy broadband services as virtually unchallenging even in regions where few potential subscribers exist. Clearly these assumptions were attempts to bracket the expectations about the ease with which rural broadband could be deployed and exhibit a retrospective view of the current question.

In summary, many examples of equivocality were observed during the course of the interviews relating to the theme of the sustainability and economics of the last mile

business case. Respondents moved back and forth from a view that the overall benefits and availability of broadband were well known to the idea that the rural lifestyle may not be aligned with the benefits of broadband, and therefore broadband was viewed as unnecessary and potentially not well known to certain stakeholders. Within the context of the profitability of the overall business case for rural broadband, respondents provided insight into demand side (subscribership), supply side (infrastructure costs and land access) and competitive considerations. The demand side “view” that respondents provided was that of needing an adequate number of subscribers to make a profitable business case and was contrast by the view that certain respondents took which was that a profitable business case could be made even in the most sparsely populated areas. Respondents’ overall beliefs that a sustainable business case for rural broadband does not yet exist represent a significant influence in the creation of self-fulfilling prophecies discussed below. It is likely that respondents would look for and ultimately find evidence that satisfies these beliefs, which could be one explanation for the speed of rural broadband adoption in Alberta.

#### **4.1.2 The role of government is unclear to stakeholders.**

- regulatory approvals, access to infrastructure

Responding to questions regarding rural broadband adoption, respondents provided insight into aspects of the regulatory processes that exist which govern access and availability of the Alberta Supernet. In particular, speed to delivery/speed to access the Alberta Supernet was considered important. The Sensemaking activities that took place regarding the need for expedited access to the Supernet were indicative of the criticality of broadband “backhaul” availability to last mile broadband providers. The financial

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implications for expedient access and approvals for small start up ISPs were also explored through various Sensemaking processes. In particular, respondents commented that:

It seems that, you know, in terms of being hooked up, for example, to SuperNet there is a little bit of room for improvement to streamline the process, shorten the timelines for getting the access and things like that.

And:

There are too much processes involved, there are too much...their processes are a little bit lengthy. You have to have...you should be able to sit on the money for a while and be able to pay the bills at the beginning, before you get to the point that you generate the revenue, the base setup, you know, by putting an order, it takes time. Its very government oriented.

Additionally, respondents provided their perspectives about the ability to share and access common infrastructure to aide in developing rural broadband and the last mile. Such as:

Well there's been a few initiatives that have taken place, particularly under the federal government side, with access to towers, with co-location on towers, trying to force, maybe force is too strong a word, but trying to coerce people into talking more about sharing tower infrastructure.

And:

The other one you mentioned, which is very good, is the tower sharing. Right now, tower sharing is more on the paper. If you really want to get a tower from somebody, if there is no relationship, I think it is going to become very difficult. So, again, if there is a little bit of help in that area that would facilitate the rollout a little bit faster.

The ability to deploy a solution quickly was indicated to be of high importance to small start-up ISPs. In particular, the need to sustain business activities while signing up customers/subscribers was noted as critical for survival and dependent on the ease with which the approvals process occurs. As respondents provided comments regarding their experiences with regulatory approvals and access, it was apparent that a large degree of

uncertainty was present in the responses and specifically that experiences with regulatory processes have been unsatisfactory, especially in terms of the length of time taken to execute a contract. In the case of access to other (i.e., private, semi-private) infrastructure, respondents provided several ambiguous responses. On the one hand, it was indicated that the government has taken strides to provide access to private infrastructure through legislation (i.e., cell towers, private wireless towers) however it was evident from the responses that many questions and differing perspectives regarding access are still present. One such question indicated an ambiguity around tower analysis and who should oversee the process and provide resolution in the event of a dispute. To date, respondents indicated that visible progress in this area has been slow. As a consequence, this has contributed to a greater degree of uncertainty over the future of infrastructure access and availability.

- spectrum availability

Electromagnetic spectrum availability and licensing was discussed at length and indicated as high in importance by several participants. Spectrum availability refers to the amount of licensed spectrum or frequency available for wireless service providers. The regulatory bodies that manage spectrum access in Canada is the Canadian Radio and Telecommunications Commission, and Industry Canada, and both are divisions of the federal government. Participants' comments revolved around the need for spectrum and the current auction model of selling licensed spectrum to private entities for a given term. Spectrum availability was considered by several respondents to be a competitive driver of sorts and necessary for wireless ISPs to be able to compete against incumbent service providers such as Telus and Bell. Specifically, respondents commented that:

Spectrum was the key one that I was thinking of. The spectrum right now is locked up by certain, you know, spectrum holders and they're not... It can be quite challenging for new operators to try and get spectrum because it's all locked up right now.

And:

The term for some of the spectrums are up. This might be coincidence...now I think Industry Canada is coming back to some of those incumbents and saying "have you used it or not?" If you haven't used it, you need to give it up. So, I think that's another reason for the rollout to become a little bit more aggressive within the next couple of years because they have to do something with it or they have to lose it.

And:

That is, in my opinion, if government comes up with a plan, not for the incumbents but for the new service providers, that they can have access to that with some terms and conditions if they deploy. I promise you there are going to be ten companies lining up there to do that.

And:

I'd be really interested in the opening of more spectrum because that's something we fight with all the time. If you're working in unlicensed frequencies, where the majority of manufacturers are building equipment, thus dropping costs, you need to understand, you need more unlicensed frequency. That's a CRTC and Industry Canada thing.

Licensed spectrum was acknowledged as being difficult to obtain and, as a result, an encumbrance to providing wireless rural broadband. Participants' considerations toward licensed spectrum as being necessary for effectively competing and providing rural broadband played an influential role in their responses as Sensemaking transpired. Respondents moved along from providing rationale for the necessity of licensed spectrum to indicating that it was unclear when or if spectrum would be made available in the future. The clear indication was that of contributing to increased levels of uncertainty for providing licensed wireless broadband. In addition, the government's role in facilitating the availability of licensed spectrum was acknowledged but respondent's were uncertain about

the future availability of spectrum given that clarity was not forthcoming regarding the intentions of the government for certain “blocks” of licensed spectrum, as contracts are expiring in the near term. Respondent’s were equivocal on the subject as was evident in their rationalizing that spectrum availability equates to rural broadband availability – “I promise you there are going to be ten companies lining up there to do that”.

- funding programs and intervention

According to respondents, the government’s role in providing funding to enable rural broadband development was considered to be an important factor. Various types of funding suggestions were provided by respondents in such areas as; where funds could be applied, what options exist for providing funding (i.e., direct (grants) or indirect (building/providing infrastructure)) and including references to specific programs already in place, which were recalled from respondents’ memory. Several respondents remarked:

If you can’t self fund it, then, if there are some sort of government programs that could help the community to fund part of the infrastructure, then that sweetens the deal for a carrier or an entrepreneur to come in and make a viable business case out of it.

And:

50%, and then whoever wants to roll it out needs to come up with the other 50%, so that really helps with the business case in the rural areas, because now your cost at least initially cost in half, so that will be very, very beneficial again for entrepreneurs to come in because the business case is not as attractive as the advanced areas so that bit helps.

And:

The other landscape change, which I think will be significant, is both provincially and federally, the governments are recognizing that this is an issue that isn’t going to go away. So, provincially you have the rural connections, broadband, infrastructure pilot program, which I think has about 8 million dollars. Which is

essentially for municipalities and not-for-profits to develop local broadband offerings.

Respondents also indicated that there are unintended consequences of government funding intervention which include providing enough funding for the initial infrastructure and start up of a solution but little or no funding for keeping a project going after it has been deployed. Respondents suggested:

Well, what they found out was that, while they had great take-up, they then started to deal with all the problems that you typically deal with in any business, which is people not paying their fees, equipment that gets damaged and having to be replaced, vandalism, weather problems, and in wireless, for example, lightning being one of the major ones.

Government funding was considered a vital component for the success of rural broadband development. Respondents made suggestions for various levels of government to provide funding in the areas of infrastructure development or by providing direct grants to ISPs. Respondents also provided suggestions for the role of the community and municipal governments in building infrastructure and allowing ISPs to co-locate and share tower space as an option. The main motivation for these responses appeared to be the ability for government grants and funding to create an attractive business case through providing access to capital and the minimization or sharing of risk (i.e., financial risk to the ISPs). In certain cases, respondents acknowledged that direct government funding intervention produced unintended consequences such as enabling projects that are unable to sustain operations once the infrastructure was in place. While considering these implications, respondents were confronted with a level of uncertainty regarding the benefits of government intervention and the adoption of rural broadband in general. Particularly, respondents oscillated between the benefits of government intervention and the potential

for it to create an unsustainable operational model. In addition, it was notable that there was a void of suggestion that the government play a direct role in providing rural broadband. In other words, a degree of uncertainty exists in what was not indicated by participants as a direct role of the government in providing rural broadband services.

