

# *The Economic Impact of Universities in the Atlantic Provinces*



**For:**  
**The Association of Atlantic Universities**

**Gardner Pinfold Consulting Economists Ltd**

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# SUMMARY

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## ***Atlantic Canada's universities are a major contributor to economic growth and development***

The Atlantic Provinces – Newfoundland and Labrador, Nova Scotia, New Brunswick and Prince Edward Island – with 17 universities, offer students from within and outside the Region a rich array of post-secondary education options. Most universities operate from a single campus, but in order to facilitate access, a few universities also operate satellite campuses in one or two other communities.

The Atlantic universities occupy a vital role in the knowledge economy. They contribute to innovation and economic and social development primarily by producing highly qualified graduates who are instrumental to the success of introducing new ideas, approaches and technologies. The universities also conduct basic research, generating discoveries leading to new products and processes.

In carrying out these activities, universities also contribute to the demand side of the economy. They spend millions of dollars on wages and salaries and other goods and services needed to produce their various outputs.

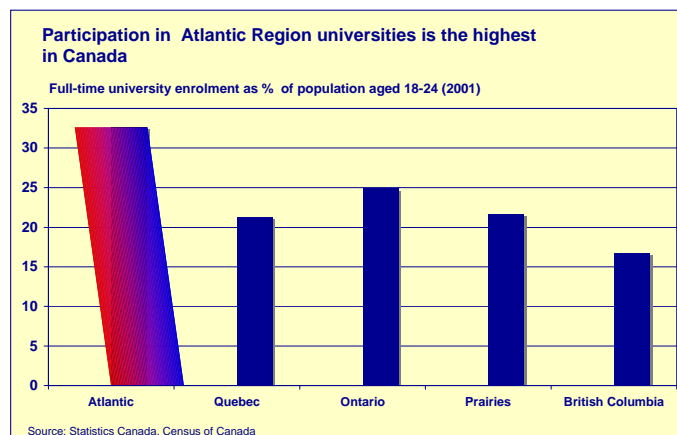
## ***Demand for university education is strong in the Atlantic Provinces***

With over 77,000 full-time and 14,500 part-time students, 250,000 local alumni and over 16,600 faculty and staff, the Atlantic universities represent a regional community numbering some 356,000 people.

The significance of the large alumni presence, of course, is that the Atlantic universities play such a substantial role in meeting the economy's needs for university-educated human resources. Graduates occupy leadership and support positions throughout industry, government, medicine, law, education and the arts.

The Atlantic universities have grown substantially over the past 25 years, a reflection of demographic trends as well as the increasing demand for post-secondary education. Enrolment has increased by about 75% since 1980, rising to 91,645 in 2005. About 20% of students originate from outside the Region.

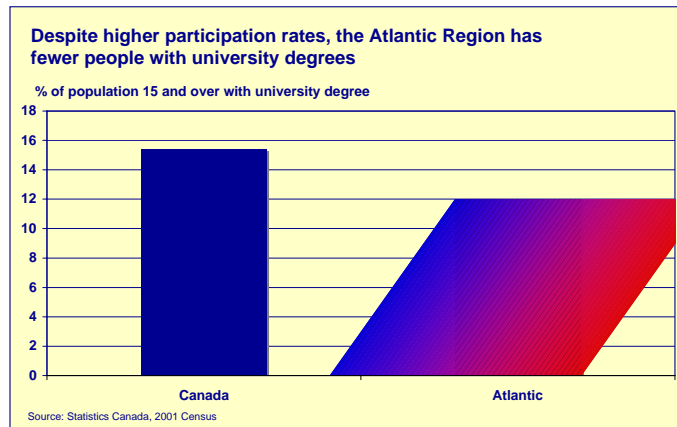
The ratio of full-time enrolment to university-age population (ages 18 to 24) is higher in the Atlantic Provinces than any other region of Canada. This reflects not only a higher university participation rate in the Atlantic Region, but also the ability of the Atlantic universities to attract a relatively high number of students from elsewhere in Canada and internationally.



The Atlantic universities awarded some 17,000 degrees in 2005. About 13,500 were undergraduate degrees awarded mainly in the faculties of arts and science, with a substantial number also awarded in management, computer science, nursing and education. Another 3,500 graduate and professional degrees were also awarded, covering a full range of disciplines including engineering, architecture, business, medicine, law, dentistry and veterinary medicine.

The Atlantic universities benefit not just the Region, but the rest of Canada as well. Though the Atlantic Region leads in participation, we lag the rest of Canada in our ability to generate enough jobs to employ all the graduates. The proportion of the population in the Atlantic Provinces with degrees remains below the Canadian average by a few percentage points (12% vs. 15%). The Region continues to experience a “brain drain” to more industrialized and faster growth areas of Canada that are able to offer a wider array of challenges to recent graduates.

Looking ahead, the Atlantic universities face an enrolment challenge. Demographic trends are not favourable as the university age



population is expected to decline over the next several years in the Atlantic Provinces. It is not clear how much room there is for growth in the participation rate within the Region. Moreover, tuition fees at most Atlantic universities are already among the highest in Canada. It is to the credit of the regional institutions that in the face of the tuition fee differential, they have attracted increasing numbers of students from other parts of Canada and internationally. This attests to the overall quality of the universities. If this growth is to continue, tuition fees will have to remain competitive while universities strive to enhance program diversity and overall quality.

### ***An increasingly international outlook benefits all***

The Atlantic universities are becoming increasingly diversified with respect to student origin. Over the past 10 to 15 years, the rate of growth in the number of students from other parts of Canada and other countries has outstripped the growth rate from within the Region at most institutions. The larger universities report they attract students from 100 or more countries. This infusion greatly enriches the Region’s cultural diversity, deepening our understanding of other societies, offering fresh perspectives on international affairs, and broadening our exposure to other cultural forms including music and the arts.

Universities are already positioned as one of the leading factors why some of the best and brightest – students as well as faculty – are attracted to the Atlantic Provinces. Our universities have the potential to play a substantial role in supporting, and even shaping, emerging provincial immigration policies.

From a narrow economic impact perspective, the universities’ success in attracting students from outside the Region and outside Canada is a positive development because it results in an increase in the export dollars earned. For the 5-6,000 international students currently attending the Atlantic universities, this adds up to over \$100 million in export earnings per year.

The international outlook extends also to the universities' role in international projects. In 2004, ten of the Atlantic universities participated in some 30 projects in 15 developing countries. Such projects attract funding from various agencies, supporting faculty and students in a broad range of initiatives. The universities benefit through administrative fees, while project participants gain valuable international experience that serves to enhance both teaching and research. A side benefit is that such projects also serve to advertise the university internationally, providing points of contact and information for potential students.

## ***Universities help to define their communities***

Universities form an integral part of their local communities extending well beyond the measurable economic dimension. They help to define the character of several towns and cities in the Region, contributing greatly to the quality of life. The universities also demonstrate leadership and commitment to economic and social development through a broad array of community initiatives. These include continuing education programs of a highly technical nature as well as ones of general interest, provision of legal aid services, community health programs, arts programs and business and advisory services. Community initiatives also include faculty volunteer activities many of us take for granted – articles to local newspapers on health, economics or political issues, and appearances on radio and television programs aimed at informing the public about science, arts and current affairs.

Among some of the notable community initiatives:

- ❑ University of Prince Edward Island – AVC Teaching Hospital
- ❑ Dalhousie University – Dalhousie Legal Aid Service
- ❑ Memorial University – SafetyNet Alliance
- ❑ Mount Saint Vincent University – Centre for Women in Business
- ❑ Saint Mary's University – Small Business Development Centre
- ❑ St. Thomas University – Theatre St. Thomas
- ❑ University of New Brunswick – Community Health Clinic
- ❑ Université Sainte-Anne – Building and Protecting Acadian Culture
- ❑ Cape Breton University – Mi'kmaq Resource Centre
- ❑ Acadia University – Acadia Centre for Estuarine Research

## ***University education generates substantial economic and social benefits***

Public and private investment in post-secondary education occurs for sound economic and social reasons, with benefits accruing to individuals and to society more generally.

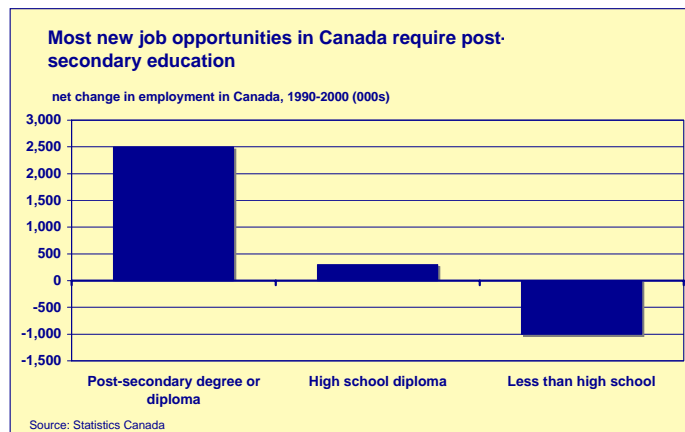
- ❑ A more educated workforce not only is likely to be more innovative in the sense that it possesses greater capacity to research and develop technologies and processes resulting in increased productivity, but it also is likely to have greater capacity to receive and apply new technologies and approaches.
- ❑ Education benefits the individual by enhancing personal development. It also benefits society more generally by improving public health, safety and the environment, and also through the participation of students, faculty and alumni in community activities.

Individuals make the investment to attend university for various reasons including love of learning, self-improvement, securing interesting work, and also in the expectation of earning a higher income. Across the Atlantic Provinces, the data clearly indicate that earnings rise with education level. Individuals with a first university degree earn an average of 60-70% more per year than individuals with a high school diploma. Over a working life, this means an additional half a million dollars in earnings. With a graduate degree beyond the bachelor's level, the average earnings premium rises to over 100%, or an additional three-quarters of a million dollars.

Post-secondary education plays a major role in the achievement of high levels of economic growth and development, and to the realization of the broader quality of life benefits associated with it:

- ❑ the growth of human capital (educational attainment) in G7 countries typically accounts for as much as 20% of the growth in total output
- ❑ differences in educational attainment account for most of the differences in output (GDP per capita) variation across OECD members
- ❑ investment in OECD countries is positively correlated with the extent of secondary schooling in the labour force
- ❑ one additional year of education raises output per capita by as much as 6%
- ❑ the level of education plays a role in technological catch-up; productivity growth is more rapid where countries have a higher level of average schooling.

A practical illustration of the significance of higher levels of knowledge lies in the educational requirements in growth areas of the economy. Simply put, most jobs created today in Canada require a post-secondary degree or diploma. Few jobs in the new economy can be filled with just a high school diploma. Jobs requiring less than a high school diploma are rapidly disappearing.



## **Universities are a primary source for innovation and basic research**

Universities in the Atlantic Provinces occupy the central role in conducting research and development (R&D) in the Region. Between 1994 and 2003, they performed R&D valued at over \$3.3 billion (about 6% of the national total). In 2003 alone, the value of R&D performed at the Atlantic universities came to just over \$500 million (direct and indirect costs). This represents 63% of R&D in the Region, with the private sector performing just 18%. This contrasts sharply with activity at the national level, where the private sector leads research activity (55%), with universities accounting for about 30%.

Source of funds	Atlantic Provinces		Canada	
	\$ millions	% of total	\$ millions	% of total
Governments	892	26.9	17,459	33.4
Higher education	2,028	61.1	25,564	49.0
Business & other	397	12.0	9,185	17.6
<b>Total</b>	<b>3,317</b>	<b>100.0</b>	<b>52,208</b>	<b>100.0</b>

Source: Statistics Canada

Universities in Atlantic Canada lead the R&D effort in part because they have the commitment and capacity (researchers and infrastructure) to do so, but in part by default – because the business sector makes such limited investments in R&D compared with the rest of Canada. Few firms invest in R&D because of the structure of the economy, the small size and limited R&D budgets of most firms, and the absence of a well-developed R&D climate in the Region. These realities underscore the continuing need to support university research capability, *facilitate commercialization and innovation through the creation of industry-university partnerships and foster the conditions for higher levels of private sector R&D performance.*

Universities in the Atlantic Provinces are taking steps to accelerate the commercialization process. Each university has established a technology transfer office to assist researchers with the various hurdles and challenges. With assistance from the Atlantic Canada Opportunities Agency, the universities also have created a formal network (“Springboard”) to advance the commercialization process by providing various support services.

	Atlantic	Canada
Expenditures on IP management (\$ thousands)	1,869	36,419
Sponsored research (\$ millions)	186	4,282
Research contracts (\$ millions)	66	810
Income from IP (\$ thousands)	626	55,525
Inventions (number)		
Disclosed	51	1,133
Protected	28	527
Patents held	49	3,047
Spin-off companies (number)	63	876
Licences and options	n.a.	1,756

Source: Statistics Canada, *Survey of Intellectual Property Commercialization in the Higher Education Sector, 2003*

## The Atlantic universities are a \$2 billion industry

Direct spending attributable to the Atlantic universities in 2004 amounted to an estimated **\$2.08 billion**. This includes spending by the universities on operations (including payroll) and capital projects, as well as incremental spending by students and visitors.

