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Connected Lives North - Chapleau

Report on the Introduction of High-speed Internet to a Northern Ontario Rural Community

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Executive Summary

In November 2005, Bell Canada, in partnership with Nortel, initiated a one-year intervention in a northern Ontario town (Chapleau) whereby the majority of the town of Chapleau had either wireless or ADSL access to high-speed broadband. The question to be resolved is, ***"How did the broadband connection transform the socio-economic profile of the residents of the community?"***

Two waves of survey data collection took place (Wave1 – Dec. 2005 to Feb. 2006; Wave 2 – Oct-Nov 2006). The first wave provided a baseline measure of social interaction and civic engagement for the town of Chapleau prior to the deployment of high speed broadband, and the second wave allowed for the examination of changes due to the new technology. Approximately 31 percent (n=159) of residents surveyed responded to the first survey, and 41 percent (n=219) responded to the second wave survey. In addition, 33 individuals participated in in-depth interviews between July 29th and August 1st 2006.

Over 70 percent of all respondents are Internet users. However, the age divide still exists as 74 percent of people 65 years of age or older are non-users. Age difference may explain why there is a difference between non-users and Internet users, but only partially. Even when we control for age, level of Internet use is associated with various social phenomena. For example, non-users have a lower level of face-to-face contact than Internet users. This may be due to the Internet acting as a catalyst for engagement – a facilitating tool to enable a greater ease in scheduling face-to-face social interaction. In addition, moderate users are more likely to belong to a voluntary organization, thus also increasing civic engagement as well as social interaction. There is no evidence that the Internet replaces face-to-face social engagement in this rural community. Rather, the Internet appears to supplement social interaction and social engagement.

Increased technology ownership took place over this span of time. Part of this is due to the proliferation of mobile phone use at this time. It is also due to the positive externalities associated with the high speed Internet connection (i.e., purchases of laptop computers etc.). Thus, a technological multiplier effect occurred after the implementation of the wireless mesh network.

As is often the case with a new technology, the effects of its introduction and diffusion have only been partially realized. Moreover, new effects emerged. For example, Chapleau residents did not massively switch to become Internet users after the introduction of mesh technology. Yet, they did incorporate the Internet into their lives in a process we call "normalization".

Acknowledgements

We thank our collaborators for their insights, skills and knowledge: Prof. Derek Wilkinson at the Department of Sociology, Laurentian University and University of Toronto sociology doctoral students Bernie Hogan and Tracy Kennedy. Surveying, interviewing coding and transcription were led and done by Bernie Hogan and Tracy Kennedy, with the interviewing collaboration of Paul Armstrong, Paul Glavin, Inna Romanovska, Cindy-Lynne Tremblay and Natalie Zinko (who also provided organizational aid in Toronto). Survey and interview transcription were performed by Julie Amoroso, Lindsay Cai, Steven Dymond, Stacey Graham and Sarah Gram.

We also thank all the people at BCE, Nortel, Bell University Labs, Intel Research and the Social Sciences and Humanities Research Council of Canada who supported and funded this component of our Connected Lives North research Michael Hipwell, of BCE/Bell was our shepherd through the final months of research. Angela Lamb and Brian Rivard of BCE/Bell, were especially helpful in dealing with the inevitable challenges. Kenneth Anderson, Richard Beckwith and Kathi Kitner of Intel Research have provided valuable ethnographic insight.

And most importantly, we thank all of the respondents from Chapleau, who made this project possible through their patience, generosity and insight.

Report on the Introduction of High-speed Internet Connection to a Northern Ontario Rural Community

Background

In November 2005, Bell Canada, in partnership with Nortel, initiated a one-year intervention in a northern Ontario town (Chapleau) whereby the majority of the town of Chapleau had either wireless or ADSL access to high speed broadband. The question to be resolved is, ***"How did the broadband connection transform the socio-economic profile of the residents of the community?"***

To answer this question, we focused our attention on the relationship between Information and Communication Technology (ICTs) and Social Interaction/Social Capital.

The motivating questions for this research were:

- How does the shift to individual means of communication – the Internet and mobile phones – affect domestic and community relations?
- If people are immersed in the Internet, how does this affect their relations with household members?
- Does the shift from groups to networks affect the ways in which Information and Communication Technologies (ICTs) are being used?
- Do ICTs increase or decrease involvement with community members and more organized forms of civic life?
- How do ICTs affect travelling to see friends and relatives?
- What is the nature of social support – emotional and material aid – in a networked individualised society in which many interactions take place via ICTs?
- How does the newly available technology affect the manner in which people work and the locations where they work?

Data Collection:

For this project, our research team considered a number of methodological approaches to data collection. Due to time and resource constraints, face-to-face interviews were not feasible. Because of the types of potential effects that this technology may have had upon individuals, households, and businesses, a typical telephone survey would have been impractical due to the length of the questionnaire. We therefore used a drop-off system of survey delivery as the most economical and practical mode of data collection for this setting with a higher response rate than typical mail-in surveys.

We considered using an on-line survey instead of a paper based survey. The advantages of using an on-line survey are that it reduces the number of input errors and reduces the time required for data input. However, there were several disadvantages of using on-line surveys for this study. First, the on-line study would not be accessible to those who do not adopt the broadband service or who are uncomfortable with the technology. This would mean that we would at least require a mixture of on-line and paper based surveys.

Second, those who had a poor experience with the broadband service would be less likely to fill out an on-line survey in the second wave of our survey. Unsatisfied customers would be more willing to state their opinions in a paper survey. Third, we saw a virtue in using the same procedure that had been used in a recent study by our team of Internet use in urban Toronto. Using their procedures and some of the same questions has aided our study's validity, reliability and comparability.

We believe there are significant insights from the first two waves of this survey. However, we also recommend a third wave study be undertaken in order to assess more long-term effects of this technology. Although we also undertook additional in-depth face-to-face interviews for a smaller sub-sample in order to address specific processes and behaviours, this report focuses primarily on the first two waves of data collection.

The Two Surveys:

Wave1 – The first wave occurred just before and during the implementation of broadband (November 2005-January 2006). The goal of this wave was to assess the baseline state of technology adoption in Chapleau. This was intended to help us understand what changes could be attributed to the subsequent introduction of broadband and wireless. The initial survey was mailed at first, but we switched to hand delivery to improve the response rate. Professor Derek Wilkinson from Laurentian University and three of his students hand delivered the surveys to those sampled individuals who had not yet responded to the initial mail out, using a French-language version when necessary. A $5 Bell telephone card was included as a thank you with the survey.