In summary, participants' responses relative to the theme of government and regulatory processes indicated that much ambiguity and uncertainty are present in the areas of regulatory approvals and access to infrastructure, spectrum availability and licensing and the role of government in providing funds or intervening to enable broadband development. Participants indicated that the regulatory process involved with accessing the Supernet is very bureaucratic and inefficient for small ISPs that require a quick turnaround in order to sustain business operations while getting started. Access to infrastructure was another area of uncertainty with respect to tower sharing agreements as was the government's role in enabling access to private infrastructure. Spectrum availability was considered to be high in importance for providing wireless rural broadband. Respondents were relatively aligned in their claims regarding their interest in licensed spectrum however several respondents provided contrasting comments regarding its relative importance for providing rural broadband. In fact, respondents' comments suggested that certain ISPs are using unlicensed spectrum and indicated that more unlicensed spectrum is required. With respect to government funding and intervention, respondents provided a range of views and comments. The responses varied from providing direct grants to ISPs to funding infrastructure construction. Municipal governments were identified as potential enablers for broadband access by building the infrastructure within the community and then allowing

ISPs to co-locate. The various interpretations were clear indicators that Sensemaking was occurring and support the notion that a high degree of ambiguity exists when it comes to the role of the government. Although not directly commented on, it was also noted that a degree of uncertainty exists around the possibility of the government providing rural broadband solutions directly. Although respondents acknowledged that the government could play a larger role in rural broadband, they stopped short of suggesting that the government play a direct role providing services. Even in the case of the Supernet, where the government of Alberta provided a majority of the capital for construction and retains ownership rights, two private sector organizations, Axia and Bell, are involved as network operator and minority owner respectively. Direct government involvement is therefore seen as an unwelcomed approach to providing rural broadband services. Welcomed approaches were seen as providing subsidies to private enterprises, funding of infrastructure and the provisioning and availability of licensed spectrum to more industry participants.

#### **4.1.3 The pace of technological change influences broadband participation.**

- availability and types of technology

Respondents commented on the availability and types of technology for developing rural broadband solutions and indicated how these trends could potentially impact ISPs. In some cases, respondents acknowledged the level of connectivity in rural Alberta being limited to slow, out-of-date technologies such as dial-up and satellite. Still others provided contrasting remarks that the technology for providing rural broadband is commercially available and that technical challenges previously faced providing rural broadband services have largely been overcome. Wireless broadband technologies were mentioned as being the

medium of choice due to its low cost and ease of installation. In particular, respondents commented that:

You know, I would just...as of right now, the type of internet connectivity that exists in rural Alberta is probably more limited to dial-up and satellite-type services which are very limited in terms of performance so it restricts the types of applications and the content that is available in the cities that the rural community is not able to take advantage of.

And:

I'd also say that the technology is here now. Like, over the past 24 months or so really the only options for rural Albertans were probably satellite and dial-up and now that we've got the WiMAX technologies, for example. The wireless technologies have improved to a degree where you can get broadband speed, large areas, so there is a more favorable business case where service can be offered at a reasonable price with the technology to make a business case.

And:

In reality what happened was that wireless became the medium of choice. It's an inexpensive medium to put into place and relatively inexpensive compared to any other method to provide dense populations or dense areas with coverage.

And:

In terms of technology, I'm quite sure there isn't one size fits all. The appropriate technology for a piece of bald prairie is not the same technology that's useful for Foothills, Bushland or very remote communities. So, there isn't one technological answer.

As respondents discussed the various aspects and impacts of technology relating to rural broadband they attempted to reconcile the implications of the current level of connectivity in rural Alberta to the commercial availability of broadband technology. In other words, respondents were observed to struggle between, or attempt to make sense of, a technological paradox (i.e., the technology is available but not accessible in rural Alberta). Implications for the importance of technology were suggested as the ability to access content and applications in rural Alberta that are consistent with "the cities". Participants

discussed technological innovation at length, specifically wireless broadband technology, creating a tone that wireless technologies seem to be preferred to other broadband alternatives (i.e., fiber optics). In certain cases, the cost of alternatives was presented as the rationale for the preference of wireless. Specific wireless technologies like WiMAX and Mesh architecture were presented as significant possibilities for overcoming the challenges of the last mile. As this preference surfaced, respondents were seen to rationalize their preference for wireless as being cost effective, covering the largest areas with the least effort and being less complex to construct. Other respondents offered a contrasting perspective that a standardized technology and approach to rural broadband was not possible due to landscape and other geographic challenges. In fact, respondents with this contrasting perspective remarked that wireless was potentially only a short to medium term solution but not a long term answer to rural broadband. The equivocality of this view toward wireless technology was seen as having an impact on the levels of uncertainty surrounding the need to make a choice for which technology to use (i.e., wireless or something else) and accept a certain degree of associated risk. In particular, respondents struggled with the uncertainty of the idea of making long-term investments in a technology with a potentially short-term life cycle.

- wireless spectrum dependency

As respondents discussed various themes relating to technology, wireless spectrum again appeared as an important consideration. Specifically, several respondents indicated that licensed spectrum was a requirement for providing rural broadband which suggested a “licensed spectrum dependency”. Participants discussed the relative challenges to providing rural broadband in reference to the availability of licensed spectrum in rural

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areas. The alternative to licensed spectrum, unlicensed spectrum, was generally viewed to be an inferior option. In terms of unlicensed spectrum, competitive threats, low barriers to entry and quality of service were mentioned as additional challenges contributing to its inferiority relative to licensed spectrum (i.e., many wireless devices and other technologies use unlicensed frequency such as wireless handhelds, radio, satellite communication, which can impact quality of service due to interference). Respondents commented that:

I think the biggest, or one of the big reasons, is the lack of spectrum in the rural areas. In general there is no spectrum available for the service providers to use. Either they need to use unlicensed spectrum, which has it's own problem because you are at the mercy of who else is going to be there and all that, and even in terms of the equipment availability the equipment is more available on the spectrum side as opposed to non-spectrum systems. So, the spectrum, I think, is a big bottleneck.

And:

If you're working in unlicensed frequencies, where the majority of manufacturers are building equipment, thus dropping costs, you need to understand, you need more unlicensed frequency available so, again, more manufacturers can build that equipment and you're not going to be interfered with while you're providing services to your customers.

And:

Anyone can put in an unlicensed service in. The challenge there is the performance is not a guaranteed performance. So you run the risk of interference and degraded service and, you know, how reliable can your business case be in situations like that?

A perceived dependency on licensed frequency enabling rural broadband development was explicitly noted in respondents' comments. In fact, several respondents mentioned that without access to licensed spectrum, it was considered more difficult to provide wireless broadband in rural areas. The reasons were mentioned as the possibility of interference from other wireless service providers and the availability of licensed equipment being more readily available from manufacturers. Contrasting this viewpoint, participants explained

that unlicensed frequencies are where the majority of manufacturers are building equipment (i.e., radios that communicate within the unlicensed spectrum). These comments are contradictory and provide an interesting example of how various groups can assign multiple meanings to the same phenomenon and how Sensemaking processes are incorporated to manage the resulting ambiguity. Without validating which comments are accurate, the observation was made that respondents equivocate meanings depending upon from which frame of reference they extract cues during the Sensemaking process. In most cases, respondents' comments regarding licensed versus unlicensed frequencies were observed to be motivated by their concerns with interference and their ability to provide customers with a reliable service. Given the comments with respect to competition and low barriers to entry, respondents seemed to indicate that licensed spectrum would provide a necessary competitive advantage to providing rural broadband. This suggests that licensed spectrum is a significant factor in the ISP business model.

- Infrastructure

Infrastructure availability and access were discussed as important factors of consideration by ISPs as respondents thought about rural broadband. Respondents commented about working with the energy and agriculture industries in order to facilitate infrastructure sharing agreements in the case of deploying wireless broadband. As well, respondents commented on how the evolution of technology such as cellular and 3G technologies may impact infrastructure considerations. Further comments were provided regarding the advantages that the Supernet provides for developing rural broadband because it is a pervasive backhaul. Respondents comment that:

That's why we're working with the energy sector. As you know, we want to see if there is a possibility that we can work with the industrial sites and see what opportunities exist there. As well, we've got people talking to Agricore. Anything that has a large structure, or large facility, we're seeing... You know, it's already been established, it's already received their permitting and... So, we're ensuring that we do as many co-locations as possible with our partners in Rogers and Bell.

And:

So, you know, at the same time as we're moving forward on mesh and everybody is building their own networks, we can't discount that fact that the Bell's and the Roger's and Telus' of the world are also rolling out 3G enabled technology on their cell networks.

And:

I think, going back to the SuperNet, that's another bullet that makes it a lot more attractive in Alberta compared to somewhere else to provide rural broadband because usually in broadband the backhaul, getting to the internet, it's marked the biggest cost.

Contrasting these comments, respondents offered that a general sentiment of frustration exists with respect to the uptake of the Supernet as a backhaul. Specifically, one respondent suggested that the Supernet is operating a mere fraction of its capacity when stating:

I think, by and large, the overwhelming feeling is one of frustration and certainly the uptake on the Supernet has not been anything like the province expected, so I don't know if you've had any success in getting usage because of the Supernet or whether you've tried to. A couple of people weren't speaking particularly for the record, but they weren't speaking in confidence either; one was the representative of Bell, who said that the traffic was 5% of capacity.

