Silicon Valley North: Regional Clustering in Canadian Technology Industries

By Samir Rostum, Princeton University[ψ]

June 5, 1999

Abstract

This paper focuses on a rapidly evolving center of technological growth in Canada's technology industry, the Ottawa-Carleton region. This region is frequently domestically publicized as *Silicon Valley North.* The region is undergoing an economic expansion similar to the one documented by numerous researchers in Silicon Valley.[1] We will examine the assertion that many features of the region's high tech culture parallel those in existence in its Californian counterpart. In the context of investigating such issues, we undertook a survey of individuals with strong links to the technological growth of the region.

1 Objectives of the study

The primary objective of this study is to analyze the socio-economic success factors at play in Silicon Valley North. Our goal here will be to do so with a particular emphasis on extracting points of comparisons to Silicon Valley.

We will argue that spatial clustering is not enough for the continued success of a regional industrial cluster. We are therefore interested in exploring the true preconditions for success of such clusters. We also intend for this study to identify points of interest for future research. In investigating the current state of the Silicon Valley North region and its potential for future growth, we will briefly discuss certain anomalous findings and their implications on continued economic prosperity.

2 Context

The last quarter century has been characterized by rapid growth in most technological fields. These rapid changes have been felt even in industries that have only nominally weak technological ties. Arguably the most significant result has been the expansion of the global communications infrastructure.

Under the influence of the increasing popularity of electronic communications media, some researchers have suggested that businesses today feel less need to locate themselves in close geographic proximity both to their suppliers and to their competitors. This conclusion is somewhat suspect and will be investigated here.

Industrial clusters are geographic concentrations of similar and often intimately related industries. They evolve over time and present competitive advantages that are hard to duplicate by any other means. The industries operating within well-established clusters usually share technical knowledge, financial, or structural

[ψ] Samir Rostum, Princeton University, Princeton, New Jersey, USA, 08544 (srrostum@princeton.edu)

[1] For an historical analysis of Silicon Valley, see Saxenian. Her work was a major inspiration for this project.

advantages. Industry clusters typically include highly specialized supply-demand relationships and dependencies that serve to tightly bind the component industries.

Typically, these geographic concentrations lead to the development of specialized skills, institutions, and alliances within the cluster. Businesses enjoy a *collective* regional advantage by locating near each other. They more easily acquire information, communicate, and share resources. These are all key factors to the success both locally and internationally of the regional cluster and of its member groups.

Regional clusters tend to exhibit very high degrees of supply chain connectivity. In the case of the most robust industrial clusters (Silicon Valley is one particularly good example) it is more appropriate to refer to supply *webs*. Each producer typically has multiple local suppliers available for the same good. For example, due to the extreme process sensitivity and unpredictability of the silicon fabrication process, it is a technology that virtually demands redundant fabrication facilities.[2]

The advantages of regional clusters also include the integration of social dynamics with local growth industries, supportive regional governments, robust academic communities, and active service sectors. In the case of export oriented industrial clusters, wealth creation in the region is also driven by exporting goods and services and attracting new wealth, both from domestic and international markets.[3]

3 Methodology

3.1 Survey design

The primary research tool used in this study was a telephone survey (see **Appendix A** for the scripted questionnaire).

Several factors motivated our decision to use a telephone survey. For reasons to be detailed shortly, our respondents were chosen among individuals whose opinions would be likely to have regional influence or whose work would afford them significant knowledge of the local high tech culture. In almost all cases, these were men and women whose time was very valuable. In order to ensure a maximal response rate, we chose a telephone survey format; telephone surveys have the advantage of immediacy and of making reasonably small time demands on the respondents.

Having decided on a format, we were then left to ponder the formulation of the survey questions. It is important to note that in this type of survey, both the questions and the manner in which they are posed are very directly dependent on the nature of the issues being investigated. In this survey, the goal was to measure the opinions of the respondents on various points of interest. A simple but inelegant solution might have been to pose unstructured or "open-ended" questions. Unfortunately, this would have led to many problems in data analysis and interpretation.