Atlantic universities, summary of direct spending, 2004  
(\$ millions)

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Total
<b>University expenditure (\$ millions)</b>					
Operating (2004)	796.2	344.2	416.4	78.4	1,635.2
Capital (2000-2004 average)	14.7	20.4	5.8	1.2	42.1
<b>Student/visitor spending (\$ millions)</b>	194.0	82.0	109.0	20.0	405.0
<b>Total</b>	<b>1,004.9</b>	<b>446.6</b>	<b>531.2</b>	<b>99.6</b>	<b>2,082.3</b>
<b>University employment</b>					
Full-time faculty & staff	5,949.0	4,421.0	2,998.0	662.0	14,030.0
Part-time faculty & staff	1,667.0	341.0	600.0	16.0	2,624.0
<b>Total</b>	<b>7,616.0</b>	<b>4,762.0</b>	<b>3,598.0</b>	<b>678.0</b>	<b>16,654.0</b>

Source: Atlantic universities

The Atlantic universities employ over 16,655 faculty and staff. In addition, 3-4,000 students not included in these figures are employed as researchers and teaching assistants, and also in other support roles.

The employment impact, while significant at the regional level, intensifies as the focus narrows to the local economies where the universities are located. Virtually all faculty and staff live in the university communities. The universities in the provincial capitals create 2.5-5.0% of total employment in their respective cities. The universities in smaller towns dominate the town economies, accounting for 15-30% of total employment. The universities generally are the largest employers in the community.

Universities represent not only a generator of high-paying jobs, but also of highly stable jobs. Unlike many enterprises in the regional economy, universities tend to be less vulnerable to the swings in the business cycle. The Region experienced considerable job losses over the last decade as competitive forces resulted in corporate consolidations in central Canada.

University jobs are valuable as well because most are full-year and full-time. This may seem like a minor consideration to many observers who believe the vast majority of jobs in urban centres are full-year and full-time. But this is not the case. The 2001 Census data show that in the broader economy, and even in the major urban centres, only *50-55% of those reporting earned income held full-time jobs that lasted a full year.*

The research conducted for this study reveals several other notable impacts arising from university activity:

- ❑ The Atlantic universities' total payroll (salaries and benefits) amounted to just over \$1.0 billion in 2004. Virtually 100% of this was paid to residents of the towns and cities in which the universities are located. The universities generate from 4.0-12.5% of the earned income in the major urban centres in the Atlantic Provinces. In the smaller university towns, the institutions dominate the local economies accounting for 30-60% of the personal income generated in the communities.
- ❑ Over and above the approximately \$1.0 billion spent on payroll in 2004, the Atlantic universities spent \$635 million on a wide range of goods and services, most of which were procured from suppliers in the regional economy.
- ❑ The Atlantic universities invested \$210 million in the construction of academic, residential and other facilities between 2000 and 2004. Taking the average amount, this adds just over \$40 million to the annual expenditure used in the impact analysis. These projects provide important opportunities for the Region's contractors and construction workers.
- ❑ Students attending the Atlantic universities spent an estimated \$980 million in 2004. Approximately 60% flowed to the universities to pay for tuition, residence fees and books. The remaining 40% – about *\$400 million* – flowed to the wider economy to cover costs of rental accommodation, food, transportation and entertainment.

### ***University spending triggers wider impacts throughout the regional economy***

Though the major economic impact attributable to the universities lies in the contribution graduates make to innovation and growth – the so-called *dynamic* impact – the Atlantic universities also trigger an immediate regional impact through their expenditures to hire faculty and staff and to buy other goods and services.

- ❑ **Economic output: \$4.39 billion** – For each dollar of university and net student spending, the multiplier effect generates over a dollar of activity elsewhere in the economy.
- ❑ **Gross Domestic Product (GDP): \$2.0 billion** – GDP is the most widely used indicator of economic activity, measuring the income generated in the economy through the production of the universities' output – knowledge in the form of graduates and research results.



- **Employment: 27,320 jobs** – in addition to the thousands employed directly by the universities, several thousand other jobs are created elsewhere in the regional economy as spending triggers activity amongst suppliers of goods and services and their suppliers, which in turn triggers spending by employees, and so on.
- **Tax revenue: \$466.8 million** – total taxes collected by the federal and provincial governments including income and corporate, and GST, HST and PST as applicable.

## **Concluding observations**

While the contribution of the Atlantic universities to the economic and social well being of the Region is clear, the universities face several significant challenges to their ability to enhance this role:

- **Funding** – the provinces represent the single largest source of university funding, a reflection of their commitment to post-secondary education. But cuts to federal transfers, coupled with competing demands from other sectors, have impaired the ability of most provincial governments to keep up with rising university capital and operating costs. In response, universities have increased tuition fees, cut spending on much-needed maintenance, and in some cases, cut back on hiring additional faculty. Tuition fees at most of the Atlantic universities are \$1,000-2,000 above the national average. Not only does this impose higher costs on students from the Region, but the universities also risk pricing themselves out of the national market on which they increasingly rely.
- **Enrolment** – the Atlantic universities face a potentially difficult financial future arising from the threat of declining enrolment. Most universities in the Region experienced declining enrolment in the past two years. In the longer term, demographic trends point to a steady decline in the number of university-age students in the population of the Region. While increases in the participation rate are possible and could compensate for the demographic trend, this is unlikely because the rate in the Region is already the highest in Canada. An option most universities are turning to is recruitment of students from outside the Region. These efforts must be intensified, though they run the risk of being undermined by the rising tuition fee differential.
- **University-industry R&D partnerships** – in light of the nature and magnitude of public R&D funds currently available to universities, there is an expectation that universities will play a pivotal role in developing and sustaining innovation capacity. To meet this expectation, particularly in the Atlantic Provinces where the private sector conducts limited R&D, a multi-pronged strategy is needed.
  - Genuine partnering in defining research needs and objectives, as well as the details of the research program including expected results and disposition of the IP. This represents a shift in approach away from the “supply push” model where researchers look for transfer opportunities once results are in hand, to a “demand pull” model based on a defined need and requiring close collaboration among industry and university partners at the earliest stages of planning. This requires buy-in *and investment in innovation capacity* not just from universities and industry, but also from government, other research institutions and funding agencies.
  - Researchers may have to extend the nature and scope of their research, with greater emphasis on applied or locally relevant issues.

- Greater emphasis on continuing education is needed to facilitate the technology transfer process.
- New funding arrangements, such as that created under the Atlantic Innovation Fund, provide a basis for a much-needed partnership approach to engender locally relevant research.
- Consideration should also be given to expanding university tenure and promotion criteria so that measurable commercialization performance indicators are added to conventional criteria such as publications, teaching, conferences and thesis supervision.

# **INTRODUCTION**

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## **1. WHY THIS STUDY**

Many people think of universities simply as institutions providing post-secondary education. While this is clearly their primary function, the nature of their activities and scope of their influence extend well beyond the campus.

- ❑ Graduates go on to supply regional, national and international economies with the human capital they need to innovate, grow and diversify.
- ❑ Universities conduct basic research, providing the foundation for innovation in products and processes across a wide spectrum of areas including science, health, social sciences and engineering. Discoveries lead to economic growth, social development and improved health outcomes.
- ❑ They serve as the focal point for the performing and visual arts, for debate on emerging issues, and for athletic activities, thereby enriching the lives of all in the communities they serve.
- ❑ The Atlantic universities deliver a wide range of continuing education programs, a vital resource to meet the demands for life-long learning in the knowledge economy.
- ❑ Universities extend their reach into the developing world, providing assistance in addressing health, scientific, environmental and resource management issues.

In addition to facilitating and supporting economic and social growth and development, universities also play a direct role in generating economic activity in their communities and regions. They do this through the tens or hundreds of millions of dollars spent annually in operating their facilities, and in constructing new buildings. They also do this by generating employment for faculty and staff, who in turn spend their incomes in the local community.

The main aim of this study is to produce a clear and comprehensive statement of the role and value of the Atlantic universities. It is intended to address a major gap in public understanding of the nature, scope and impact of university activities. Describing and quantifying the linkages between university activities and economic impacts provides a basis for a greater appreciation of the value the Atlantic economy and its communities derive from public and private support for these institutions.

## 2. CONTENTS

Following this introduction, Chapter II sets out an overview of the 17 Atlantic universities, providing the reader with a snapshot of each institution, as well as recent trends in enrolment, number of graduates, revenues and expenditures and research funding. The profiles are supported by more detailed fact sheets contained in the Annex.

Chapter III assesses the total economic impact of the universities from the *demand* side, as industries buying goods and services to support operations and construct new facilities. Direct employment and income are quantified and assessed in the context of the university communities, highlighting the relative importance of the institutions. This chapter also looks at universities as export industries, providing estimates of the additional spending attributable to students and visitors from outside the Region.

Chapter IV examines the economic value of universities from the *supply* side, as producers of knowledge (in the form of graduates and research results) leading to innovation and greater productivity. Trends in numbers of graduates and alumni are quantified. The value of education is estimated from the perspective of the individual and in terms of the contribution to economic growth.

Chapter V takes a close look at university research and its relationship to innovation and economic growth in Canada and the Atlantic Provinces. We examine how research funding has grown over the past decade, and the relative importance of universities in Atlantic Canada as both funders and performers of research. This chapter also explores some of the challenges facing universities, in particular the implications for innovation of conducting research in a region with such limited private sector capacity either to conduct research or engage in effective technology transfer, and what's being done to address these challenges.

Chapter VI outlines some of the research activities and results emerging from the universities, as well as examples of community action. This selection is intended merely to illustrate the nature and scope of the benefits derived from the universities by focusing on concrete examples.

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# THE ATLANTIC UNIVERSITIES

## 1. KEY ROLE IN THE KNOWLEDGE ECONOMY

The Atlantic Provinces are home to 17 universities. Most operate from a single campus, while a few also operate satellite campuses in one or two other communities in order to facilitate access. The greatest concentration of universities occurs in the Halifax Regional Municipality (HRM), with six. In all cases, the universities do much to define the communities in which they are located. The map in Figure 2-1 (see page 5) illustrates the distribution of institutions across the Region.

The Atlantic universities range widely in size, structure and scope of program offerings. Enrolment varies from under 200 to over 18,000, with a total of 91,645 undergraduate and graduate students in 2005 (Table 2-1). The universities concentrate on undergraduate programs, though most offer graduate studies, and several provide professional degrees. Some 17,000 degrees are awarded annually.

Universities may be characterized as export industries because they meet demand (student, research grant, contract) originating outside local economies in regional, national and international 'markets'. The greater the export component of demand, the greater the short-term growth impact on the local economy.

**Table 2-1**  
**Atlantic Provinces universities, 2005 enrolment**

University	Main campus	Program			Total
		Undergraduate	Graduate	Part-time	
Memorial University of Newfoundland	St. John's, NL	13,731	1,507	3,089	18,327
Dalhousie University	Halifax, NS	10,657	2,640	2,226	15,523
University of New Brunswick	Fredericton, NB	10,748	992	1,591	13,331
Saint Mary's University	Halifax, NS	6,767	324	1,116	8,207
Université de Moncton	Moncton, NB	4,817	393	1,269	6,479
St. Francis Xavier University	Antigonish, NS	4,123	85	648	4,856
Mount Saint Vincent University	Halifax, NS	2,244	94	2,047	4,385
Acadia University	Wolfville, NS	3,521	142	353	4,016
University of Prince Edward Island	Charlottetown, PE	3,306	85	487	3,878
Cape Breton University	Sydney, NS	2,806	99	665	3,570
St. Thomas University	Fredericton, NB	2,855	-	262	3,117
Mount Allison University	Sackville, NB	2,089	5	241	2,335
University of King's College	Halifax, NS	1,125	-	28	1,153
NSCAD University	Halifax, NS	829	19	183	1,031
Nova Scotia Agricultural College	Truro, NS	624	50	85	759
Université Sainte-Anne	Pointe-de-L'Église, NS	404	-	137	541
Atlantic School of Theology	Halifax, NS	-	52	85	137
	<b>Total</b>	<b>70,646</b>	<b>6,487</b>	<b>14,512</b>	<b>91,645</b>

Source: AAU

Universities supply thousands of graduates each year, providing the critical underpinnings for economic growth, diversification and innovation. Our economy relies increasingly on higher and deeper levels of education to meet the challenges of remaining competitive in a global environment rapidly redefining its requirements in response to shifting demands and supply capabilities.<sup>1</sup>

Education is a good investment, not only for society, but also for the individual going to university. Males with at least a bachelor's degree earn at least 50% more than those who have not finished high school. The gap is even greater for females. Those with a bachelor's degree earn two-to-three times more than those who have not finished high school. These lessons are clearly not lost on those already in the workforce or trying to get in. Table 2-1 shows that almost 16% of university students are enrolled in part-time studies.

Universities occupy a pivotal role in the knowledge economy. Through research and teaching they act as enterprises 'supplying' knowledge. This is their primary function. In carrying out this function, they also contribute to the demand side of the economy. Universities spend millions of dollars on wages and salaries and other goods and services needed to produce their various outputs. In 2004, university operations (excluding capital expenditures) in the Atlantic Provinces generated a demand for goods and services valued at just over \$1.6 billion (Table 2-2).