Access to buildings and other tall structures was considered to be an important consideration for deploying wireless broadband due to the ability to expedite construction and reduce capital requirements. Respondents indicated a reliance on attaining co-operation from the energy and agriculture industries as a way to facilitate rural wireless broadband development. An uncertainty was detected within the responses as to whether or not a co-operative arrangement could be established or if these arrangements were considered

critical or ideal for providing wireless broadband. Respondents moved their thinking back and forth amidst considering the implications of advancing technologies to the availability and potential benefit of the Alberta Supernet for enabling rural broadband deployment. 3G and cellular technologies in particular were discussed in the context of how these developments would impact infrastructure use. A large degree of uncertainty was present as respondents pondered the idea and possibility of sharing infrastructure with competitive technologies. One realization produced by this Sensemaking process could be the low probability that cellular carriers would facilitate and enable other (i.e., competitor's) broadband solutions by agreeing to share their towers. Additionally, the Alberta Supernet was discussed as a significant advantage in Alberta for enabling rural broadband, but these thoughts were tempered by respondents' recollections that the Alberta Supernet is operating at a fraction of its capacity. The comments suggest that respondents were dubious as they attempted to make sense of this apparent ambiguity while considering the following; on one hand the Supernet is an enabler and a tremendous advantage to delivering broadband in rural Alberta, on the other it is not well utilized.

- availability of technical expertise

Participants discussed the challenges surrounding the availability of technical expertise in rural communities that are required to provide on-going operational support for broadband services. In addition, respondents made comments regarding the level of expert knowledge required in order to build a rural broadband solution. Further comments were made regarding the level of technical knowledge required in order to collaborate with suppliers such as the Supernet and the added challenges these requirements create. Respondents stated:

Now, these are in communities where there aren't a lot of high, technical people living there or working there. So, the pool from which to draw from for employees is very small and they went through five or six different employees in the last three years. Others who weren't that motivated to do that and the result being a system that, even though it was completely paid for by the federal government, they find it a bit of a struggle to make enough money off of the subscribers to support one resource to take care of about 94 subscribers. So, that challenge replicates itself over and over and over in all the small communities that we end up going into.

And:

I guess, I would also add that new carriers coming on board, the technical challenges for rolling out a new network are pretty steep. There is a lot of knowledge that's needed by the company which wants to roll out a network. It's not just the business.

And:

Even working with the SuperNet, I mean, you require a fair bit of technical competence in order to even deal with SuperNet management.

Respondents clearly indicated that providing rural broadband solutions is not just a business challenge but also a knowledge challenge. In particular, participants claimed that the size of the resource pool of qualified individuals with expertise in providing rural broadband is relatively small. This illustrates that the respondents' Sensemaking processes were influenced by their frames of reference. In other words, as respondents dealt with the idea of the uncertainty of finding necessary technical expertise, this perspective created a self-fulfilling prophecy (i.e., respondents' tendencies to find what they are looking for). From this perspective it was surmised that the respondents' beliefs about technically competent individuals being difficult to find would potentially reduce the possibility of finding them. On the other side of this frame of reference, participants' beliefs regarding the minimum technical competency required in order to "deal with Supernet management" has significant implications for the Sensemaking process as well. One implication of this

belief is that respondents expressed an anxiety toward the thought of interacting with Supernet personnel. The level of anxiety in turn had a potentially emotional affect on the respondents' Sensemaking processes.

In summary, as participants provided responses relating to the technological and internet service provider trends within the rural broadband environment, they identified four specific categories of ambiguity and uncertainty; the availability and types of technology, spectrum dependency, infrastructure and availability of technical expertise. Respondents acknowledged that the technological challenges preventing rural broadband have largely been overcome, and suggested that a "technology paradox" has developed because of the unavailability of the technology within rural Alberta. Wireless broadband was overwhelmingly considered to be the technology of choice for providing rural broadband, although participants indicated that wireless technology is considered a shorter term "stop gap" to enable rural broadband due to its cost effective nature and ease of deployment. As a related factor, respondents discussed licensed wireless spectrum as a requirement for providing a quality wireless broadband solution while establishing a competitive advantage over unlicensed spectrum. However, contrasting this perspective were beliefs regarding unlicensed hardware being the focus of most equipment manufacturers. Access to infrastructure such as buildings and private towers was discussed as it relates to facilitating wireless broadband deployments. A degree of uncertainty was observed as participants considered the likelihood of attaining access to a competing technology provider's tower. Finally, the lack of technical expertise and knowledge existing in the area of rural broadband was discussed and observed to be a "self-fulfilling

prophecy” or belief held by some of the respondents. The “knowledge gap” was also identified to exist when interacting with the Supernet’s management team about technical specifications for using the Supernet. Technological change and obsolescence were seen as influential factors in the decision to enter the rural broadband market. Due to the heavy capital investments required, rural broadband stakeholders were seen as more risk averse than their urban counterparts when it comes to investing in rural broadband infrastructure.

#### **4.1.4 Broadband currently plays a limited role in rural Alberta.**

- community activism and involvement

According to respondents, community involvement requires willingness and interest on the part of residents and community representatives in order to foster rural broadband development. In addition to this, respondents considered trust and a familiarity with the culture and needs of the rural community to be necessary ingredients for successfully bringing broadband to rural Alberta. In particular, respondents stated:

Yeah, it’s very important but we all have to share in this and we all have to pull together. Yeah. So, that’s been just the best part, is dealing with the co-ops, working with the energy sector, talking to the people in agriculture, grassroots people who I grew up with, the Department of Agriculture, Service Alberta.

And:

So, that, from a community perspective, I would say the community leaders, if you’re interested in getting broadband access into your community, find locations within your community where you have ability to access to land and put up tower infrastructure which will then attract ISPs to use it. Because that’s the single largest barrier to entry is having to put that tower infrastructure in place.

And:

You know, they have confidence and they know these people and as well they know that they can drive across the road and sit and have a chat and a coffee and knock on the door and say, “Can you explain this and give it to me in layman’s

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terms and I don't need this high pressure sales pitch and I don't need to be promised the moon and find out that you're not delivering.

And:

So, even in the #####, it is interesting in the #####, again, we had some other challenges that, when we wanted to put the tower up, we had some issues there. The county approved but they were, there was one appeal that didn't want the tower next to their property.

Participants commented that a “grass roots” community movement is a necessary ingredient for successfully developing rural broadband. Respondents gave a range of suggestions on how to accomplish this from working alongside of ISPs to municipalities building their own towers and allowing service providers to share space. Land and tower access were considered by respondents to be the single biggest barriers to broadband development. This assertion presupposes wireless broadband being the medium of choice and was congruent with previous responses. At the same time, this comment is equivocal in that respondents also claimed that licensed spectrum is the largest barrier to access. Although both comments are referring to characteristics of wireless broadband, the distinction is more than subtle and is evidence of further ambiguity among the responses. Fostering a strong sense of community and the importance of trust were discussed as critical for interacting with community stakeholders. In fact, respondents suggested that rural Albertans tend to overtly trust members of their own community, while they remain skeptical of individuals or organizations from outside the community. The implications of these comments in the context of the Sensemaking process are significant. Close relationships built on trust foster what Weick (1995) refers to as an uninterrupted process of Sensemaking and nurtures relatively positive emotions. When individuals encounter an interruption (i.e., a stimulus from the outside) as in the case of a foreign invader inserted

into the situation, Sensemaking is disrupted and negative emotions occur (p. 47).

Respondents referred to the potential for an outside force to interrupt patterns of Sensemaking occurring around rural broadband. In one case, a respondent described a situation where a community resident created an interruption by objecting to the construction of a tower near their property. The significance of this observation is that it increases the uncertainty of tower transactions for facilitating wireless broadband construction.

- The role of broadband and awareness of its benefits

All respondents indicated that broadband is playing a very limited role in rural Alberta. In addition, respondents shared their views that the benefits of rural broadband are unclear and unknown but in certain cases rural communities are aware of its benefits. In one specific case, an example was provided as evidence of the high degree of awareness among rural employees. Respondents indicated that:

I would say that it is playing a very limited role in rural Alberta and I'm sure we'll get to the Supernet and the distinctions between the Supernet and rural broadband but I was quite shocked when I saw a graph from the CRTC report in July. I don't know if you are familiar with that but it shows that rural Alberta actually has the lowest level of availability of broadband in the whole country.

And:

I think that there are pods. There are groups that do the research and they come out with big announcements and sometimes the counties have come out with big announcements and I think it's really muddied the waters for Albertans. You know, with the SuperNet there, there's all this research and analysis being done but research and analysis is only good until you put it into practice, until you actually start to deploy.

And:

People who are living in the rural areas, they are more aware of what the possibilities could be for them. They don't have it today but they are more aware

maybe because, you know, they travel to other areas and they have relatives and things like that in the urban centers.

And:

So, when people went to work in those locations they were, essentially, cut off from the rest of the world for the two weeks that they were in. We built a data system that then became a phone system as well and the operators, the next time we went back, could not say enough good things. Now they could phone their families. The two weeks didn't seem so crazy because they weren't isolated and they had the ability not only to use the voice over IP to call out and have real quality voice but also had access to the internet for video conferencing, for entertainment purposes, for anything else.