---

[2] Transistor fabrication in the early days of the technology has been compared to an unreliable automobile assembly line. In this analogy, even if the designer tries to fabricate a pickup truck, he would be equally likely to see a sports car, a compact car, or a motorcycle drive off the assembly line.

[3] See discussions of industrial clustering at SANDAG, the San Diego Association of Governments, which serves as a forum for regional decision-making in California. (http://www.sandag.cog.ca.us)

A much more elegant solution to this problem, and the one that we ultimately favored, was the use of a Likert scale. The Likert scale, named for its creator, poses the question as part of the instructions, above the scale. The response items are statements that represent particular opinions. The respondents indicate their degree of agreement or disagreement with each of the response items.

This scale provides answers in the form of coded data that are comparable and can be readily manipulated. This quite nicely solves the data analysis and interpretation problems associated with open-ended questions. Moreover, the method is economical because one set of instructions and one scale can serve many items; once the respondent understands what is required, he or she can complete the items very quickly and easily.[4]

3.2 Survey sample selection

Sample selection is vital to the success of any survey in accomplishing its research goals. Its importance in this survey is somewhat exaggerated by the small sample size. In light of this potential hazard, we chose not to take a random sample. Instead, we opted for a representative sampling of regional decision-makers. This choice was motivated by the expectation that it would allow us to progress to the identification of regional trends and success factors despite having a limited number of responses. We expect that appropriate follow up research could be conducted on a larger scale to examine the trends identified in this work.

Figure 1: Distribution of respondents by type of organization

Code	Type of Organization	#	%
A	Academic	4	10
B	Business	22	56
G	Government	5	13
M	Media	8	21
TOTAL		39	100

With the above goal in mind, our sample was drawn from an appropriate pool of regional business leaders, government and university officials, and members of professional associations. Respondents were spread between four different types of organization: Academic, Business, Government, and Media. **Figure 1** gives the distribution of respondents by type of organization. We chose to impose such a grouping in the interests of examining the technological culture from both the business (internal) and the non-business (external) perspectives. Respondents characterized as non-business were those in categories A, G, and M. As we will see, there were non-trivial differences in the opinions of these two groups.

4 Regional traits

The Ottawa area is home to more than 904 companies specializing in advanced technology. These industries employ over 52,700 advanced technology workers.[5] The Ottawa region is consistently growing, with the number of recent start-ups swelling by 20 percent each year. In particular, Ottawa is a center for advanced research and development in the fields of telecommunications, software, space science, and environmental technology. Upwards of 75 percent of all telecommunications research and development in Canada is conducted there. This

[4] See Alreck, pp. 133-135 for a discussion of the Likert scale.

[5] See Guly for these and related statistics.

makes Ottawa one of the world's top five sites for these types of highly specialized work.[6]

With a population in excess of one million people, the Ottawa region is still growing. And as the seat of the federal government, the region is assured of a continued source of capital to finance that growth.

5 Success factors in Silicon Valley

It will be beneficial in our analysis of the success factors at play in regional clusters to give a brief introduction to some of the issues contributing to the success of Silicon Valley.

The job market in emerging technologies in the sixties and seventies was remarkably homogeneous. It was during this time, when there were relatively few minorities and even fewer women technology workers, that California began its rise to dominance of the American technology industry. In retrospect the fact that young white men composed the majority of the research population is not particularly laudable. This feature of the regional employment landscape did, however, contribute to a sense of common cultural identity and encouraged the formation of multiply linked social networks. Moreover, many of the companies associated with the region today evolved from a relatively small number of seed companies (Fairchild Semiconductor among them). This atypical growth pattern gave the region a familial feel in later years; the top management in many local companies had previously been co-workers. This tight knit business culture certainly contributed to the continued success of the region even as competing regions faltered.