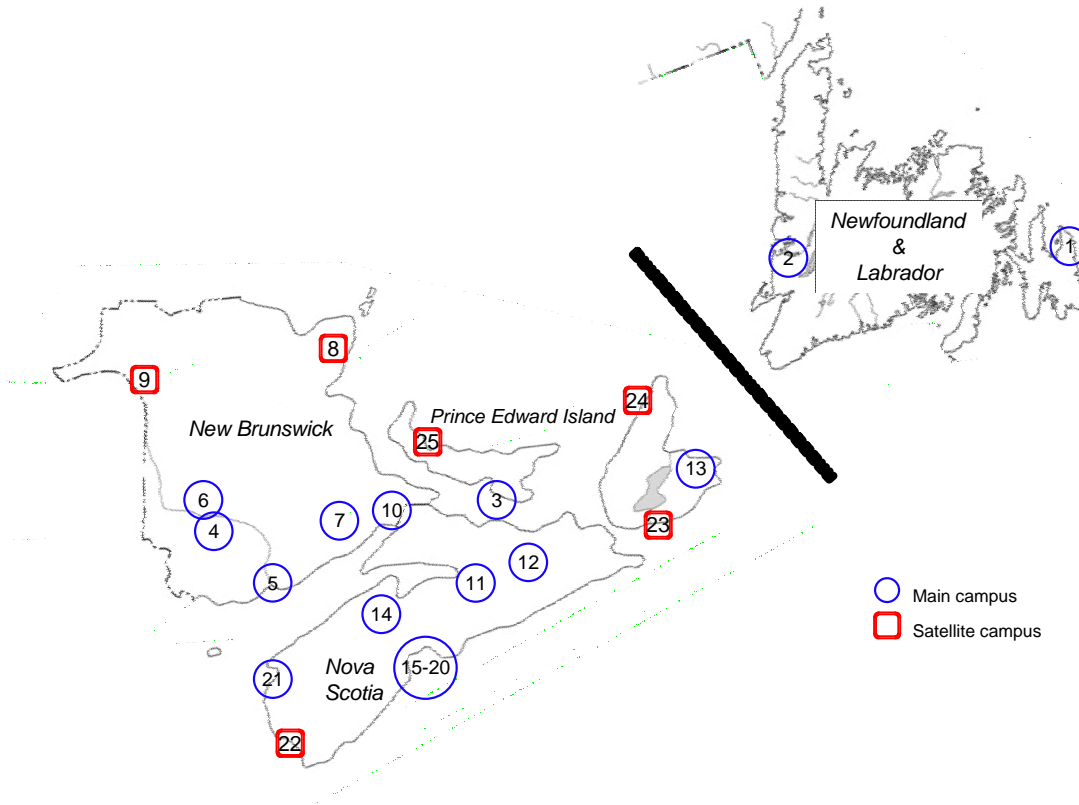
**Table 2-2**  
**Atlantic universities operating expenditures, 2004**

	(\$000s)
Dalhousie University	381,379
Memorial University of Newfoundland	344,186
University of New Brunswick	229,614
Université de Moncton	106,715
Saint Mary's University	92,521
St. Francis Xavier University	80,807
Acadia University	78,514
University of Prince Edward Island	78,346
Mount Allison University	48,996
Mount Saint Vincent University	46,167
Cape Breton University	42,469
St. Thomas University	31,043
Nova Scotia Agricultural College	30,699
Université Sainte-Anne	17,181
NSCAD University	13,300
University of King's College	11,044
Atlantic School of Theology	2,081
<b>Total</b>	<b>1,635,062</b>

Source: Atlantic universities finance offices

<sup>1</sup> The 2003 Statistics Canada Labour Force Survey reports that between 1990 and 2003, 1.4 million jobs were created for university degree holders, while 1.2 million jobs were lost for those with less than a high school diploma.

**Figure 2-1  
Atlantic universities**



*Note: Map not to scale*

**Memorial University of Newfoundland**

- 1. St. John's
- 2. Corner Brook

**University of Prince Edward Island**

- 3. Charlottetown

**University of New Brunswick**

- 4. Fredericton
- 5. Saint John

**6. St. Thomas University**

**Université de Moncton**

- 7. Moncton
- 8. Shippagan
- 9. Edmundston

**10. Mount Allison University**

**11. Nova Scotia Agricultural College**

- 12. St. Francis Xavier University
- 13. Cape Breton University
- 14. Acadia University

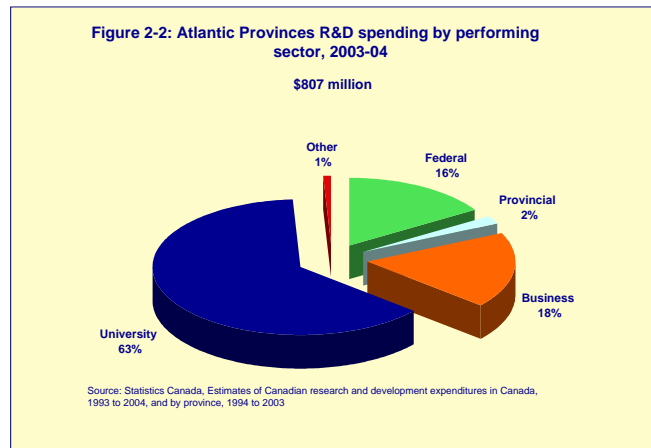
**15. Dalhousie University**

- 16. University of King's College
- 17. Saint Mary's University
- 18. Mount Saint Vincent University
- 19. NSCAD University
- 20. Atlantic School of Theology

**Université Sainte-Anne**

- 21. Pointe-de-L'Église
- 22. Tusket
- 23. Petit-de-Grat
- 24. Saint-Joseph-du-Moine
- 25. Wellington

While universities make an immediate and substantial contribution to the economy through their educative function, they also play a major role in performing the basic and applied research fundamental to innovation, growth and diversification. Nowhere in Canada is this role more significant than in the Atlantic Provinces. In 2003-04 (the latest year for which comprehensive information is available from Statistics Canada), higher education institutions in the Atlantic Provinces performed 63% of the \$807 million invested by all sectors on research in the Region (Figure 2-2).<sup>2</sup>



The private sector in the Atlantic Provinces performed 18% of research. In Canada as a whole, higher education performed 34% of research in 2003, with the private sector performing 56%.

The performance record of the private sector reflects its relative economic weakness in the Atlantic Provinces. Few local companies operate in sectors driven by strong local research and development needs, and those that do often lack the financial resources needed to mount an effective research program. Much of the research and development effort is concentrated in central Canada where many companies are headquartered. These realities underscore the continuing need to strengthen university research capability and facilitate commercialization and innovation through the creation of industry-university partnerships.

Universities form an integral part of their local communities extending well beyond the measurable economic dimension. They help to define the character of several towns and cities in the Region, contributing greatly to the quality of life. They provide cultural and athletic facilities and related amenities facilitating exposure to a diverse array of national and international figures in music, visual arts, politics, science and literature. Faculty and staff participate in community initiatives, often at the forefront of change. Students volunteer for various community-based organizations including hospitals, schools, legal aid, and service and sports clubs.

The value of the university extends also to its role in international projects. In 2004, ten of the Atlantic Provinces universities participated in some 30 projects in 15 developing countries.<sup>3</sup> Such projects attract funding from various agencies, supporting faculty and students in a broad range of initiatives. The universities benefit through administrative fees, while project participants gain valuable international experience that serves to enhance both teaching and research. A side benefit is that such projects also serve to advertise the university internationally, providing points of contact and information for potential students.

<sup>2</sup> The figure of \$510 million represents the total value of university R&D performed, including both direct and indirect expenditures. Direct expenditures are those attributable to the funded research project including salaries of the researchers, equipment and supplies. Indirect expenditures are those incurred by the institution in support of the research activity including utilities, maintenance, permanent equipment, and offices of intellectual property management.

<sup>3</sup> AUCC. Project areas include environment, health, management, oceanography, animal sciences, fisheries science, higher education, town planning, bio-engineering and nursing.



## 2. UNIVERSITY PROFILES

### *Trends and observations*

Most institutions report increased enrolment in recent years, with overall numbers up by some 8% compared with the early 1990s. The increases favour the larger metropolitan areas where university-aged populations tend to show the strongest growth. Exceptions to the growth trend were some specialized universities, those with a cap on enrolment and universities located in areas with low or declining populations.

In part to diversify their student base and in part to compensate for adverse demographics, most institutions have stepped up their recruitment of students from beyond their traditional catchment areas. These efforts are being rewarded as most institutions are reporting an increasing proportion of students from outside the province and outside Canada.

Most institutions report that most graduates stay in the Region, providing an expanding knowledge economy with the educated workforce it needs for growth and diversification. The proportion of graduates residing elsewhere in Canada ranges between 25 and 40%, while 3 to 10% are reported as residing outside the country. The high proportion of graduates residing outside the Region indicates the local economy, though expanding, is not growing fast enough to absorb all those seeking opportunities here.

Universities are relying increasingly on their own sources of revenue. Though provincial funding is increasing, federal cuts to transfers to the provinces coupled with rising demands of the health care system make it difficult for the provinces to keep up with rising costs (see Annex). Own-source revenue as a percentage of total revenue now ranges from 50-60% at several universities, up from 35-40% a decade ago (Memorial University is the one significant exception). Tuition fees form the largest share of the own-source revenues. Tuition fees in the Region are \$1,000-\$2,000 more than the Canadian average. As competition for students increases, keeping this difference from expanding will become a key consideration.

Investment in research by the federal government has increased in recent years following commitments made in its Innovation Strategy. The Atlantic universities have demonstrated their merits by securing substantial increases in funding from a variety of sources. In the more research-intensive institutions, the amount of research funding has doubled (Memorial University and University of New Brunswick), or tripled (Dalhousie University), over the past ten years. UPEI, with its emerging bioscience research specialization, generated a five-fold funding increase.

The universities are also capitalizing on opportunities to increase revenues by expanding their ancillary services including, residences, bookstores, catering services, conference facilities and room rentals, and sports facilities. Universities are becoming more effective at finding ways of offering these services to the benefit of the public as well as the institution. Ancillary revenues represent an increasing share of own-source revenues.

The universities make a substantial impact on the economic and social life of the communities where they are located. This impact is measured in terms of their share of the community population (in some cases, larger than the communities themselves), large share of employment (often the largest employer), and disproportionately high contribution to community income (average salaries tend to be about double the community average).

Profiles of the Atlantic universities follow, based on 2004-05 data.

## NEW BRUNSWICK

**The Université de Moncton** is the Region's leading French language university. A primarily undergraduate teaching university, the institution also has campuses in Shippagan and Edmundston. Along with its offerings of arts, sciences, engineering, forestry, administration, law, education, health sciences and social sciences, the university has a long history in technology-based research, with recent successes in thin films and photonics, as well as the development of the province's first wind atlas with prospects in the development of alternative energy projects. Graduates of the Université play important social, economic, and cultural roles in the Region's Acadian communities.

- ❑ educates 6,400 students, 90% of whom originate in the province
- ❑ attracts 10% of its students from outside the province, consistent with a decade ago
- ❑ employs 1,300 full- and part-time faculty and staff
- ❑ generates annual expenditures in the \$100 million range
- ❑ attracts research funding of \$6.5 million, up from \$4.8 million a decade ago
- ❑ grants degrees to over 1,100 students, about 70-80% of whom remain in the province.

**Mount Allison University** in Sackville ranks as one of Canada's leading undergraduate institutions, offering full liberal arts and science programs, including a highly regarded program in fine arts. The university prides itself on its "residential campus", a special feature attributable to its small-town location, and having a capped enrolment of about 2,500 students. Mount Allison is home to the Centre for Canadian Studies, the Aboriginal Community Development Centre, and the Rural and Small Town Programme. The school serves an important role in defining and enhancing community life in Sackville.

- ❑ educates about 2,275 students, 35% of whom originate from within the province
- ❑ attracts approximately 65% of its students from outside the province
- ❑ employs approximately 340 full- and part-time faculty and staff
- ❑ generates annual expenditures in the \$47 million range
- ❑ attracts research funding of \$3.0 million
- ❑ grants degrees to over 480 students each year, about 30% of whom remain in the province.

**The University of New Brunswick** is the province's largest university with main campuses in Fredericton and Saint John. As one of the Region's larger comprehensive universities, UNB offers a full range of undergraduate and graduate arts and science programs, with professional degrees offered in law, engineering and business administration. Forestry and environmental management are areas of specialized study. UNB is a research leader, attracting about 80% of the university research funding in the province. Among the diverse research institutes at UNB are the Institute of Biomedical Engineering, Centre for Nuclear Energy Research, Wood Science Technology Centre and the Canadian Rivers Institute.

- ❑ educates 12,725 students, 70% of whom originate in the province
- ❑ attracts 30% of its students from outside the province, up about 10% from a decade ago
- ❑ employs about 2,100 full- and part-time faculty and staff
- ❑ generates annual expenditures of about \$229 million
- ❑ attracts research funding in the \$38 million range, up from \$18 million a decade ago
- ❑ grants degrees to over 2,600 students, over 50% of whom remain in the province.

**St. Thomas University**, in Fredericton, specializes in the liberal arts, offering undergraduate degrees in arts, applied arts, social work, gerontology, journalism, and education. It is also a key cultural contributor in Fredericton in the performing arts, through Black Box Theatre at Theatre St. Thomas. St. Thomas received its highest ever Macleans Magazine University ranking in 2005, a testament to its small class sizes, faculty with PhDs, scholarships and student services. St. Thomas has been broadening its international student base in recent years, with overall enrolment doubling in the past two decades.

- ❑ educates 3,200 students, 70% of whom originate in the province
- ❑ attracts 30% of its students from outside the province, up from 25% a decade ago
- ❑ employs 262 full- and part-time faculty and staff
- ❑ generates annual expenditures in the \$30 million range
- ❑ attracts research funding of about \$480,000, up tenfold from a decade ago.
- ❑ grants degrees to 571 students, 69% of whom remain in the province.

## NEWFOUNDLAND AND LABRADOR

**Memorial University of Newfoundland**, one of Canada's leading comprehensive universities, offers a wide range of undergraduate, graduate and professional programs at its campus in St. John's, with several undergraduate degrees also offered at its Sir Wilfred Grenfell campus in Corner Brook on the west coast of Newfoundland. Memorial's Marine Institute campus in St. John's is one of only two such institutions in Canada, focusing on marine education and training, applied research, and technology development. With its broad mandate to educate, conduct research and undertake outreach activities, Memorial touches virtually every aspect of life in the province – cultural, social and economic. Research at Memorial spans all disciplines, with particular strengths in the marine sector, health sciences, social sciences, arts and culture and engineering. Through its various specialized institutes, the university provides research, education, training and industrial support to a wide range of industries in the province to improve their productivity and ability to generate revenues.