Participants indicated that a high degree of confusion exists among rural residents about the benefits of rural broadband. The reason for the confusion was explained by respondents as being the result of multiple conflicting messages being disseminated to Albertans through several channels. Respondents made contentious comments regarding the false promises and failure of the Supernet to deliver on expectations thus having contributed further to the level of confusion. In other words, if respondents were to have phrased a potential question being asked by rural Albertans it would have been, "what is the Supernet and how does it help me"? Putting words into action was indicated as the best strategy for reducing the level of ambiguity. On the other hand, respondents acknowledged that rural residents are more aware of broadband benefits as a result of exposure to people with broadband or to their families' and friends' use of broadband. Rural workers were mentioned through the use of an example as individuals that are aware of the benefits of broadband because of how it enables them to communicate with family and access entertainment while away at work. The significance of the respondents' recollection of this example is that it provides insight into their values toward rural broadband. Clearly, the respondents' views are that rural broadband has an extremely beneficial, long term impact

on society. Taken together, the respondents' discussion of the awareness of benefits provided several examples of ambiguity and further highlights the presence of equivocality associated with rural broadband.

- education and knowledge – use, security of private information

Identity theft, personal information security and education were some of the considerations made by respondents when discussing the concept of education and knowledge surrounding rural broadband. Participants offered several comments such as:

I just returned from WiMAX World in Chicago and everybody was somewhat saying the same thing. We need to be conscientious about security. Did you know that Canada has, out of all the countries in the world, the largest identity theft and the largest theft as it relates to internet? It's because of working unsecured/unlicensed.

And:

One of the things that we're also trying to do is really educate people. In other words, don't do your banking online on an unsecure spectrum/unlicensed spectrum. Be cautious because we also just finished our presentation we attended to the Chamber of Commerce and information from the R.C.M.P. and it would almost scare you.

And:

The other thing that I'm really strong about is to make them good users. So we have it in this... You know, the SuperNet is carried to the schools and the libraries and the hospitals. So, it would be my wish, and certainly I've spoken about that with Service Alberta and sharing these thoughts with them, that I'd really like for the user to be educated as well. In other words a good user, a good researcher.

Respondents provided insight into their desire to develop awareness of personal information security. Interestingly, respondents' views on the necessity for developing user awareness toward information security have little to do with rural broadband per se and more to do with a culture of use. Drawing this particular cue from within the frame of rural

broadband inadvertently creates an association between information security and broadband access and impacts the Sensemaking process. In other words, the respondents' views toward personal security could be interpreted as highly emotional (i.e., fear of the unknown, anxiety, loss of control, etc.), whereas they may not possess a similar emotional view toward the lone topic of rural broadband. However, combining the two concepts into one forces an emotional connection (i.e., now rural broadband is considered in the same category as personal information security) and a similar emotional reaction toward both. Reinforcing this point, respondents discussed the role of unlicensed spectrum as being inadequate for protecting personal information security. From a technological sense this is not entirely accurate but due to the frame of reference and unconscious connections being made (i.e., Sensemaking) respondents were seen again making a direct emotional connection to indirectly related phenomenon. Respondents also commented that developing a strong knowledge base and culture of use was a priority. The underlying values this indicated was that of broadband's capacity for expanding various socio-economic benefits such as; knowledge, literacy, health care, etc.

In summary, three areas of ambiguity and uncertainty were identified by the respondents' discussions around the theme of rural communities and stakeholders. They are; community activism and involvement, awareness of broadband benefits and education and knowledge of use. Grass roots community participation was mentioned as vital for promoting rural broadband. Trust and an understanding of rural culture were discussed for building the necessary relationships in order to develop rural broadband strategies. On the other hand, respondents suggested a confusion and low level of awareness over the benefits of broadband which contrast the suggestion to develop a grass roots approach. In other

words, a gap exists between the perceived level of awareness of broadband and the strategies respondents suggested were necessary for broadband development. Further, respondents provided insight into their thoughts about the relationship between personal information security and rural broadband, specifically unlicensed spectrum. A paradox was observed to exist between the socio-economic benefits participants agreed to be characteristic of, and the ultimate role that respondents believed to be currently played by, rural broadband.

#### **4.1.5 The expectations for rural broadband have changed little over time.**

- community socio-economic development and the promises of broadband

Research subjects provided their thoughts and comments regarding the socio-economic promises of broadband. Social considerations described for the role of broadband included addressing environmental concerns and supporting rural families by empowering work from home options. From an economic perspective, participants discussed employee safety and competitive solutions for companies with operations located in remote areas. For example, respondents stated:

Enabling the technology will also level the playing field on marketing, strategically marketing, social marketing and, of course, we all know the footprint that we are leaving on the environment. As you know, I work in the energy sector as well and the value added, to be able to ensure the safety of the employees in a work alone situation, to reduce crime, the response to emergency medical systems.

And:

I personally, on a personal note, consider that the family unit has somewhat disintegrated. Both parents work to maintain a living where I believe that if they can both work from home that the children and the community, and just as a province, we will benefit tenfold.

And:

usually when you build broadband infrastructure you are building the pipe. You just put the pipe there. That enables a lot of applications. I think that's what is going to be very important and looking at the economy of Alberta, like the oil exploration, oil and gas and all that becomes very important because that's where a large amount of people is. That's where the jobs are in remote areas but having that infrastructure enables a lot of applications.

In addition, respondents discussed some of the negative aspects of rural broadband as relating to promises that had failed to be delivered. The Alberta Supernet was given as a specific example as respondents claimed:

So, there are exceptions but, by in large, it hasn't enabled because people don't have the access.

And:

As a brand, the Alberta Supernet has some very negative perceptions out in rural Alberta and there are many people who don't want to talk about that.

As respondents discussed the potential benefits of rural broadband, their thoughts were contrast by association with negative perceptions over the failed promises of the Alberta Supernet. In terms of Sensemaking, an undertone of both positive and negative emotion was observed as potentially influencing respondents' discussion. The mention of the potential benefits of rural broadband for supporting the family unit points to a strong value connection. The potential importance of this value was seen as elevating the level of frustration over the failed promises of rural broadband development (i.e., the Supernet). In addition to a strong connection with family values, rural broadband was discussed in the context of providing support for socio-economic development. Participants provided examples of broadband's role in supporting socio-economic development that included; helping to overcome work alone challenges, health care and education access, enabling small businesses to be competitive, access to entertainment, low cost field

telecommunication and access to applications for field workers. Overall, participants described feeling frustrated by the failings of rural broadband and the Alberta Supernet.

- rollouts and penetration

Respondents hypothesized about the proliferation of future rollouts and penetration as they discussed the role of rural broadband. Specifically participants suggested:

I think you will see a lot more roll outs, it will roll out very well. Price may be a little bit comes down but I think the biggest changes you see will be more roll outs there. We are aware of a few competitions that are out there that have already...they are trying to do that. So, I think penetration is going to increase definitely.

And:

They cannot just sit down and do nothing. I think that's another thing that definitely would help produce some more deployments in the next couple of years. And, there is only spectrum that is going to be due the end of next year and there is another block of spectrum that is going to be due, I think, in three years. So, again that would help with more rollouts.

Respondents shared their beliefs about the possibility of an increased number of rural broadband rollouts in the near future. Interestingly, participants claimed that this would be due to price and increased competition and somewhat contradicted their views that access to infrastructure is the single biggest barrier to entry. At the same time, respondents reiterated the availability of spectrum being the impetus for additional rollouts to occur. Overall, these views indicated a sense of optimism about the future of rural broadband development.

To summarize, respondents' values about rural broadband were discussed as being an important socio-economic development tool. Specifically, views were discussed about broadband's ability to support the needs of a diverse range of groups from the family unit

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to the remote oilfield worker. In the case of broadband's failure to deliver on promises, an interesting connection between the Alberta Supernet and rural broadband was implied. The negative perceptions associated with the Alberta Supernet seemingly encompass rural broadband in a general sense. On the opposite hand, participants shared their beliefs about the proliferation and increased rollouts of rural broadband in the near term. Reduced costs and increased competition were provided as rationale for these beliefs which seemed to contradict previous discussions regarding infrastructure being the single largest barrier to entry. Spectrum availability was remarked as a possible enabler of increased rollouts and further enhanced the overall optimistic view participants held toward the future of rural broadband development. Interestingly, the expectations for rural broadband have changed very little over the last five years even though progress has been slow, even disappointing. Respondents' views resonated with the views of participants from town hall sessions held in 2004 providing a temporal consistency in the optimism shared about the potential for rural broadband.

## **5.0 Discussion and Recommendations**

### **5.1 Summary of Findings**

The results of this study provide an interesting exploration into the Sensemaking processes undertaken by industry decision makers while discussing the topic of rural broadband connectivity. Sensemaking activities were the identifiable and observable characteristics that research participants displayed as they encountered the forces of ambiguity and uncertainty during their discussions. Through the application of Weick's (1995) theoretical framework, the research explored the question "what don't we know?" about rural broadband in Alberta. During the interviews the following themes of ambiguity and uncertainty emerged:

- Currently, a sustainable business case for rural broadband does not exist.
- The role of government is unclear to stakeholders.
- The pace of technological obsolescence influences broadband participation.
- Broadband currently plays a limited role in rural Alberta.
- The expectations for broadband have changed little over time.

Collectively, these themes represent what individual research participants were thinking in relation to broadband development in rural Alberta. The following section will discuss the relationship of these themes to the original research questions as well as directions for future research.