The local geography of the Silicon Valley region also contributed to its success. Companies initially located near Stanford in Palo Alto, but quickly spread south to Mountain View, Sunnyvale, Santa Clara and San Jose. The Santa Cruz Mountains bound the region to the west and the San Francisco Bay bounded it to the east. This inhospitable surrounding landscape imposed a necessary spatial proximity on the businesses that settled there. In later years, as companies tried to expand north and south of the region, geographic clustering was increasingly driven by high land costs. The effect was the same in both cases: with companies located closer together, there was an increased tendency for them to share information. Naturally, this contributed to the formation and to the strengthening of social networks already in place. The close physical proximity of all the industries also contributed to a high rate of job turn over in the region by making it much less disruptive to change employers.

The ready supply of student graduates in the area with technology-related skills has also contributed to the continuing success of Silicon Valley. The region draws a large number of graduates of physics and engineering programs from Stanford and the University of California at Berkeley, and support workers from several state or technical colleges.

Perhaps all of the above factors have contributed to the formation of the Silicon Valley culture. In some views it is the culture of the region that ultimately drives the industrial machine. Probably the most significant feature of this culture is the tendency to accord much more status to the act of technological innovation than to purely economic success. In other words, not only is risk-taking glorified by the popular culture, but failing in a risky venture is also rendered socially acceptable.

[6] Statistics published by Ottawa Center for Research and Innovation (www.ocri.ca)

6 Survey results

The most important results of the survey are summarized in **Figure 2**, which shows the list of response items in order of their decreasing relative importance to all respondents. This figure demonstrates that none of the factors in the success of Silicon Valley North clearly dominates the rest. As one would expect, the overall health of the region is intimately linked to structural, cultural, and economic incentives for growth.

Although no one factor is completely dominant, having *a pleasant community with a high quality of life* was an important consideration for all respondents. It is remarkable that this item, with the least obvious ties to economic success, was consistently ranked highest. Perhaps there is some truth in the business dogma that a happy worker is a productive worker. We will also argue that changes in the external perception of the quality of life in a regional center can significantly impact the region's economic growth.

The most important business-related success factor in the survey was having *a mix of large and small technology firms in the region that has helped growth*. In fact, most respondents pointed to gains in the collective strength of the region's industries resulting from the horizontal integration of smaller companies. This is in contrast to the model of large vertically integrated technology giants typical of the American East Coast[7]. This was re-confirmed by the high importance respondents assigned to having *a network of specialized firms that compete intensely while collaborating in formal and informal ways*. One respondent commented that in Silicon Valley North, numerous small companies have been and continue to be spun off from larger ones. Management in the larger companies is smart enough to recognize talent within itself. When someone wants to run with a new idea, one that is feasible, the company helps to finance a spin-off and acts as a guardian angel. The smaller company also benefits from the piggyback effect on the distribution and marketing side. He pointed out numerous examples of companies following this loose parent-child model.[8]

In these comments we see the foundations of a different dynamic than was observed by researchers in Silicon Valley, where success and innovation are intimately linked through culture. There, venture capital is readily available and the local culture encourages the entrepreneur. Conversely, Silicon Valley North seems to suffer from a dearth of venture capital. Indeed, this conclusion is supported by our survey results, which places the *financial community with a good supply of venture capital for new start-ups* at the bottom of the list. It would appear that in the absence of many risk taking venture capitalists, entrepreneurial spirit in Silicon Valley North has grown, at least in part, to depend on funding from large companies. Despite this potential problem area, our survey indicates that most respondents still believe that the *local culture encourages innovative thinking and entrepreneurial attitudes.*

---

[7] As a counter-example, Nortel (formerly Northern Telecommunications), one of the largest technology employers in the region, exhibits both large size and significant vertical integration of their production process.

[8] Where they appear, respondents' comments are paraphrased. Corrections have been made for grammar and to eliminate words used only for continuation.