- ❑ educates over 18,000 students, about 85% of whom originate in the province
- ❑ attracts 15% of its students from outside the province, up from 5% a decade ago
- ❑ employs over 4,760 full- and part-time faculty, staff and students
- ❑ generates annual expenditures in the \$344 million range
- ❑ attracts research funding in the \$70 million range, up from \$24 million a decade ago
- ❑ grants degrees to over 2,800 students, about 70% of whom remain in the province.

## NOVA SCOTIA

**Acadia University** in Wolfville, generally ranked among the top three Canadian undergraduate universities, pioneered the use of laptop technology as an integral part of the delivery of the academic program. The school offers degrees in arts, pure and applied sciences, professional studies and theology. Estuarine research and climate change are two of the main areas of scientific research. Acadia plays an important role in the Annapolis Valley community, supporting community groups, contributing to the environment of the area, and serving as a centre for conferences, athletics and the arts.

- ❑ educates 4,100 students, 45% of whom originate in the province
- ❑ attracts 55% of its students from outside the province, up 14% from a decade ago
- ❑ employs a full- and part-time faculty and staff of 680
- ❑ generates annual expenditures in the \$78 million range
- ❑ attracts research funding in the \$3 million range, up from \$1.5 million a decade ago
- ❑ grants degrees to just over 1,000 students, about 49% of whom remain in the province.

**Atlantic School of Theology** in Halifax prepares graduate students for the ministry in the Anglican, Roman Catholic and United Church faiths. There are as many as ten other Christian traditions served annually as well as our founding church partners, Anglican, Roman Catholic and United Church of Canada. AST is affiliated with Saint Mary's University, resulting in the establishment of the Canadian Centre for Ethics in Public Affairs. AST serves up to 170 students in its degree and certificate programs, and contributes greatly to the social benefit of regional communities, both through student activities on field placement and after graduation.

- ❑ educates 148 students, 55% of whom originate in the province
- ❑ attracts 45% of its students from outside the province down slightly from a decade ago
- ❑ employs 26 full- and part-time faculty and staff
- ❑ generates annual expenditures of about \$2.2 million
- ❑ grants degrees to about 20 students annually, about 40% of whom remain in the province.

**Cape Breton University**, the province's newest university, plays a vital role in meeting the needs for post-secondary education on Cape Breton Island. It offers a unique blend of degree, diploma and certificate programs, combining liberal arts, business and sciences with engineering and technology. Responsiveness to community development forms a key element of the university's mandate, and this helps to define areas of applied research, focus and delivery of technical assistance to business and community organizations, and also the curriculum. Cape Breton University also serves as a centre for music, theatre and the visual arts.

- ❑ educates over 3,600 students, 83% of whom originate in the province
- ❑ attracts almost 20% of its students from outside the province, up from 10% just two years ago
- ❑ employs 360 full- and part-time faculty and staff
- ❑ generates annual expenditures in the \$43 million range
- ❑ attracts research funding of \$3.8 million
- ❑ grants degrees to nearly 600 students, about 78% of whom remain in the province.

**Dalhousie University** in Halifax is one of the Region's oldest and largest universities, offering undergraduate and graduate programs in all major disciplines, as well as professional programs in medicine, law, dentistry, pharmacy, engineering and architecture. Dalhousie ranks as the leading research institution in the Atlantic Provinces (based on total research funds), with concentration in such areas as health/medicine (concentrating in neuroscience, cancer, cardiovascular systems and infectious diseases), marine biosciences and materials science. Dalhousie is leading a campaign to create a Life Sciences Research Institute, a world-class collaborative facility focusing on the research interests of the university, hospitals and the National Research Council.

- ❑ educates nearly 16,000 students, about 50% of whom originate in the province
- ❑ attracts almost half of its students from outside the province
- ❑ employs 3,400 full- and part-time faculty and staff
- ❑ generates annual expenditures in the range of \$400 million
- ❑ attracts research funding of over \$100 million, up from \$35 million a decade ago
- ❑ grants degrees to over 3,300 students, about half of whom remain in the province.

**University of King's College**, located in Halifax, King's is the oldest university in the Commonwealth. Through its commitment to teaching, research and the collegial exchange of ideas, King's offers interdisciplinary undergraduate education principally in the humanities and journalism, with special emphasis on first-year learning. Rich in tradition, King's allows its students the benefit of attending a smaller institution while capitalizing on the offerings of a large university through its relationship with Dalhousie.

- ❑ educates over 1,100 students, about 40% of whom originate in the province
- ❑ attracts about 60% of its students from outside the province
- ❑ employs full- and part-time faculty and staff of about 85
- ❑ generates annual expenditures in the \$12 million range
- ❑ grants degrees to over 200 students.

**Mount Saint Vincent University** in Halifax is known for its unique programs and small class sizes. A strong liberal arts and science core is mixed with professional disciplines such as public relations, education, business, tourism hospitality management and IT, with graduate programs in women's studies, family studies and gerontology, applied human nutrition, education and child and youth study. A wide variety of distance learning programs is also offered via multi-mode delivery, including the internet.

- ❑ educates nearly 4,600 students, 75% of whom originate in the province
- ❑ attracts 25% of its students from outside the province
- ❑ employs over 600 full-and part-time faculty and staff
- ❑ generates annual expenditures exceeding \$44 million
- ❑ attracts research funding of \$1.2 million
- ❑ grants degrees to over 1,000 students, about 65% of whom remain in the province.

**The Nova Scotia Agricultural College** in Truro offers programs in applied science, with a focus on agriculture and life sciences. Research forms a core mission at NSAC, with the school ranking as one of the most research intensive institutions in Canada. NSAC is home to several research centres, each with a specialized focus including agri-business, poultry, crop development, soils, blueberries and bio-environmental engineering. NSAC is also home to AgriTECH Park, a 16-acre campus offering incubation, laboratory and industrial space and facilities.

- ❑ educates nearly 750 students, 70% of whom originate in the province
- ❑ attracts 30% of students from outside the province, consistent with a decade ago
- ❑ employs 240 full-and part-time faculty and staff
- ❑ generates annual expenditures in the \$24 million range
- ❑ attracts research funding in the \$6 million range
- ❑ grants degrees to 90 students, about 70% of whom remain in the province.

**NSCAD University** in Halifax is one of Canada's leading institutions dedicated to advancing the visual arts through education, research and production. NSCAD offers undergraduate and graduate degrees in a variety of areas including craft, design, fine arts, media arts, and historical and critical studies. The school's full-time enrolment has grown considerably since 1995, and the university has expanded to accommodate the increase, establishing a permanent downtown presence in old Halifax. Expansion to a second campus on the Halifax waterfront will take place in 2007. The new facility will provide space to accommodate large-scale and semi-industrial arts including sculpture, ceramics, foundry and metal shops. As part of a broader re-development of the waterfront area, the NSCAD facilities are expected to anchor the emergence of a new arts and culture district.

- ❑ educates almost 1,000 students, about 50% of whom originate from the province
- ❑ attracts 50% of its students from outside the province
- ❑ employs almost 200 full- and part-time faculty and staff
- ❑ generates annual expenditures in the \$13 million range
- ❑ grants degrees to over 200 students, about 50% of whom remain in the province.

**Université Sainte-Anne** is located in five Nova Scotia communities, with a campus on Prince Edward Island. The mission of the University is to respond to the needs of the francophone and French-speaking community, offering degrees in sciences, social sciences, public administration, communications and French studies. Université Sainte-Anne has seen increasing enrolment in the past twenty years, mainly in the continuing education stream.

- ❑ educates just over 500 students, 70% of whom originate in the province
- ❑ attracts 30% of its students from outside the province
- ❑ employs 125 full- and part-time faculty and staff
- ❑ generates annual expenditures in the \$18 million range
- ❑ attracts research funding of about \$2.75 million, up from \$1.8 million a decade ago
- ❑ grants degrees to 45 students, about 70% of whom remain in the province.

**St. Francis Xavier University** in Antigonish, has been ranked as the number one primarily undergraduate university by Maclean's Magazine for the past four straight years. An increasing proportion of its growing student population originates outside the Region and outside Canada. StFX is home to the Coady International Institute, renowned for its outreach education and support programs. The university has recently opened a new \$25 million science centre, offering state of the art facilities for its expanding research program. Science research at StFX is concentrated in applied petroleum sciences, high performance computing and earth sciences. StFX's commitment to community development is evident from its recent signing of an MOU with the regional health authority to collaborate on research addressing health and education issues.

- ❑ educates 5,200 students, about 60% of whom originate in the province
- ❑ attracts 40% of its students from outside the province, up 6% from a decade ago
- ❑ employs a full- and part-time faculty and staff of about 900
- ❑ generates annual expenditures in the \$80 million range
- ❑ attracts research funding of over \$5 million, up from \$1.3 million a decade ago
- ❑ grants degrees to over 1,100 students, about 65% of whom remain in the province.

**Saint Mary's University** in Halifax, the province's largest primarily undergraduate institution, offers degree programs covering a full range of arts and science disciplines. Saint Mary's is noted for its commerce program, offering highly regarded undergraduate and graduate business management degrees. Science research at Saint Mary's is expanding rapidly and includes such diverse areas as electron microscopy, computational astrophysics and high performance computing. The university plays an important role in the drive to attract and retain immigrants, hosting the Atlantic Metropolis Centre and also the Teaching English as a Second Language (TESL) Centre. Faculty supports the business community by providing affordable consulting services to local companies. Saint Mary's commitment to the community is evident with its substantial offering of part-time and continuing education opportunities.

- ❑ educates nearly 12,000 students, about 70% of whom originate from the province
- ❑ attracts 30% of its students from outside the province, up 10% from a decade ago
- ❑ employs full- and part-time faculty and staff of about 1,000
- ❑ generates annual expenditures of \$91 million
- ❑ attracts research funding in the \$3.8 million range
- ❑ grants degrees to over 1,400 students, 67% of whom remain in the province.

## **PRINCE EDWARD ISLAND**

**The University of Prince Edward Island** in Charlottetown ranks among Canada's top 10 primarily undergraduate universities. It offers a wide range of undergraduate, graduate and professional degrees, with specialization in arts, sciences, nursing, engineering, education and business. UPEI is dedicated to educating the "whole person", and prides itself on being a student-centred institution, where individuals benefit from small classes, cooperative learning and international exchanges. UPEI is home to the Atlantic Veterinary College, the Region's only veterinary school. Also located on the UPEI campus is the National Research Council Institute of Nutrisciences and Health. UPEI's strategic objective is to strengthen and further develop its bioscience cluster through innovative research and collaborative partnerships.

- ❑ educates over 4,000 students, about 81% of whom originate in the province
- ❑ attracts 19% of its students from outside the province
- ❑ employs nearly 750 full- and part-time faculty and staff
- ❑ generates annual expenditures of over \$82 million
- ❑ attracts research funding in the \$10 million range, up from \$1.5 million a decade ago
- ❑ grants degrees to over 600 students, about 65% of whom remain in the province.

### III

## IMPACT – UNIVERSITY AS INDUSTRY

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### 1. OVERVIEW

The Atlantic universities are a **\$2.0 billion** industry, based on 2004 direct expenditures by the institutions, and by students and visitors to the campuses. Expenditures to support operations and construct new facilities generate jobs and income on campus, and also create jobs and income elsewhere in the economy through the multiplier effect. The regional economy also benefits from spending by students and visitors on goods and services obtained off campus from merchants and service providers in the community.

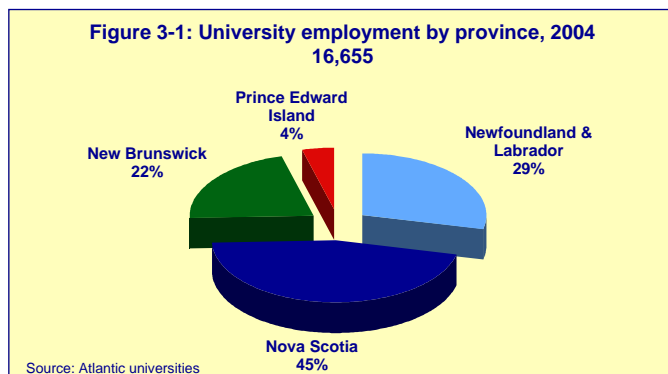
This chapter measures the immediate economic impact of these expenditures. We characterize it as the immediate impact because it captures just the spending effects, not the broader and longer-term economic impacts resulting from increased knowledge. The knowledge impacts result from the entry into the workforce of an increased supply of graduates, as well as from the practical application of research findings. These impacts are discussed in Chapter IV.

The data to support this analysis and the resulting impact estimates were obtained largely from the universities, and supplemented with estimates of student spending. Each university provided a breakdown of operating and capital expenditures according to specified categories, as well as employment figures for full- and part-time faculty and staff. They also provided detailed information on student numbers and origin, as well as the percentage living on campus in university housing.

### 2. EMPLOYMENT AND INCOME

#### *Universities generate substantial employment in their communities*

The Atlantic universities employ 16,655 faculty and staff, 14,030 full-time and approximately 2,625 part-time. In addition, 3-4,000 students not included in these figures are employed as researchers, teaching assistants and demonstrators, and also in other support roles. The universities accounted for about 1.5% of the just over one million employed in the Atlantic Provinces in 2004. The distribution of university employment by province is depicted in Figure 3-1.



