The evolution and status of the Vancouver wireless industry

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"The existence of a very entrepreneurial culture at MDI has been very important in the development of the cluster. The presence of Motorola has in the past also been a key factor by providing insight into a "bigger" world. The result has been increased confidence in the US market and a more risk risk-tolerant entrepreneurial culture."
Norman Toms, CTO Sierra Wireless (Greytech, 2002)

Introduction

In 2002, The Wireless Innovation Association of British Columbia (WinBC) commissioned a survey of the industry by Price WaterhouseCoopers (2002) – PwC below. Nearly seventy companies contributed from a database of 121 for a 55% response rate. Caroline Lewko of the National Research Council developed a value chain diagram (WinBC(2002) - See Fig. 1) and WinBC (2002) identifies 112 firms (along with a number of infrastructural organizations in the categories at the bottom of this diagram). Any total is fluid and somewhat ambiguous since the boundary separating wireless from several related activities is certainly fuzzy.
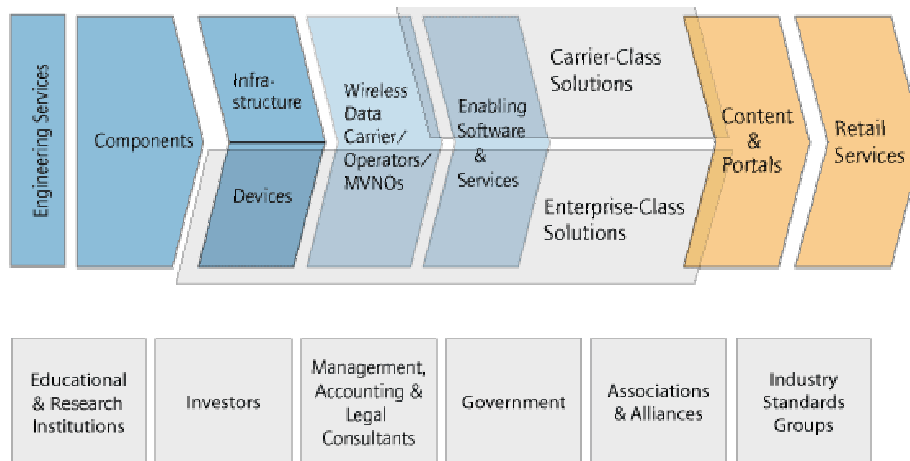

Fig. 1 The wireless supply chain developed by WinBC.

The respondents to the PwC survey employed approximately 1500 people at the end of 2001 and expected to increase that number. 64% of the respondents reported revenues totaling $253 M for 2001. The distribution approximately power law type and the top ten accounted for $240 M of the total.   The companies are young with 76% of respondents involved in the wireless industry for less than five years. The work force is also young and well educated. 91% of companies reported an average age of 26 to 40 and 71% of employees were educated to Bachelors level or higher. The firms are BC centric. 83% reported more than 50% of employees are based in BC. Table I.0 presents a list of notable firms representative of the industry scope.

▪ <u>Nokia</u> Designs next generation wireless devices. Close link to games that form a part of Vancouver's new media cluster.	▪ <u>Telus Corporation</u> Major service provider.
▪ <u>Telos Technology</u> Developed carrier-class wireless softswitch technology to smoothly transition wireless operators to next generation wireless networks.	▪ <u>Sierra Wireless Inc.</u> Designs and manufactures wireless data devices and enabling software including wireless modems.
▪ <u>MDSI Mobile Data Solution</u> Develops wireless workforce management software.	▪ <u>Spectrum Signal Processing Inc.</u> Designs and manufacturers signal processing engines and subsystems for wireless signal processing and packet voice applications.
▪ <u>Infowave Software Inc.</u> Develops wireless business solutions that connect mobile workers.	▪ <u>Norsat International Inc.</u> Designs and engineers satellite ground equipment and infrastructure products for digital video broadcasting and high speed data networks.
▪ <u>fSONA Optical Wireless</u> Designs and manufactures infrared laser communications equipment for high speed wireless communications.	▪ <u>Colligo Networks Inc.</u> Develops portable peer-to-peer business messaging and collaboration software.
▪ <u>McCarney Technologies</u> McCarney has developed an "Intelligent Vehicle Device" that can prognosticate and offer Impending Failure Detection in a moving vehicle or dynamic power plant.	▪ <u>Soft Tracks Enterprises</u> Develops wireless payment solutions.