FIGURE 2: SUCCESS FACTORS IN SILICON VALLEY NORTH - SORTED BY DESCENDING RELATIVE IMPORTANCE BASED ON AVERAGE SCORES

QUESTIONS	strongly disagree	disagree	neutral	agree	strongly agree			average score	
	1	2	3	4	5		Total		
	#	#	#	#	#		#		
1. To what extent do you agree or disagree that the following factors have contributed to the success of Silicon Valley North as a centre for the high technology industry?									
c) A pleasant community with a high quality of life.	0	0	1	16	22		39	4.54	
h) A mix of large and small technology firms in the region that has helped growth.	0	2	2	13	22		39	4.41	
e) A local culture that encourages innovative thinking and entrepreneurial attitudes.	1	2	8	16	12		39	3.92	
n) A network of specialized firms that compete intensely while collaborating in both formal and informal ways.	0	2	11	16	10		39	3.87	
g) A local geography that contributes to easy interaction between companies.	0	6	5	17	11		39	3.85	
i) Close proximity to the national capital.	3	4	11	6	15		39	3.67	
k) Export-oriented industries that attract new wealth from domestic and international markets.	1	1	18	11	8		39	3.62	
d) A thriving service industry to support the high tech community.	0	3	18	11	7		39	3.56	
l) A regional culture that fosters collective learning.	0	5	12	19	3		39	3.51	
j) A corporate culture that promotes co-operation and intellectual exchange between companies.	0	5	13	18	3		39	3.49	
a) A large supply of recent student graduates in the area with the right skills.	1	5	13	17	3		39	3.41	
m) A flexible industrial system organized around professional networks rather than around individual firms.	0	6	15	15	3		39	3.38	
b) A supportive regional government with favourable programs/policies (e.g. tax breaks).	2	12	13	10	2		39	2.95	
f) A supportive financial community with a good supply of venture capital for new start-ups.	5	9	11	11	3		39	2.95	
2. Do you agree that Silicon Valley North will likely grow over the next decade at a growth rate similar to that over the last decade?	0	2	6	8	23		39	4.33	

The issue of having a *large supply of recent student graduates with the right skills in the area* scores lower on the scale than might have been expected. Although there are two universities within the immediate region, members of the local high tech community do not credit their collective success to homegrown talent. Perhaps since technical workers in general, and recent graduates in particular, are much more mobile in today's economy, recruitment tends to be spread over North America. Also, since Ottawa has been consistently ranked among the top cities in the world for quality of living, it is likely that prospective employees are more willing to relocate to the region.[9] This makes distant sources of talent more readily accessible, and may explain the proportionately small emphasis placed on local graduates.

Another relatively important success factor is proximity to a large purchaser of goods and services. The federal government acts as a significant source of guaranteed business to the region. This is evidenced by the relatively high score of 3.67 for *close proximity to the national capital*. One respondent commented that the initial impetus for the creation of Silicon Valley North was an existing base in government research technology. By comparison, Silicon Valley as we know it today traces its roots to the founding of Hewlett-Packard in 1937. Although Silicon Valley has not been without government contracts, significantly more federal money was spent in the East Coast technology companies. Most wartime electronics contracts during the Second World War, for example, were awarded to large East Coast companies.[10]

Despite its arguable importance as a major contributing factor in the formation of the successful Silicon Valley cultural model, having a *flexible industrial system organized around professional networks rather than around individual firms* scored low in our survey. In retrospect, this response item ought probably to have been more carefully worded. We suspect that it may have received its low ranking because it was unclear to respondents. Also, since the region is home to several big name technology producers whose large size makes them very visible, it is possible that respondents failed to fully consider the role of smaller companies. Moreover, since local culture is typically transparently embedded, respondents may have found that they did not have clear existing opinions on this issue.

Having considered some of the less ambiguous response items in the survey, we will now turn briefly to an examination of the items that reveal disparities between business and non-business respondents. We will comment on the items for which there was either significant agreement or significant disagreement between business and non-business groups (**Figure 3**). Notice that the average of all responses in both groups differed by only 0.01 points of the five-point scale. This suggests that we introduce neither a positive nor a negative bias by our choice of categorization.