The original research hypothesis stated that the findings would illustrate how prolonged exposure to the forces of ambiguity and uncertainty has shaped the current state of broadband development in rural Alberta. Admittedly, this hypothesis contained a "reach" factor given the small sample size of participants and the "snapshot in time" duration in

which the interviews were conducted. However, an historical benchmark was included in the research through the analysis of town hall transcripts created in 2004 during a related research project. Combining historical themes with themes that emerged in the more recent interviews, the research findings indicate a temporal consistency in what people were thinking in relation to rural broadband. Respondents' thoughts about socio-economic development opportunities and concerns over adoption rates have remained relatively consistent over the past five years which enhances the plausibility of the hypothesis.

### **5.1.1 Research question #1**

What strategies are employed by industry decision-makers for reducing ambiguity and uncertainty in the social and economic context of broadband development in rural Alberta?

Generally, Sensemaking processes were employed by participants to reduce levels of ambiguity and uncertainty as they discussed topics relating to rural broadband development. Respondents were observed making sense of the last mile business case by exploring potential opportunities to enhance an ISP's ability to succeed. A direct government subsidy paid to ISPs was a common theme among participants. However, clearly an unintended consequence to this approach is that reduced barriers to entry (i.e., subsidies) would potentially increase the number of ISPs competing to provide service. If this were to occur, it would have the opposite effect of diluting the subscriber base for all ISPs and exacerbate the problem. Clearly, this was a concern for respondents and heightened their uncertainty.

At the same time, respondents suggested the idea that communities lead their own efforts such as building tower infrastructure in order to entice an ISP into the community. Sensemaking was present during respondents' discussions about needing clearer indications on the actual demand for rural broadband services. In particular, respondents

indicated a desire to understand the felt need or the actual demand for rural broadband which was interpreted as a related Sensemaking effort used to reduce uncertainty (i.e., not enough information). To a large degree, the role of government and regulatory processes were observed to be themes where intense Sensemaking transpired. In particular, respondents shared their thoughts about the government's intervention plans and where they best saw the role of government. Subsidies to ISPs and infrastructure sharing arrangements were the two main roles of government suggested by participants. With respect to regulatory processes, respondents were observed to be making sense of the application processes to "sign up" and use the Supernet's backhaul services. Participants suggested that a high degree of bureaucracy exists with respect to application processes indicating a belief about the low ease of access to the Supernet.

The government's role providing access to licensed spectrum was discussed by participants as they rationalized the need for licensed spectrum being the largest roadblock to providing wireless broadband services. At the same time, wireless broadband was discussed as respondents made sense of the cost benefits of wireless infrastructure being optimal to other technologies such as fiber optics and satellite which created a unique challenge to it being considered the optimal choice. Respondents tacked back and forth between technology selection and infrastructure as they were observed making sense of other factors affecting technological deployment. Complicating this process was the consideration of the limited availability of technical expertise to support rural broadband installations. Several respondents made sense of the role of the community by suggesting that the community must play an active part in the development of rural broadband.

Awareness of benefits and knowledge (i.e., culture) of use were used to describe the forces

of attraction that would lead rural communities to participate in the rural broadband question.

Respondents made sense of the role of broadband being tied to the values of work and family. Keeping the family unit whole and enabling remote workers to communicate with family while “in the field” working, were indicators of a strong values connection to broadband access. Overall, the first finding is therefore that industry decision-makers’ strategies for “making sense” involved discussing topics that were relevant and meaningful to them in terms of rural broadband.

Developing on the themes identified under the role of government, respondents viewed “spectrum” as a resource to be controlled in order to be successful. In reality, electromagnetic spectrum consists of invisible, ubiquitous particles that are vital for telecommunications. As an ideal, respondents viewed spectrum as being more widely available in order to level the playing field for smaller competitors. In this sense, respondents were seen as considering spectrum as essential for beating the competition and not as a public good.

### **5.1.2 Research question #2**

How has ambiguity and uncertainty experienced by industry decision-makers and broadband stakeholders influenced the speed of rural broadband adoption?

Stated earlier, Sensemaking can lead to creative solutions which emerge while attempting to reduce ambiguity and uncertainty. In order for the outcome of the Sensemaking process to have an immobilizing effect, it is reasonable to consider that as the situation which develops becomes more unmanageable, or more precisely, the attempts to reduce ambiguity and uncertainty are unsuccessful, the ability to take necessary action becomes increasingly difficult. Just what steps could, or should, industry decision makers

and rural broadband stakeholders alike, take in the context of developing rural broadband?

Weick (2001) states that “much ambiguity occurs because there are events floating around that seem to bear no relation to one another. Because it is not clear what is going on, it is even less clear what ought to be done about it” (p. 49). The question becomes, what is it about the persistence of ambiguity that could lead to an immobilizing result? A partial answer lies in what Weick (2001) refers to as a self-fulfilling prophecy. In other words, as individuals experience their world, their experience shapes their perception, which in turn influences how they experience their world. Not to be confused with structuration, a self-fulfilling prophecy is what occurs when individuals mentally create a situation in which the results are what they expected (i.e., they find what they set out to discover). The relevance to the Sensemaking process is that outcomes are determined by confirmations of beliefs and expectations. Weick (1995) claims:

When perceivers act on their expectations, they may enact what they predict will be there. And when they see what they have enacted, using their predictions as a lens, they often confirm their prediction. The joint product of this directive action and selective attention is a set of inputs that match expectations and make sense. (p. 152)

Over the long term (i.e., the longer the duration that self-fulfilling prophecies reinforce themselves) the more entrenched self-fulfilling prophecies become. In discussing a classroom experiment Weick (1995) explains that self-fulfilling prophecies were reinforced through social interaction that lasted for 8 months. Weick (1995) comments, “This is crucial because it is clear that the general social interaction sequence in which that initial expectancy was embedded repeats itself over and over” (p. 150). Weick (1995) goes on to reference Henshel’s (1987) concept of serial self-fulfilling prophecies. Serial self-fulfilling prophecies help explain how as confidence and credibility increases (i.e., as what is

expected to be found is discovered) a validation cycle develops and unfolds over time with increasing speed “and to dominate as the prevailing definition of the situation, because it is clearer, more meaningful, and more stable than the surrounding events that are more loosely coupled” (p. 151). Stating that rural broadband adoption rates can be explained by people having their perceptions validated is an over simplification of the concept of a self fulfilling prophecy. Expectations are the driving force. Weick and Sutcliffe (2001) provide insight that “expectations are like an invisible hand that guides you toward soothing perceptions that confirm your hunches, and away from more troublesome ones that don’t” (p. 41). A self-fulfilling prophecy brought on by ambiguity and uncertainty, developing strength over time, has an enormous impact on decision making processes. “If people consider many alternatives, or both positive and negative alternatives, or argue over objectives, these all raise uncertainty that can lower motivation, commitment and impact” (Weick, 2001, p. 50). On the one hand, Sensemaking processes are stages on the path to action as Taylor and Van Every (2000) put it, “Sensemaking is a way station on the road to a consensually constructed, coordinated system of action” (p. 275). When a self-fulfilling prophecy develops as in the case of the last mile, these processes become debilitating. Henfridsson (2000) identifies deeply embedded attention structures as those responsible for guiding Sensemaking. Henfridsson (2000) elaborates, “When restricting, these attention structures can lead to self-fulfilling prophecies and vicious circles” (p. 101). Weick (2001) explains that the need to register all information, “the fine grain of the environment” (p. 50) is an act of decision rationality. This is arguably the track rural broadband adoption has taken (i.e., the necessity for a detailed analysis of options prior to action). However, there is an alternative to needing to have more information (i.e., to reduce uncertainty) or relative

agreement about the meaning of a phenomenon (i.e., to reduce ambiguity), which is to take action. As Weick (2001) explains:

But there is another way to deal with complicated environments. This alternative strategy is to wade in, take vigorous action, and simplify the environment so that relatively crude analyses are sufficient to keep track of the main things that are necessary. You don't have to worry about registering subtle nuances if your action simplifies that environment and removes the nuances. (p. 50)

The second finding is that with respect to rural broadband development, self-fulfilling prophecies have created an environment of inertia. Research participants shared their specific beliefs about the rural broadband environment which uncovered their self-fulfilling prophecies regarding the government's intervention strategy. Several different expectations for the role of government were discussed (i.e., ambiguity) by research participants (i.e., direct subsidy, building infrastructure, freeing up spectrum) which indicates the belief that a role for government should exist or needs to exist for rural broadband. As evidenced in research participants' responses, the role of government has yet to materialize in any concrete form, which has validated respondents' perceptions and created a self-fulfilling prophecy. In other words, research participants' expectations about the role of government are extremely varied and speculative (i.e., referring to what the government's role "should" or "could" be) as opposed to statements about the actual role of the government. Without clarity, stakeholders can be observed to have potentially been deterred from taking independent action.

Equally as strong were participants' expectations about the rural broadband business case. Respondents' discussed the uncertainty surrounding the ability to subscribe ample customers in order to be profitable. Participants also described the challenges surrounding supporting operations with limited availability of technical expertise in rural communities.