Table I.0 Selected notable wireless firms in Vancouver

The snapshot of the industry presented by the PwC – WinBC survey suggests a newly emerging concentration as yet awaiting the emergence of the firms of "global reach" that are postulated in Porter's (1998) theory as key elements of a cluster. *This is far from the case.* Wireless in BC owes its origins to the McDonald-Detweiler descendent MDI-Motorola, Glenayre, and MPR. All of these have, essentially, been lost to the region or the industry (Canada West Telecom Group – CWTG - 2003). MDI, or Mobile Data International, had 500 employees in 1988, revenue over $50 M and a >51% market share. It was acquired by Motorola and became the mobile data division with a world product mandate and reached 1000 employees and $100 M in revenue. The Vancouver operation has

been terminated with transfer of the balance of its activity to China. Glenayre was the largest electronics manufacturer in BC in 1990 with 600 employees. It sold its manufacturing division to a US buyer in 1992. The collapse of the traditional pager market in 2001 led to a loss of 95% of the Vancouver jobs. BCTel-MPR became an element of Telus. Telus has adopted a strategic follower strategy that does not support the innovation and research thrusts of MPR. Thus, Most of the 700 jobs at MPR in 1986 have been lost. However, the CWGT analysis attributes about 50 spin-offs to MPR.

The Vancouver history makes the wireless concentration there a *case of central importance to cluster theory*. It provides an empirical test of the crucial question; can a cluster survive the loss of anchor firms? In the Vancouver case, not one but almost all anchors were lost. Nevertheless, significant vitality and optimism for the future characterizes the performance that is documented by surveys and by the attitude that we found in our interviews. Is Vancouver wireless now a "cluster" or is it a hope and a plan for a future recovery? Here, an important and unexamined (to our knowledge) question arises. What is the measure of the concept of "global reach" that Porter introduced? No doubt, the Motorola activity in Vancouver had global reach. On the other hand, we have suggested (Langford et al 2002) that Peter Phillips' "knowledge entrepot" concept applies to Western Canadian high tech clusters including Vancouver wireless. One aspect of this analogy to the traditional trade entrepot is the notion that the collective capacity for adding value in a specific regional concentration is usually expressed in exporting intermediate products to a world market. If the export is mainly intermediate products, does global reach become recognition by the main suppliers of final demand (in wireless firms such as Erickson, Nokia, Intel, or Microsoft) and not the general business and financial community? Many of the current small and medium sized industry leaders do report strong links to the major international servers of final demand. The analysis of this issue will raise an interesting issue in the emerging mathematical domain of network theory (Barabasi, 2002). What is a node that critically influences the performance of a network?

Origins of Vancouver wireless firms

Our interviews[2] (with 20 current participants) in the wireless industry in Vancouver strongly confirmed the ideas brought forward from the WinBC and CWTG surveys. It is easy to trace the connection of the majority of the young firms to key people who worked with the now absent "anchor firms'. As well, many leaders of wireless creativity in those environments remain active in the local industry as mentors, advisors, and even "angels" to new firms.

Clearly, the original anchors created a talent pool that has remained in Vancouver to a quite significant degree. This buildup started as early as the 1960s (PricewaterhouseCoopers, 2003) with Glenayre Technologies, Inc.

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[2] Interviews were conducted using the Innovation Systems Research Network interview guides.

founded in 1963. Glenayre drew technology from RMS Industrial Controls and was a leader in classic pager technology. Numerous smaller and later firms that include Telelink Technologies in 1989 to Contec Innovations in 2000 drew key people from Glenayre. One of our interviewees spoke of the "…Glenayre people all around". The second major stream began with MacDonald Detweiler Associates founded in 1969. The key step in wireless was the founding of MDI in 1978 to build the mobile data technology and business. The acquisition of MDI by Motorola in 1988 led to further growth. Some of the later firms founded by alumni of MDI-Motorola (PricewaterhouseCoopers, 2003) include Sierra Wireless, E-Dispatch Wireless, Webtech Wireless, and Soft Tracks. The third major stream in building the talent pool was developed by BC-Tel, MPR. This last contribution probably leads to the continuing stronger link expressed in our interviews across the wireless industry to Simon Fraser University than to the University of British Columbia. The MPR laboratories were linked to Simon Fraser.