The area of largest disagreement between the responses of the two groups was the *availability of venture capital*. Non-business respondents consistently rated the availability of venture capital much higher than did business respondents. Based on our previous analysis of the funding structure for new entrepreneurs, there may exist a regional communications barrier between the financier and the entrepreneur. This difference may also reflect a different perception of what constitutes venture capital on the part of the different groups. Respondents in the business category might have tended to discount sources of funding not in the private sector while others might have tended to include them.

---

[9] Based on rankings produced by the Swiss-based Corporate Resources Group.

[10] See Saxenian, "Genesis: Universities, Military Spending and Entrepreneurs"

FIGURE 3: SUCCESS FACTORS IN SILICON VALLEY NORTH - SORTED IN DESCENDING ORDER OF ABSOLUTE DIFFERENCE BETWEEN AVERAGE BUSINESS AND NON-BUSINESS RESPONSES

QUESTIONS	average scores--business	average scores--non-business		business versus non-business
1. To what extent do you agree or disagree that the following factors have contributed to the success of Silicon Valley North as a centre for the high technology industry?				
f) A supportive financial community with a good supply of venture capital for new start-ups.	2.73	3.24		0.51
d) A thriving service industry to support the high tech community.	3.73	3.35		0.38
g) A local geography that contributes to easy interaction between companies.	3.68	4.06		0.38
m) A flexible industrial system organized around professional networks rather than around individual firms.	3.50	3.24		0.26
a) A large supply of recent student graduates in the area with the right skills.	3.50	3.29		0.21
l) A regional culture that fosters collective learning.	3.59	3.41		0.18
k) Export-oriented industries that attract new wealth from domestic and international markets.	3.55	3.71		0.16
e) A local culture that encourages innovative thinking and entrepreneurial attitudes.	3.86	4.00		0.14
j) A corporate culture that promotes co-operation and intellectual exchange between companies.	3.55	3.41		0.14
c) A pleasant community with a high quality of life.	4.59	4.47		0.12
n) A network of specialized firms that compete intensely while collaborating in both formal and informal ways.	3.82	3.94		0.12
b) A supportive regional government with favourable programs/policies (e.g. tax breaks).	3.00	2.88		0.12
h) A mix of large and small technology firms in the region that has helped growth.	4.36	4.47		0.11
i) Close proximity to the national capital.	3.64	3.71		0.07
Average:	3.65	3.66		0.21
2. Do you agree that Silicon Valley North will likely grow over the next decade at a growth rate similar to that over the last decade?	4.45	4.18		0.27

It is also remarkable that as the second lowest ranking success factor, *having a supportive regional government with favorable tax breaks* had one of the highest degrees of agreement between the two groups. With such a consistently low rating, we must recognize this as a potential problem area for the region. Despite this relatively consistent low ranking, however, one respondent pointed out that a good tax subsidy for research and development employees exists at about 25% tax credit per head. Moreover, cost per head for research and development workers in Silicon Valley North is about half that in either the United States technology market and in the United Kingdom. The low exchange rate of Canadian dollars plays a role in creating this cost disparity.

7 Opportunities for further research

There are so many interesting issues in this exciting area of research that we could just barely touch on any of them in this study. Indeed, the primary problem we would associate with the survey was its limited scale. Although many interesting questions are raised, most cannot be answered authoritatively by means of a simple survey, which should best serve to determine where future research should be concentrated. The issues raised would benefit from further field study.

It would be interesting, for example, to look at ways in which the individual members of the local high tech culture are socially linked. Membership in clubs and cultural events could be examined, for example. This would provide some insight into both the nature and the quantity of social ties that exist. Examining the degree to which these social ties can become business contacts might also prove instructive.

We would also like to explore the role of universities in the area as partners to industry, contributing to research and development projects. Professors and graduate students often work with industry from an academic setting. This non-standard business model might have been overlooked in the local ranking of the importance of universities.

Venture capital and funding patterns certainly differ from those observed in Silicon Valley. This is an interesting structural feature of the local economy, and very worthy of future investigation. It seems likely in the present model, where the entrepreneur has funding ties to larger businesses, that dynamic decision making would suffer. This may be reflected as a regional economy less able to respond quickly to external stimuli.