The third finding is therefore that a self-fulfilling prophecy has developed that a sustainable ISP business model for rural broadband does not exist. In this sense, respondents' expectations or beliefs are an indicator that a self-fulfilling prophecy has the potential to stymie creative solutions for developing a sustainable business case and further delay necessary risk taking and action (i.e., if continuous input from the environment is validating the belief that a business case does not exist, ISPs and other stakeholders are unlikely to act).

Finally, a significantly strong set of expectations were divulged by respondents regarding the particular choices of technology used to deploy rural broadband. The fourth finding is therefore that a self-fulfilling prophecy was observed to exist around wireless technology as being optimal for deploying broadband. Low capital cost and flexibility with difficult terrain were some of the reasons respondents gave as their rationale for preferring wireless technology to other forms (i.e., fiber, satellite). At the same time, this preference was counterbalanced by the respondents' uncertainty surrounding the availability of licensed spectrum, availability of subsidies for building infrastructure, longevity of wireless technology decisions and mandated tower sharing arrangements. A directly related and subsequent self-fulfilling prophecy was evident toward the dependence on license wireless spectrum. Respondents indicated that licensed spectrum was essential for providing wireless rural broadband, at the same time they acknowledged that the incumbent licensees and the government's auction processes were potentially standing in the way of new ISPs entering the wireless space. The nature of this self-fulfilling prophecy with respect to technology comes from the respondents' perspectives that wireless broadband is optimal. Having developed this perspective, participants provided responses that were more angled

toward the associated challenges with wireless deployments. In other words, when it came to discussing challenges with rural broadband deployments, respondents' were observed to discuss themes that reinforced their beliefs regarding wireless as the optimal choice. The significance of this finding for the research is that as a preference for wireless technology builds, respondents are more apt to search for and have their hunches confirmed about the issues impeding wireless rural broadband deployments, which has the effect of delaying action.

## **5.2 Recommendations**

The following recommendations are made in consideration of the research findings and combined with additional research to enhance their validity and relevancy to the topic. In particular, Flora (2007), Hollifield & Donnermeyer & Wolford's (2007), Gurstein's (2004) and the National Research Council of Canada in Rideout's et al. (2006) research have significant relevance in light of these findings in addition to having several applications for industry decision makers dealing with the question of rural broadband development in Alberta.

### **5.2.1 Initiating action and the role of rural communities**

Rural communities must take a greater leadership role in broadband development by appointing community champions. One way to accomplish this is by providing assistance to rural communities in the form of community champion identification and development programs. This would begin to establish the necessary "grass roots" connections and relationships from inside the community, and create what Flora (2007) considers essential networks for building social capital. Flora (2007) remarks, "Networking creates the bonding social capital to make an effective team and access to the external resources helpful to their efforts" (p. 69). Much of the emphasis on rural broadband development has historically consisted of an outside group or organization discussing solutions and bringing promises to rural Albertans (i.e., take the negative sentiments discussed regarding the failed promises of the Alberta Supernet). Designating community champions that possess a high degree of trust and respect within their community to provide leadership around rural broadband development initiatives would establish the momentum required to stimulate action. In order to install the required community champions an advocacy group could

work with communities to identify and develop these individuals. Serving as a resource centre, this group could provide a network of relationships to other communities, ISPs, government departments to aide each community in developing a local solution. Rideout et al. (2006) highlight community intermediaries actually perform public sector services and should receive support and funding from relevant levels of government as a result. Along with developing community champions Hollifield & Donnermeyer & Wolford (2007) point to developing strong public-private partnerships to help increase awareness and success of a telecommunications project (p. 60). Public-private partnerships result in a strong collaboration and combination of addressing the community's interests alongside the interests of the private sector (i.e., a profitable business model) which in turn can accelerate broadband development. Hollifield & Donnermeyer & Wolford (2007) further support the notion that a decentralized model is more likely to succeed when it comes to rural telecommunications development projects (p. 61). Reducing this down, the research has shown that the "stymie factor" to rural broadband development is that limited action has resulted due in part to self-fulfilling prophecies created by the presence of ambiguity and uncertainty. This being the case, one possible answer is to start taking action. What action? In Hollifield & Donnermeyer & Wolford's (2007) findings taking any action is appropriate because failures can lead to success and "a previous community-based effort contributes to a context that encourages future development attempts" (p. 65). These actions would likely begin to reduce the levels of ambiguity and uncertainty surrounding rural broadband and directly challenge the self-fulfilling prophecies that exist. Weick (1995) elaborates:

Each person and organization chooses who it will be by first choosing what actions, if any, it needs to explain, and second, by choosing which explanations for these actions it will defend. An inability or unwillingness to choose, act, and justify leaves people with too many possibilities and too few certainties. Binding decisions

affect the tasks we are attracted to, the reasons that move us, the values we try to realize, the plans we admire, and the people we seek out. Avoidance of such decisions slows the development of attractions, reasons, values, plans and associates. (p. 160)

Gurstein (2004) offers a different perspective with his discussion of Community Informatics (CI). Facilitating strategies through which communities understand and develop plans for “effective use” of broadband technologies within their local settings encourages participation (Gurstein, 2004, p. 227). A clear role for government in the rural broadband domain could be the development of community capacity to build local broadband strategies. Direct government funding to community intermediaries (Rideout et al., 2006, p. 83) for strategic activities should be considered. In addition, providing resources and expertise outside the community to contribute to the development of the strategy would be useful. As a first step, a “grass roots” or inside-out approach to delivering rural broadband would create the necessary momentum and critical mass upon which a successful program could be established. Once a clear vision and plan for each individual community is created including the particular type of technology (i.e., wireless, fiber optic) chosen by each specific community, engaging with ISPs and telecomm providers would be the next logical step. Without a more complete picture and plan for “how” (i.e., uses) each community could use broadband technology, the current fixation on “what” (i.e., access) each community needs will result in the continual flagging of progress as levels of ambiguity and uncertainty grow and self-fulfilling prophecies are magnified further.

### **5.3 Conclusion**

In conclusion, the research has developed a framework for observing and identifying acts of Sensemaking within the rural broadband organization by using Weick's (1995) seven characteristics. Through the use of individual, semi-structured interviews as well as reviewing historical town hall transcripts, the research was able to identify what individuals were thinking and saying about rural broadband development in Alberta. Although the findings are valid within the research population, it would be useful to include a number of focus groups in addition to the interviews. Sensemaking is an individual process (i.e., a person makes sense of his or her environment) conducted in a social setting (i.e., in a society surrounded by other Sensemaking individuals). In other words, individuals influence each other's Sensemaking processes in a real time fashion. Conducting focus groups to observe how individuals influence each other's Sensemaking processes would expand upon this research. Henfridsson (2000) asked a similar question about how Sensemaking processes affect the outcome of IT adaptation, by focusing on the role of ambiguity and Sensemaking in IT adaptation. This research project was focused on the impact of prolonged ambiguity on rural broadband adoption rates by asking whether prolonged exposure could have an immobilizing affect. Future research may also consider looking at developing a quantitative measure for levels of ambiguity. Admittedly, developing a measure for phenomenon that is subject to multiple interpretations would be no easy task.

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## Appendix 1

### INFORMATION LETTER AND CONSENT FORM

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[Date]

#### Your Consent to Participate in a University of Alberta Research Project

I would like to invite you to participate as an interview respondent in a research project which I am conducting, entitled, “Ambiguity and uncertainty in the last mile: Broadband adoption in rural Alberta.”

This research project will attempt to explore the processes by which prolonged ambiguity and uncertainty experienced by industry decision-makers has contributed to the state of broadband adoption in rural Alberta. In addition, the research will attempt to answer how industry decision-makers describe their strategies for reducing ambiguity and uncertainty in the social and economic context of completing the 'last mile' of the SuperNet? A certain degree of ambiguity can stimulate innovation and spur creative solutions through a collaborative process called Sensemaking. In the case of the last mile in rural Alberta, the research will also explore how these Sensemaking activities have contributed to the current levels of ambiguity?

If you volunteer to participate, the interview will take no longer than one hour of your time. The interview will be recorded and then transcribed and analyzed by the researcher. The project's outcomes will include an analysis paper and conclusions to be made available to participants of the research, my advisor and potentially other affiliates of the University of Alberta's, MACT program.

In keeping with the ethical standards set by the University of Alberta, I will strive to protect your dignity and anonymity. If I have someone transcribing, I will ensure that she or he understands and signs a Transcriber Confidentiality Agreement. I will comply with the University's Standards for the Protection of Human Research Participants <http://www.uofaweb.ualberta.ca/gfcpolicymanual/policymanualsection66.cfm>.

Furthermore, I will not identify you or any other individuals in any articles, reports, or other documents I produce. Following the completion of the project, I will keep all the data private and secure for five years. After that period, I will destroy all the data. Upon request, I will send you a copy of the draft transcripts for comment. It is possible that someone could conclude your identity from quotations used in articles or reports. Your views might then be attributed to you, which you might not have wanted to happen. I do not anticipate any other risks.

I would like you to know that you are under no obligation to participate as an interview respondent. If you do volunteer to participate, you can withdraw at any time until data analysis begins on 30 September 2008. If you decide to withdraw after an interview, I will not use any information collected from you, including the transcription and my notes.