The employment impact intensifies as the focus narrows to the local economies where the universities are located. The impacts for universities in selected urban areas for which complete employment data for 2004 are available are set out in Table 3-1. The figures for the universities combine full-time positions with an estimate of full-time equivalent employment for part-time positions (excluding students).

- The universities in the provincial capitals account for 2.5 to almost 5.0% of total employment in their respective economic areas.
- The universities in smaller towns dominate the town economies, accounting for 15-30% of total employment. The universities generally are the largest employers in the community.

**Table 3-1**  
**Atlantic universities relative employment impact**

University and economic area		Employment		University as % of economy
		University	Economy	
MUN	St. John's (1)	4,210	90,000	<b>4.7</b>
UPEI	Charlottetown	680	15,300	<b>4.4</b>
DAL SMU MSVU NSCAD AST UKC	Halifax Regional Municipality	5,085	200,300	<b>2.5</b>
UNB STU	Fredericton (1)	1,870	63,400	<b>3.0</b>
ACA (2)	Wolfville	585	1,980	<b>29.5</b>
StFX (2)	Antigonish	580	1,935	<b>29.9</b>
Mt. A (2)	Sackville	325	2,330	<b>13.9</b>

1. Employment data for Memorial and UNB include only faculty and staff at the main campuses.

2. Employment data for the smaller communities are for 2001, the most recent available.

Source: Statistics Canada and Atlantic universities

Another, and arguably more meaningful, way to understand the relative economic importance of the university "industry" in each economy is to compare it with employment levels in other key industries. The figures in Table 3-2 make it clear the universities are at least on a par with other leading industries, and in many cases exceed employment levels in those industries.

- Memorial University in St. John's is second only to the provincial government, exceeding the employment levels in the manufacturing, wholesale trade and financial services sectors.
- UPEI employs a number comparable to the wholesale trade and financial services sectors in Charlottetown.



- ❑ Employment at the cluster of six universities in Halifax exceeds that of the federal and provincial governments and compares favourably with wholesale trade and financial services in the commercial and financial capital of the Atlantic Provinces.
- ❑ Employment at UNB and St. Thomas exceeds by a substantial margin that in the other sectors listed, with only the provincial government employing more.

**Table 3-2**  
**Employment levels – universities vs. other sectors in university cities**

	<b>Fredericton</b>	<b>St. John's</b>	<b>Charlottetown</b>	<b>Halifax</b>
<b>Universities</b>	<b>1,870</b>	<b>4,210</b>	<b>680</b>	<b>5,085</b>
Manufacturing	1,810	4,065	1,890	10,210
Wholesale trade	1,330	3,575	835	8,580
Finance & insurance	1,270	2,685	760	8,820
Federal government	1,150	3,820	2,025	6,005
Provincial government	3,700	4,430	1,310	4,085

Source: Statistics Canada and Atlantic universities

### ***University income impact reflects high average salaries***

The Atlantic universities' total payroll (salaries and benefits) amounted to just over \$1.0 billion in 2004. Virtually 100% of this was paid to residents of the towns and cities in which the universities are located.

University faculty and staff tend to be paid above the average incomes. This reflects not only the additional investment faculty make in order to earn advanced degrees, but also the fact that universities have to compete to attract academics who combine the highest standards of teaching and research. Consequently, the university payroll creates an economic impact on local economies that exceeds substantially the relative employment impacts. This is evident by comparing the impact percentages in Tables 3-1 and 3-3.

- ❑ In all cases, the income impact is virtually double the employment impact, indicating that average incomes earned by university faculty and staff are double those in the economy generally.
- ❑ The universities generate from 4.1 to 12.5% of the earned income in the major urban centres in the Atlantic Provinces.
- ❑ In the smaller university towns, the institutions dominate the local economies accounting for a quarter to over half the income generated in the communities.

**Table 3-3  
University payroll 2004, indicative income impact**

University and economic area		Earned income (\$000s)		University as % of area economy
		University	Economy (1)	
MUN (2)	St. John's	196,625	3,135,000	<b>6.3</b>
UPEI	Charlottetown	44,650	525,400	<b>8.5</b>
DAL SMU MSVU NSCAD AST UKC	Halifax Regional Municipality	294,250	7,250,000	<b>4.1</b>
UNB (2) STU	Fredericton	115,270	925,000	<b>12.5</b>
UdeM	Moncton	62,540	1,085,000	<b>5.8</b>
ACA	Wolfville	36,680	59,400	<b>61.7</b>
StFX	Antigonish	41,435	75,800	<b>54.7</b>
Mt. A	Sackville	24,370	91,850	<b>26.5</b>

1. 2001 Census average earned income data adjusted to 2004 values to reflect inflation and economic growth.

2. University income for faculty and staff at main campus only.

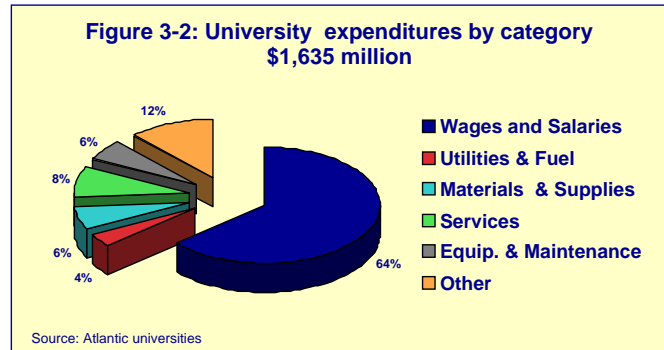
Source: Statistics Canada and Atlantic universities

Universities represent not only a generator of high-paying jobs, but also of highly stable jobs:

- ❑ Unlike many enterprises in the regional economy, universities tend to be less vulnerable to the swings in the business cycle. The Region experienced considerable job losses over the last decade as competitive forces resulted in corporate consolidations.
- ❑ University jobs are valuable as well because most are full-year and full-time. This may seem like a minor consideration to many observers who believe the vast majority of jobs in urban centres are full-year and full-time. But this is not the case. The 2001 Census data show that in the broader economy, and even in the major urban centres, only 50-55% of those reporting earned income held full-time jobs that lasted a full year.

### 3. OPERATIONS

Over and above the approximately \$1.0 billion spent on payroll in 2004, the Atlantic universities spent \$635 million on a wide range of goods and services. Though most of these purchases are made from local (Atlantic Provinces) firms, the import content of the products varies widely. A breakdown of operational expenditures by major category is provided in Figure 3-2.



- Among the goods and services with high local content are utilities, communications, engineering services, maintenance and food service.
- The goods and services with high import content tend to be specialized items, often purchased in limited quantities including laboratory equipment, computers, text books, insurance and travel services.

### 4. CONSTRUCTION

The Atlantic universities invested \$210 million in the construction of academic, residential and other facilities between 2000 and 2004. Taking the average amount, this adds just over \$40 million to the annual expenditure used in the impact analysis. These projects provide important opportunities for the Region's contractors and construction workers.

More importantly, these investments allow the universities to respond to three main drivers:

- Increasing demand: with a return to enrolment growth in the late 1990s, particularly among students from outside the Region, universities faced increased demand for expanded residential facilities and classroom space.
- The need to compete: in order to maintain a strong competitive position with universities elsewhere in Canada – both for students and faculty – the Atlantic universities needed to invest in specialized facilities in such areas as computer science, natural and physical sciences and management.
- Foster research capability: to take advantage of increased funding, the universities have invested in new facilities and equipment, thereby positioning themselves to play an even stronger role in Canada's innovation agenda. The Atlantic universities compete with institutions across Canada and the U.S. both for funds and the top-flight researchers to carry out the work. State-of-the-art facilities form a vital underpinning to success.

## 5. STUDENTS AND VISITORS

### *Student spending adds to economic impact*

Students contribute to the economic impact of universities in two ways:

- ❑ as students, they participate in the economy through their expenditures on tuition, living expenses (lodging, food, transportation, clothing) and entertainment. For students living in on-campus housing, the bulk of these expenditures flow to the universities. For students living off-campus, a substantial share flows directly to the local business community.
- ❑ as graduates, they participate directly in the economy through the application of the knowledge and abilities they have acquired. From a private perspective, this contribution is reflected in how their lives are enriched, the kinds of jobs they hold and the incomes they earn. From a public or social perspective it is reflected in how educational attainment advances economic growth and development.

It is the former source of impact we are interested in estimating in this section. The latter is taken up in Chapter IV.

Students attending the Atlantic universities spent an estimated \$980 million in 2004. The annual cost to attend one of the Region's universities ranges between \$10,000 and just under \$17,000, including all university fees, residence, as well as miscellaneous expenses to cover such items as entertainment, transportation and clothing.

- ❑ Approximately \$580 million (60%) flowed to the universities to pay for tuition, residence fees and books. Student fees form an increasing share of the university revenue stream used to cover academic and accommodation costs. This spending is captured as part of the \$1.6 billion university expenditure data used to drive the economic model used to estimate impacts.
- ❑ The remaining \$400 million (40%) flowed to the wider economy to cover costs of rental accommodation, food, transportation and entertainment (Table 3-4). Off-campus students not living at home account for the bulk of this spending, though both the on-campus and at home students also contribute through spending on transportation, entertainment and food.

### *Visitor spending*

People visiting the universities also contribute to the local economies. They visit for a variety of reasons including attending convocations and conferences, conducting business with the universities, and attending major sporting and arts events.

**Table 3-4**  
Estimate of incremental student spending, Atlantic universities, 2004

Item	Cost	Number of full-time students			Part-time	Total
		On-campus	Off-campus	At home		
		15,400	35,000	23,800	18,320	92,520
		(\$000s)				
Tuition	2,500-7,800					432,000
Books	700	10,780	24,500	16,660	1,832	53,772
Accommodation	3,500-7,500	93,795	112,000	-	-	205,795
Food (off-campus)	2,400	-	84,000	57,120	-	141,120
Other	1,600	24,640	56,000	38,080	29,312	148,032
<b>Total</b>	<b>10,000-16,725</b>	<b>129,215</b>	<b>276,500</b>	<b>111,860</b>	<b>31,144</b>	<b>980,719</b>
<b>Incremental</b>		<b>24,640</b>	<b>252,000</b>	<b>95,200</b>	<b>29,312</b>	<b>401,152</b>

Source: Atlantic universities, Statistics Canada, Consultant estimates

Estimating the scope and magnitude of the relevant spending associated with such visits presents a formidable challenge for two reasons:

- Data: none of the universities keeps track of the number and type of such visits, much less the spending associated with them, in any systematic way.
- Methodology: not all spending is incremental – some sources of spending would have occurred anyway in the regional or provincial economy (e.g., out-of-town parents visiting for convocation spend in the university community instead of their home community).

The combined effect of the data and methodological constraints makes any estimate highly conjectural. Nonetheless, some observations are possible:

- Convocation: the incremental impact at the *regional* level is estimated to fall in the range of \$1-2 million annually. This is based on three key assumptions.
  1. Only spending by visitors from outside the Region is included as incremental to the regional economy.
  2. Relatives and friends of three-quarters of the graduating class from outside the Region (20%) would attend convocation. This puts the number of visitor-parties at 2,550  $[(17,000 * .2) * .75]$ .
  3. Average local spending (i.e. excluding transportation) by each visitor party is \$500-750 over a two-day period.

If the university town forms the relevant economic context for the visitor's convocation spending, then the impact would capture spending by all visitors from outside the local community. For example, spending by a student's parents from Grand Falls attending convocation in St. John's or from Fredericton attending convocation in Halifax would be counted as part of the impact.

The sum of the incremental impacts at the *local* level is estimated to fall in the range of \$2.5-4.0 million annually. This is based on three key assumptions.

1. Only spending by visitors from outside the university town/city is included as incremental to the local economy.
  2. Relatives and friends of 80% of the graduating class from outside the local economy (60%) would attend convocation. This puts the number of visitor-parties at 8,160  $[(17,000 * .6) * .8]$ .
  3. Average local spending (i.e. excluding transportation) by each visitor party is \$300-500 over a 1-2 day period.
- Conferences: all universities host conferences from time to time. These vary widely in size and number and origin of participants. Most universities report that, wherever possible, university facilities are used for meetings, accommodation and meals. Many meetings are held during the spring and summer months when universities are not in session and facilities are available. From an impact perspective, this means the university accounts already capture the bulk of conference revenues and expenditures. The basis for estimating incremental spending (e.g., the number of participants, their origin and spending patterns) is not compiled.

- Other events: the vast majority of people attending university-sponsored sports and arts events would come from the local university community. The data needed to estimate the incremental impact of those visiting from outside the local community are not compiled systematically. Consequently, measuring the impact with any confidence is not possible.

## 6. TOTAL ECONOMIC IMPACT

### *Total direct spending exceeds \$2.0 billion*

Direct spending attributable to the Atlantic universities in 2004 amounted to an estimated **\$2.08 billion**. This includes spending by the universities on operations and capital projects (an average for the 2000-2004 period is used), as well as incremental spending by students and visitors. Spending is summarized in Table 3-5.