8 Conclusions

The success of Ottawa in building a high tech community of companies has placed it in direct economic competition with other major centers in Canada. Recently, a study by Deloitte and Touche, commissioned by the Greater Toronto Area (GTA) concluded that Toronto is, “not only bigger, but better than Ottawa when it comes to high tech.”[11] This study is of particular value to us because it exemplifies one of the major considerations at play in this type of research. The researcher must recognize that industrial clusters have a large investment in public opinion about their region. This intense form of regional competition can best be characterized as advertising. However, in the long run, regional advantage derives much less from successful advertising campaigns than it does from freedom of communication between businesses. Indeed, we can re-assert that it takes more than spatial proximity to make a prosperous industrial cluster.

[11] As reported by Guly.

According to the president of the Ottawa-Carleton Board of Trade, Gail Logan, for example, Ottawa has been and will continue to be the technology capital of Canada. "We have the benefit of research facilities and organizations which support our high tech sector, whether it be OCRI (Ottawa Center for Research and Innovation), the Ottawa Life Sciences Council, the National Research Council, or the universities and colleges that are involved in research development and training."

The findings of our survey confirm Logan's characterization of the Ottawa-Carleton region in many important ways. The presence of an existing quasi-permanent government research base and the availability of local universities and colleges are indeed very important assets to the region. Based on our results, however, we suggest that the educational resources of the region may be underutilized. By comparison, the importance of business ties to technology programs at universities and colleges in Silicon Valley is a major success factor for that region and may prove an important model for industrial clusters elsewhere.

Similarly, the intimate linking of an entrepreneurial culture with a solid framework of financial support has been a key feature of Silicon Valley's success. Our results suggest the existence of a fairly static corporate financial model in the Ottawa-Carleton region. With a high dependence on federal government money, and a significant internal funding pattern for entrepreneurial start-ups, parts of the region may demonstrate sluggish response to rapid external changes.

Conversely, the Ottawa region derives enormous benefit from its consistently high quality of life rating. Most of our respondents pointed to it as a major success factor and, as was discussed, this makes intuitive sense even at the purely superficial level of argument that happiness breeds productivity. In the rapidly growing technology market, where both regions and businesses have become competitors, any advantage that a region can exploit to improve its profile advances its immediate relative economic prospects. Moreover, pleasant communities are most often associated with increased individual participation levels in activities that tend to foster contact with many people. Members of such communities are thereby allowed to form a wide network of weak ties, the importance of which has been shown by Granovetter.[12] From an extension of his work we see that in mobilizing for change, strong ties tend to breed local cohesion and macro fragmentation whereas weak ties facilitate uniform action. Our results suggest, however, that strong community bonds may not be translating directly into the business sector in the Ottawa-Carleton region; respondents failed to identify *professional* networks as strong success factors.

There is no one key to regional success. Ultimately, continued growth depends on many factors. Some are functional, economic considerations such as proximity to a large consumer of goods and services or the availability of capital to encourage innovation. Others are more structural in nature, like placing an emphasis on the development of social and business relationships between companies, and increasing the degree of internal competition between smaller companies to preserve dynamic decision-making. Still other factors include the cultural aspects of success, placing particular importance on the dominant local behavioral patterns and social norms for the promotion and encouragement of innovative behavior and entrepreneurial attitudes.

All of these factors contribute to the success of an industrial cluster, and all are present to varying degrees in the Ottawa-Carleton high tech industry.

[12] See Granovetter, particularly Chapter 3, pp. 51-61.

Appendix A: Telephone Survey Questionnaire

Silicon Valley North Questionnaire
(Telephone Survey)

Hello, I am a Canadian third-year student studying electrical engineering at Princeton University. I would like to take only five-minutes of your time to ask you brief questions for a study I am doing, which compares factors contributing to the success of Ottawa-Carleton as a high tech community with factors contributing to the success of Silicon Valley in California.

Name of respondent:
Title:
Company:
Phone number:

1. To what extent do you agree or disagree that the following factors have contributed to the success of *Silicon Valley North* as a centre for the high technology industry?