Response Rate – Baseline (Wave 1):

Original Mail out - random sample of 669 residents.

Unusable addresses - 149
Correct addresses – 520

Returned (Answered) – 100
Response Rate – 100/520 = 19.2%

Hand Delivery – 420
Returned – 59
Response Rate – 59/420 = 14%

Total Responses – 159
Overall Response Rate –159/520 = 30.6%

Wave 2 – Nine months post introduction of the mesh technology, an article was placed in the community newspaper, thanking the respondents for participating. Two weeks prior to the survey, a letter of introduction from the University of Toronto / Laurentian University researchers was sent out, along with a letter from the mayor of the town. In October 2006, 10 months post introduction of the mesh technology, a small group of volunteers hand delivered surveys to a random sample of 669 Chapleau

residents. A new $5 bill with a hand written note saying thank-you was also sent with the (French and English) survey packages. A reminder card was mailed out 2 weeks later. And another reminder card was mailed out 4 weeks later. This strategy yielded a higher response rate than Wave 2, with 219 surveys returned for a response rate of 41.2 percent

Response Rate – Post Technology Introduction (Wave 2):

Same Random Sample as in Wave 1 (669 respondents)-

Correct addresses – 618
Refusals – 86

Face-to-face drop off – 225
Returned – 112
Response Rate – 50%

Mailbox / Mailed out – 307
Returned – 107
Response Rate – 34.9%

Total Responses – 219
Overall Response Rate – 41.2%

The Interviews:

In July 2006, a research team traveled to Chapleau to conduct interviews. The interview had two objectives. The first was to assess in rich detail the impressions of the Internet in general and the Bell /Nortel infrastructure in particular. The second was to assess the extent of communication between respondents and specific important individuals in the respondent's life (known as the "personal community"). Of the 159 original survey respondents, 74 said they did not want to be contacted about an interview. This left 85 people who said 'yes' or 'unsure'. In total, we conducted 33 interviews in Chapleau, July 29 - August 1, 2006.

Breakdown

Refusals	13
Away/out of town	13
Wrong number or out of service	5
No shows	1
Cancellations	4
Unreachable	16
Interviews	33
Total	85

Human Subjects Research Issues

Ethical approval was obtained through the University of Toronto. There was negligible risk to the participants for participating in this survey. The study used standard social scientific survey and interview methods. All participation was voluntary. Research with participants was non-invasive, not stressful, and did not gather sensitive information. Participants were informed that they may withdraw at any time and may decline to answer any questions. All participants were sent two letters of consent to sign: one to keep and one to send back to the researchers.

Data Input and Cleaning

The data input process for Wave 1 was managed by BCE staff, who hired students from the University of Toronto to do the actual data input at the BCE offices in downtown Toronto. The process was a web-based data input process with dual input. In other words, each survey was input into a database twice and compared to ensure accuracy of the input process. This data was then sent over to the University of Toronto researchers, for further cleaning and recoding (to ensure logical and coherent answers from respondents[1]). Once this process was competed, BCE was notified to destroy all databases and data resulting from the input process. Thus, the University of Toronto researchers had the only database to preserve participant confidentiality. From this database, those participants who had responded favourably (a total of 16 people) to allowing BCE/Nortel access to their responses were placed in a second database that was then sent over to BCE staff.

In a similar process, Wave 2 used dual input by University of Toronto students. For managerial clarity and financial savings this process was managed by the University of Toronto researchers. This process of dual input resulted in an inter-inputer reliability of 94.6 percent. When the dual input resulted in disagreements, two graduate researchers went back to the original survey and judged which of the two data entry operators was correct or whether both had made an error.

Results

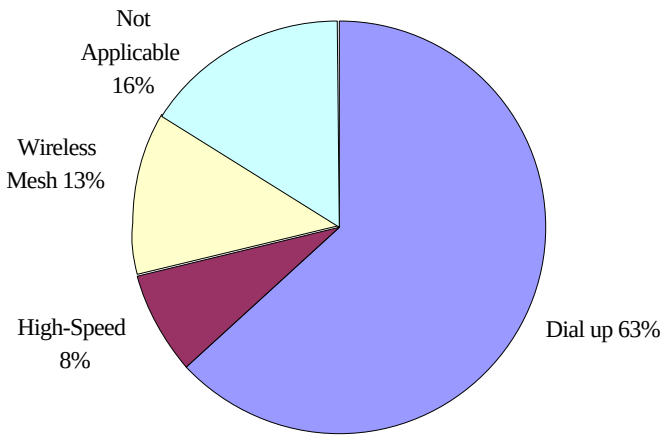
Cross-sectional Analyses:

Baseline (Wave 1):

Respondents ranged in age from 24-97 years (mean=48 years); 45 percent of respondents were female, 70 percent were employed, 55 percent had college or greater education, 74 percent were married, 84 percent had children, 64 percent were Roman Catholic, 43 percent were affiliated with the Liberal Party. In terms of how people were connecting to the Internet, the following proportions held:

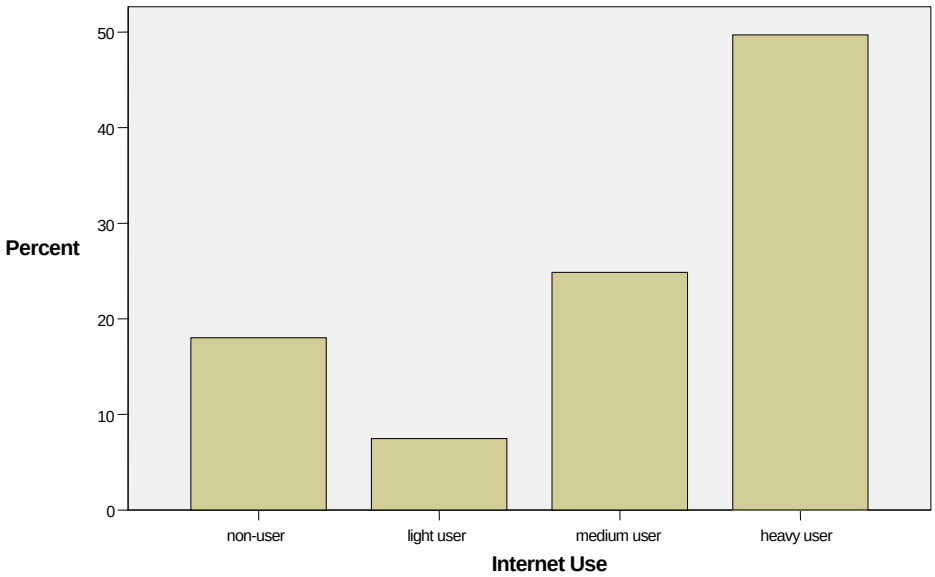
[1] An example of an illogical response would be one in which the respondents said that they have spent 5 hours/day at home on the Internet, 3 hours/day at work on the Internet, but in terms of overall time / week on the Internet they responded 3 hours.