**Table 3-5**  
Atlantic universities, summary of direct spending, 2004  
(\$ millions)

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Total
<b>University expenditure (\$ millions)</b>					
Operating (2004)	796.2	344.2	416.4	78.4	1,635.2
Capital (2000-2004 average)	14.7	20.4	5.8	1.2	42.1
<b>Student/visitor spending (\$ millions)</b>	194.0	82.0	109.0	20.0	405.0
<b>Total</b>	<b>1,004.9</b>	<b>446.6</b>	<b>531.2</b>	<b>99.6</b>	<b>2,082.3</b>
<b>University employment</b>					
Full-time faculty & staff	5,949.0	4,421.0	2,998.0	662.0	14,030.0
Part-time faculty & staff	1,667.0	341.0	600.0	16.0	2,624.0
<b>Total</b>	<b>7,616.0</b>	<b>4,762.0</b>	<b>3,598.0</b>	<b>678.0</b>	<b>16,654.0</b>

Source: Atlantic universities

### *The economic impact extends beyond direct employment and income*

University spending generates immediate economic activity, and also so-called “spin-off” activity in the wider economy through what is commonly known as the multiplier effect. Economists divide these activities into three categories according to the type of expenditure triggering it:

- **Direct** – this captures the economic impact from university spending on goods and services including the employment of faculty and staff, the income they earn and the taxes they pay. It also captures the increase in economic activity through the purchase of the many goods and services used to operate the universities and deliver the academic and research programs.
- **Indirect** – this captures the increase in economic activity occurring elsewhere in the economy in the production of the primary and intermediate goods and services purchased as inputs by suppliers of direct goods and services. These indirect or inter-industry effects can take weeks or months to work their way through the economy.
- **Induced** – this captures the increase in economic activity in the broader economy resulting from spending by those employed in direct and indirect activities.

Several indicators are commonly used to measure economic impact: economic output, Gross Domestic Product, employment and tax revenue. These indicators, and their values for the Atlantic universities, are set out below with results summarized by province in Table 3-6.

**Table 3-6**  
**Economic impact of Atlantic universities**  
**(all values in \$ millions except employment)**

	Nova Scotia	Newfoundland and Labrador	New Brunswick	Prince Edward Island	Atlantic Provinces Total
<b>Gross value of production</b>					
Direct	920.8	378.4	496.1	81.5	1,876.7
Indirect	234.8	73.4	118.8	13.4	440.7
Induced	994.6	441.9	532.4	102.6	2,071.1
<b>Total</b>	<b>2,150.2</b>	<b>893.7</b>	<b>1,147.4</b>	<b>197.5</b>	<b>4,388.5</b>
<b>Gross domestic product</b>					
Direct	538.6	246.8	295.7	49.8	1,131.0
Indirect	88.7	25.4	43.8	5.0	162.9
Induced	340.7	165.2	172.3	41.2	717.3
<b>Total</b>	<b>968.0</b>	<b>437.5</b>	<b>511.8</b>	<b>95.9</b>	<b>2,011.2</b>
<b>Employment (FTE)</b>					
Direct	7,616	4,762	3,598	678	16,654
Indirect	2,000	475	650	70	3,195
Induced	4,185	1,570	1,435	280	7,470
<b>Total</b>	<b>13,801</b>	<b>6,807</b>	<b>5,683</b>	<b>1,028</b>	<b>27,319</b>
<b>Tax revenue</b>					
Direct	80.8	39.0	37.3	7.5	164.7
Indirect	18.5	4.8	8.9	0.9	33.1
Induced	127.5	63.9	63.5	15.0	269.1
<b>Total</b>	<b>226.7</b>	<b>107.7</b>	<b>109.7</b>	<b>23.4</b>	<b>466.8</b>

Source: Ecotec Input-Output Model

- **Economic output: \$4.39 billion** – for each dollar of university and net student spending, the multiplier effect generates over a dollar of activity elsewhere in the economy. Economic output measures the gross value of all goods and services produced at each stage of inter-industry activity building up to the final university output, knowledge.
- **Gross Domestic Product (GDP): \$2.0 billion** – GDP is the most widely used indicator of economic activity, measuring the income generated in the economy through the production of the universities’ output – knowledge in the form of graduates and research results.
- **Employment: 27,320 jobs** – in addition to the thousands employed directly by the universities, several thousand other jobs are created elsewhere in the regional economy as spending triggers activity amongst suppliers of goods and services and their suppliers, which in turn triggers spending by employees, and so on.
- **Tax revenue: \$466.8 million** – total taxes collected by the federal and provincial governments including income and corporate, and GST, HST and PST as applicable.

Among the key points to note in understanding the meaning of the impact values reported in Table 3-6:

- Some readers may be confused when both the gross value of production (GVP) and GDP are reported. These indicators measure different things. GVP represents the sum of the value of all intermediate goods or services used as inputs for a final product, as well as the value of the final product. For example, the GVP of computers would capture not just the final product price, but also the output value of the various components (e.g., hard drive, optical drive, logic board, case) used as inputs in its assembly, as well as the output value of the more basic materials (e.g., plastic, metal, wire) used as inputs for the components. The double counting is deliberate to provide an indication of the scope and level of activity taking place among industries.
- GDP is distinguished from GVP because it captures only the value of *final* output, as reflected in the direct expenditures made to produce the good or service in question (in this case knowledge). Rather than adding the gross value of output, only value added (or income) is carried from one stage of the production process to the next in arriving at the net contribution to the economy. For this reason, GDP is a substantially lower value than GVP.
- Compared with the direct and induced impacts, the indirect impact is relatively low. This is because goods and services account for a relatively small part of direct spending (40%) by universities. It also reflects the level of import content of many of the goods purchased in the Atlantic Provinces. The larger impact occurs at the induced stage as incomes earned in direct and indirect activity spin their way through the economy.



## IV

# CREATING WEALTH THROUGH KNOWLEDGE

## 1. OVERVIEW

Public and private investment in post-secondary education occurs for sound economic and social reasons, with benefits accruing to individuals and to society more generally. The most obvious benefits are:

- ❑ **Access to opportunity** – individuals invest in post-secondary education in two ways: through the tuition they pay to attend university, and also through the earnings they forego by not working while in school. These investments are made in expectation of gaining access to better opportunities and earning higher incomes than they otherwise would have earned had they joined the workforce following completion of high school or with even less education.
- ❑ **Economic growth** – this measures the impact of education in terms of its effects on productivity. The theory states that a more educated workforce not only is likely to be more innovative in the sense that it possesses greater capacity to research and develop technologies and processes resulting in increased productivity, but it also is likely to have greater capacity to receive and apply new technologies and approaches.
- ❑ **Human welfare** – education not only benefits the individual by enhancing personal development, it also benefits society more generally by improving public health, safety, the environment, and such imponderables as political and community participation. These wider benefits arguably feed back into economic performance, thereby reinforcing the case for greater investment in education.

Canada, through its federal and provincial governments, its corporations and individuals invested \$27.7 billion in post-secondary education in 2004-05, or about 2.1% of the nation's GDP. This represents about \$865 for every person in Canada (Table 4-1).

In Atlantic Canada, the \$1.9 billion investment in post-secondary education in 2004-05 represents about 2.5% of regional GDP. This amounts to just under \$800 per capita. That we lag the national average in per capita spending occurs despite generally higher tuition fees (the private investment component). But higher fees are not high enough to offset lower levels of public funding. With successive cuts in federal transfers and growing demands of the health care system, the Atlantic Provinces lack the fiscal capacity to fund post-secondary education at a level comparable with the national average (Table 4-1). And despite lower per capita spending, it nonetheless accounts for a higher proportion of GDP than the national average. This reflects our lower average GDP in the Region and points clearly to the need to accelerate productivity and growth.

**Table 4-1 Investment in post-secondary education, Atlantic Provinces and Canada, 2004**

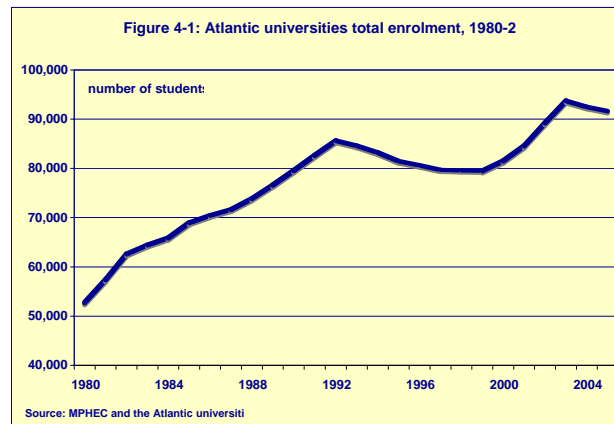
	Atlantic Provinces		Canada	
	\$ millions	%	\$ millions	%
<b>Own source</b>				
Tuition	480.8	25.7	5,580.9	20.2
Other	438.7	23.5	6,697.2	24.2
sub-total	919.5	49.2	12,278.1	44.4
<b>Public</b>				
Provincial	783.0	41.9	12,894.1	46.6
Other	166.6	8.9	2,487.0	9.0
sub-total	949.6	50.8	15,381.1	55.6
<b>Total</b>	<b>1,869.1</b>	<b>100.0</b>	<b>27,659.2</b>	<b>100.0</b>
Population (000s)	2,345		31,974	
Spending per capita (\$)	797		865	
GDP (\$ millions)	76,311		1,290,185	
Spending as % of GDP	2.45		2.14	

Source: Statistics Canada, CANSIM tables 385-007, 051-0001, 380-0017, 384-0002.

## 2. TRENDS – STUDENTS AND ALUMNI

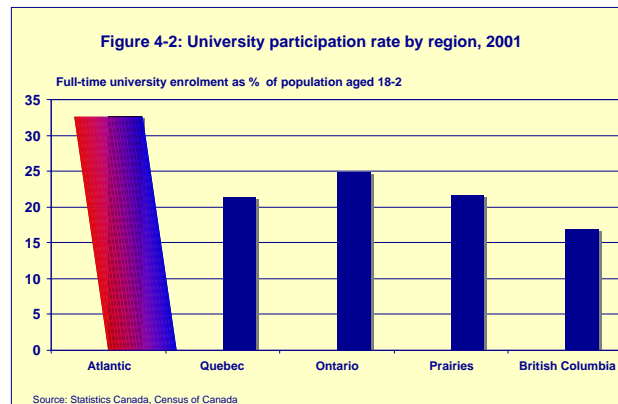
### *Increased numbers – demographics and participation rate*

Total enrolment (undergraduate and graduate, full- and part-time) at the Atlantic universities exceeded 91,600 in 2005. While this reflects a 74% increase overall from the 1980 figure, the growth path over the 25 years shows four distinct phases: fairly steady growth between 1980 and 1992, a period of decline from 1993 to 1999, a return to growth between 2000 and 2003, followed by two years of decline to 2005 (Figure 4-1).



Enrolment in universities is influenced mainly by two factors: demography and the participation rate. Demography indicates the number of persons of university age (usually defined as the 18-24 year age group) in the population. The participation rate tells us the percentage of that group actually enrolled in university.<sup>4</sup> Various social and economic factors influence the participation rate.

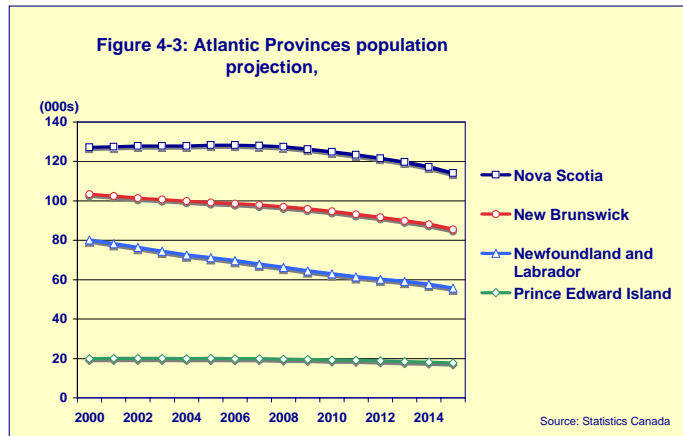
Most students enrolling in one of the Atlantic universities originate in the home province of the institution they attend. The percentage ranges from a low of 65% in Nova Scotia to a high of 80% in PEI. Over much of the past 25 years, the Atlantic Provinces have experienced a decline in the population aged 18-24. Enrolment increased during the 1980s because the rising participation rate outweighed this decline. The Region's universities also benefited from modest increases in enrolment from other provinces. The participation rate stabilized during the 1990s and, when coupled with the continuing drop in university-aged population (this had become a national trend by this time), enrolments fell. The recovery in the late 1990s is attributable to the combined effects of a return to increasing participation rates (Figure 4-2) and favourable demographics, at least at the national level.<sup>5</sup>



<sup>4</sup> Two definitions of the participation rate may be used: 1) total full-time enrolment in provincial institutions expressed as a percentage of the population aged 18-24, and 2) the ratio of the number of provincial residents enrolled in universities anywhere in Canada against the provincial population aged 18-24. Definition 1 is the more meaningful one for this study since it reflects participation from an institutional perspective, irrespective of province (or place) of origin. But in light of the high proportion of students of provincial origin at each of the Atlantic universities, provincial participation rates narrowly defined are a matter of critical importance.

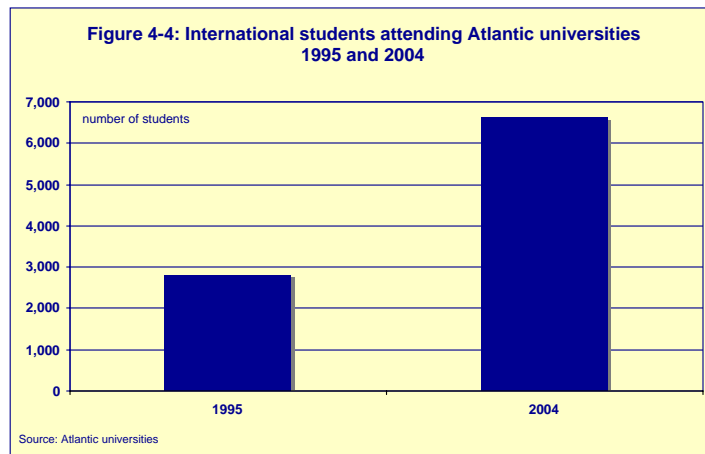
<sup>5</sup> For a full discussion of enrolment trends in the Maritimes, see, Maritime Provinces Higher Education Commission, *Profile of Maritime University Students: Enrolment, Participation and Degree Completion*, in *Trends in Maritime Higher Education*, Vol. 2 No. 1, October 2003.