Research strategy and innovation

Survival in the wireless industry with it short product life cycles depends on innovation. Consequently, all of the firms studied are actively innovative. To appreciate the character of the innovations, it is necessary to identify the business focus of the firms. 48% of respondents to the WinBC survey report several products or service lines. 37% provide "enterprise class solutions", and 67% report enterprises as the target customer base. The most heavily populated category of the value chain classification in Fig. 1 is "enabling software and services" followed by the two "infrastructure and devices" and "carrier class solutions". Even with the limitations associated with counting firms rather than counting sales, it seems clear that the output of the cluster is largely in intermediate products and that the work is focused on systems integration.

Most interviewees report that their most important innovations in the last three years represent "world firsts". Innovations in ways of doing business were as prominent in the interviews as innovations in products. This is consistent with the responses in the WinBC survey to questions about critical success factors. 76% reported ability to execute sales as critical where only 25% mentioned R&D capacity. The interviews suggest that this does not mean these firms see R&D as unimportant. Rather, it suggests they have a high level of confidence in their ability to accomplish technical innovation. In house R&D and marketing personnel were regularly identified as the "very important" sources for innovative ideas.

Networking, relationships, suppliers, and customers, competitors

Collaboration is important. Responses from 46 companies in the WinBC survey reported an average of eight collaborations with other companies and institutions. The average breaks down into 2.8 with BC companies, 4.7 with companies

outside the region, 0.5 with universities, and 0.2 with research institutes. The high rate of collaboration outside the region emphasizes the importance of linkages with major players beyond Vancouver and emphasizes the "open" character of the cluster.

Target customer groups were identified in the WinBC survey. 67% of respondents are targeting other companies, 45% targeting mobile operators, and 34% targeting government bodies. This emphasizes the intermediate product character of the industry. The WinBC survey respondents generate 61% of income outside Canada. The US market is most important overall, but Europe and Asia are quite important and South America is significant. In short, the market is global. A number of interviewees did identify the advantage of having local customers in an early stage for "beta-testing". Some, however, have essentially no local customers and most establish close relationships with distant ones. One interviewee laughed and said, "It is actually the standing joke in the company that we don't do any business in Vancouver or for that matter not a hell of a lot in Canada. Most of our products – about 60% of it is done in the US, 20% in Europe and about 10% in Asia." The global business climate does not produce any strong temptation to relocate.

Few of the firms have local competitors. Many face much larger firms as competition in the global market. A few control large market share. A large number gain their strength by identifying a specific niche market. Market intelligence is gained from two main sources. One is marketing personnel through their contacts with customers. The other, and an important one, is the web. With the short product cycles of this industry, it is important for firms to get performance information out to potential customers. Web sites play a major role. These web sites are, of course, equally accessible to competitors.

Except in the case of short-run sophisticated manufacturing, suppliers tend not to be located locally. Contract manufacturers who are available reasonably close by do the specialized work. Major component suppliers do have local representatives. As expected the added barrier to face-to-face meeting creates difficulties for some, but this is not a major or widespread concern. The improved opportunities to learn from suppliers do not seem to be a factor in location decisions. Several participants reported that the top three most important material inputs for firms are components, designs, and knowledge and information. This response underscores the importance of access to a global marketplace.

The Vancouver region as a site and its infrastructure

The central theme of the comments about the advantages of locating a wireless firm in Vancouver is the talent pool. One interviewee articulated this very well. "One of the overwhelming things was the presence of the three companies I identified, mainly two, Motorola and Glenayre, sources of highly qualified

personnel, and to a lesser extent MPR Teltech. They had created and imported this nucleus of highly trained people who loved the scenery and the lifestyle and didn't want to move. That was the number one asset and if you score everything on a scale from 1 to 100, they're up in the 90's and everything else on your list is below 10." The Vancouver region is celebrated by all interviewees for the quality of life. In many locations, the real influence of this factor may be overstated. Our impression is that this is not true in Vancouver. Frequently participants cited this factor as more important to decisions regarding business location than type of business. In many cases entrepreneurs in the region are not willing to relocate. In one interview it seemed as though starting a business was a key solution to remaining in the region: "the main thing is that we are all here and so none of us wanted to move away… but we are here for a reason and that is because we like Vancouver. Geographically; no one had done this in Canada yet so even though this had happened in the US and in Europe, no one has actually put something together like this that has worked. So why Vancouver and not Toronto and Calgary for example, well, we are here and so Western Canada is our focus for now." This participant found a niche market in the young western Canadian wireless industry.