Internet Connection – Wave 1



Internet Use: 18 were percent non-users (0 hours/week), 8 percent were light users (<2 hours/week), 25 percent were medium users (2-7 hours/week), and 50 were percent heavy users (>7 hours/week). We compared the overall Internet use at home to a scale value which summed the length of time on the Internet for individual reasons (e.g., for general information, communicating with family members etc.) and we noticed a mean difference of only 1.24 hours, and a median difference of zero hours. Thus, the overall assessment is a valid and reliable measure of Internet usage, and we use this overall value throughout our analyses.

Level of Internet Use – Wave 1



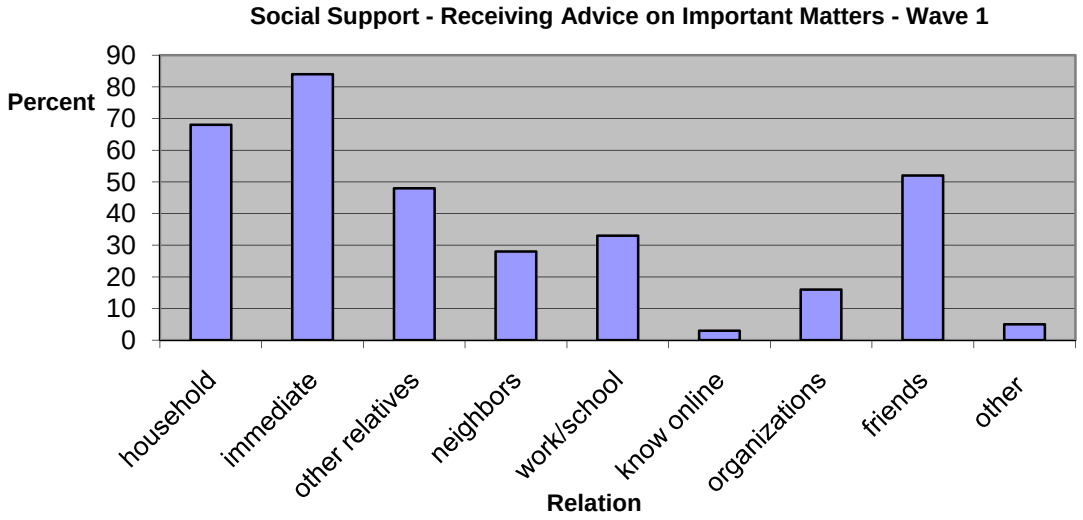
Internet users were more likely to be employed than non-users (p=.036), and more likely to have a higher education (p=.006). Non-users were more likely to be older than medium users (diff=9.0 years; p=.027) and heavy users (diff=11.2 years; p=.001). In terms of gender, men were on the Internet only 31 percent longer than women (9.82 versus 7.48 hours). In

addition, the higher the level of Internet use, the more likely participants were to have more than one desktop computer (p=.009).

Social Support:

A key research objective was to examine social support, online and offline. Respondents were asked from whom they received advice. In the responses to almost all questions regarding social support, the following ranking always took place. First was immediate family, then household member, then friend, and then other relative. Regardless of whether the resource was being given or received, the top four answers were always ranked in the same order. The one exception was "Received/Gave Health Care", where friend and other relative were switched.

In terms of the diversity of support (i.e., the types of support given/received) there is some evidence that non-users provide and receive less types of support (lower diversity) to/from household members than do Internet users, although this is not statistically significant. In terms of "Total Support Given/Received", there is no statistical difference by level of Internet use. There is a non-surprising exception—non-users had lower levels of providing and receiving support for computer issues than did users.



Day to Day Behaviour (making plans, doing chores):

Making plans using email or instant messaging is obviously lower for non-users than for other Internet users.[2] There were no significant differences in the extent of face-to-face interactions by level of Internet use. Non-users report spending more time on chores (household, cooking, baking, gardening, home repair) compared to light, medium and heavy users (p<.05).

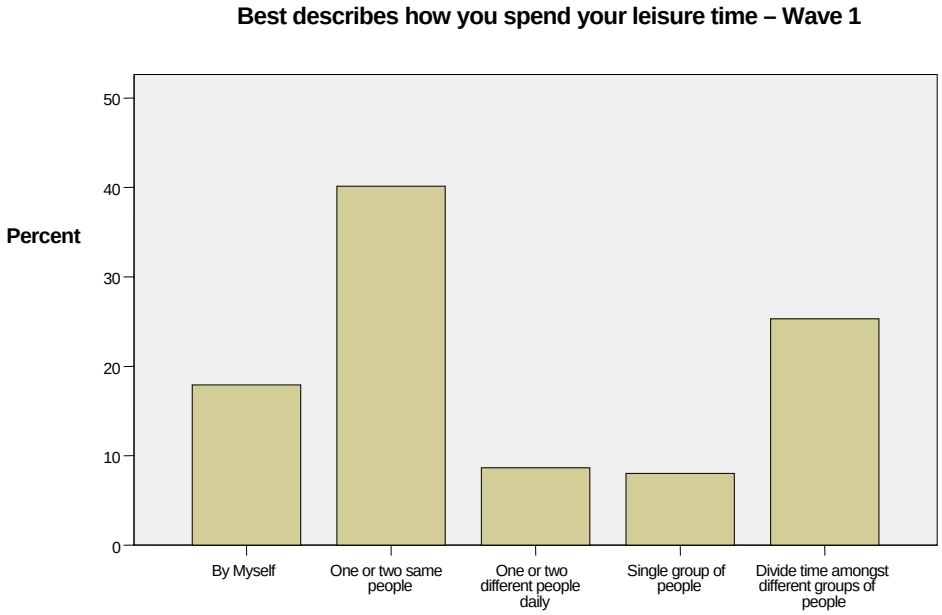
[2] Measured as: "Never" (1), "Monthly or Less" (2), "A Few times a Month" (3), "Once a Week" (4), "A Few times a week" (5), "About Daily" (6)

Keeping in Touch (Weekly):

Again, there is the obvious difference that non-users were less likely to keep in touch weekly with friends and family members by using Instant Messaging (IM) or email. However, there are no significant differences in the extent of weekly face-to-face, cell phone use, or landline phone use. Thus, being on the Internet increases overall contact because it adds on to face-to-face and phone contact.