Looking ahead, the Atlantic universities face an enrolment challenge. The participation rate already leads that of other Canadian regions by five-to-nine percentage points (Figure 4-2) and it is not clear how much room there is for growth in the long run. Demographic trends are not favourable as the university age population is expected to decline over the next several years in the Atlantic Provinces (Figure 4-3). Moreover, tuition fees at most Atlantic universities are already among the highest in Canada. It is to the credit of the regional institutions that in the face of the tuition fee differential, they have attracted increasing numbers of students from other parts of Canada and internationally. If this growth is to continue, tuition fees will have to remain competitive.



### Greater diversity

The Atlantic universities have become increasingly diversified with respect to student origin (Figure 4-4). Over the past 10 to 15 years, the rate of growth in the number of students from other parts of Canada and other countries has outstripped the growth rate from within the Region at most institutions. From a narrow economic impact perspective, this is a positive development because it results in an increase in the export dollars earned by the universities. For the 5-6,000 international students in the Region in 2004, this adds up to over \$100 million in export earnings per year over a four-year degree.

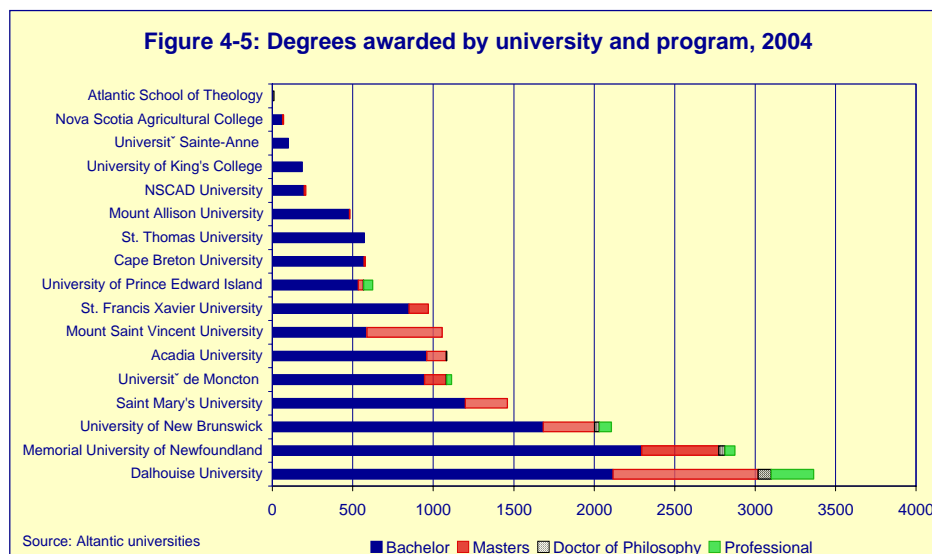


The Region is also enriched through the contribution international students make to the Region's cultural diversity. The larger universities report they attract students from 100 or more countries. This contribution cuts across many aspects of life, both inside and outside the universities, deepening our understanding of other societies, offering fresh perspectives on international affairs, and broadening our exposure to other cultural forms including music and the arts.

The universities have the potential to play a substantial role in supporting, and even shaping, emerging provincial immigration policies.<sup>6</sup> In the past few years it has become clear to provincial governments that slow population growth and adverse demographic trends in the Region are inconsistent with strong economic growth and diversification. All the Atlantic Provinces have seized on immigration as a potential solution, though success in this area is not without its challenges. Universities are already positioned as one of the leading factors why some of the best and brightest – students as well as faculty – are attracted to the Atlantic Provinces.

## Graduates

The Atlantic universities award about 17,000 degrees annually (Figure 4-5). This is up from about 10,000 degrees awarded in 1980, an increase of about 70%. In 2004, just under 13,500 undergraduate degrees were awarded, mainly in the faculties of arts and science, with a substantial number also awarded in commerce/management, computer science, nursing and education. Some 3,500 graduate and professional degrees were also awarded in 2004, covering a full range of disciplines including arts and science, engineering, business, medicine, law, dentistry and veterinary medicine.

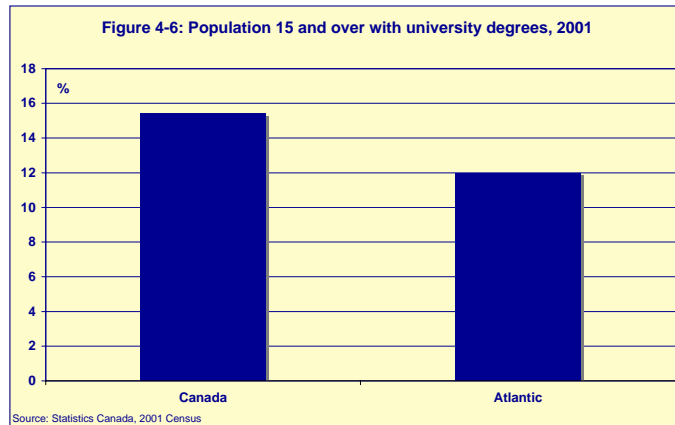


Data from the 2001 Census indicate that about 12% of the Atlantic Provinces population over 15 years of age – 221,410 people – holds at least a first university degree (bachelor or professional). Judging from alumni data provided by the Atlantic universities, we estimate that *upwards of 85%* of these degree-holders would have been graduates of one or other of the Region's 17 universities. Since 2001, the number of degree-holders entering the workforce in the Region has probably climbed by 40-50,000.

The significance of this, of course, is that the Atlantic universities play such a substantial role in meeting the economy's needs for university-educated human resources. Graduates occupy leadership and support positions throughout industry, government, medicine, law, education and the arts.

<sup>6</sup> Seizing on this role, the Atlantic Metropolis Centre (AMC), a collaborative effort of universities, government and the NGO community, was created in 2004 to provide research and policy support with respect to key immigration issues.

Nonetheless, the Atlantic Provinces lag the rest of Canada in our ability to generate enough jobs to employ all the graduates. Despite consistently higher university participation rates, the proportion of the population in the Atlantic Provinces with degrees remains below the Canadian average by a few percentage points (12% vs. 15%). The Region continues to experience a “brain drain” to more industrialized and faster growth areas of Canada that are able to offer a wider array of challenges to recent graduates.<sup>7</sup> The cumulative effect of this is evident from Figure 4-6.



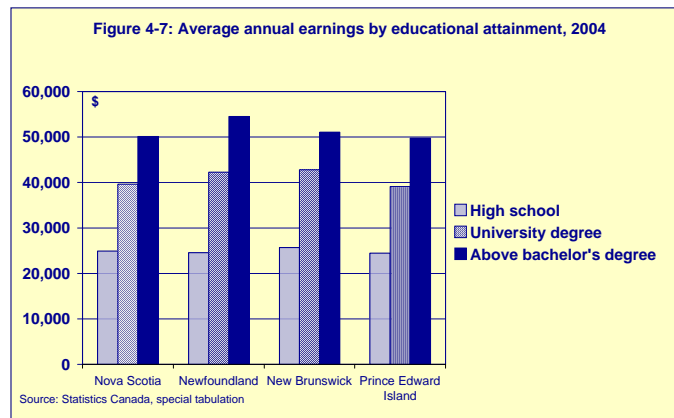
### 3. VALUING POST-SECONDARY EDUCATION

#### *Perspective of the individual – income*

Individuals make the investment to attend university for various reasons including love of learning, self-improvement, securing interesting work, and also in the expectation of earning a higher income. While any measure of value arising from the first three reasons would be highly subjective and therefore difficult to quantify, the latter is readily quantifiable using published earnings statistics.

Across the Atlantic Provinces, the data indicate that earnings rise with education level.

Individuals with a first university degree earn an average of 60-70% more per year than individuals with a high school diploma (Figure 4-7). With a graduate degree beyond the bachelor’s level, the earnings premium level rises to over 100%. Holders of the graduate degree earn about 25% more than those with a bachelor’s degree. Though Figure 4-7 shows overall averages, earnings typically rise with years of service, with the earnings curve for those with high school or less flattening relatively quickly.



<sup>7</sup> A 2003 report by the Maritime Provinces Higher Education Commission, *Survey of 1999 Maritime Graduates in 2001*, concludes that the Maritimes experienced a net loss of 15% of graduates, a result not dissimilar from the net loss from the 1996 graduating class.

These earnings differentials make the investment in a university education worthwhile from a financial perspective. In assessing the rate of return to education from the student's perspective, it is important to bear in mind that the investment in a university education embodies two sources of cost: the direct cost of tuition, books, and living expenses, as well as the opportunity cost reflected in the foregone earnings (the income that would have been earned had the individual starting working after completing high school). Using the relative income data in Figure 3-7, we estimate:

- ❑ the investment in a bachelor's degree would result in an *additional \$450,000 in lifetime earnings*.
- ❑ the investment in the advanced degree would result in an *additional \$750,000 in lifetime earnings*.

### **Perspective of the economy – growth**

Post-secondary education plays a major role in the achievement of high levels of economic growth and development, and to the realization of the broader quality of life benefits associated with it. Recognizing this, Canada's federal and provincial governments invest billions of dollars annually to support post-secondary institutions in Canada. That Canada perennially finds itself at or near the top of the United Nations Human Development Index would be attributable at least in part to this support.<sup>8</sup>

Despite its obvious connection, the relative contribution of higher education to economic growth and development defies easy quantification. The focus of research in the field is on the contribution of education to productivity growth. The weight of evidence points to significant impact on total factor productivity.<sup>9</sup> Among the conclusions flowing from a review of the literature focusing mainly on OECD countries:<sup>10</sup>

- ❑ the growth of human capital (educational attainment) in G7 countries typically accounts for as much as 20% of the growth in total output.
- ❑ differences in educational attainment account for most of the differences in output (GDP per capita) variation across OECD members.
- ❑ investment in OECD countries is positively correlated with the extent of secondary schooling in the labour force.
- ❑ results point to a positive and significant impact of human capital accumulation to output per capita growth; one additional year of education raises output per capita by 6%.

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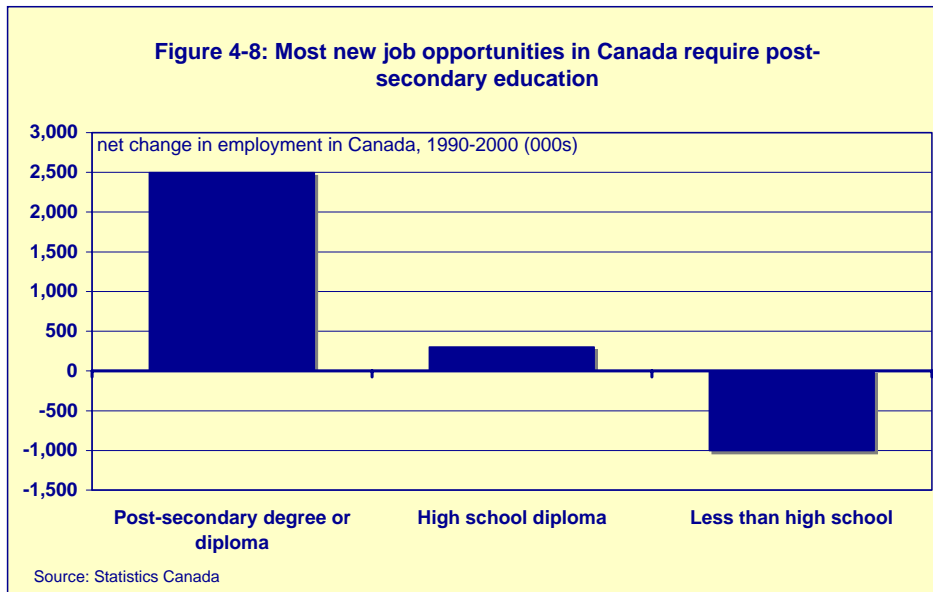
<sup>8</sup> United Nations, *Human Development Report, 2005*. Relying on such criteria as real income, life expectancy and educational attainment, Canada was ranked fifth in the 2005 Report, ahead of Sweden, Switzerland, the United States, Japan and the United Kingdom.

<sup>9</sup> Total factor productivity refers to the change in output resulting from a change in how labour and capital are combined in the productive process rather than from an increase in the quantity of either factor. An increase in output from such an adjustment, say, in the quality of labour, may be thought of as "working smarter".

<sup>10</sup> An excellent review of the literature on the subject may be found in, Temple, J., 2001. *Growth effects of education and social capital in the OECD countries*, OECD Economic Studies.

- the level of education plays a role in technological catch-up; productivity growth is more rapid where countries have a higher level of average schooling.
- the balance of recent evidence points to productivity effects of education at least as large as those identified by labour economists (as reflected in income differences due to educational attainment).

A practical and accessible illustration of the significance of higher levels of knowledge lies in the educational requirements in growth areas of the economy. Simply put, most jobs created today in Canada require a post-secondary degree or diploma (Figure 4-8). Few jobs in the new economy can be filled with just a high school diploma. Jobs requiring less than a high school diploma are rapidly disappearing.



