

# BASELINE REPORT

## NEW BRUNSWICK INFORMATION TECHNOLOGY SECTOR



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## **EXECUTIVE SUMMARY**

The Social Sciences and Humanities Research Council (SSHRC) has funded a national project to examine the potential impact of innovation on the economy. The five-year project is titled: “Innovation Systems and Economic Development: The Role of Local and Regional Clusters in Canada.” The goal of this project is to determine the level of innovation and the importance of clustering in knowledge-based industries in various regions across the country. The University of New Brunswick, as one of the participating universities, is heading the study project in Atlantic Canada. Researchers from other Atlantic universities are also participating.

The Atlantic Canada Opportunities Agency (ACOA) and the National Research Council’s Institute for Information Technology – e-Business are also very interested in the current status of the provincial information technology (IT) industry and its focus on innovation. This created an opportunity for a collaborative project to establish a “baseline” for the provincial IT industry. This Baseline Report was made possible partly through funding provided by these institutions.

This Baseline Report describes the state and nature of the IT sector in New Brunswick (2001) in regard to the number of companies therein and various other statistics concerning employees, revenues, growth, research and development (R&D), export intensiveness and regional differences. This report will provide a benchmark against which future studies can be compared.

An Addendum to this report will be made available in the near future. It will be based on the results of 44 in-depth interviews with select industry leaders. The focus of this Addendum will be the history and future of the IT industry in New Brunswick. The Addendum will also analyze the factors associated with Michael Porter’s Cluster Theory and discuss their importance to the success of the IT industry in the province.

Further, the results of the 44 interviews outlined above will be analyzed in conjunction with 25 in-depth interviews with various stakeholders from economic development agencies, academia, the public sector, etc. These findings will be subjected to intensive theoretical analysis to determine possible application modifications of the Porter Model. A series of recommendations for possible industry initiatives will be made for both the private and public sector. Once published, these results will be made available to the general public.

This report contains descriptive statistics that outline the state of the New Brunswick IT industry as of 2001. The following is a sample of some of the cornerstone statistics that are an important benchmark for future studies:

1. The majority of IT firms in the province are independently owned (83.6%);
2. The industry employs in excess of 4,540 people in full-time-equivalent positions;
3. Approximately 75% of the companies employ 15 or fewer employees;
4. The estimated financial impact of the industry is \$755,377,940 for 2001;
5. 72.0% of the companies polled generate revenue outside the province and 50.8% of the companies have sales to the United States;
6. 149 companies out of 164 respondents indicated they had created a new product, service or process in the preceding three years; and
7. The key obstacles to conducting more R&D are time and money.

## I. INTRODUCTION

Innovation as a corporate strategy is crucial for success in a knowledge-based economy. Individual companies may create their own innovation strategy but competitive forces in the local environment will have a direct impact on the success of this strategy. Regional groupings or “clusters” of industry specific firms, supporting industries and organizations act as a catalyst for the creation of an innovative environment.

According to the cluster theory forwarded by Michael Porter and others, four attributes of a nation/region combine to create competitive advantage. These factors are depicted as a “diamond” and form a self-reinforcing system called a cluster. The four principle factors of the Porter “Diamond Model” are:

- 1) Demand conditions (i.e. a sophisticated domestic market);
- 2) Factor conditions (i.e. infrastructure, skilled labour market, capital, etc...);
- 3) Related and supporting industries (i.e. local sophisticated suppliers, service providers, etc...); and
- 4) Firm strategy, structure and rivalry (i.e. local competition)

The diamond model can also be applied to regional economic clusters related to a given industry or sector. Economic clusters are concentrations of interconnected companies, suppliers, service providers and other institutions that compete but also co-operate. Firms work together to identify common concerns and needs. This leads

to collaborative actions designed to increase the general competitiveness of the region. As competition increases, so do the expectations of the local consumer. Firms are then forced to upgrade and innovate in order to remain competitive. Government is depicted as an organization on the periphery of the system, but it does play an important role. Porter and others believe that government should encourage innovation through a variety of methods, particularly specialized factor creation. These activities are designed to supplement the natural effects (i.e. innovation) of the diamond and thus further increase the international competitiveness of the domestic industry.

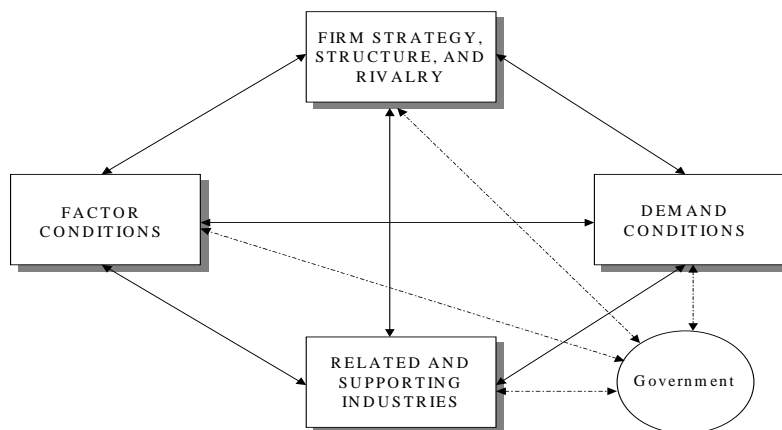


Diagram 1. The Porter Model

The Social Sciences and Humanities Research Council (SSHRC) understands the importance of innovation and has subsequently funded a national project to examine the potential impact of innovation on the economy. The five-year project is titled: “Innovation Systems and Economic Development: The Role of Local and Regional Clusters in Canada.” The goal of this project is to determine the level of innovation and the importance of clustering in knowledge-based industries in regions across the country. The University of New Brunswick, as one of the participating universities, is

heading the study project in Atlantic Canada. Researchers from other Atlantic universities are also participating.

A central premise, on which this study is based, is that as regional groupings or “clusters” of firms and supporting institutions engage in related activities, the capacity for innovation increases. The Innovation Systems Research Network (ISRN) will analyze how the growth of clusters contributes to economic growth and development within a number of regions in Canada. Regionally, the great diversity of Canada in terms of economics and historical development provides an ideal opportunity for the examination of cluster activity. Together with previous research, the findings of this study will help create a coherent body of knowledge that will enhance Canada’s capacity for innovation in the 21<sup>st</sup> century. In New Brunswick, the focus will be on the IT sector and initiatives designed to foster clusters.

SSHRC’s Major Collaborative Research Initiatives program funds innovative large-scale research projects. This program emphasizes collaboration with other research organizations interested in similar areas. With the launch of the Atlantic Innovation Fund by the Atlantic Canada Opportunities Agency (ACOA) and the creation of the Institute for Information Technology – e-Business by the National Research Council (NRC), an opportunity for a collaborative project to establish a “baseline” for the provincial IT sector was possible. This Baseline Report was made possible partly through funding provided by these institutions.

The intent of this Baseline Report was to establish the state of the Information Technology sector in New Brunswick (2001). More in-depth analysis will evaluate the extent to which the New Brunswick IT sector matches Porter’s cluster prescription. A key question to be addressed later is whether a perfect match with Porter’s model is necessary for IT companies in a technological non-dense region such as New Brunswick to be internationally competitive. Further, questions regarding policy

intervention and whether government or private companies compete to overcome any disadvantages associated with a non-metropolitan, non-dense technological region will be studied in greater detail over the next few months. These results will be published subsequently.



## **II. OBJECTIVES**

The focus of the Baseline Report is to identify the basic characteristics of the Information Technology industry in New Brunswick as of 2001. This report is the first step in the project and will be followed by more detailed analysis. The first section of this report focuses on the size of the industry in terms of its composite firms and their characteristics, the number of employees in the sector, the financial impact of the industry, research and development initiatives, and innovation activities.

The major results section of this report will focus on the degree of innovation reported in the New Brunswick IT industry. Conceptually, there is a spectrum for innovation and the aim of this study is to plot the IT industry somewhere on that spectrum. At one end of the spectrum are industries designed to meet the needs of the local market. Companies in these industries have little interest in innovation or export activities. On the other end of the spectrum are companies that actively market their products globally and who regularly invest in innovation and R&D activities. Several factors are considered in order to determine if New Brunswick has a localized and narrowly focused IT industry or whether the industry is an active and competitive component of the global economy.

### **III. METHODOLOGY**

#### **DEFINING THE NEW BRUNSWICK INFORMATION TECHNOLOGY INDUSTRY**

A standardized definition of the IT industry and its component companies was required as a selection criterion for inclusion in this research project. Numerous sources were examined but a single comprehensive definition of either term could not be found. However, a number of definitions did exist that provided a starting point for this research. The Greater Fredericton Knowledge Industry Task Force gives a broad definition of a technology provider company: “A company/organization that offers products and services to the marketplace which are directly based in information technology (i.e. software, consulting and applications).” The North Dakota Information Technology Department defines IT as “The use of hardware, software, services, and supporting infrastructure to manage and deliver information using voice, data and video.” Examples include video conferencing equipment, telephone and radio equipment and switches used for voice communications and network systems. The Information Technology Association of America defines IT as: “The collection of products and services that turn data into useful, meaningful, accessible information.” From the above examples it was determined that the New Brunswick IT industry would be comprised of companies that provided one or more of the following: computer hardware, software, internet services, consulting, training, data processing or other technical services.

The next step in defining the New Brunswick IT industry was to identify companies that were somehow related to the definition outlined above. Several agencies and organizations in the province have listings of IT companies and these lists provided a starting point for the research. Lists were collected from the following sources:

1. The defunct New Brunswick Information Technology Association (NBITA);
2. The New Brunswick Economic Development Commissions;
3. Business New Brunswick’s Mini IT Directory;
4. Export Development New Brunswick’s IT Directory; and
5. The Cyber Social list of attendees.

Additional companies were found through the following sources:

1. Strategis, Industry Canada's Business and Consumer Web site;
2. New Brunswick phone listings; and
3. Information technology industry contacts.

The consolidation of this information resulted in a baseline list of 369 companies that were associated with the IT industry. Not all of the organizations listed in the first draft of the baseline list were private sector companies primarily engaged in an identifiable IT industry sector. The following types of organizations were deleted from the draft baseline list:

1. Crown corporations;
2. Government agencies or departments;
3. Companies that were not associated with an identifiable sector in the IT industry, such as accounting or marketing firms;
4. Retail companies which did not include a value-added IT component to their offerings;
5. Companies that were major users of IT products and services, such as call centres and heavy industry; and
6. Companies that did not have an active Web site or one in development were also excluded from the list.

Sixty-four companies were eliminated from the baseline list because of the criteria listed above. An additional 92 companies were eliminated after initial telephone interviews were conducted. After consultation with various representatives from the IT industry, a further 15 IT companies were subsequently identified and added. This resulted in 228 potential participants for the research.

**Potential Participants**

	Frequency	Percent
Baseline List	369	100.0
Eliminated Prior to Interview	-64	-17.3
Eliminated After Interview	-92	-24.9
Companies Added	15	4.1
Total Potential Participants	228	61.8

Table 1: Potential Participants

### **GENERAL SURVEY INFORMATION**

Researchers in the Toronto region of the ISRN developed a research instrument entitled “ISRN Cluster Study – Company Interview Guide.” This questionnaire was modified to meet the specific requirements of the New Brunswick study. Prior to being administered the revised instrument was subjected to a validation process that included participants from the academic and private sectors. This iterative process resulted in two instruments entitled “New Brunswick IT Cluster – Short Questionnaire,” and “New Brunswick IT Cluster – Long Questionnaire.”

The Short Questionnaire is divided into five sections and contains a total of 60 questions. Part one contains information relating to basic company characteristics such as type of business, size of business and year established. Parts two and three contain questions concerning the National Research Council (NRC) and the Atlantic Canada Opportunities Agency (ACOA) respectively. Part four deals exclusively with research and development issues. Part five contains various financial analyses such as projected gross revenues and sales distributions.