Leisure Time:

Leisure time activities were spent mainly with one or two of the same people (40 percent), although a considerable number also divided their time amongst different groups of people (25 percent). The greatest percentage of non-users report dividing their time amongst different groups (37 percent). By contrast, the greatest percentage of Internet users report spending their time with the same one or two persons (44 percent).



Multivariate Analyses Wave 1:

A series of logistic regressions were run to determine whether level of Internet use was associated with various social outcomes. Using the regression technique allows the identification of Internet effects independently of other variables, such as age, education and income.

Keeping in Touch – Face-to-face – Family

The odds of keeping in touch weekly went down if participants were medium or heavy users as compared to non-users. Similarly, age and education also showed a reduction in the odds of weekly keeping in touch with family face-to-face, probably because older and more educated people were more likely to be residentially dispersed. Only employment increased the odds of weekly face-to-face interaction, by a factor of 2.5.

Table 1a: Odds of Keeping in Touch With Family – Face-to-face

	Odds Coefficient	Significance
Medium User	.224	(p=.056)
Heavy User	.292	(p=.088)
Age	.966	(p=.068)
Education	.729	(p=.087)
Employed	2.512	(p=.096)

Nagelkerke R^2 = .202

Member in at least one voluntary organization

Prior to the advent of the wireless mesh network, light Internet users were 5 times more likely to be a member of at least one voluntary organization when compared with non-users. Additionally, older and more educated people were more likely to hold a membership in an organization.

Table 1b: Odds of Membership in a Voluntary Organization

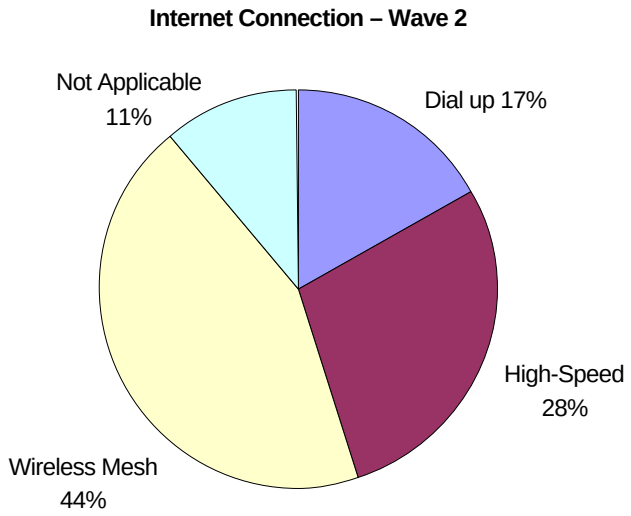
	Odds Coefficient	Significance
Light User	5.087	(p=.030)
Age	1.036	(p=.059)
Education	1.696	(p=.004)

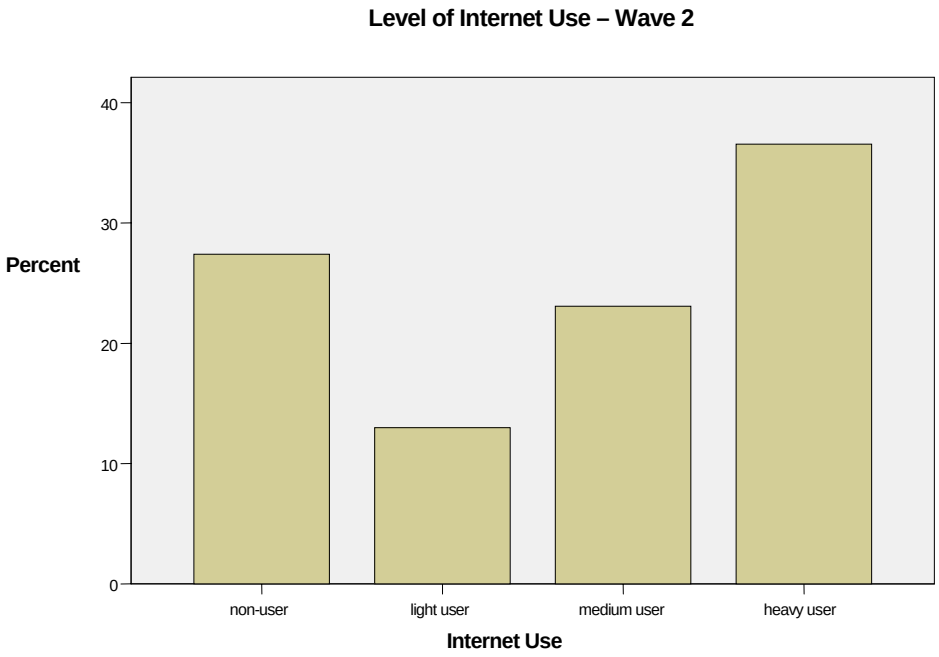
Nagelkerke R^2 = .168

Post Technology Implementation (Wave 2):

Respondents ranged in age from 15 to 91years (mean=50 years); 63 percent of respondents were female, 58 percent were employed, 42 percent had college or greater education, 58 percent were married, 76 percent had children, 68 percent were Roman Catholic, and 43 percent were affiliated with the Liberal Party.

In terms of how often people were connecting to the Internet, the percentages were: 27 percent non-user, 13 percent light user, 23 percent medium user, and 37 percent heavy user. Internet users were more likely to be employed than non-users (p<.001), to have a higher education (p<.001) and to be married (p=.003). Non-users were more likely to be older than light users (diff=12.09 years; p<.001) medium users (diff=17.45 years; p<.001) and heavy users (diff=12.30 years; p<.001). Men were on the Internet 8 percent longer than women (7.57 versus 6.98 hours).