The only problem identified with Vancouver as a business locations is that housing costs are high enough to inhibit recruiting of senior management staff from outside. There is one more point about the talent pool. Vancouver is relatively strong in other ICT areas, especially new media[3]. There is some overlap of skills that enrich the already thick labour market. One interviewee noted the importance of the corporate web site and the value of finding a superior web designer.

The local talent pool and learning that occurred at Glenayre, Motorola, and MPR represent a major path for knowledge flow, especially tacit knowledge. The majority of the hiring by firms interviewed is personnel with experience from other Vancouver firms. However, the local educational institutions (SFU, UBC, and BCIT) were frequently mentioned as an important resource and regional advantage. One interviewee noted an explicit strategy to hire a certain number of new graduates in order to bring in fresh thinking. This probably means inputs from the latest explicit knowledge from the global basic knowledge system. Academic institutions can function as "intelligence agencies" for the codified knowledge that tends not to flow through market channels, especially not from customer preferences (Christensen, 2000). Transfer is most often *via* people.

The Vancouver infrastructure of support organizations including industry "wise" accountants, lawyers, and patent agents is regarded as good. Transport is not seen as a problem, and access to the Pacific Rim is noted as an advantage. As leading 19th century industries grouped around rail lines, modern industries cluster near airports. This may account for the significant concentration of firms in Richmond.

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[3] See Richard Smith's ISRN study of the Vancouver New Media cluster.

Finance is the problematic area. Obtaining funding was identified as the second most important critical success factor in the WinBC survey. Studies across Canada identify access to capital as a critical issue. There are local venture capital firms interested in wireless and "2nd generation" entrepreneurs with resources. Additionally, there is an effective "Angel Network" in Vancouver Most interviewees, but not all, felt that there was a capital shortage. In the WinBC survey respondents reported that almost half the funding had come from founders and proprietors and that 2/3 of the funding to date has come from within BC. 49% had received less than $1 M to date and only 11% had received more than $10 M. One quarter of firms have received funding from public markets and one quarter have received funding from venture capital funds.

Role of research institutes

The collaboration data quoted above indicates some interaction with academic research. Little emerged from the interviews suggesting that typical academic research connects directly with the main concerns of these firms. This was, perhaps, best explained by one of the interviewees. "We never really expected and never got anything directly in terms of brand new technologies. I don't think anyone does in this type of an industry, biotech maybe, but I think electronic engineering, especially in consumer electronics or electronics that's very standards-driven, as ours is [does not]. The reason that [not] much room [exists] for the brilliant academic new algorithm to be introduced and to do anything for you, [is that] you are constrained by things like standards…" The initiative to create a wireless chair at Simon Fraser appears to be driven by interest in training more than research. Again quoting an interviewee; "The primary goal…[with]… the university is to make ourselves visible to the students and having them close by certainly allows us to participate and keep a little bit of visibility among those students..." The one government research institute program regularly mentioned was the NRC IRAP program. The only other government initiative mentioned with frequency approaching (but not matching) IRAP was the SRED tax credits. The results of our Vancouver interviews parallel those of our Calgary study. The comments about the role of standards and the contrast with biotechnology are probably of general significance.

Some issues of social capital

Among influential people, Geroge Hunter the director of BCTiA (The British Columbia technology Industries Assocaition) was mentioned frequently along with "the guys" at Glenayre and people associated with MDI.
Participation at formal association activities did not figure prominently in the interviews although WinBC (The Wireless Innovation Network of British Columbia) and BCTIA are well received.

Trade shows but not ones bringing local player together were mentioned. Mainly attendence focuses on the ones that are most relevant to the immediate business interests. These tend to divide the vancouvere firms and these usually occur outside the region. One interviewee said, "we go to the one where we know we can get customers. If we can't get customers there we aren't going to go."

Future

Financing small start ups and maintaining a good tax structure are priority concerns for the industry that emerged in the interviews. . One person said that understanding "seamless connections" needs to get better especially if wireless roaming is to improve and that this will be a major issue for these firms. However, the central question for the future didn't often arise.

Although few interviewees raised the matter, it is clear that the main issue for the future is how well the Vancouver industry can function as a cluster without the anchor of a firm comparable to the three founding firms of global reach. Will some of the medium sized and more mature of the current Vancouver firms exert the influence within the wireless industry internationally that can sustain a "buzz' about Vancouver. Sierra Wireless is an example of a firm that may play such a role as quotes at the head of this report suggest. At the moment comment would be pure speculation, but it will be of great value to continue to monitor the developments in the Vancouver industry over the next two years.

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