The Long Questionnaire is comprised of the Short Questionnaire and three other sections. Section 2 focuses on the origins of the New Brunswick IT industry in general and the company in particular. Section 3 focuses on the Porter Model and it includes subsections dealing with customers, competitors, suppliers, partnering / co-development, specialized professionals, employees, finance, research strategies and innovations, networking and general factors. The final section probes the respondents’ viewpoint of the future of the New Brunswick IT industry. This questionnaire contains approximately one hundred and fifty questions, many of which have sub-questions.

Both questionnaires required the respondent to have detailed knowledge of their organisation’s history as well as current practices. The Long Questionnaire also

required fairly detailed knowledge of the New Brunswick IT industry. For these reasons, only senior corporate executives in the respondent companies were asked to participate in this study.

The “Short Questionnaire” was administered via telephone interviews that were conducted between October 2001 and February 2002. Each interview required between twenty and thirty minutes to complete. The Long Questionnaire was administered via in-person interviews and they were conducted between March and August 2002. Each interview required between one and three hours to complete depending on the complexity of the responses given.

A database was created in Microsoft Access in order to process responses for the Short Questionnaire. This database included the Short Questionnaire responses that were administered during the Long Questionnaire process. As interviews were being conducted, some researchers entered the data directly into this database. Other interviewers recorded answers manually and transferred them to the database once the interview was completed. All data was double checked by other researchers to reduce the possibility for error. In order to facilitate statistical analysis, the Access database was transferred to the Statistical Package of the Social Sciences (SPSS) format. SPSS is the statistical computer software used for all data analysis in this study. The responses to the Long Questionnaire were interpreted and verified prior to being entered directly into SPSS.

#### **RESPONSE RATES**

Twenty-one companies chose not to participate in this study. Eighteen companies did not respond to requests for an interview. The data for these companies was taken from public sources such as Strategis and corporate websites. The data was evaluated and compared to the respondent information to determine if the non-respondents were

representative of the population in general. The analysis considered company size in terms of employees, location, and company classification.

Data on the number of employees was not available for seventeen of the thirty-nine companies. Of the remaining twenty-two companies, only four had more than fifteen employees, with the largest having thirty. Thus, all large New Brunswick IT companies participated in this research. The distribution of the non-respondent companies in terms of geographical location and company classification closely resembled the distribution for the respondent companies. No bias is therefore perceived by excluding the data from the thirty-nine non-respondent companies. It is important to note that the data in this report is only a sample of companies from a larger population. However, the sample size is very large and, thus, highly representative of the population as a whole.

<b>Participation Rate</b>		
	Frequency	Percent
Yes	189	82.9
No	21	9.2
No Response	18	7.9
<b>Total</b>	<b>228</b>	<b>100.0</b>

Table 2: Participation Rate

**COMPANY CLASSIFICATION DEFINITIONS**

The IT sector is comprised of a wide variety of different companies. For a better understanding of the make-up of the sector in New Brunswick, it had been hoped that SIC codes (Standard Industrial Classification) and/or NAICS codes (North American Industry Classification System) would provide a guide to classifying these companies. However, this was not the case. Very few of the respondents were able to confirm or provide either code. Also, the SIC and NAICS code classifications were vague and provided no useful guidelines for this study. For these reasons, no statistical analysis will be conducted on this information.

A practical method of classifying companies in terms of their primary focus was devised for this study. The intent was to group the companies according to easily identifiable sectors within the IT industry. Company classifications were derived from two sources. The first source was a number of regional development agencies and government agencies that had already created a number of classification systems. The second source was self-reported company descriptions. Seven sub-categories or classifications were created from these company descriptions and pre-existing classification systems. The sub-categories are: Systems Integrators, Internet Solutions, Advanced Training, Software Development, Consulting, Telecommunications, and Multimedia.

## IV. RESULTS

The results of this study are broken down into eight sections. Section one contains a basic description of the characteristics of the New Brunswick IT industry. Section two contains information on the size and importance of the IT sector. Section three is an analysis of the regional characteristics of the industry. Section four examines the company classifications of the IT companies in New Brunswick. Sections five and six analyze research and development intensity and initiatives, respectively. Section seven is a more detailed analysis of the companies who are engaged in research and development and commercialization activities. Finally, section eight further examines companies who are not engaged in R&D.

### 1. INDUSTRY CHARACTERISTICS

This section is divided into two sub-sections: type of business, and company classification. The goal is to provide a brief overview of the New Brunswick IT industry as a whole.

#### TYPE OF BUSINESS

Type of Business		
	Frequency	Percent
Independent	158	83.6
Branch	17	9.0
Subsidiary	12	6.3
Other	2	1.1
Total	189	100.0

Table 3: Type of Business (Question 11)

Respondents were asked to classify their business as an independent business or a branch/subsidiary of a larger firm. Two companies did not fit these standard definitions and were classified as “Other.” One company was a franchise and the other



was a self-reported “service-offering centre.” Further analysis will not be conducted on the “Other” category for statistical reasons. Table 3 summarizes these findings. A large majority of respondents (83.6%) are independent businesses. The remainder of the industry is comprised of branches (9.0%) and subsidiaries (6.3%).

#### TYPE OF BUSINESS BY NUMBER OF EMPLOYEES

Type of Business By Number of Employees							
	Number of Employees						Total
	0 - 3	4 - 5	6 - 15	16 - 50	51 - 100	101 - 300	
Independent	53	28	47	19	6	5	158
	33.5%	17.7%	29.7%	12.0%	3.8%	3.2%	100.0%
Branch	1	1	5	6	2	2	17
	5.9%	5.9%	29.4%	35.3%	11.8%	11.8%	100.0%
Subsidiary	3		2	3	1	3	12
	25.0%		16.7%	25.0%	8.3%	25.0%	100.0%
Other			1			1	2
			50.0%			50.0%	100.0%
Total	57	29	55	28	9	11	189
	30.2%	15.3%	29.1%	14.8%	4.8%	5.8%	100.0%

Table 4: Type of Business By Number of Employees (Questions 11, 12 & 20)

Each business type was analyzed in terms of the number of employees. Table 4 displays this data. Independent companies tend to have fewer employees than either branch companies or subsidiaries. 80.9% of independent companies have fifteen or fewer employees. Only 7.0% of independent companies have more than fifty employees. In contrast, 58.9% of branch companies and 58.3% of subsidiaries have more than fifteen employees. Therefore, on average, branch companies and subsidiaries provide work for more employees than independent businesses.

**Number of Employees By Type of Business**

	Frequency	Average Number of Employees	Total Number of Employees	Percent
Independent	158	16.3	2,575.5	56.7
Branch	17	38.9	661.5	14.6
Subsidiary	12	83.1	997.0	22.0
Other	2	153.0	306.0	6.7
Total	189	24.0	4,540.0	100.00

Table 5: Number of Employees By Type of Business (Questions 11, 12 & 20)

To further identify the make-up of the sector, Table 5 contains additional data on the number of employees by type of business. This table displays both the average and total number of employees per type of business. The one hundred and eighty-nine companies interviewed employ a total of 4,540 workers, with the average company employing twenty-four workers. As a whole, independent companies account for 56.7% of the total number of employees in the IT industry in New Brunswick. However, on average, individual independent businesses contain the fewest number of employees in the industry (16.3). On the other hand, branches and subsidiaries employ an average of 38.9 and 83.1 employees, respectively. In summary, there are a large number of independent businesses in the province but most contain a relatively small number of employees. Branches and subsidiaries make up only 15.3% of the businesses in the province, but they employ 36.6% of all workers in the New Brunswick IT industry. They are few in number, but branches and subsidiaries employ a disproportionately high number of employees. This suggests that they are among the larger operations in the province.

It was necessary to examine branch companies and subsidiaries more closely in order to explain their importance in the New Brunswick economy. Therefore, if a respondent indicated the existence of a “parent” company, three follow-up questions were asked: size and location of head office, and product mandate. These questions were designed in part to determine if branches and subsidiaries are accessing external

as well as local markets. Also of importance is the size of the IT branches and subsidiaries in the province relative to independent companies. A discrepancy was noted with responses to the question regarding employee size. Some respondents provided the number of employees solely in the corporate headquarters, and others respondents provided total employees in the company. This discrepancy could not be corrected. The number of employees is given in full time equivalents.

## BRANCH INFORMATION

Branch Information				
Employees in New Brunswick	Employees at Head Office	Percentage of Workforce in New Brunswick	Head Office Location	
2.0	40,000	.01	USA	
4.0	50.0	7.41	Canada	
6.0	44.0	12.00	Canada	
9.0	70,000	.05	USA	
10.0	NA	NA	USA	
13.0	7	65.00	Canada	
15.0	100	13.04	Canada	
17.0	39,000	.04	USA	
19.0	4	100.00	Canada	
25.0	1,500	1.64	Canada	
27.5	39,000	.71	USA	
30.0	30,000	.10	USA	
35.0	120,000	.03	USA	
100.0	165,000	.06	Asia	
100.0	900	10.00	Canada	
120.0	350,000	.03	Canada	
129.0	13,000	.99	Canada	
<b>Total</b>	<b>661.5</b>			

Table 6: Branch Information (Questions 17, 17b, 18, and 20)

Of the seventeen branch offices listed in Table 6, only one respondent indicated that their parent company was located in New Brunswick. Seven of the companies had corporate headquarters in the United States, ten had Canadian headquarters, and the

remaining three were either European or Asian. The New Brunswick workforce, as a percentage of the entire corporate labour pool, varies greatly between USA and Canadian corporations. For USA based corporations, New Brunswick employees accounted for less than 1.0% of each company's total workforce. New Brunswick employees working for Canadian based corporations, on average, accounted for 24.6% of their company's total workforce. These results suggest that the majority of branch companies are foreign companies with very small operations (comparatively) in New Brunswick.

#### SUBSIDIARY INFORMATION

Subsidiary Information				
Employees in New Brunswick	Employees at Head Office	Percentage of Workforce in New Brunswick	Head Office Location	
.0	35	.00	Canada	
3.0	6	33.33	Canada	
3.0	6	33.33	Europe	
13.0	40	24.53	Canada	
14.0	60	18.92	Canada	
20.0	7	74.00	Canada	
25.0	25	50.00	Canada	
50.0	99,000	.05	Europe	
60.0	1,500	3.85	USA	
249.0	10,000	2.43	Canada	
260.0	150	63.41	USA	
300.0	11,000	8.33	Canada	
<b>Total</b>	<b>997.0</b>			

Table 7: Subsidiary Information (Questions 17, 17b, 18, and 20)

Table 7 contains general company characteristics for respondents classified as subsidiaries. A high percentage of subsidiaries indicated that their corporate headquarters were located in Canada (75%). In contrast, only 55.5% of branches have their corporate headquarters located in Canada. Only two subsidiaries have a New

Brunswick workforce of less than 1.0% of the total corporate workforce. Also, subsidiaries tend to have more employees based in New Brunswick than do branches. In contrast to branches, most subsidiary head offices are located in Canada. Also, in comparison to branch companies, subsidiaries have larger percentages of their total workforce located in New Brunswick. [NOTE: The company listed as having zero employees in New Brunswick and a corporate labour force of thirty-five represents a new business unit that will be operational in the near future.]