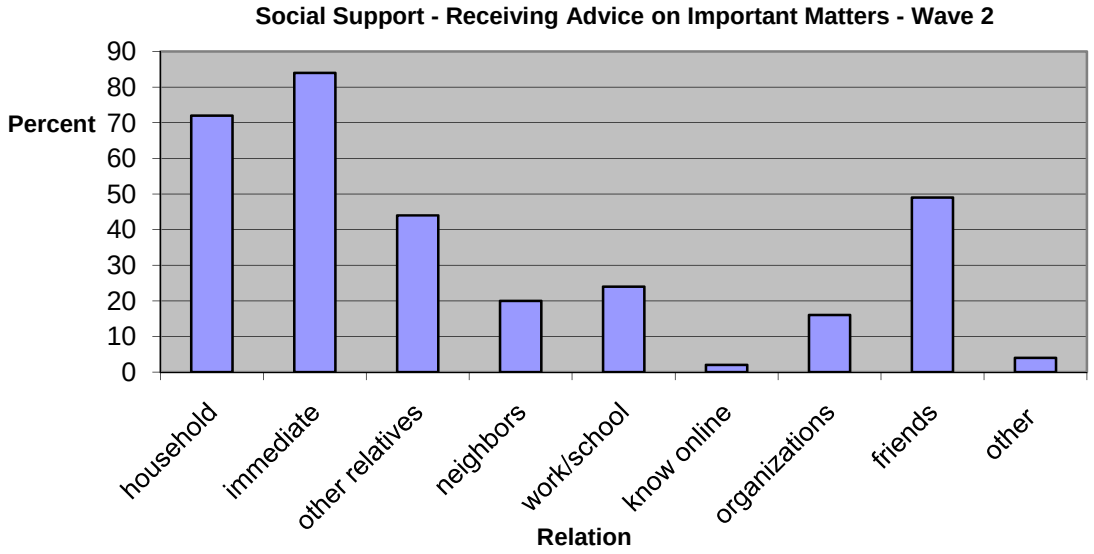




Social Support:

In all questions regarding social support, the following ranking always took place. First was Immediate Family, then household member, then friend, then other relative. Regardless of whether the resource was being given or received, the top three answers were always ranked in the same order. However, non-users provided a lower diversity of support (meaning they gave fewer types of support) to their household members than did light users ($p=.024$), medium users ($p=.041$), or high users ($p=.002$). Similarly, they received a lower diversity of support from their household members than did light users ($p=.013$), medium users ($p=.046$), or high users ($p<.001$). In terms of "Total Support Given/Received", meaning

all the various types of support given/received, non-users gave less support than did medium users (p=.01) and high users (p=.002), as well as received less support than did medium users(p=.014) and high users(p=.002).



If one looks at the diversity of the types of people one provided the support to or received it from (e.g., household, immediate family etc.) and examined each type of support possible, it is not surprising that non-users had lower levels of providing and receiving support for computer issues than did high users. But what is also interesting is that in terms of support on important matters, non-users showed lower levels of diversity of support than did high users for both giving (p=.014) and receiving (p=.002). This means that on important matters they gave support to and received support from fewer types of people/relationships.

Day to Day Behaviour (making plans, doing chores):

There was no measurable difference that day to day behaviour varied based on the level of Internet use of the respondents, with the exception of Instant Messaging (IM). Non-users instant messaged less often than did high users. This is not surprising, as non-users by definition have a difficult time using IM without using a computer. As well, non-users made plans by email less often that all other users. There was no difference in behaviour around doing chores based on the level of Internet use.

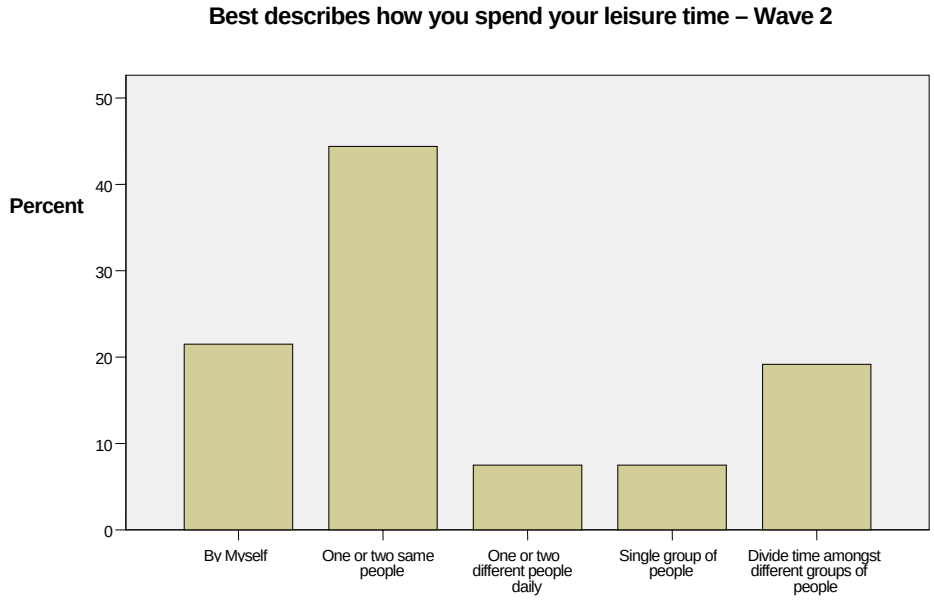
Keeping in Touch (Weekly):

Non-users kept in touch weekly less than did high users because non-users met their friends face-to-face less than they did (p=.004). Light users kept in touch weekly with friends less often via cell phone than did medium users (p=.033). There is also evidence that they kept in touch less often via cell phone than did high users but this was not statistically significant. Keeping in touch with friends online was naturally different for non-users versus users (i.e., non-users did it less). However, light users did this less often than did high users as well (p=.042), and the trend is that medium users also did this less often than high users. Similarly, these same online behaviours took place when looking at keeping in touch with family members.

Non-users were more likely to organize social activities in person than Internet users. The greater the use of the Internet, the greater the greater the likelihood of organizing social activities online (p=.003). Coordinating family schedules in person was also shown to be positively related to Internet use (p=.010).

Leisure Time:

Leisure time activities were spent mainly with one or two of the same people (44 percent), though a considerable number also divided their time amongst different groups of people (21 percent) or by themselves (21 percent). When we examine leisure time by level of Internet use, Internet-users report spending their time with one or two of the same people (47 percent). Non-users divide their time amongst different groups (27 percent), and then second, spending time with one or two of the same people (36 percent).



Multivariate Analyses Wave 2:

In a similar manner to Wave 1, a series of logistic regressions were run in order to control for factors of age, education, gender, and employment, to determine whether level of Internet use predicted various social outcomes.

Keeping in Touch – Face-to-face – Family

There was no significant association in Wave 2 between the level of Internet use and the extent to which people kept in touch weekly with family face-to-face. Internet use neither increased nor decreased face-to-face contact. The relationship of medium and heavy users having lower odds of weekly face-to-face interactions with family disappeared after the installation of the wireless mesh network.