If you have any concerns about my research project, you can contact me at work at (403) 231-1137. My e-mail address is [dbrown15@shaw.ca](mailto:dbrown15@shaw.ca). My supervisor is Marco Adria Ph.D., Associate Professor and Director of the Communications and Technology (MACT) Program. He can be reached by phone at (780)492-2254. The plan for this study has been reviewed for its adherence to ethical guidelines and approved by the Faculties of Education, Extension and Augustana Research Ethics Board (EEA REB) at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Chair of the EEA REB at (780) 492-3751.

Sincerely yours,

Dan Brown

I understand the purpose, activities and potential benefits and risks of this research project. I understand that the researcher will protect my anonymity and privacy, that my participation is voluntary, and that I can withdraw at any time until one month after the interview is complete. I understand that I am to sign and return one copy of this form and that I may keep the other copy.

Printed name of participant \_\_\_\_\_ Date \_\_\_\_\_

Signature of participant \_\_\_\_\_

## Appendix 2

### Interview Questions

I will ask the following open-ended questions of the research participant during the one-hour interview meeting to gather detailed information about the participant's opinion or perspective on the speed of rural broadband adoption in Alberta. I will analyse and compare the information gathered on a case-by-case basis using a coding system in order to draw conclusions. I will record the sessions and transcribe the interview for reference during the development of the final research paper. The summary will be provided to the respondent for the opportunity to make revisions. I will also ask the respondent if informal contact may be made after the interview to clarify or follow-up on the discussion that occurred during the interview.

1. How would you describe the role that broadband plays in rural Alberta?
  - a. PROBES:
    - i. Enabling technology? In what ways?
    - ii. Thinking about how broadband can provide expected services; what are some examples of those services?
2. Thinking about what you have discussed and/or heard about the state of rural broadband adoption in Alberta, what, in your opinion, are the major factors influencing the speed of adoption?
  - a. PROBES
    - i. Can you provide specific examples of this?
    - ii. In your view, what factors would influence someone's (an organization's) decision to participate in providing last mile broadband connectivity in rural Alberta?
    - iii. How has this changed in the last 12 months? 24 months?
    - iv. Where do you see the adoption of broadband in rural Alberta heading in the next 12 months? 24 months?
3. On March 29<sup>th</sup>, 2008 the Van Horne Institute and The University of Calgary hosted a Rural Broadband Access Round Table at the McDougall Centre in Calgary. This session was a leading edge method of consultation in that it brought together many diverse groups into a neutral forum to stimulate creative discussion around the state of broadband adoption in rural Alberta.
  - a. *You Did attend the session.* Reflecting on what was discussed during the round table (i.e. The mayor of Parkland County's opening remarks regarding broadband access in his community, the change drivers (new last mile technologies, business models, availability of infrastructure, telecommunications (Bell, Telus), competitive, regulatory and industry (CAPP) perspectives), in your view what was the overall outcome of this session? What clarifications were made for you during this session about rural broadband adoption in Alberta? How did the information that was



## Appendix 3

### Analysis Codes

This project is intended to explore the processes followed by industry decision makers when dealing with the complex issue of providing last mile broadband connectivity throughout rural Alberta.

The theoretical framework upon which the research is based is Weick's model of Sensemaking which provides a lens through which to observe the forces of ambiguity and uncertainty. The observational framework comes as a two-dimensional object; 1) The processes used by the research subjects to reduce both ambiguity and uncertainty and 2) The effect that prolonged ambiguity has had on the rate (speed) of broadband adoption in rural Alberta. The project hypothesizes that prolonged ambiguity has created a degree of inertia which has led to disappointment and frustration about the speed of rural last mile broadband adoption. It is also anticipated that the research will offer insight into the perceived role of broadband technologies in rural Alberta (in general) and specifically identify the perceived barriers faced by stakeholders of rural broadband technology.

- What supporting/developmental (social, political, economic) role(s) could broadband play in rural Alberta?
- This research project tests the hypothesis that prolonged ambiguity has created a level of inertia which has led to disappointment and frustration about the speed of rural last mile broadband adoption.

The view of the respondents is as individuals within a community of stakeholders collaborating about the complexities associated with delivering the last mile in rural broadband. The research explores the seven characteristics of "Sensemaking" as described by Weick (1995) in the context of rural broadband organization. These characteristics are;

- Grounded in identity construction - Who a person is as indicated by discovering how and what they think.
- Retrospective - To learn what a person thinks, you look back over what they said/did earlier.
- Enactive of sensible environment - Creation of the object to be seen and studied when a person speaks or takes some sort of action.
- Social - What is said and concluded by an individual is determined by who socialized them and how the person was socialized, as well as by the audience the person anticipates will audit the conclusions they reach.
- Ongoing - What an individual says/does is spread across time, competes for attention with other projects and is reflected on after it is finished, which can influence interests and perception.
- Focused on and by extracted cue - The "what" that an individual singles out and embellishes as the content of thought is only a small portion of the utterance that becomes salient because of context and personal dispositions.

- Driven by plausibility rather than accuracy - An individual needs to know enough about what they think to get on with projects but no more, which means sufficiency and plausibility take precedence over accuracy.

The following tables contain the codes associated with each characteristic and related dimensions of Weick's (1995) theory of Sensemaking.

<b>Name of code</b>	<b>Code</b>
<i>Grounded in identity construction</i>	IDT
Individualized – “I”	IDT-INDIV
Transactional	IDT-TRAN
Self-enhancement	IDT-SELF
Organizational Self - Collective	IDT-COLL
Influenced	IDT-INF
Beliefs	IDT-BEL
<i>Retrospective</i>	RETRO
Experienced or (lived)	RETRO-EXP
Distinct Event	RETRO-DIST
Attention applied	RETRO-ATT
Current influencer (of state)	RETRO-INFL
Equivocal	RETRO-EQ
<i>Enactive of sensible environments</i>	ENA
Action taken	ENA-ACT
Relating	ENA-REL
Interdependent	ENA-INT
Self Fulfilling	ENA-SELF
Bracketed	ENA-BRACK
<i>Social</i>	SOC
Coordinated actions	SOC-COORD
Shared Meanings	SOC-SHARE
Overlapping views of ambiguous events	SOC-OVER
Generalized other	SOC-GEN
Stereotypes	SOC-STER
Roles	SOC-ROLE
<i>Ongoing</i>	ON
Interaction	ON-INTACT
Referenced Events	ON-EVE
Interrupted Flow	ON-INT

Negative Emotion	ON-EMONEG
Positive Emotion	ON-EMOPOS
<i>Focused on and by extracted cues</i>	FOC
Established Point of reference	FOC-REF
Embellishing	FOC-EMB
Dilemma	FOC-DEL
Identified Characteristic	FOC-ID
Intention (seed)	FOC-INT
Context	FOC-CON
<i>Driven by plausibility rather than accuracy</i>	PLAU
Filtered Information	PLAU-FILT
Suggestion	PLAU-SUG
Pragmatic	PLAU-PRAG
Creativity	PLAU-CREA
Elaboration	PLAU-ELAB
Speed (in decision making)	PLAU-SPEED

## Code Descriptions

Name and code	Description
<i>Grounded in identity construction</i>	Who a person is as indicated by discovering how and what they think
Individualized – “I” IDT-INDIV	References made by the interviewee in the first person – i.e. “I” did such and such, or “my” company, etc. Cues to look for are self-enhancement, self-efficacy and self-consistency.
Transactional IDT-TRAN	Examples of the manner by which the interviewee (as member of an organization) begins processes of transacting with others.
Self-enhancement IDT-SELF	Examples of activities that are referenced by the interviewee for the purpose of maintaining a consistent, positive self-conception.
Organizational Self - Collective IDT-COLL	Examples of the interviewee representing the thoughts and views of the rural broadband community/organization.
Influenced IDT-INF	Suggestions or references made to other players within the rural broadband community– i.e. government, telecomm, etc.
Beliefs IDT-BEL	Personal, spoken or implied beliefs about the state or a particular component of rural broadband and related influencers.
<i>Retrospective</i>	To learn what a person thinks, you look back over what they said/did earlier.
Experienced or (lived) RETRO-EXP	References made to experiences with past events and activities within the rural broadband community.
Distinct Event RETRO-DIST	A description provided about a specific event or situation that occurred within the rural broadband community.
Attention applied RETRO-ATT	More than a descriptive recollection of a past event, does the interviewee apply deliberate attention to a given past experience within the rural broadband environment.
Present moment influencer (of state) RETRO-INFL	How does the current state of the rural broadband environment appear to influence the interviewee’s recollection

	and developed meaning of past events?
Equivocal RETRO-EQ	Examples of multiple meanings being applied to a single phenomenon or event.
<i>Enactive of sensible environments</i>	Creation of the object to be seen and studied when a person speaks or takes some sort of action.
Action taken ENA-ACT	Action taken within the community of rural broadband – ex. participation in advocacy and community groups.
Relating ENA-REL	Evidence that what is being said can be interpreted as confronting the activity of the environment.
Interdependent ENA-INT	Interdependent of other members within the rural broadband community. Members stimulate a given situation which in turn influences the actions of the individual members, further stimulating the situation and so on.
Self Fulfilling ENA-SELF	Evidence that people create and find what they expect to find. Ex. Low broadband adoption in rural Alberta.
Bracketed ENA-BRACK	Cues to tangible, material and technical artifacts producing substance and meaning.
<i>Social</i>	What is said and concluded by an individual is determined by who socialized them and how the person was socialized, as well as by the audience the person anticipates will audit the conclusions they reach.
Coordinated actions SOC-COORD	Evidence suggests that decisions are made in the presence of others or with the knowledge that they will have to be implemented, or understood, or approved by others.
Shared Meanings SOC-SHARE	Evidence points to experienced collective action which is shared within the larger group – i.e. rural broadband community.
Overlapping views of ambiguous events SOC-OVER	Observations made by the interviewee on the state of rural broadband adoption.
Generalized other SOC-GEN	Examples of cues used to refer to other participants in the rural broadband