**GROSS REVENUES PROJECTED FOR 2001 BY TYPE OF BUSINESS**

	Type of Business				Total
	Independent	Branch	Subsidiary	Other	
Are in Development	10				10
	6.3%				5.3%
Less than \$99	27		3		30
	17.1%		25.0%		15.9%
\$100 - \$199	13				13
	8.2%				6.9%
\$200 - \$499	29		1	1	31
	18.4%		8.3%	50.0%	16.4%
\$500 - \$999	24	1	1		26
	15.2%	5.9%	8.3%		13.8%
\$1,000 - \$4,999	30	5	3		38
	19.0%	29.4%	25.0%		20.1%
\$5,000 - \$9,999	7	2			9
	4.4%	11.8%			4.8%
\$10,000 - \$24,999	2	4	1		7
	1.3%	23.5%	8.3%		3.7%
\$25,000 - \$49,999	1	1	1		3
	.6%	5.9%	8.3%		1.6%
\$50,000 +	1		1	1	3
	.6%		8.3%	50.0%	1.6%
No Response	14	4	1		19
	8.9%	23.5%	8.3%		10.1%
Total	158	17	12	2	189
	100.0%	100.0%	100.0%	100.0%	100.0%

Table 8: Gross Revenues Projected for 2001 By Type of Business (Questions 52 & 11)  
 Note: Dollars in Thousands

Gross revenues are a good indicator of the size and importance of a particular company. Respondents were asked to provide projected gross revenues for 2001. Exact revenue data is not available because respondents were asked to provide gross revenues on a specific scale. Scales were used in the questionnaire because many

companies are reluctant to provide detailed financial information. Table 8 shows that anticipated gross revenues are closely related to the type of business in operation. Branch companies typically anticipate much higher gross revenues than either independent companies or subsidiaries. 74.1% of independent companies have expected revenues of less than \$1,000,000, and less than 7.0% expect to generate more than \$5,000,000. 66.7% of subsidiaries anticipate revenues of less than \$5,000,000. Half of the subsidiaries interviewed expect to generate less than \$1,000,000 in 2001. On the other hand, more than 70.0% of branch companies expect sales in excess of \$1,000,000, and almost 30.0% anticipate sales to exceed \$10,000,000 in 2001. This suggests that independent businesses and subsidiaries conduct much less business, in terms of gross revenues, than do branch companies. Given the employee data presented in the previous section, we see that branches are larger companies, with a large number of employees and very high projected gross revenues. They are frequently foreign owned, as well. Subsidiaries employ the most workers but typically generate less revenue than branches. Independent businesses are the smallest, both in terms of employee size and gross revenues.

#### COMPANY CLASSIFICATION

<b>Company Classification</b>		
	Frequency	Percent
Software Development	52	27.5
Internet Solutions	41	21.7
Consulting	35	18.5
Advanced Training	29	15.3
Multimedia	17	9.0
Telecommunications	10	5.3
Systems Integrators	5	2.6
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 9: Company Classification (Questions 16a and 22)

A detailed explanation of the methods used to categorize respondents according to company classification is found in the Methodology section of this report. Several companies offered a diverse range of products and services and, therefore, could have been placed in more than one classification group. To remedy this problem, respondents were asked to indicate the most appropriate classification for the company. Table 9 is a frequency count of these categorizations. A more detailed analysis on company classification will be provided later in this report.



## 2. SIZE AND ECONOMIC IMPORTANCE OF THE IT SECTOR

Employment, sales, and growth rate are critically important in analyzing the economic impact of the IT sector. Respondents were asked a series of questions related to employee size, gross revenues, and sources of gross revenues. One goal was to determine the impact of the IT sector on levels of employment. Also, these questions were designed to reveal the financial impact and expected growth of the IT sector in New Brunswick. Finally, it was important to determine whether or not these companies export their services and products outside of New Brunswick. This would help reveal the degree to which IT companies access export markets in this province.

### NUMBER OF EMPLOYEES

Number of Employees			Number of Employees		
	Frequency	Percent		Frequency	Percent
0 - 3	57	30.0	0 - 3	57	30.2
4 - 5	29	15.3	4 - 5	29	15.3
6 - 15	55	28.9	6 - 15	55	29.1
16 - 50	28	14.7	16 - 50	28	14.8
51 - 100	9	4.7	51 - 100	9	4.8
101 - 300	11	5.8	101 - 300	11	5.8
300 +	1	.5	300 +	0	.0
Total	10540	100.0	Total	4540	100.0

Data Includes Aliant

Data Excludes Aliant

Table 10: Number of Employees  
(QUESTIONS 12 AND 20)

Table 11: Number of Employees  
(QUESTIONS 12 AND 20)

Telephone companies are normally considered components of the IT industry because they usually employ a significant number of IT professionals. This study has excluded Aliant as a participant for two reasons. First, Aliant's IT subsidiaries are included in the report and the inclusion of Aliant, as a parent company, would result in double counting for some of the data. Second, Aliant has over 6,000 employees in New Brunswick and including them would skew the data on the number of employees working for IT firms in the province. Table 10 shows that the total number of employees would exceed 10,000 if Aliant were included in the data analysis.

Respondents were asked for employee information in terms of full time equivalents. This standardizes responses and reduces the potential impact of part-time, seasonal, and casual employees on the research. The figures represent total employees rather than solely IT workers in each company interviewed. Although this increases the number of IT workers in the province, it is a good indicator of the economic impact of the New Brunswick IT companies. It is important to remember that only 82.9% of the IT companies in the province were surveyed for this study. Therefore, the data is slightly under representative of the population as a whole.

As mentioned previously, respondent companies employ a total of 4,540 workers. According to the 2001 Labour Force Survey, 334,400 people out of a total workforce of 376,700 are employed in New Brunswick. Therefore, IT companies in the province employ approximately 1.4% of the entire New Brunswick workforce. It is interesting to compare these figures with other important sectors of the New Brunswick economy. Among others, the health-care/social assistance sector employs 40,000 workers (12.0%); manufacturing 39,000 (11.7%); agriculture 6,000 (1.8%); and utilities 4,600 (1.4%). The information technology industry is a significant employer in the province of New Brunswick, especially when compared to traditionally dominant sectors of the economy such as manufacturing.

These figures are slightly depressed for three reasons. First, not all IT companies in the province are included in this study. Although the participation rate (82.9%) is high, thirty-nine IT companies did not participate. If employee statistics for all companies were included, the percentage of the total New Brunswick workforce represented by IT workers would be greater. Second, as explained above, Aliant has been excluded from this study. Including this company in the study would have increased the number of employees by over 6,000. Third, as discussed in the introduction to this report, call centres are excluded from this study. Many official statistics include call centres as components of the IT sector. There are more than eighty call centres in New

Brunswick employing more than 13,000 people [Source: New Brunswick Customer Contact Centre Industry Association]. Including these employees would raise the percentage of the workforce categorized as IT workers to at least 7.9% of the total workforce.

As noted in the Table 11, the IT companies in New Brunswick are generally small, with 74.6% of respondents having fewer than sixteen employees, and 45.5% having five or less. Only twenty-one (10.6%) of the IT companies in New Brunswick have more than fifty employees. Thus, the sector is made up of a large number of very small companies.

#### NUMBER OF IT EMPLOYEES

<b>Number of IT Employees (Estimate)</b>			
	Frequency	Percent	Cumulative Percent
Less than 1	20	10.6	10.6
1.00 - 1.99	22	11.6	22.2
2.00 - 2.99	15	7.9	30.2
3.00 - 3.99	21	11.1	41.3
4.00 - 4.99	14	7.4	48.7
5.00 - 5.99	9	4.8	53.4
6.00 - 6.99	9	4.8	58.2
7.00 - 7.99	3	1.6	59.8
8.00 - 8.99	6	3.2	63.0
9.00 - 9.99	5	2.6	65.6
10.00 - 19.99	35	18.5	84.1
20.00 - 49.99	11	5.8	89.9
50.00 - 99.99	7	3.7	93.7
100.00 - 300.00	12	6.3	100.0
<b>Total</b>	<b>189</b>	<b>100.0</b>	

Table 12: Number of IT Employees (Estimate)

It is also worthwhile to estimate the number of IT employees in the province. This provides another indicator of the importance of the IT sector. Table 12 displays an estimate of the number of IT employees in the province per company. These figures

were calculated by multiplying the total number of employees per company by that company's percentage of sales in the IT sector. The result is an estimate of the number of IT employees for each respondent. The average respondent company employs approximately twenty information technology employees. Using this formula, the total number of information technology employees in all respondent companies equals 3,862. It is interesting to note that 48.7% of the companies surveyed have fewer than five IT employees.

#### **GROSS REVENUES PROJECTED FOR 2001 BY NUMBER OF EMPLOYEES**

As expected, statistical analysis shows that companies with more employees typically anticipate higher levels of gross revenues for 2001. For companies with fewer than four employees, 43.9% expect less than \$100,000 in revenue for 2001. Only 3.5% of these companies have expected revenues of greater than \$1,000,000. 88.9% of companies with between fifty and one hundred employees have expected gross revenues of greater than \$1,000,000 for 2001. All companies with more than one hundred employees have expected revenues of more than \$5,000,000 for the fiscal year 2001, and 45.5% expect more than \$25,000,000 in revenue.

## INFORMATION TECHNOLOGY INTENSIVENESS

Percentage of Sales in IT		
	Frequency	Percent
0 - 10%	10	5.3
11 - 20%	11	5.8
21 - 30%	5	2.6
31 - 40%	6	3.2
41 - 50%	7	3.7
51 - 60%	3	1.6
61 - 70%	5	2.6
71 - 80%	9	4.8
81 - 90%	9	4.8
91 - 100%	124	65.6
Total	189	100.0

Table 13: Percentage of Sales in IT (Question 16b)

To identify IT intensiveness, respondents were asked: “What percentage of your business would involve information technology in terms of sales?” The question was designed to determine if the company was focused on the IT industry’s intensiveness as a value-added service provider. Respondents were asked to include only value-added income and not retail sales income. As noted in Table 13, 144 of respondents reported that at least 71.0% of their gross income was derived from value-added IT revenue. This indicates that the majority of companies included in the survey were highly IT intensive.

**GROSS REVENUES PROJECTED FOR 2001**

<b>Gross Revenues 2001</b>			
	Frequency	Percent	Cumulative Percent
Development Phase	10	5.3	5.3
Less than \$99	30	15.9	21.2
\$100 - \$199	13	6.9	28.1
\$200 - \$499	31	16.4	44.5
\$500 - \$999	26	13.8	58.3
\$1,000 - \$4,999	38	20.1	78.4
\$5,000 - \$9,999	9	4.8	83.2
\$10,000 - \$24,999	7	3.7	86.9
\$25,000 - \$49,999	3	1.6	88.5
\$50,000 +	3	1.6	90.1
No Response	19	10.1	100.0
<b>Total</b>	<b>189</b>	<b>100.0</b>	

Table 14: Gross Revenues 2001 (Question 52)

Note: Dollars in Thousands

Gross revenues are another indicator of a company's size and importance. Respondents were asked to provide projected gross revenues for fiscal year 2001. As discussed earlier, rather than requesting an exact figure, respondents were asked to select one of the income ranges outlined in Table 14. Again, it is important to remember that 83.9% of the IT companies in the province participated in this study. Aggregate financial information was slightly underestimated in terms of the industry as a whole. Totals in this study would be larger if all IT companies in the province had provided sales data. Twenty-nine of the respondents either provided no information or were in the development phase and, therefore, had no income for fiscal year 2001. As with employees, the data reveals that most companies are small in terms of annual sales, with 110 firms (64.6%) reporting gross annual revenues of less than one million dollars. Also, 49.3% of respondents estimated that total revenue for 2001 equaled less than \$500,000.