Keeping in Touch – Face-to-face – Friends

Heavy users were 3.6 times more likely to keep in touch weekly with friends face-to-face when compared with non-users. Similarly, the higher the education people had, the more likely they were to have weekly face-to-face contact with friends.

Table 2a: Odds of Keeping in Touch With Friends – Face-to-face

	Odds Coefficient	Significance
Heavy User	3.575	(p=.005)
Education	1.409	(p=.074)

Nagelkerke R^2 = .107

Membership in voluntary organizations

Medium users were 2.2 times more likely to be a member of at least one voluntary organization than not, when compared with non-users. Similarly, the higher the education and whether respondents were employed increased the likelihood that they were members.

Table 2b: Odds of Membership in a Voluntary Organization

	Odds Coefficient	Significance
Medium User	2.197	(p=.070)
Education	2.052	(p<.001)
Employed	2.240	(p=.043)

Nagelkerke R^2 = .180

Cross-Sectional Comparison – Wave 1 and Wave 2:

Tables 3a-c examine some of the major demographic, Internet behaviour, social support, and general behavioural variables across Waves 1 and 2. Due to some differences in demographic variables (e.g., gender, education, employment, marriage, and children), these two waves of data are not fully comparable. We therefore examine these two waves cross-sectionally and consider statistical differences as suggestions to be examined further in the longitudinal analyses that follow.

Table 3a shows the obvious difference that after the implementation of the new wireless mesh technology, a change in the manner of connecting to the Internet occurs. The distribution of level of Internet use between the two waves is statistically different (p=.025). Table 3b shows the number of types of social support received by Internet users versus non-users (p< .10) increased between the two waves. Similarly, the frequency of making plans via cell phone more than doubles for light and medium Internet users, whereas it only increases by 61 percent for non-users (p<.001). Doing Chores increases for each of the levels of Internet users, but goes down for non-users (p<.05).

Table 3c displays the percentage of participants keeping in touch weekly with friends by level of Internet use. Three forms of keeping in touch are examined: face-to-face contact, online contact, and phone contact. The distribution of weekly face-to-face contact by level of Internet use between the two waves is statistically different (p<.05). Heavy users are more likely to report keeping in touch weekly through face-to-face contact after the advent of the wireless mesh technology (69 percent in wave 1 versus 80 percent in wave 2). Thus, Internet

use does not result in social isolation. The opposite takes place: the higher level of Internet use, the greater the likelihood of face-to-face interactions.

Table 3a: Comparing the First Two Waves

Demographics	***Wave 1*** *N=159*	***Wave 2*** *N=219*	***Significant Difference***
Mean Age	48	50	n.s.[3]
% Female	45	63	<.001
% Employed	70	58	.02
% College +	55	42	<.001
% Catholic	64	68	n.s
% Married	74	58	.001
% Children	84	76	.053
% Liberal Party political affiliation	43	43	n.s.
Internet Use: *Method of Connection (%)*			
None	16	27	<.001
Dial-up	63	17	
High speed	8	28	
Wireless	13	44	
Internet Use: *Level of Internet Use (%)*			
None	18	27	.025
Light	8	13	
Medium	25	23	
Heavy	50	37	

[3] Non-significant

Table 3b: Cross-sectional Comparisons: Social Support and Day-to-Day Behaviour

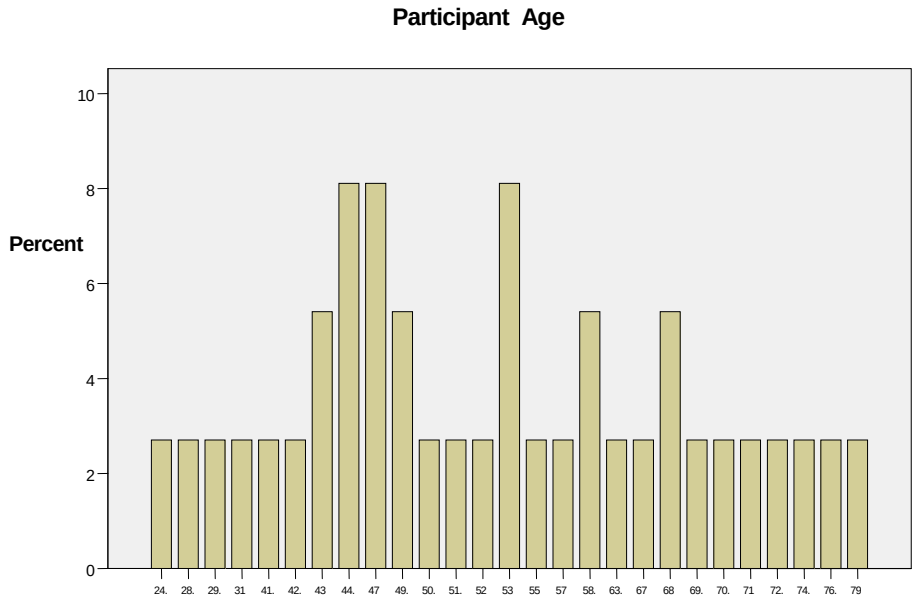
Social Support Given: *Total Number of Support Types (Mean)*	***Wave 1*** *N=161*	***Wave 2*** *N=191*	***Significant Difference***
• Non-User	5.17	5.52	n.s.
• Light	5.58	6.32	
• Medium	6.11	6.42	
• Heavy	5.99	6.48	
Social Support Received: *Total Number of Support Types (Mean)*			
• Non-User	5.83	5.55	<.10
• Light	5.58	6.20	
• Medium	6.46	6.45	
• Heavy	6.22	6.54	
Day-to-Day Behaviour: *Making Plans by Cell Phone (Mean)*	***Wave 1*** *N=150*	***Wave 2*** *N=117*	***Significant Difference***
• Non-User	1.17	1.88	<.001
• Light	1.00	2.44	
• Medium	1.25	2.47	
• Heavy	1.42	2.04	
Day-to-Day Behaviour: *Doing Chores (Mean hours per week)*	***Wave 1*** *N=139*	***Wave 2*** *N=204*	***Significant Difference***
• Non-User	3.67	3.54	<.05
• Light	3.17	4.00	
• Medium	2.78	3.17	
• Heavy	3.31	3.61	