	community in a general sense. i.e. “they”, “them”, “those individuals”
Stereotypes SOC-STER	Examples of bias and opinion when referring to specific individuals or contributors to the state of broadband adoption.
Roles SOC-ROLE	Stated roles of individuals – ISP’s, government, individuals, etc.
<i>Ongoing</i>	What an individual says/does is spread across time, competes for attention with other projects and is reflected on after it is finished, which can influence interests and perception.
Interaction ON-INTACT	Examples of interactions with others that forged a specific meaning in time regarding the state of rural broadband adoption.
Referenced Events ON-EVE	Specific events recalled and discussed.
Interrupted Flow ON-INT	Examples of interruptions of action sequences and the causes of the interruptions.
Negative Emotion ON-EMONEG	Negative emotions brought about by the interruptions.
Positive Emotion ON-EMOPOS	Positive emotions are created as a result of the interruption – ex. the interruption is no longer present.
<i>Focused on and by extracted cues</i>	The “what” that an individual singles out and embellishes as the content of thought is only a small portion of the utterance that becomes salient because of context and personal dispositions.
Established Point of reference FOC-REF	What appears from the interview transcript to be a reference point from which further explanation unfolds? The deliberate directing of attention to something/someone.
Embellishing FOC-EMB	Evidence exists of exaggeration or an enhancement of a particular experience or situation within the rural broadband community (extracted cue).
Dilemma FOC-DEL	A particular “event” or situation relating to rural broadband that produced a specific challenge and is remembered or

	referenced within the interview.
Identified Characteristic FOC-ID	A specific characteristic of the rural broadband environment, etc. that is referenced i.e. hostility, excitement, volatile.
Intention (seed) FOC-INT	Expressions of intentions are, as a process of moving over time, a transition from the unknown to a more clear state.
Context FOC-CON	From what context are the extracted cues taken. i.e. social, political, demographic, geographic.
<i>Driven by plausibility rather than accuracy</i>	An individual needs to know enough about what they think to get on with projects but no more, which means sufficiency and plausibility take precedence over accuracy.
Filtered Information PLAU-FILT	Which information is being summarized or categorized in order to reduce or filter what is being discussed?
Suggestion PLAU-SUG	What hints or suggestions are made or implied regarding the state of rural broadband? Anecdotal evidence exists within the responses?
Pragmatic PLAU-PRAG	Which responses are rooted in practical decision making?
Creativity PLAU-CREA	Which responses appear to be focused on creative decisions and ideas?
Elaboration PLAU-ELAB	What information is being generalized and obviously enhanced in importance?
Speed (in decision making) PLAU-SPEED	Which responses indicate a preference for speed of decision making or taking action?

#### **Appendix 4**

A macro code or (etic) was assigned to each of the seven properties and five or six sub-codes (emic) were developed which represent the dimensions of each macro code. The categories and related macro codes representing the properties of Sensemaking are:

1. Grounded in identity construction - IDT
2. Retrospective - RETRO
3. Enactive of sensible environments - ENA
4. Social - SOC
5. Ongoing - ON
6. Focused on and by extracted cues - FOC
7. Driven by plausibility rather than accuracy - PLAU

The application of this coding analysis provided a lens through which to observe instances of Sensemaking which could then be interpreted as evidence of the existence of ambiguity and uncertainty. Correspondingly, the individual rubrics (etic) of Sensemaking were identified by their individual dimensions (emic) within the interview transcripts. In other words, the Sensemaking process was the observed “outcropping” of the detection of ambiguity and uncertainty in the context of this research. This is because Sensemaking is what Weick (1995) refers to as a process individuals use when faced with multiple meanings around the same phenomenon (i.e., ambiguity or equivocality) or when insufficient information is available with which to make risk-mitigated decisions. Taken in the singular, Sensemaking is how individuals “make sense” of their worlds. Interpreted in this fashion, the research explores, through the identification of these outcroppings, the unobservable structures that exist beneath the surface as we are unable to observe ambiguity and uncertainty directly. Weick (1979) and Taylor (2000) provide further theoretical frameworks (i.e., organizing theory) to help explain these patterns. Together with both the coding framework, and the theoretical lens of Weick and Taylor, multiple passes through the data were conducted.

Passing through the data is what Neuman (2003) refers to as open coding (i.e., pass 1), axial coding (i.e., pass 2) and selective coding (i.e., final pass). During the initial pass, the coding framework (Appendix 3) was applied to the data in search of patterns. In addition, some basic note taking was completed. The second pass through the data revealed new hierarchical categories which emerged out of the words and assumptions (i.e., understood, implied) that encapsulated the specific instances where Sensemaking occurred. These categories and related code assignments were:

1. An economic business case for developing rural broadband – CAT-BUS
2. A high degree of bureaucracy exists within the various regulatory and compliance processes that relate to rural broadband – CAT-BUR
3. The role of government within the rural broadband organization – CAT-GOV
4. The uncertainty of the ISP landscape and technological trends – CAT-ISP
5. Availability of market research for rural broadband – CAT-MRKT
6. The role of rural communities – CAT-RUR

7. The overall dynamics and uncertainty within the rural broadband space – CAT-UNCERT
8. Public awareness about the benefits of broadband – CAT-AWARE

Each of these higher level categories was identified as potential buckets into which the occurrences of the initial codes could be placed and began to resemble organizing structure. In other words, Sensemaking processes centered on reducing ambiguity and uncertainty of these categories, revealed an emergent hierarchy. Taylor (2000) would refer to this as the emergent organization. During the third and final pass through the data, along with providing transcribed evidence of the validity of the hierarchy of codes, a more refined hierarchy was developed. The final hierarchy that emerged was:

1. Sustainability and economics of the last mile business case – CAT-BUS
2. Government and regulatory processes – CAT-GOV
3. Technological and Internet Service Provider (ISP) trends – CAT-ISP
4. Rural communities and stakeholders – CAT-RUR

Additionally, the primary research collected as a result of these interviews was augmented by analyzing historic town hall transcripts of 2 town hall meetings conducted in 2004. The relevance of the town hall meeting transcripts is that the meetings were held in rural communities at the on-set of the Supernet Alliance Research Project, a government funded initiative through the Social Science and Humanities Research Council of Canada (SSHRC). The project was headed by Dr. David Mitchell (University of Calgary) and was divided into eight subprojects. Each project studied the impact of broadband technologies in specific areas – public consultation, libraries, health, etc. Through public consultations in more than 10 rural communities throughout Alberta, the project was able to uncover the concerns, perceptions and values relevant to individuals and communities regarding rural broadband access. Although the town hall transcripts were not the direct focus of this research initiative, they provided an historic baseline from which comparisons were drawn to the more recent primary research. In addition to the hierarchical themes that emerged above, an additional theme emerged from an analysis of the town hall transcripts:

5. The role and expectations for broadband in rural Alberta. CAT-ROLE

The study's conclusions are valid within the context of the participant's views around rural broadband adoption in Alberta. Specifically, a high degree of validity exists in the context of the categories of Sensemaking discovered through the identification of ambiguity and uncertainty present in the rural broadband organization.

## Appendix 5

### Email Inquiry sent to Professor Karl E. Weick

**From:** Brown, Dan [DBrown@ccscorporation.ca]

**Sent:** Tuesday, May 12, 2009 10:42 PM

**To:** karlw@umich.edu

**Subject:** Sensemaking and ambiguity in rural broadband - Alberta, Canada

Professor Weick,

Thank you in advance for your time.

My name is Dan Brown, and I am a graduate student at the University of Alberta, Alberta, Canada. I am completing my final research project entitled "Ambiguity and uncertainty in the last mile. Broadband adoption in rural Alberta" for which I have attached the information letter for your perusal. The theoretical framework upon which my research is based is your concept of Sensemaking. What I am toiling with is whether or not there is some way to 1) measure levels of ambiguity in some meaningful way and 2) attribute the outcome or state of a given situation to the levels of ambiguity present (i.e. in a predictive fashion).

If you are able, I would really appreciate if you could give some thought to these 2 questions;

1) Does it make "sense" to view the theory in this way?

2) If so, have you developed your research to this degree or are you aware of anyone that has?

Thank you.

Sincerely,

Dan Brown

**Email Response received from Professor Karl E. Weick – May 15<sup>th</sup>, 2009**

Best i can say is, your treatment sounds plausible and I know of no one whose work would help you. Your information letter is impressive. As long as you ask your respondents somewhere in the interview, "what should I have asked you," I think you'll make a substantial contribution.

Good luck,  
-karl weick

Karl E. Weick

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