**THE FINANCIAL IMPACT OF THE IT INDUSTRY FOR 2001**

**The Financial Impact of the IT Industry for 2001**

	Median	Frequency	Average Revenue	Cumulative Revenue
Development Phase	\$0	10	\$0	\$0
Less than \$99	\$50	30	\$1,500	\$1,500
\$100 - \$199	\$150	13	\$1,950	\$3,450
\$200 - \$499	\$350	31	\$10,850	\$14,300
\$500 - \$999	\$750	26	\$19,500	\$33,800
\$1,000 - \$4,999	\$3,000	38	\$114,000	\$147,800
\$5,000 - \$9,999	\$7,500	9	\$67,500	\$215,300
\$10,000 - \$24,999	\$17,500	7	\$122,500	\$337,800
\$25,000 - \$49,999	\$37,500	3	\$112,500	\$450,300
\$50,000 + <sup>a</sup>	\$75,000	3	\$225,100	\$675,400
No Response	\$0	19	\$0	\$675,400

a. Note: Dollars in Thousands

Table 15: The Financial Impact of the IT Industry for 2001 (Estimate)

Table 15 estimates the financial impact of New Brunswick's IT industry for 2001. This table was created by multiplying the median of each gross revenue response by the total number of firms in that range. The result is a statistical estimate of the total revenue generated by the industry. The 170 companies who provided gross revenue data generated in excess of \$675,400,000. Nineteen companies did not provide this financial information. Also, as mentioned previously, thirty-nine companies either chose not to participate in this study or did not respond to requests for an interview. Including an estimate of the revenues from these companies provides a more accurate estimate of the financial impact of the entire IT industry in the province. Calculating the entire industry average gross revenue per company and using this for each of the fifty-eight companies was not feasible. The majority of companies who failed to provide financial data were small in terms of employee size. Each of the nineteen non-respondents employed less than fifty workers. Those companies not participating in this study were also identified as smaller companies. Therefore, since a strong correlation exists between employee size and financial size, it was determined that the

industry average would overestimate the financial impact of these non-participants and non-respondents. Another measure that took into account the smaller size of these companies was required. By extrapolating the financial data for the respondent companies of less than fifty employees, it was possible to estimate total revenues for both non-participants and non-respondents.

Taking into account their size relative to the entire population, the average estimated financial impact of a company with fifty or fewer employees is \$1,378,930. Therefore, for the fifty-eight non-participant and non-respondent companies of relatively the same size, the estimated total impact is \$79,977,940. This revenue data is not included in the above industry estimate. Combining the estimated financial impact of the respondents (\$675,400,000) with that of the non-respondents and non-participants (\$79,977,940) gives a total estimate of gross revenues (2001) for the entire industry of \$755,377,940.

It was noted in the preceding section that 64.6% of respondent companies generate less than \$1,000,000 in revenue annually. Referring to Table 15, the total economic impact of these same firms is only \$33,800,000. This is significant because 64.6% of the IT companies surveyed generate only 5.0% of the cumulative revenue of the industry. This is a very small contribution in terms of the province's economic performance. This information supports our finding that the New Brunswick IT sector is comprised of a large number of small enterprises with relatively low revenues.



**Gross Revenues 2001 - Total Gross Revenues in IT Sales**

	Frequency	Total Revenue	Percent	Cumulative Revenue
Development Phase	10	\$0	5.3	\$0
Less Than \$50	11	\$227	5.8	\$227
\$50 - \$99	27	\$1,405	14.3	\$1,632
\$100 - \$199	20	\$2,810	10.6	\$4,442
\$200 - \$499	24	\$8,083	12.7	\$12,525
\$500 - \$999	24	\$17,325	12.7	\$29,850
\$1,000 - \$1,999	5	\$7,815	2.6	\$37,665
\$2,000 - \$4,999	32	\$96,585	16.9	\$134,250
\$5,000 - \$9,999	6	\$41,625	3.2	\$175,875
\$10,000 - \$49,999	8	\$152,500	4.2	\$328,375
\$50,000 +	3	\$150,000	1.6	\$478,375
No Response	19	\$0	10.1	\$478,000

Table 16: Total Gross Revenues 2001 in IT Sales (Estimate)

Note: Dollars in Thousands

Revenues derived exclusively from IT sales are another indicator of the IT intensiveness of companies in New Brunswick. This information determined if respondents were involved in business outside of the IT field. Table 16 contains an estimate of the industry's total gross revenues from sales related only to IT. As mentioned previously, respondents were asked to provide information for gross revenues on a scale. In order to calculate total gross revenues in IT sales, it was necessary to estimate the total gross revenues for each respondent. The most accurate approximation of actual gross revenue data is to use the mid-point of each scale variable selected by the respondent. For example, if a company indicated revenues in the range of \$100,000 to \$199,000, then we would estimate that company's gross revenues to be \$150,000.

The next step was to determine the total amount of gross revenues per company derived from IT sales. To do this, we have taken the responses to percentage of sales in IT and multiplied them by our estimate for gross revenues as described above. This

provides us with IT gross revenue data for each respondent. Table 16 displays this information for each company and for the industry as a whole. It is interesting to note that the New Brunswick IT industry generated approximately \$478,375,000 in gross revenues exclusively from IT sales. Given that the IT industry generated approximately \$755,377,940 in gross revenues from all sources (including estimates for non-respondents and non-participants), over 70.0% of the gross revenues in 2001 of respondent companies was derived exclusively from IT sales. Not surprisingly, this information shows that IT companies in the province do very little business outside their field of expertise – Information Technology related activities.

#### **GROWTH OF IT SECTOR AS MEASURED BY GROSS REVENUES**

<b>Historic 3-Year Growth Rate</b>			
	Frequency	Percent	Cumulative Percent
Less Than 0%	16	8.5	10.1
0%	28	14.8	27.7
1 - 20%	17	9.0	38.4
21 - 50%	28	14.8	56.0
51 - 100%	18	9.5	67.3
101 - 200%	17	9.0	78.0
201 - 300%	7	3.7	82.4
301 - 500%	15	7.9	91.8
501 - 1000%	5	2.6	95.0
1001% +	8	4.2	100.0
Total	159	84.1	
No Response	30	15.9	
<b>Total</b>	<b>189</b>	<b>100.0</b>	

Table 17: Historic 3-Year Growth Rate (Question 53)

Future 3-Year Growth Rate			
	Frequency	Percent	Cumulative Percent
Less Than 0%	1	.5	.6
0%	14	7.4	8.9
1 - 20%	14	7.4	17.3
21 - 50%	34	18.0	37.5
51 - 100%	35	18.5	58.3
101 - 200%	21	11.1	70.8
201 - 300%	9	4.8	76.2
301 - 500%	19	10.1	87.5
501 - 1000%	13	6.9	95.2
1001% +	8	4.2	100.0
Total	168	88.9	
No Response	21	11.1	
<b>Total</b>	<b>189</b>	<b>100.0</b>	

Table 18: Future 3-Year Growth Rate (Question 54)

Respondents were asked about the company’s change in gross revenues over the past three years and the projected changes for the next three years. This information is useful for assessing the growth rate of the industry in terms of general and future growth expectations. Respondents frequently provided an estimated annual growth rate, and these rates were extrapolated to provide the three-year target. The “Less Than 0%” category indicates a company that has experienced a decrease in growth over the past three years. The “1001% +” category indicates a company that has experienced infinite growth during the period. All companies in this category commenced operations during the last three years and, therefore, their income increased from zero to its present dollar amount, which is an infinite percentage.

There are great variations in growth rate – responses varied from less than 0% to greater than 1000%. 27.7% of respondents experienced zero or no growth in the past three years. 56.0% of respondents reported a growth rate of 50.0% or less in the same time period. Also, only 14.7% of respondents experienced 300.0% or greater growth

in this time period. This growth is quite slow when one considers that, from a global perspective, the IT sector experienced very fast growth during that time period.

It was also important to examine predicted future growth. Table 18 shows that respondents are optimistic about their company's growth prospects in the future. For example, only 8.9% of respondents anticipate 0% growth or less in the next three years. 27.7% of respondents experienced these levels of growth during the past three years.

Next, we explored whether past performance is a good indicator of expected future performances. 74.8% of the IT companies in New Brunswick expect that their growth rate in the next three years will either remain the same or increase. This shows that companies rarely anticipate future earnings to be lower than that which they have recently experienced. In other words, the majority of respondents are optimistic about future revenue growth.

#### **EXPORT INTENSITY**

According to the Porter model, innovation allows companies to expand their operations and access outside markets. This section tries to establish whether the IT sector in New Brunswick is highly localized or if companies are accessing markets outside the region. Our analysis begins by considering all respondents. Next, we will concentrate on the sales activity of branches and subsidiaries. The following section analyzes the sales profile for all of the respondent companies. Profiles include both domestic and international sales figures.

**Export Intensiveness**

	Frequency	Percent
Companies do business only in NB	28	15.6
Companies do business only in Atlantic Canada	55	30.7
Companies do business only in Canada	84	46.9
Companies do some business in USA	91	50.8
Companies do some business Internationally (USA excluded)	52	29.1

Table 19: Export Intensiveness

The export intensiveness information found in Table 19 supports the proposition that the IT industry in New Brunswick is servicing external markets. Only 15.6% of respondent companies conduct business and derive revenues from sales entirely within the province of New Brunswick. Only 30.7% of companies conduct business exclusively within the Atlantic region. 50.8% of companies interviewed conduct at least some business in the United States, and 29.1% generate some revenue from sales outside of Canada and the United States.

**Export Sales**

	Companies	Percent
Sales Outside of Canada	95	53.1
No Sales Outside of Canada	84	46.9
<b>Total</b>	<b>179</b>	<b>100.0</b>

Table 20: Export Sales

Table 20 displays information on export sales. While 53.1% of the companies surveyed have sales to countries outside of Canada and derive revenues from these sources, one may deduce that the New Brunswick IT industry is not entirely localized

and that the industry is servicing markets both outside the province, as well as outside the country. However, 46.9% do not export outside the country.

<b>Average Exports Per Region</b>		
	Average Percent	Cumulative Percent
Sales in New Brunswick	53.8	53.8
Sales in Atlantic Canada Excluding New Brunswick	8.2	62.0
Sales in Canada Excluding Atlantic Canada	12.8	74.8
Sales in the USA	18.2	93.0
Sales Internationally Excluding the USA	7.0	100.0
<b>Total Respondents</b>	<b>179.0</b>	

Table 21: Average Exports Per Region (Questions 55, 56, 57, 58 and 59)

To further analyze export intensiveness, it is important to determine the amount of business being conducted to different regions, both inside and outside of Canada. Table 21 shows the average sales percentages per region. This table displays the average responses for all respondent companies. Table 21 shows that IT companies in New Brunswick on average conclude over 53.8% of their sales in New Brunswick. Also, on average, nearly 74.8% of the sales of New Brunswick IT companies are made in Canada. This data shows that, despite accessing outside markets, IT companies in the province conduct a large majority of their sales in Canada. The USA accounts for only 18.2% and, the rest of the world for only 7.0% of total sales.

**EXPORTS BY TYPE OF BUSINESS**

	Product Mandate		Total
	Type of Business		
	Branch	Subsidiary	
Product Mandate Outside of New Brunswick	11 64.7%	11 91.7%	22 75.9%
No Product Mandate Outside of New Brunswick	4 23.5%	1 8.3%	5 17.2%
No Response	2 11.8%	0 .0%	2 6.9%
<b>Total</b>	<b>17</b> <b>100.0%</b>	<b>12</b> <b>100.0%</b>	<b>29</b> <b>100.0%</b>

Table 22: Product Mandate (Question 22a)

For a vibrant cluster to exist, there must be an export mentality and not only the service of a very small local market. Companies characterized as branches and subsidiaries were asked if their New Brunswick operation had a product or sales mandate outside of the province. The results are found in Table 22. The intent of this question was to determine if these companies export their products and services outside New Brunswick. In other words, do these IT companies have a mandate outside the province, or are they there only to service the local market? It is important to note that 91.7% of subsidiaries and 64.7% of branches (number reduced because of missing responses from three companies) had a product or sales mandate outside New Brunswick.