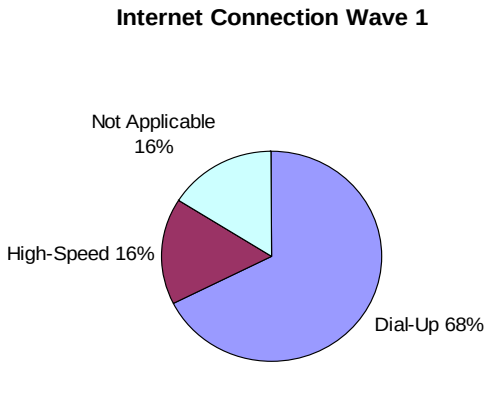
Table 3c: Percent Using Various Media to Keep in Touch (Weekly)

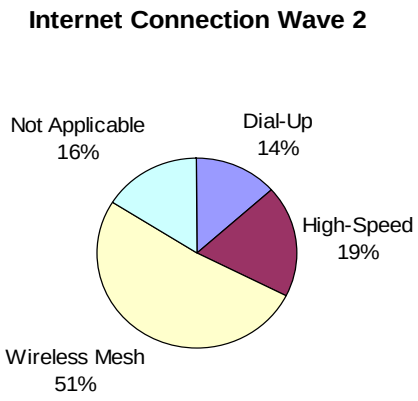
Keeping in Touch: Media	***Wave 1***	***Wave 2***	***Significant Difference***
Face to Face	*N=145*	*N=207*	<.05
• Non-User	61	53	
• Light	75	59	
• Medium	67	64	
• Heavy	69	80	
Online	*N=145*	*N=208*	n.s.
• Non-User	9	12	
• Light	42	48	
• Medium	50	71	
• Heavy	59	74	
Phone	*N=145*	*N=208*	n.s.
• Non-User	74	77	
• Light	58	74	
• Medium	76	77	
• Heavy	72	79	

Longitudinal Analyses:

Thirty-seven of the 219 individuals who responded in Wave 2 had also responded at Wave 1. These 37 individuals were examined to determine whether changes in behaviour occurred during the period of ICT use. They ranged in ages from 24 to 79 years old (mean=54), 54 percent of them were female, 47 percent to 51 percent[4] were employed, 64 percent to 68 percent were married, and 69 percent to 73 percent had children.

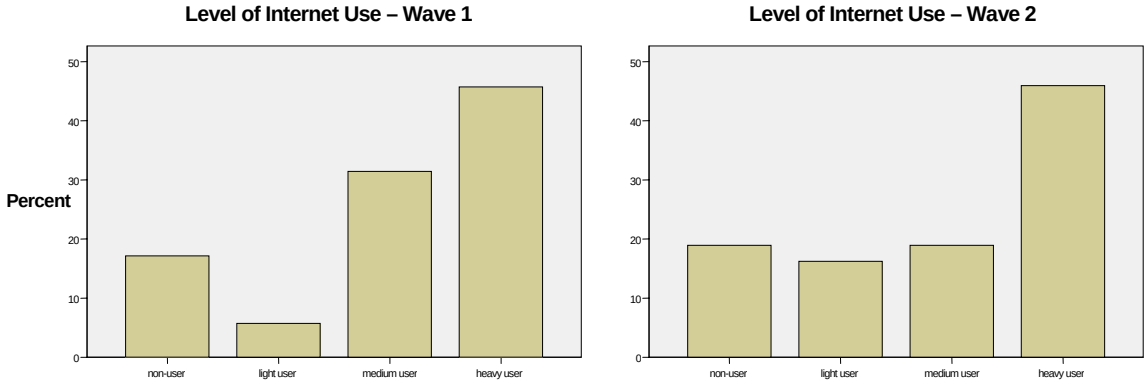






[4] The two values in this case implies that approximately 4% (51%-47%=4%) of the 37 individuals (2 people) gained employment in between the time of the two waves. Similarly, 2 of the 37 got married, and 2 of the 37 had children during this time.

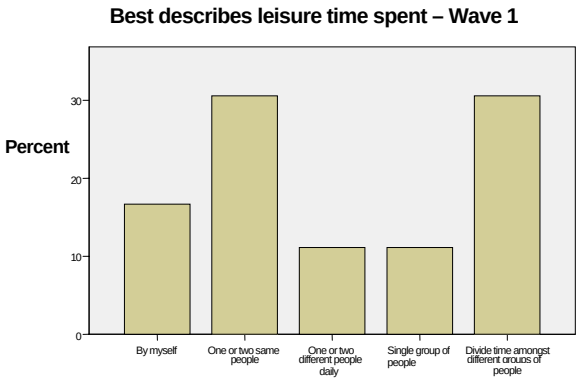
In terms of technology use, how individuals connected to the Internet changed in some ways: While the number of non-users did not change, the dial-up users transitioned to high-speed and more strongly to wireless mesh. Of course, part of this transition could be due to the pricing structures involved during this period. However, other than the medium through which people connected to the Internet, there was little evidence of change in the overall frequency of connecting to the Internet from home, or from work. In addition, the raw hours of being online over this period did not change. However, when we break down the respondents into non-users (0 hours /week), light users (<2 hours/week), medium users (2-7 hours/week), and heavy users (>7 hours/week), we see an increase in light users, with a corresponding decrease in medium users. This suggests the possibility of a reduction of Internet usage over this period.

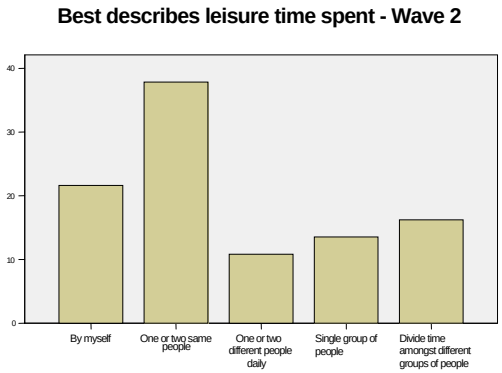


During this 10 month period, a noticeable increase in ownership of various technologies for this group of respondents (diff=.78, p=.001) was measured. In other words, on average these people increased their ownership of items such as mobile phones, laptop computers, cordless phones, PDA's, etc. In fact, the major increase in ownership was due to an 18 percent increase in desktop computers, a 50 percent increase in laptop computers, and a 150 percent increase in mobile phones. Heavy Internet users were primarily responsible for this increase in overall technology ownership (p=.029).