Circle one number for each response item as follows: 1=strongly disagree 2=disagree 3=neutral 4=agree 5=strongly agree

	RANKING				
SUCCESS FACTORS	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
a) A large supply of recent student graduates in the area with the right skills.	1	2	3	4	5
b) A supportive regional government with favourable programs/policies (e.g. tax breaks).	1	2	3	4	5
c) A pleasant community with a high quality of life.	1	2	3	4	5
d) A thriving service industry to support the high tech community.	1	2	3	4	5
e) A local culture that encourages innovative thinking and entrepreneurial attitudes.	1	2	3	4	5
f) A supportive financial community with a good supply of venture capital for new start-ups.	1	2	3	4	5
g) A local geography that contributes to easy interaction between companies.	1	2	3	4	5
h) A mix of large and small technology firms in the region that has helped growth.	1	2	3	4	5
i) Close proximity to the national capital.	1	2	3	4	5
j) A corporate culture that promotes co-operation and intellectual exchange between companies.	1	2	3	4	5
k) Export-oriented industries that attract new wealth from domestic and international markets.	1	2	3	4	5
l) A regional culture that fosters collective learning.	1	2	3	4	5
m) A flexible industrial system organized around professional networks rather than around individual firms.	1	2	3	4	5
n) A network of specialized firms that compete intensely while collaborating in both formal and informal ways.	1	2	3	4	5

2. Do you agree that Silicon Valley North will likely grow over the next decade at a growth rate similar to that over the last decade?

1	2	3	4	5

Comments:

Thank you for taking the time to participate in this study.
Samir Rostum, Electrical Engineering, Princeton University

Appendix B: Telephone Survey, Sample

- Total interviews attempted: 60
- Total number of respondents: 39
- Response rate: 65%

- Survey respondents' home organizations

1. Callisto Media Systems
2. Canadian Marconi Company
3. Capital Alliance Ventures
4. Carleton University
5. Canadian Advanced Technology Association (CATA) Board Member
6. Centrepoint Technologies
7. City of Kanata
8. DRS (formerly SPAR Aerospace)
9. I-Stat Canada Ltd.
10. KPMG
11. National Government (Member of Parliament)
12. Mitel Corporation
13. Mosaid Technologies
14. Newbridge Networks Corporation
15. Nortel
16. Ottawa Business Journal
17. Ottawa Center for Research and Innovation (OCRI)
18. Ottawa Citizen
19. Ottawa-Carleton Board of Trade
20. Ottawa-Carleton Regional Government
21. SHL Systemhouse
22. Silicon Valley NORTH (Ottawa Edition)
23. SR Telecom
24. University of Ottawa

- Organizations for which desired respondents could not be contacted: 3 calls or more

1. Calian Communication Systems Ltd.
2. Carleton University – Industrial Experience Program
3. Corel Corporation
4. Hitachi Data Systems
5. JSI Telcom Inc.
6. Lockheed Martin Canada
7. LSI Logic Corporation of Canada
8. Optimum Technology
9. Semiconductor Insights Inc.
10. University of Ottawa School of Graduate Studies & Research

Appendix C: References

- Alreck, Pamela L. and Robert B. Settle. The Survey Research Handbook. Richard D. Irwin Inc., Illinois, 1985.
- Fountain, Jane E. "Social Capital: A Key Enabler of Innovation and Science and Technology" in Investing in Innovation: Toward a Consensus Strategy for Federal Technology Policy. MIT Press, Cambridge, Massachusetts, 1997.
- Granovetter, Mark. Getting a Job: A Study of Contacts and Careers. University of Chicago Press, Chicago, 1995.
- Guly, Christopher. "The Battle to be called Silicon Valley North", High Tech Report, Ottawa Citizen, May 3, 1999.
- Saxenian, AnnaLee. Regional Advantage: Culture and Competition in Silicon Valley and Route 128. Harvard University Press, Cambridge, Massachusetts, 1994.