This ability to export products and services outside the province indicates that the branches and subsidiaries have a more global focus than the immediate geographical market in New Brunswick.

### Exports By Type of Business

% within Type of Business	Type of Business		
	Independent	Branch	Subsidiary
Sales in New Brunswick	52.9%	72.1%	38.6%
Sales in Atlantic Canada Excluding New Brunswick	8.3%	10.3%	4.3%
Sales in Canada Excluding Atlantic Canada	13.8%	6.3%	12.1%
Sales in the USA	18.1%	8.8%	29.3%
Sales Internationally Excluding the USA	7.0%	2.7%	15.7%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Table 23: Exports By Type of Business (Questions 55, 56, 57, 58, 59 and 11)

The fact that respondents conduct business outside of the province of New Brunswick does not prove that a strong export market exists. It is important to examine the amount of business being conducted in both local and export markets. Table 23 indicates the percentage of revenues derived from sales to different markets. This table shows that most independent companies fit the profile of the average respondent. In other words, a comparison of Table 23 with Table 19 shows that the export intensiveness for independent companies is highly representative of the population as a whole. Roughly half of the sales of independent companies are conducted in New Brunswick. The data for branches and subsidiaries differs greatly from that of the average respondent. Compared to other types of businesses, branch companies conduct the highest proportion of their business in New Brunswick (72.1%) and in Atlantic Canada excluding New Brunswick (10.3%). On average, 88.6% of the gross revenues of branch companies is derived from sales in Canada. Export revenues only account for 11.5% of branch sales. Subsidiaries, on the other hand, are the largest exporters with 45.0% of gross revenue derived from international sales.



## EXPORTS BY COMPANY CLASSIFICATION

This information is important because it shows what types of companies are accessing only local markets, and what companies are generating revenues elsewhere. The export profile of each respondent differs greatly depending on the classification of the business. As shown in Table 21, the average respondent derives 62.0% of their gross revenues from sales to Atlantic Canada. The data from Table G1 shows that consulting (80.9%), internet solutions (76.4%) and telecommunications (73.1%) companies derive significant percentages of gross revenues from sales to Atlantic Canada. Systems integrators (43.4%), software developers (40.4%), and advanced training companies (49.6%) all derive much lower percentages of gross revenues from sales in this region. On average, these companies derive much higher percentages of revenues from sales to both Canadian and other markets. On average, these companies derive more than twice as much revenue from sales to the United States than other respondents.

## EXPORTS BY NUMBER OF EMPLOYEES

Exports By Number of Employees						
% within Number of Employees	Number of Employees					
	0 - 3	4 - 5	6 - 15	16 - 50	51 - 100	101 - 300
Sales in New Brunswick	64.2%	68.9%	44.4%	54.6%	39.0%	21.4%
Sales in Atlantic Canada Excluding New Brunswick	7.8%	9.0%	7.0%	12.3%	5.1%	5.3%
Sales in Canada Excluding Atlantic Canada	10.6%	11.5%	18.4%	7.4%	15.3%	12.1%
Sales in the USA	10.9%	8.7%	24.3%	18.7%	27.0%	38.8%
Sales Internationally Excluding the USA	6.5%	1.9%	5.9%	7.1%	13.6%	22.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 24: Exports By Number of Employees (Questions 55, 56, 57, 58, 59, 12 and 20)

The results from Table 24 demonstrate that as employee numbers increase, so do the amount of gross revenues derived from sales to markets outside of New Brunswick.

Companies with more employees are accessing larger markets such as the United States and therefore are generating more revenues from these sources. For example, companies with more than one hundred employees derive, on average, more than 61.0% of their revenue from international markets. Companies with fewer than twenty employees derive less than 20.0% of their revenue from these sources.

### 3. REGIONAL CHARACTERISTICS

In this section, we will examine if regional differences exist in relation to the IT sector. We will probe for regional differences in terms of export sales, the number of employees, and the type of business. For this study, New Brunswick was divided into five regions: Fredericton, Moncton, Saint John, Miramichi and Other. Many participant companies were located on the “outskirts” of larger cities in the province. Therefore, it was necessary to determine city-limit boundaries to assign these companies to specific regions. This study used regional boundaries drawn by the development corporations of each major city. The Greater Fredericton area boundaries were those used by Enterprise Fredericton (formerly the Greater Fredericton Economic Development Corporation). Enterprise Saint John defines the geographical limits of the Greater Saint John region, and that definition was used for this study. Finally, the Greater Moncton Economic Commission definition of the Greater Moncton region was used for that area of the province. Respondents were assigned a region based on their business address.

	Frequency	Percent
Fredericton	66	34.9
Moncton	50	26.5
Saint John	37	19.6
Miramichi	10	5.3
Other	26	13.8
Total	189	100.0

Table 25: Companies By Region (Question 7)

Table 25 displays the frequency of companies by region. As expected, the majority of businesses are located in the larger urban centres in New Brunswick. 81.0% of respondents were located in one of the three largest cities in the province - Fredericton, Moncton, and Saint John.

## EXPORTS BY REGION

<b>Exports By Region</b>					
% within Region	Region				
	Fredericton	Moncton	Saint John	Miramichi	Other
Sales in New Brunswick	52.6%	52.3%	54.7%	43.9%	61.9%
Sales in Atlantic Canada Excluding New Brunswick	5.9%	11.7%	8.8%	5.4%	6.7%
Sales in Canada Excluding Atlantic Canada	12.5%	10.9%	12.4%	29.6%	12.2%
Sales in the USA	19.2%	20.7%	15.7%	20.6%	13.4%
Sales Internationally Excluding the USA	9.8%	4.7%	8.2%	.6%	5.9%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Table 26: Exports By Region (Questions 55, 56, 57, 58, 59 and 7)

Table 26 shows that regional differences in IT sales distribution patterns are negligible. The majority of regions in New Brunswick fit the average export profile of the IT industry as a whole. For example, companies located in Fredericton and Saint John generate gross revenues which closely represent universal export figures. However, some anomalies exist. For example, respondent companies in Moncton derive slightly more revenue from sales in the Atlantic region than companies in other regions. Also, export sales figures for Moncton companies outside of the United States are slightly below average. In Miramichi, respondents reported sales figures in New Brunswick and Atlantic Canada which are lower than average. However, for companies located in Miramichi, sales figures for the rest of Canada were nearly twice the average of all respondents.

## NUMBER OF EMPLOYEES BY REGION

	Number of Employees By Region					Total
	Region					
	Fredericton	Moncton	Saint John	Miramichi	Other	
0 - 3	18	14	10	2	13	57
	31.6%	24.6%	17.5%	3.5%	22.8%	100.0%
4 - 5	11	7	4	1	6	29
	37.9%	24.1%	13.8%	3.4%	20.7%	100.0%
6 - 15	20	16	10	3	6	55
	36.4%	29.1%	18.2%	5.5%	10.9%	100.0%
16 - 50	9	10	5	3	1	28
	32.1%	35.7%	17.9%	10.7%	3.6%	100.0%
51 - 100	2	1	5	1		9
	22.2%	11.1%	55.6%	11.1%		100.0%
101 - 300	6	2	3			11
	54.5%	18.2%	27.3%			100.0%
Total	66	50	37	10	26	189
	34.9%	26.5%	19.6%	5.3%	13.8%	100.0%

Table 27: Number of Employees By Region (Questions 12, 20 and 7)

The data was analyzed was done to determine whether significant differences exist in the number of employees by region. Table 27 displays the relationship between number of employees and region. As expected, the majority of the large IT businesses are located in one of the three major centres in New Brunswick – Fredericton, Moncton and Saint John. 54.5% of the respondents with more than one hundred employees were located in the provincial capital of Fredericton. No company located in a city or town outside of Fredericton, Moncton, Saint John and Miramichi had more than fifty employees. 96.2% of companies located outside these major New Brunswick cities have fifteen or fewer employees.

## TYPE OF BUSINESS BY REGION

	Region					Total
	Fredericton	Moncton	Saint John	Miramichi	Other	
Independent	51 32.3%	45 28.5%	28 17.7%	9 5.7%	25 15.8%	158 100.0%
Branch	9 52.9%	3 17.6%	4 23.5%		1 5.9%	17 100.0%
Subsidiary	6 50.0%		5 41.7%	1 8.3%		12 100.0%
Other		2 100.0%				2 100.0%
Total	66 34.9%	50 26.5%	37 19.6%	10 5.3%	26 13.8%	189 100.0%

Table 28: Type of Business By Region (Questions 11 and 7)

This section examines regional differences by type of business. Table 28 displays information on the type of businesses found in each region. Of interest is the fact that 93.1% of branches and subsidiaries are located in Fredericton, Moncton or Saint John. Fredericton is home to more than 50.0% of the subsidiaries and branches in the province. It is important to note that Saint John appears to attract significant outside investment. Outside of Fredericton, Saint John has the greatest proportion of businesses classified as either subsidiaries (13.5%) or branches (10.8%). In fact, Saint John has three times more subsidiaries and branches than the second most populous city in the province - Moncton. Of note is the fact that 90.0% of businesses located in Moncton and Miramichi are classified as independent businesses.

#### **4. COMPANY CLASSIFICATION**

Table 9 on page 30, shows the company classifications of respondents. In this section we are probing for differences among the classification of companies. We begin by looking at differences in the number of employees for each classification. Next, we examine differences among different company classifications by type of business and by region.

##### **COMPANY CLASSIFICATION BY NUMBER OF EMPLOYEES**

. Compared to the frequency distribution of employee numbers in the entire IT industry, there are very few differences between companies of different classification. In other words, the data on employee numbers is consistent across different company classifications. However, some anomalies do exist. For example, internet solutions and telecommunications companies are smaller on average than the average respondent company. 56.1% of internet solutions companies employee less than four individuals. Also, advanced training institutions generally have more employees than other respondents.

##### **COMPANY CLASSIFICATION BY TYPE OF BUSINESS**

Independent companies, as the dominant form of business in the province, comprise at least 60.0% of each type of company classification. Independent businesses therefore make up a majority of each type of classification. Of note is the fact that 52.9% of branch companies are engaged as consulting businesses. Also, a large percentage of subsidiaries (41.7%) are advanced training institutions.

##### **COMPANY CLASSIFICATION BY REGION**

This section examines regional differences in the classification of companies. Multimedia companies, internet solutions companies, and advanced training institutions are well dispersed across the province, as each major region in the province is home to at least one of these types of companies. System integrators are also evenly distributed geographically. On the other hand, 51.9% of software development firms are located in the provincial capital of Fredericton. Also, consulting companies are heavily concentrated in Fredericton (34.3%) and Saint John (31.4%). Finally, 70.0% of all telecommunications companies are based in Moncton.



## 5. RESEARCH AND DEVELOPMENT INTENSITY

We have seen that innovation is a major factor leading to competitive advantage in the marketplace. Innovation includes both improvements to technologies as well as process improvements. Through the cluster theory, Porter and others have identified R&D as a key component of innovation. An innovative company is a company that often maintains a competitive advantage over its competitors.

In order to examine the role played by research and development in the New Brunswick IT industry, respondents were asked a variety of questions concerning their R&D initiatives. These questions ranged from their knowledge of federal tax incentives, to the type of R&D conducted, to the number of employees responsible for R&D in their firm.