In terms of perception surrounding Internet benefits, these respondents demonstrated a reduced perception regarding the ease in: (1) obtaining health care information (p=.042); (2) connecting with relatives (p=.004); (3) connecting with friends (p=.058); and (4) meeting new people (p=.058). This could well be the process of realization: prior to utilizing a technology one 'hears' about the easy and facility of certain processes and actions but when faced with doing them, 'realizes' that they are not as easy or useful as originally imagined. Heavy users were responsible for much of this 'realization', perceiving: getting health care information (p=.023), and connecting with relatives (p=.022) to be more difficult at wave 2 compared to wave 1.

Leisure time activities in general stayed somewhat constant with a slight shift from dividing that time among different groups of people to spending time alone or with one or two of the same people.





Social Support:

There was a reduction in receiving three types of social support between waves 1 and 2: i.e., help with important matters (mean differential = -.59, p=.036), help with job (diff = -.62, p=.055), and help with health issues (diff=-.73, p=.041). Similarly there was a reduction in giving social support around job issues (diff = -.78, p=.028), as well as giving computer advice (diff= -.81, p=.018). However, giving support by talking in general increased (diff=.59, p=.090).

Yet, another way of looking at social support is the extent to which individuals provide different types of social support: the diversity of support provided by different types of individuals (i.e., relatives, friends, colleagues etc.). Participants showed a reduction in the number of different types of support they gave (diff= -.92, p=.027) and received (diff=-.81, p=.044). Similarly there was a reduction in the diversity of giving support to people from organizations (diff=-.54, p=.035).

If we examine how social support changed during this period by Internet use, heavy users received information on health issues from a more diverse set of individuals at wave 2 compared to wave 1 (diff=1.00 p=.048). Heavy users also reported receiving (diff=-.94 p=.052) and providing (diff=-1.625 p=.002) less support when talking about the day, in terms of the diversity of individuals with whom they interacted.

Day to Day Behaviour (making plans, doing chores):

Making plans by cell phone increased (diff=.071 p=.030) between wave 1 and wave 2. No other means of communication for making plans changed during this period. Making plans in person decreased (diff=1.2 p=.033) for non-users, while medium users became more likely (diff=1.125 p=.095) to use cell phones to make plans. There is no evidence that that light-users or heavy users changed how they made plans between wave 1 and wave 2.

Respondents spent somewhat less time cooking and baking at wave 2 (diff=.42 p=.062), and less time on house repair at wave 1 (diff=.39 p=.090). Heavy users reduced the time they spent cooking and baking from wave 1 (diff=.533 p=.015).

Keeping in Touch (Weekly):

There was no significant change in how respondents kept in touch weekly with friends and family. However, the trends do suggest an increase in those who used the Internet to keep in touch with friends (44 percent to 50 percent) and family (47 percent to 50 percent). Medium users became more likely to use the Internet to keep in touch with friends (diff=.16 p=.083) at wave 2 compared to wave 1.

Summary of Findings:

Over 70 percent of all participants are Internet users. The age divide still exists, as 74 percent of people aged 65+ are non-users. When the effect of age is controlled, the level of Internet use remains associated with a variety of social phenomena. For example, non-users have a lower level of face-to-face contact than did Internet users. This may be due to the Internet acting as a catalyst for engagement – a facilitating tool to enable a greater ease in scheduling face-to-face social interaction. In addition, medium users have a greater likelihood of belonging to a voluntary organization thereby increasing civic engagement as well as social interaction. Broadband Internet connection does not show any evidence in this rural community, of replacing social engagement. Instead, it supplements social interaction and social engagement.

Increased technology ownership took place over this period. Part of this is due to the proliferation of mobile phones around this same period, but also it is due to the positive externalities associated with the high speed Internet connection (i.e., purchases of laptop computers etc.). However, the social transformations associated with the introduction of mesh technology were not fully realized. After the initial excitement, Chapleau residents incorporated high-speed Internet into their normal lives.

Discussion

Research Limitations:

We achieved moderate response rates to both surveys. However, due to the small longitudinal component of this survey (37), only substantial differences in behaviour can be statistically significant. Where we do uncover statistically different outcomes, we are confident of their existence within the community. Also, we studied this community over a ten month period. Social changes can have lagged effects – true changes cannot be viewed until later into this process. In order to determine whether the changes we did discover were robust, we suggest a third wave of data a year after the cessation of the wireless mesh network.

Finally, one of the greatest problems in determining a causal linkage in this data is the fact that simultaneously with the implementation of the high-speed Internet connection/wireless mesh network, there were also the initiation of mobile phone access and major economic benefits to Chapleau from Bell and Nortel's recurring presence and concomitant spending (e.g., food, accommodations, employment of Chapleau residents etc.). In addition, Bell/Nortel were also actively engaged in increasing the access to social/civic occasions through the donation of various technologies to the civic arena that resulted in a change in the opportunity structure in the town. Thus, changes in sociability may be due in part to this change in access structure, or due to the positive influence of the Internet.

Policy Implications:

The fact about which we have absolute confidence is that the Internet is a significant part of people's every day life. With greater than 70 percent of respondents being Internet users, it is important to understand just how the Internet affects people's daily life. Initiating Internet connections, whether it be high speed or dial-up, has both intended and unintended consequences and benefits. In Chapleau, the implementation of high speed Internet connection and wireless mesh network was associated with both positive social and civic engagement, as well as minor benefits economically to technology based businesses in the region.

To overcome the age divide, there should be a focus on older users and the barriers that inhibit either initiation and/or continuation of Internet use. Education, training, and realistic expectations are crucial components to focus on when dealing with this cohort of potential users. Moreover, information and social support are positively related to dealing with or overcoming health issues. Since many health issues seem to accumulate as we age, this leaves many of the aged at a disadvantage in terms of sociability and health.

High speed / broadband connection does create a different system of usage and resulting effects than does the slower dial-up process. But, there may also be major changes within a town or community when dial-up becomes feasible, prior to any broadband connection being available. After all, 63 percent of those people surveyed were already connecting to the Internet using dial-up.

Future Research:

Quantitative Analyses:

The data we have collected are being examined in terms of further variables not yet reported here. We will be examining perceptions around community, types of information sharing and collecting, as well as other social and economic concepts. We intend to re-weight the data to make the cross-sectional comparisons more reliable. In addition, we will be comparing these data with those collected by Professor Barry Wellman in his East York "Connected Lives" study to determine whether difference exist between rural and urban communities.

Qualitative Analyses:

The interview data has been transcribed but not yet coded for analysis. This data will be coded over the summer months and analysed by the end of next year. We will use this data to understand the more specific behaviours of Internet users in Chapleau and examine whether the narratives provided by respondents elaborate on our quantitative findings, as well as correspond to those narratives collected from East York.