### KNOWLEDGE OF THE SCIENTIFIC RESEARCH AND EXPERIMENTAL DEVELOPMENT TAX CREDITS

Familiarity with Scientific Research and Experimental Development Tax Credits (SR&ED)		
	Frequency	Percent
Familiar	98	51.9
Not Familiar	91	48.1
Total	189	100.0

Table 29: Familiarity with Scientific Research and Experimental Development Tax Credits (SR&ED) (Question 37a)

The Federal Government has funded a program through the Canada Customs and Revenue Agency called the Scientific Research and Experimental Development (SR&ED) Tax Credits. This program offers tax incentives to Canadian businesses that conduct SR&ED in Canada. Respondents were asked if they were familiar with the SR&ED Tax Credits scheme. Familiarity with such a program is a potential indicator of an R&D type focus. Ninety-eight respondents (51.9%) indicated familiarity with the tax credits.

**Applications for Scientific Research and  
Experimental Development Tax Credits (SR&ED)**

	Frequency	Percent
Applicants	58	59.2
Non-Applicants	40	40.8
<b>Total</b>	<b>98</b>	<b>100.0</b>

Table 30: Applications for Scientific Research and Experimental Development Tax Credits (SR&ED) (Question 37b)

Companies who responded that they were familiar with SR&ED were asked if they had ever applied for them. 59.2% of those who were familiar with SR&ED credits had actually applied.

**NEW PRODUCT AND/OR SERVICE DEVELOPMENT**

**Number of New Product Lines and/or  
Services Developed in the Last Three Years**

	Frequency	Percent
0	15	7.9
1 - 2	69	36.5
3 - 5	54	28.6
6 +	26	13.8
Total	164	86.8
No Response	25	13.2
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 31: Number of New Product Lines and/or Services Developed in the Last Three Years (Question 38)

The development of new products and services is one indicator of the degree of innovation that a company has experienced. Therefore, respondents were asked how many new products and/or services they had developed in the preceding three years. These results are listed in Table 31. The fact that several projects had been initiated in the last three years but were not yet completed was problematic. The following were included in the survey:

1. Projects that were completed in the preceding three years, regardless of when the project was initiated;
2. Major developments or enhancements to existing products;
3. New products/services for which the New Brunswick operation of a larger firm was a critical or significant contributor to the project; and
4. New services offered in New Brunswick if the concept for them was created in New Brunswick.

The following were not included in the survey:

1. Minor enhancements to existing products;
2. Customized versions of existing products that are sold to different customers; and
3. New products that are created outside of NB for resale in the province.

Of those companies who responded to this question, 92.1% reported creating at least one new product or service in the last three years. A majority of respondents (36.5%) reported that their company had developed either one or two new product lines and/or services in the last three years. This information is promising for an industry that is heavily reliant on cutting-edge technology to generate revenue.

## NEW MAJOR INNOVATION OR PROCESS DEVELOPMENT

### Number of Other Major Innovations (Processes) Developed In the Last Three Years

	Frequency	Percent
0	89	47.1
1 - 2	41	21.7
3 - 5	15	7.9
6 +	17	9.0
Total	162	85.7
No Response	27	14.3
Total	189	100.0

Table 32: Number of Other Major Innovations (Processes) Developed in the Last Three Years  
(Question 38b)

To provide another indicator of innovation, respondents were asked for the number of other major innovations or processes that they had developed in the preceding three years. Innovations or processes were defined as internal projects or enhancements that were not meant for resale to the public. The conversion to a computerized project system would be an example of an innovation for a consulting firm. 47.1% of respondents stated that their firm had not created any such innovations in the past three years. This data is not as promising as the information provided in Table 31 dealing with new product lines/services. While the New Brunswick IT industry continues to generate new products and services for sale to the public, these same companies are not refining their operations internally.

## DEGREE OF INNOVATION

Research and development activities and the development of new products/services are important indicators of innovation. But how innovative are the products and services? This is the focus of this section of the report. Respondents who reported the creation of a new product/service or the implementation of an innovation were asked how many of these developments could be described as a world first, a first in Canada,

or a first for the firm. It is important to keep in mind that the following results are self-reported. The “No Response” category denotes companies that did not create a new product or service in the last three years. We see from the following tables that only thirty-one companies (16.4%) fall into this category.

**Number of New Product Lines/Services or Major Innovations (Processes) Categorized as a World First**

	Frequency	Percent	Cumulative Percent
0	83	43.9	52.9
1 - 2	52	27.5	86.0
3 - 4	13	6.9	94.3
5 - 6	6	3.2	97.5
7 - 8	1	.5	98.1
9 - 10	3	1.6	100.0
Total	158	83.6	
No Response	31	16.4	
Total	189	100.0	

Table 33: Number of New Product Lines/Services or Major Innovations (Processes) Categorized as a World First

Seventy-five of the respondents (39.2%) stated that their firm had created at least one world first within the last three years. This is a remarkable achievement for the New Brunswick IT industry.

**Number of New Product Lines/Services or Major Innovations  
(Processes) Catagorized as a Canada First**

	Frequency	Percent	Cumulative Percent
0	110	58.2	69.6
1 - 2	33	17.5	90.5
3 - 4	7	3.7	94.9
5 - 6	1	.5	95.6
7 - 8	2	1.1	96.8
9 - 10	2	1.1	98.1
10 +	3	1.6	100.0
Total	158	83.6	
No Response	31	16.4	
<b>Total</b>	<b>189</b>	<b>100.0</b>	

Table 34: Number of New Product Lines/Services or Major Innovations (Processes) Categorized as a Canada First

Companies who created a product/service or innovation were asked if they could categorize it as a first in Canada (i.e., no other company in the country has anything exactly like it). 25.4% of companies reported that at least one of their products was a first in Canada.

**Number of New Product Lines/Services or Major Innovations  
(Processes) Catagorized as a Firm First**

	Frequency	Percent	Cumulative Percent
0	49	25.9	31.0
1 - 2	54	28.6	65.2
3 - 4	27	14.3	82.3
5 - 6	13	6.9	90.5
7 - 8	1	.5	91.1
9 - 10	5	2.6	94.3
11 - 49	6	3.2	98.1
50 +	3	1.6	100.0
Total	158	83.6	
No Response	31	16.4	
<b>Total</b>	<b>189</b>	<b>100.0</b>	

Table 35: Number of New Product Lines/Services or Major Innovations (Processes) Categorized as a Firm First

Companies who created a product/service or innovation were asked if they could categorize it as a firm first (i.e., it is the first time your firm has developed such an item.) 57.7% of respondents stated that at least one of their new developments were firm firsts.

**PERCENTAGE OF GROSS REVENUES GENERATED BY PRODUCTS AND/OR SERVICES COMMERCIALISED IN THE LAST THREE YEARS**

**Percentage of Gross Revenues Generated by Products and/or Services Commercialized in the Last Three Years**

	Frequency	Percent
0 - 10%	48	25.4
11 - 20%	18	9.5
21 - 30%	12	6.3
31 - 40%	9	4.8
41 - 50%	10	5.3
51 - 60%	2	1.1
61 - 70%	5	2.6
71 - 80%	10	5.3
81 - 90%	3	1.6
91 - 100%	48	25.4
Total	165	87.3
No Response	24	12.7
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 36: Percentage of Gross Revenues Generated by Products and/or Services Commercialized in the Last Three Years (Question 40)

The amount of revenue generated by products/services commercialized in the last three years is a good indicator of their financial importance to the company. Respondents were asked to estimate the percentage of their company's 2001 gross revenues that was generated by products/services commercialized in the preceding three years. 25.4% of companies responded that products/services commercialized in the last three years generated less than 11.0% of their revenues. On the other hand, 25.4% of companies reported that more than 90.0% of their revenues were generated from products and services commercialized in the last three years. The importance of these new developments varied greatly from company to company. We can see that the recent commercialization of products and/or services tended to either have an extremely significant financial impact or a very limited financial impact, depending on the company in question.



**PATENT, COPYRIGHT, OR OTHER INTELLECTUAL PROPERTY PROTECTION  
OBTAINED FOR NEW PRODUCT LINES AND/OR SERVICES**

**Intellectual Property Protection Obtained for New Product  
Lines and Processes Developed in the Past Three Years**

	Frequency	Percent
Yes	57	30.2
No	132	69.8
Total	189	100.0

Table 37: Intellectual Property Protection Obtained for New Product Lines and Processes Developed in the Past Three Years (Question 41)

Another potential measure of innovation intensiveness is the intellectual property (IP) protection process that a company secures for its product lines and/or processes. Therefore, respondents were asked if they had obtained patent, copyright or other intellectual property protection for their product lines or processes. Only 30.2% of companies had obtained or applied for some form of legal protection. Many companies reported that the difficulty in obtaining IP protection for their products and services was the major reason they did not apply.

## 6. RESEARCH AND DEVELOPMENT INITIATIVES

### Firms Engaged in Research and Development

	Frequency	Percent
Yes	111	58.7
No	78	41.3
Total	189	100.0

Table 38: Companies Engaged in Research and Development (Question 42)

In the previous section, we identified the importance of research and development in fostering innovation. Respondents were asked if their companies actively conduct R&D activities to create new and/or improved products or processes. A majority of respondents (58.7%) were involved in some form of R&D activity, however, 41.3% were not. In an industry that is technology based, these results may not be promising.

The information displayed above is important but it is necessary to analyze the differences between those companies who are doing R&D and those who are not. The following section examines these differences. This section highlights the following variables - type of business, number of employees, region, company classification, gross revenues, and exports. It is important to keep in mind the fact that 58.7% of respondents are engaged in R&D.

**RESEARCH AND DEVELOPMENT INITIATIVES BY TYPE OF BUSINESS**

**Research and Development Initiatives By Type of Business**

	Firms Engaged in Research and Development		Total
	Yes	No	
Independent	94 59.5%	64 40.5%	158 100.0%
Branch	7 41.2%	10 58.8%	17 100.0%
Subsidiary	9 75.0%	3 25.0%	12 100.0%
Other	1 50.0%	1 50.0%	2 100.0%
<b>Total</b>	<b>111 58.7%</b>	<b>78 41.3%</b>	<b>189 100.0%</b>

Table 39: Research and Development By Type of Business (Question 42 and 11)

Table 39 shows the relationship between research and development and type of business. 59.5% of independent businesses are engaged in R&D. This fits the profile for the average respondent. Table 39 shows that a much larger percentage of subsidiaries (75.0%) are engaged in R&D than are branch companies (41.2%).

## RESEARCH AND DEVELOPMENT INITIATIVES BY NUMBER OF EMPLOYEES

<b>Research and Development Initiatives By Number of Employees</b>			
	Firms Engaged in Research and Development		Total
	Yes	No	
0 - 3	24 42.1%	33 57.9%	57 100.0%
4 - 5	16 55.2%	13 44.8%	29 100.0%
6 - 15	39 70.9%	16 29.1%	55 100.0%
16 - 50	15 53.6%	13 46.4%	28 100.0%
51 - 100	8 88.9%	1 11.1%	9 100.0%
101 - 300	9 81.8%	2 18.2%	11 100.0%
<b>Total</b>	<b>111 58.7%</b>	<b>78 41.3%</b>	<b>189 100.0%</b>

Table 40: Research and Development By Number of Employees (Questions 42, 12, and 20)

Table 40 compares the size companies that are undertaking R&D with those who are not. As expected, companies with fewer employees engage in R&D less frequently than companies with more employees. For example, only 42.1% of companies with fewer than four employees engaged in R&D, while over 80.0% of companies with more than fifty employees did so. Presumably, larger companies can afford to dedicate more employees to this type of activity.

## RESEARCH AND DEVELOPMENT INITIATIVES BY REGION

	Firms Engaged in Research and Development		Total
	Yes	No	
Fredericton	46 69.7%	20 30.3%	66 100.0%
Moncton	29 58.0%	21 42.0%	50 100.0%
St. John	19 51.4%	18 48.6%	37 100.0%
Miramichi	5 50.0%	5 50.0%	10 100.0%
Other	12 46.2%	14 53.8%	26 100.0%
<b>Total</b>	<b>111 58.7%</b>	<b>78 41.3%</b>	<b>189 100.0%</b>

Table 41: Research and Development By Region (Question 42 and 7)

Table 41 displays information on firms by region of province and their R&D initiatives. On average, a much larger percentage of respondents located in Fredericton conduct R&D than elsewhere in the province. The number of respondents located in Moncton (58.0%), Saint John (51.4%) and Miramichi (50.0%) who conduct R&D is highly representative of the population as a whole. Later analysis will try to identify a potential reason for these minor differences.

## RESEARCH AND DEVELOPMENT INITIATIVES BY COMPANY CLASSIFICATION

### Research and Development Initiatives By Company Classification

	Firms Engaged in Research and Development		Total
	Yes	No	
Systems Integrators	3	2	5
	60.0%	40.0%	100.0%
Internet Solutions	18	23	41
	43.9%	56.1%	100.0%
Advanced Training	20	9	29
	69.0%	31.0%	100.0%
Software Development	42	10	52
	80.8%	19.2%	100.0%
Consulting	16	19	35
	45.7%	54.3%	100.0%
Telecommunications	2	8	10
	20.0%	80.0%	100.0%
Multimedia	10	7	17
	58.8%	41.2%	100.0%
Total	111	78	189
	58.7%	41.3%	100.0%

Table 42: Research and Development By Company Classification (Question 42, 16a and 22)

Table 42 shows the relationship between R&D and company classification. Software developers (80.8%) and advanced training institutions (69.0%) engage in the largest percentage of R&D. Consulting companies (45.7%), internet solutions companies (43.9%), and telecommunications companies (20.0%) perform the least R&D. Systems integrators (60.0%) and multimedia companies (58.8%) conduct an average amount of R&D.

**RESEARCH AND DEVELOPMENT INITIATIVES BY GROSS REVENUES (2001)**

**Research and Development Initiatives By Gross Revenues 2001**

	Firms Engaged in Research and Development		Total
	Yes	No	
Are in Development	7	3	10
	70.0%	30.0%	100.0%
Less than \$99,999	13	17	30
	43.3%	56.7%	100.0%
\$100,000 - \$199,999	8	5	13
	61.5%	38.5%	100.0%
\$200,000 - \$499,999	19	12	31
	61.3%	38.7%	100.0%
\$500,000 - \$999,999	18	8	26
	69.2%	30.8%	100.0%
\$1,000,000 - \$4,999,999	22	16	38
	57.9%	42.1%	100.0%
\$5,000,000 - \$9,999,999	7	2	9
	77.8%	22.2%	100.0%
\$10,000,000 - \$24,999,999	5	2	7
	71.4%	28.6%	100.0%
\$25,000,000 - \$49,999,999	2	1	3
	66.7%	33.3%	100.0%
\$50,000,000 +	2	1	3
	66.7%	33.3%	100.0%
No Response	8	11	19
	42.1%	57.9%	100.0%
Total	111	78	189
	58.7%	41.3%	100.0%

Table 43: Research and Development By Gross Revenues Projected for 2001 (Questions 42 and 52)

Table 43 shows the relationship between R&D and the size of firms as measured by gross revenues projected for 2001. Not surprisingly, larger companies have significant resources to undertake in R&D. 70.0% of companies with more than \$5,000,000 in gross revenues engage in R&D. A large percentage of companies who expect revenues

to exceed \$100,000 engage in R&D activities. As expected, companies with less revenue find it more difficult to dedicate funds to initiatives such as R&D.

## RESEARCH AND DEVELOPMENT INITIATIVES BY EXPORTS

Research and Development Activity By Exports						
	Percentage of Exports					Total
	Systems Integrators	Internet Solutions	Advanced Training	Software Development	Consulting	
Sales in New Brunswick (R&D Companies)	48 85.7%	7 53.8%	10 50.0%	16 47.1%	23 41.1%	104 58.1%
Sales in New Brunswick (Non-R&D Companies)	8 14.3%	6 46.2%	10 50.0%	18 52.9%	33 58.9%	75 41.9%
Total	56 100.0%	13 100.0%	20 100.0%	34 100.0%	56 100.0%	179 100.0%

Table 44: Research and Development Initiatives By Exports (Questions 42 and 55)

Table 44 shows data on sales in New Brunswick sub-divided into companies engaged in R&D and companies not engaged in R&D. The relationship between research and development and exports is significant. As the percentage of exports to New Brunswick increases, the percentage of respondent companies participating in research and development initiatives decreases. Companies with larger proportions of sales in the province are typically the companies who are not engaged in research and development. For example, 85.7% of companies with very few sales in New Brunswick (less than 20.0% of total sales) are engaged in research and development. Only 41.1% of companies with more than 80.0% of their sales in New Brunswick engage in R&D. Conversely, the number of firms conducting R&D increases as the percentage of sales to New Brunswick drops. As sales to international markets increase, the number of companies engaged in R&D also rises. One explanation is that companies selling to outside markets feel they must continually innovate in order to remain competitive internationally. For companies who only access local markets, their failure to conduct R&D might be explained by their small size.



## 7. COMPANIES ENGAGED IN RESEARCH AND DEVELOPMENT AND COMMERCIALIZATION ACTIVITIES

The following section provides an in-depth analysis of companies who are engaged in R&D. The purpose is to uncover the types of R&D being conducted and the intensity of these activities. Respondents were asked about the nature of their company’s R&D activities. Companies were also asked to identify the number of employees involved in R&D. Other questions related to the company’s view of the adequacy of its R&D activities. Finally, respondents identified obstacles preventing their company from conducting more R&D.

### NATURE AND INTENSITY OF RESEARCH AND DEVELOPMENT ACTIVITIES

<b>Nature of Research and Development</b>		
	Frequency	Percent
Software Development	33	27.3
New Product Development	26	21.5
Enhancing Product Development	18	14.9
General Product Development	11	9.1
Internet Related	8	6.6
Application Development	7	5.8
Marketing	6	5.0
Other	5	4.1
Industry Research	3	2.5
Internet Security	2	1.7
Wireless	2	1.7
<b>Total</b>	<b>121</b>	<b>100.0</b>

Table 45: Nature of Research and Development (Question 43)

Table 45 displays the number of companies involved in various types of research and development. Respondents were asked about the nature of their companies’ R&D activities. This was an open-ended question, as the researchers did not want to limit the breadth and scope of the responses. One hundred and eleven companies responded to

this question, however, several reported that they were involved in more than one type of R&D. Responses were coded into manageable categories. The most common forms of R&D are product development/enhancements (45.5%) and software development/application development (33.1%).

**EMPLOYEES INVOLVED IN RESEARCH AND DEVELOPMENT ACTIVITIES**

**Total Number of Employees Involved  
in Research and Development**

	Frequency	Percent
1 - 2	36	32.4
3 - 4	35	31.5
5 - 6	13	11.7
7 - 8	5	4.5
9 - 10	5	4.5
11 - 50	14	12.6
51 - 100	1	.9
101 +	2	1.8
<b>Total</b>	<b>111</b>	<b>100.0</b>

Table 46: Total Number of Employees Involved in Research and Development (Question 44)

To examine R&D intensiveness, respondents were asked about the number of employees involved in the R&D activities of their company. Table 46 displays these results.

<b>FTE Research and Development</b>		
	Frequency	Percent
0 - 1.0	40	36.0
1.1 - 2.0	12	10.8
2.1 - 3.0	16	14.4
3.1 - 4.0	11	9.9
4.1 - 5.0	5	4.5
5.1 - 6.0	6	5.4
6.1 - 7.0	2	1.8
7.1 - 8.0	1	.9
8.1 - 9.0	1	.9
9.1 - 10.0	1	.9
10.1 - 50.0	11	9.9
50.1 - 100.0	2	1.8
100.1 +	1	.9
Total	109	98.2
No Response	2	1.8
<b>Total</b>	<b>111</b>	<b>100.0</b>

Table 47: FTE Research and Development

Respondents were then asked for the percentage of each employee's time spent on R&D activities. By multiplying these percentages with the responses for total number of employees involved in R&D it was possible to obtain the number of Full Time Equivalent (FTE) employees involved in R&D. 36.0% of companies had one or fewer employees involved in R&D, and 61.2% had three or less FTEs involved in R&D. Given the many small companies in New Brunswick shown in Table 11, the results are not surprising. However, can these companies survive with such a small R&D effort? The number of employees involved in R&D was much lower than expected.

**EMPLOYEES INVOLVED IN COMMERCIALIZATION ACTIVITIES**

**Total Number of Employees Involved in the Commercialization of Research and Development**

	Frequency	Percent
0	18	16.2
1 - 2	46	41.4
3 - 5	26	23.4
6 - 10	7	6.3
11 - 20	6	5.4
21 - 50	5	4.5
51 +	1	.9
Total	109	98.2
No Response	2	1.8
<b>Total</b>	<b>111</b>	<b>100.0</b>

Table 48: Total Number of Employees Involved in the Commercialization of Research and Development (Question 46)

**FTE Commercialization of Research and Development**

	Frequency	Percent
0 - 1.0	68	61.3
1.1 - 2.0	12	10.8
2.1 - 3.0	8	7.2
3.1 - 4.0	3	2.7
4.1 - 5.0	4	3.6
5.1 - 6.0	1	.9
6.1 - 7.0	1	.9
7.1 - 8.0	1	.9
9.1 - 10.0	2	1.8
10.1 - 50.0	8	7.2
100.1 +	1	.9
Total	109	98.2
No Response	2	1.8
<b>Total</b>	<b>111</b>	<b>100.0</b>

Table 49: FTE Commercialization of Research and Development

Another measure of intensiveness is the number of employees involved in commercialization activities. Respondents were asked about the number of employees involved in the commercialization of the each firm’s R&D activities. The next two tables list the responses in terms of total employees and Full Time Equivalent employees involved in this business activity. Table 48 shows that 16.2% of respondents have no employees involved in the commercialization of R&D. In terms of Full Time Equivalents, 72.1% of the respondent companies have less than two employees involved in the commercialization of R&D. These figures suggest that marketing is limited for IT companies.

**COMPANY REPORTED ADEQUACY LEVEL OF RESEARCH AND DEVELOPMENT (SELF-REPORTED)**

<b>Research and Development Efforts</b>		
	Frequency	Percent
More Than Adequate	14	12.6
Adequate	48	43.2
Less Than Adequate	49	44.1
Total	111	100.0

Table 50: Research and Development Efforts (Question 48)

Further, the company reported adequacy level of R&D measures a company’s R&D intensiveness against their own expectations. Respondents were asked to rate their R&D efforts as adequate, less than adequate, or more than adequate. The results are shown in Table 50. 44.1% of companies reported that their R&D activities are less than adequate. 43.2% of companies felt their R&D activities are adequate. Only 12.6% of companies engaged in R&D activities reported that their activities are more than adequate. The fact that 44.1% of companies doing R&D see their performance as less than adequate further questions their continued success. Again, company size may play an important role.

**COMPANY REPORTED OBSTACLES TO DOING MORE RESEARCH AND DEVELOPMENT**

**Key Obstacles to Doing More R&D**

	Frequency	Percent
Money	86	53.8
People	22	13.8
Time	18	11.3
Other	18	11.3
Resources	12	7.5
None	4	2.5
<b>Total</b>	<b>160</b>	<b>100.0</b>

Table 51: Key Obstacles to Doing More R&D (Question 49)

Lastly, company reported obstacles to doing more R&D are of interest. We have already examined some of the possible reasons why companies may not conduct R&D (i.e., low revenues, etc.). Companies engaged in R&D were asked to describe in their own words the key obstacles that prevent their company from doing more R&D. This was an open-ended question and several respondents provided more than one response. Responses to this question were coded and placed into one of six categories. Table 51 summarizes this data. 77.7% of respondents indicated that money was a major obstacle, preventing them from conducting more R&D. Again, given the size of many companies, it is not surprising that money accounted for 53.8% of the total response.

## **8. COMPANIES NOT ENGAGED IN RESEARCH AND DEVELOPMENT ACTIVITIES**

Table 38 shows that 41.3% of companies are not engaged in R&D activities. In this section we examine some characteristics of companies not engaged in R&D. The purpose is to probe the differences between these companies and those doing R&D in order to determine reasons why certain IT companies are not conducting R&D.

### **NUMBER OF EMPLOYEES OF COMPANIES NOT ENGAGED IN RESEARCH AND DEVELOPMENT**

**Size of Companies Not Engaged in R&D**

	Frequency	Percent
0 - 3	33	41.8
4 - 5	13	16.5
6 - 15	16	20.3
16 - 50	12	15.2
51 - 100	2	2.5
101 - 1000	2	2.5
1001 +	1	1.3
<b>Total</b>	<b>79</b>	<b>100.0</b>

Table 52: Size of Companies Not Engaged in Research and Development (Question 42, 12, and 20)

In terms of employee size, 41.8% of companies not engaged in R&D have three or less employees, 58.3% have five or less, and 76.6% have fifteen or less. The majority of companies not engaged in R&D are, therefore, smaller companies in terms of employee size.

**GROSS REVENUES (2001) OF COMPANIES NOT ENGAGED IN RESEARCH AND DEVELOPMENT**

**Gross Revenues 2001 of Companies Not Engaged in Research and Development**

	Frequency	Percent
Development Phase	3	3.8
Less than \$99,999	17	21.8
\$100,000 - \$199,999	5	6.4
\$200,000 - \$499,999	12	15.4
\$500,000 - \$999,999	8	10.3
\$1,000,000 - \$4,999,999	16	20.5
\$5,000,000 - \$9,999,999	2	2.6
\$10,000,000 +	4	5.1
No Response	11	14.1
<b>Total</b>	<b>78</b>	<b>100.0</b>

Table 53: Gross Revenues 2001 of Companies Not Engaged in Research and Development (Questions 52 and 42)

Gross revenues can also be used to measure the size of companies. 21.8% of companies not engaged in R&D gross less than \$99,000 annually, which may explain why they are not engaged in R&D activities (lack of capital). However, it does not explain why the 29.1% of companies who are grossing greater than one million dollars are not doing R&D.



**EXPECTED COMPETITIVE ADVANTAGES OF DOING RESEARCH AND DEVELOPMENT**

**Would You Gain a Competitive Advantage From Doing Research and Development?**

	Frequency	Percent
Yes	45	57.7
No	27	34.6
Not Sure	2	2.6
No Response	4	5.1
Total	78	100.0

Table 54: Would You Gain a Competitive Advantage From Doing Research and Development? (Question 50)

Companies not engaged in R&D were asked if they felt they would gain a competitive advantage through doing R&D. 57.7% of the respondents felt that they would gain a competitive advantage through doing R&D. Again, 57.7% of firms believe that R&D would give them a competitive edge but are not conducting R&D. This indicates that these companies recognize the importance of R&D in the IT industry but, for some reason, they are unable to participate.

## OBSTACLES TO DOING RESEARCH AND DEVELOPMENT

### Key Obstacles to Doing R&D By Non-R&D Companies

	Frequency	Percent
Money	33	39.8
No Mandate	15	18.1
Other	12	14.5
Time	9	10.8
People	8	9.6
Resources	6	7.2
Total	83	100.0

Table 55: Key Obstacles to Doing R&D by Non-R&D Companies (Question 51)

Companies were asked to identify the key obstacles to doing R&D. Sixty-one companies responded to this question and many provided more than one response to this question. Again, this was an open-ended question and company responses were coded into manageable categories. The results are displayed in Table 55. Money was the most frequently cited obstacle to doing R&D (39.8%). However, that is well below the 53.8% of R&D active companies that identified money as the major obstacle to doing more R&D (Table 51).

## V. NATIONAL RESEARCH COUNCIL FAMILIARITY SURVEY

Respondents were asked a series of questions concerning their company's involvement and satisfaction with the National Research Council (NRC) and its programs.

	Frequency	Percent
Yes	67	35.4
No	118	62.4
Not Sure	4	2.1
Total	189	100.0

Table 56: Usage of NRC Programs / Services (Question 24)

Sixty-seven respondents (35.4%) indicated that their company had used program(s) of the NRC.

	Frequency	Percent
Yes	65	34.4
No	124	65.6
Total	189	100.0

Table 57: IRAP Usage (Question 24a)

	Frequency	Percent
Yes	4	2.1
No	185	97.9
Total	189	100.0

Table 58: CISTI Usage (Question 24a)

<b>CTN Usage</b>		
	Frequency	Percent
Yes	2	1.1
No	187	98.9
Total	189	100.0

Table 59: CTN usage (Question 24a)

Respondents were then asked to identify the specific NRC program(s) they had utilized. The most frequently used program is the Industry Research and Assistance Program, IRAP, with sixty-five of the sixty-seven companies indicating that they had used this program in the past. Very few New Brunswick IT companies used the Canadian Institute for Science and Technology Information (CISTI) or the Canadian Technology Network (CTN) programs. Only four respondents (2.1%) indicated they had used CISTI and two (1.1%) reported using the CTN.

#### **SATISFACTION WITH NRC PROGRAMS AND SERVICES**

<b>Satisfaction With NRC Programs and/or Services</b>			
	Frequency	Percent	Cumulative Percent
Extremely Satisfied	15	22.4	22.4
Very Satisfied	28	41.8	64.2
Satisfied	16	23.9	88.1
Not Completely Satisfied	4	6.0	94.0
Not Satisfied	2	3.0	97.0
No Response	2	3.0	100.0
Total	67	100.0	

Table 60: Satisfaction with NRC Programs and/or Services (Question 25)

Respondents who indicated that their company had utilized the NRC's programs and services were asked to identify their satisfaction level with the same. Table 60

displays this data. 67.2% of respondents indicated that they were either very satisfied or extremely satisfied with the NRC's offerings.

#### **CONTACT WITH THE NRC'S INSTITUTE FOR INFORMATION TECHNOLOGY**

**Contact With the Institute for Information Technology in Ottawa**

	Frequency	Percent
Yes	26	13.8
No	150	79.4
Not Sure	12	6.3
No Response	1	.5
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 61: Contact with the Institute for Information Technology in Ottawa (Question 26)

Respondents were asked if their company had had any contact with the NRC's Institute for Information Technology in Ottawa. Only 13.8% of respondents indicated any knowledge of contacting the Institute.

#### **KNOWLEDGE OF THE NEW NRC CENTRE FOR INFORMATION TECHNOLOGY-E-BUSINESS AND ITS MISSION**

**Knowledge of the New Brunswick - NRC Institute for Information Technology e-Business and its Mission**

	Frequency	Percent
Very Good Knowledge	14	7.4
Good Knowledge	28	14.8
Some Knowledge	94	49.7
No Knowledge	53	28.0
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 62: Knowledge of the New Brunswick - NRC Institute for Information Technology e-Business and its Mission (Question 27)

Table 62 shows respondents' level of knowledge of the new NRC centre in New Brunswick. Many respondents indicated that their knowledge came solely from local news media rather than first hand knowledge and this is reflected in the category titled some knowledge. It is significant that fifty-three respondents (28.0%) have no knowledge of this centre and only forty-two indicated a higher level of knowledge of the facility (good knowledge or very good knowledge).

**AREAS OF R&D THAT THE NEW BRUNSWICK NRC INSTITUTE SHOULD FOCUS ON**

**Areas of Information Technology Research and Development That the New Brunswick NRC Institute Should Focus On**

	Frequency	Percent
Internet Related	16	12.2
Wireless	15	11.5
E-Commerce	13	9.9
E-Business	11	8.4
Broadband	9	6.9
E-Learning	9	6.9
Cyber Security	7	5.3
Training	3	2.3
Remote Services	3	2.3
Knowledge Management	2	1.5
Other	39	29.8
None	3	2.3
No Response	1	.8
<b>Total</b>	<b>131</b>	<b>100.0</b>

Table 63: Areas of Information Technology Research and Development That the New Brunswick NRC Institute Should Focus On (Question 28)

Respondents were asked to list areas of IT research and development that the New Brunswick NRC Institute should focus on in order to best assist their company. This was an open-ended question. Although most responses differed somewhat, certain recurring themes were clear and coding into manageable categories was possible. However, many responses were industry-specific and/or company-specific and this

made coding difficult. This is reflected in the high percentage of companies with responses coded as “Other” (29.8%).

**LEVEL OF INTEREST IN MEETING WITH AN NRC REPRESENTATIVE**

**Interest in Meeting With NRC to Discuss  
Research and Development**

	Frequency	Percent
Interested	132	69.8
Unsure	17	9.0
Already in Contact	18	9.5
Not Interested	22	11.6
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 64: Interest in Meeting With NRC to Discuss Research and Development (Question 29)

**Companies Who Have Used NRC  
Services/Programs and Their Interest in Meeting  
With NRC to Discuss Research and Development**

	Frequency	Percent
Interested	50	74.6
Unsure	6	9.0
Already in Contact	7	10.4
Not Interested	4	6.0
<b>Total</b>	<b>67</b>	<b>100.0</b>

Table 65: Companies Who Have Used NRC Services/Programs and Their Interest in Meeting With NRC to Discuss Research and Development (Questions 24 and 29)

**Companies Wanting to be Contacted  
by Representative of the NRC**

	Frequency	Percent
Yes	143	75.7
No	46	24.3
<b>Total</b>	<b>189</b>	<b>100.0</b>

Table 66: Companies Wanting to be Contacted by Representative of the NRC (Question 30)

Respondents were asked about their interest in meeting with a representative of the NRC to discuss: 1) NRC programs and services; and 2) the new Information Technology and e-Business facility and its mission. This information is contained in Tables 64 through 66. One hundred and fifty respondents (79.3%) were either interested in meeting with an NRC representative or they were already in contact with an NRC representative. It is interesting to note that 74.6% of those who utilized the NRC were interested in meeting with a representative to discuss new research initiatives. One hundred and forty three respondents (75.7%) granted permission to release their name and contact information to the NRC in order to facilitate a meeting.



## V. CONCLUDING REMARKS

In 2001 New Brunswick had a thriving IT sector comprised of two hundred plus companies that are estimated to generate more than three quarters of a billion dollars annually. This financial feat is achieved with a work force of only four and a half thousand employees which means that the average revenue generated per employee in the industry is \$166,382. The potential economic impact of increasing the size and improving the international competitiveness of this industry is significant.

The IT companies in New Brunswick have an exporting mentality as approximately eighty-five percent of the companies derive some of their revenue from sales outside the province. Innovation is one of the critical factors that will determine the long-term success of the firms that are targeting customers outside the province. This requirement is known by the industry as more than ninety percent of the respondents indicated that they had created a new product, service or process in the past three years. They also indicated that the most significant hurdles to conducting more R&D initiatives are funding and time. The national and international competitiveness of the New Brunswick IT sector would potentially benefit from initiatives that would encourage and/or finance R&D projects and programs.

The Addendum to this report will examine the development of the IT industry in the province and determine to what extent the underlying factors of Porter's Cluster Theory are being applied or are crucial to the success of this sector. Several potential weaknesses, like the small size of the majority of businesses, have been identified and will be studied. Future in-depth analyses will compare the realities of a non-technologically dense region such as New Brunswick to the theoretical requirements of an innovative cluster. The intent of this analysis will be to determine which sectors of the industry would derive the most benefits from public and private sector initiatives as well as the type and objectives of these initiatives. The results of these studies will be released at a future date.