# V

## RESEARCH – INNOVATION & GROWTH

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### 1. OVERVIEW

Universities in the Atlantic Provinces occupy the central role in conducting research and development (R&D) in the Region. In 2003, they spent \$510 million to cover direct and indirect R&D costs. This represents 63% of R&D performed in the Region. By comparison, universities at a national level account for just over 30% of the R&D performed, with the private sector playing the central role.

While securing funds to conduct R&D remains a major challenge for universities in Atlantic Canada, this challenge has become at least somewhat less daunting with the expansion in federal funding and the emergence of specialized funds to assist with indirect costs. Forging partnerships with a private sector whose structural and financial capacity to conduct R&D is weak represents *the* greatest challenge to securing innovation results. Leveraging R&D funds through collaboration among institutions in the Region and elsewhere in Canada shows promise, but it is too early to predict what long-term impact this may have on economic development.

The real economic significance of the resources devoted to R&D lies not in the spending, but in the *results*. Results are measured in terms of contribution to innovation, with innovation a key determinant of economic and social growth and development.<sup>11</sup> So, the key questions become whether in Atlantic Canada we are on a path that is likely to lead to improved innovation and stronger growth and development results? If not, what can be done to extract more from the R&D funds invested?

The university mandate includes teaching, research and community. With the increasing funding for R&D in the higher education sector and the heightened expectation for results by funding agencies and the public, contributing to innovation has effectively become a fourth corner of the traditional mandate.<sup>12</sup>

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<sup>11</sup> In its report, *Performance and Potential 2005-06, The World and Canada, Trends Reshaping Our Future*, the Conference Board of Canada notes that innovation is critical to building knowledge and fuelling breakthroughs, but that Canada ranks among the lower-performing industrial countries in terms of R&D expenditures and is losing ground to its OECD trading partners who are not only investing more but are better at extracting value from their R&D investments.

<sup>12</sup> The conventional mode for university researchers to engage in technology transfer is through the publication of their findings in academic journals. The notion that a property right might attach to the findings is a relatively recent idea in Canada. The practice of systematically protecting intellectual property on U.S. university campuses has a longer history, with the issue emerging in the immediate post-war years as federal research funding increased sharply. Government recognized the need for uniform guidelines towards inventions and patents in order to serve the public interest in advancing economic growth through technology transfer. Because of uncertainty over ownership of IP, and stringent conditions on exploitation when government retained IP ownership, too few inventions were moving to the patent stage and too few patents were advancing to commercial development. This all changed with passage of the *Bayh-Dole Act* in 1980, placing the stewardship of the results of basic research in the hands of universities. See Bremer, H., *The First Two Decades of the Bayh-Dole Act as Public Policy*, 2001, Presentation to the National Association of State Universities and Land Grant Colleges.



Universities contribute to innovation and economic wealth primarily by producing highly qualified people who are instrumental to the success of technology or knowledge transfer. Universities also contribute to innovation by building partnerships for commercializing R&D discoveries and inventions.

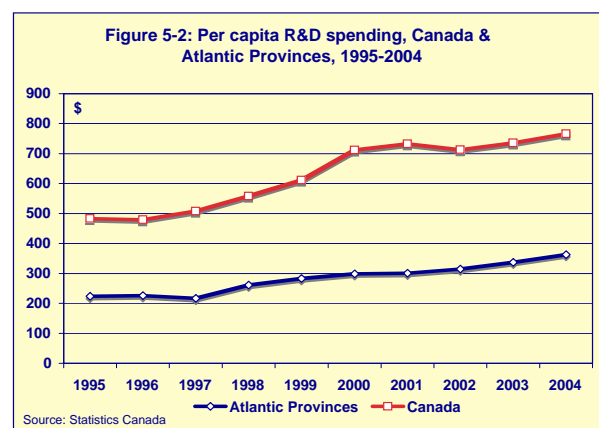
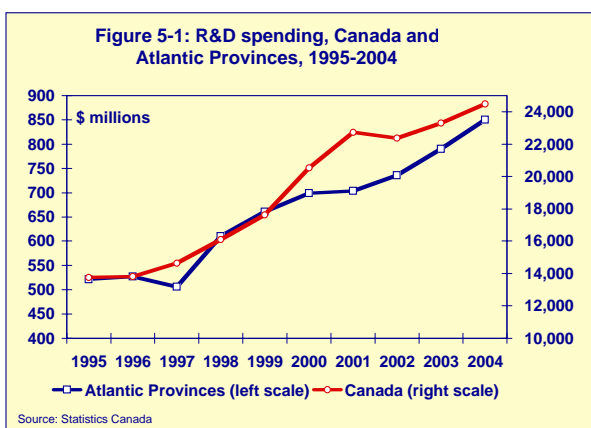
The challenge of building partnerships exists to varying degrees at all universities in Canada. It is especially acute in the Atlantic Provinces where few firms have the capacity and resources to conduct R&D, and where the climate for commercialization is weak. But ways to address this challenge, for example, by universities assuming the major part of the initiative to develop and support such partnerships, seems an essential ingredient. This involves education to improve private sector receptor capacity, as well as harnessing the university R&D asset in partnership with evolving firms to provide new product opportunities while strengthening innovative capacity. Continuing education has a major role to play in the process.

Several initiatives introduced over the past five years or so are helping to advance the innovation agenda in the Region. Research partnerships between universities and the private sector are developing, albeit slowly. Greater collaboration among universities is occurring including the creation of research networks as well as an organization to coordinate and support commercialization initiatives among universities.<sup>13</sup> While another five-to-ten years of increased funding and sustained effort are likely to be needed before a marked improvement in commercialization may be seen, it seems clear from experience elsewhere that unless private firms are engaged in the process early on, results commensurate with the level of investment will remain elusive.

## 2. RESEARCH FUNDING HAS GROWN SUBSTANTIALLY

### Funding trends

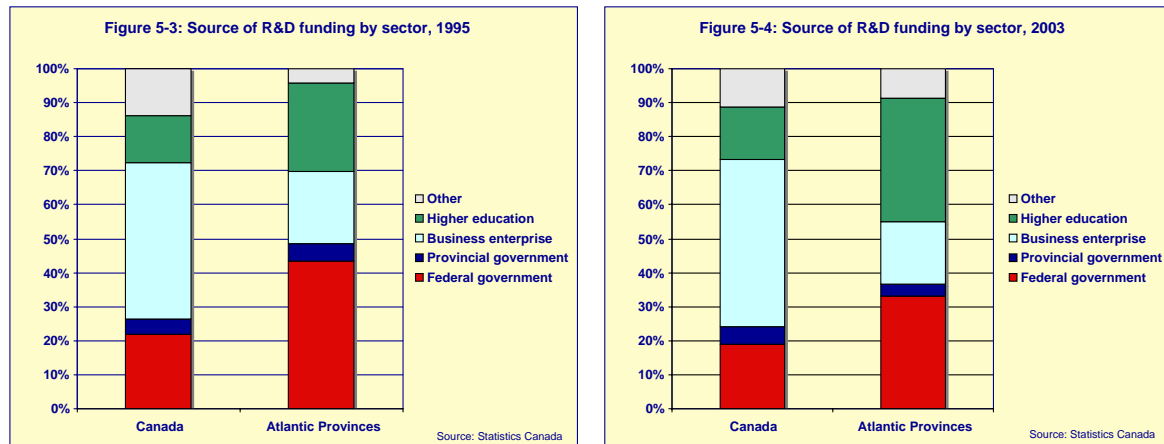
Investment in R&D in Canada almost doubled over the past decade, rising from just over \$13.7 billion in 1995 to \$24.5 billion in 2004 (Figure 5-1). Over this same period, R&D investment in the Atlantic Provinces increased by almost 65%, rising from \$520 million to an estimated \$850 million. While this growth in Atlantic Provinces R&D is impressive, spending on a per capita basis stands at just less than half the national average, a proportion that has not changed appreciably over the decade (Figure 5-2).<sup>14</sup>



<sup>13</sup> This organization, “Springboard”, representing 14 universities engaged in research is described later in this chapter.

## Funding sources

While the growth of R&D spending shows a similar pattern at the national and regional levels, the distribution of spending by source of funds differs markedly (Figures 5-3 and 5-4).



Three main differences stand out:

- ❑ At the national level, the business sector is the dominant source of funds (about 50%), a position that has increased slightly over the years. At the regional level, the business sector accounts for a relatively small share of R&D funds, with funding actually declining over the years (from 21% in 1995 to just 18% in 2003).
- ❑ In the Atlantic Provinces, higher education and the federal government dominate the funding of R&D at 36% and 33% respectively, compared with 15% and 19% at the national level. Provincial governments were the source of about 3% of R&D funding in 2003, down from 5% in 1995.
- ❑ In the Atlantic Provinces, higher education takes on greater responsibility for funding research than universities elsewhere in Canada, a responsibility that has grown over time as the federal government's *relative* contribution has declined.<sup>15</sup>

Factoring out expenditures by higher education itself, it is clear that the federal government is the main source of growth of external funding for university R&D.

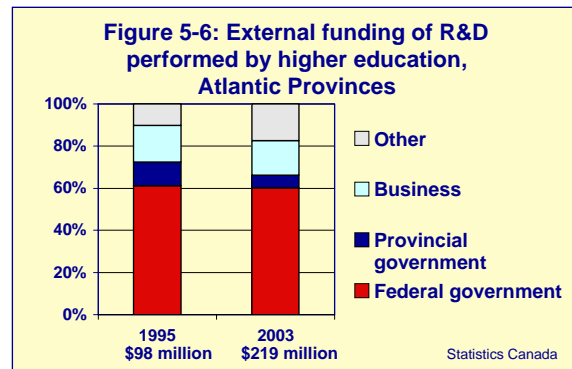
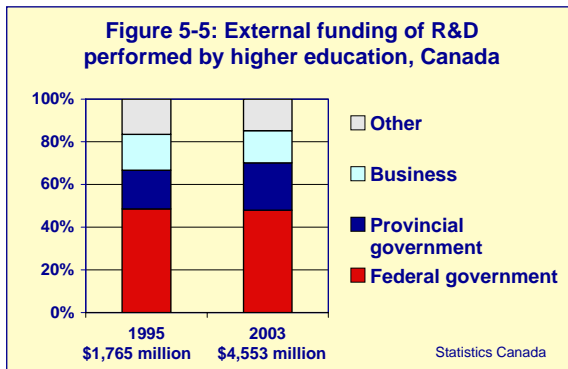
- ❑ External funding more than doubled at the national level (rising from \$1.76 billion in 1995 to \$4.55 billion in 2003), with the federal contribution holding more or less steady at just under 50%. By contrast, the federal government accounted for about 60% of

<sup>14</sup> Although the Atlantic Provinces lag Canada in overall R&D spending per capita, spending per capita by the higher education sector is equal (at just over \$100 in 2002). The substantial per capita spending gap shown in Figure 5-2 is attributable entirely to the limited R&D performance by the business sector in the Atlantic Provinces.

<sup>15</sup> Although in absolute terms federal R&D funding in Atlantic Canada has increased by almost half since 1995, funding by the Atlantic universities has more than doubled. University funding captures any direct expenditures made from endowment or other non-tied funds, but funding by universities captures mainly the indirect costs of conducting research (administrative support, permanent equipment, utilities, physical plant operation and maintenance). These costs rise more or less in proportion to the level of R&D performed. As the university sector's role in performing R&D has increased, it follows that its role as a funder of R&D has also expanded because of these indirect costs.

external funding in the Atlantic Provinces, as funding from all sources increased from \$98 to \$219 million.

- The major difference in funding lies with the provinces. At the national level, the provincial contribution increased in absolute and relative terms, while in the Atlantic Provinces, provincial funding remained steady in absolute terms but declined relative to the growth in funding from business and other sources.



Much of the increase in funding over the past five years comes largely as a result of the federal government's 2001 Innovation Strategy.<sup>16</sup> Canada had fallen well behind other OECD member states in the share of GDP devoted to research, with consequences for our capacity to innovate and increase productivity.<sup>17</sup> The Innovation Strategy intends to place Canada among the leading research nations by 2010. To strengthen Canada's innovation capacity, the Strategy sets out three main thrusts:

- Increase commercialization
- Invest in public and private R&D
- Build partnerships among innovation organizations

Increased federal funding forms a key underpinning to each of these thrusts, and since 2001, almost \$8 billion has been invested. For universities, funding flows from several sources, each designed to focus on a particular discipline or to strengthen a particular area of weakness in the capacity to conduct research and commercialize results.

The federal and provincial R&D funding frameworks for universities are described in some detail in other reports,<sup>18</sup> so only a brief overview is offered here.

- **Granting Councils:** funds flow to Canadian universities from the three Councils (percentages indicate approximate share of total Council funding in 2003)
  - Canadian Institutes of Health Research (CIHR) – 45%
  - Natural Sciences and Engineering Research Council (NSERC) – 45%
  - Social Sciences and Humanities Research Council (SSHRC) – 10%

<sup>16</sup> Government of Canada, *Achieving Excellence: Investing in People, Knowledge and Opportunity*, Ottawa, 2001.

<sup>17</sup> In 2001, Canada ranked 13<sup>th</sup> among 16 OECD nations in the percentage of GDP devoted to research expenditures. OECD Main Science and Technology Indicators, 2003.

<sup>18</sup> AUCC, *Momentum, the 2005 report on university research and knowledge transfer*; Maritime Provinces Higher Education Commission (MPHEC), *R&D Funding in Atlantic Universities*, 2005.

Between 1997-98 and 2002-03, total funding to Canadian universities from the Councils grew from just over \$500 million to about \$1 billion. The Atlantic universities received about 6%, or \$175 million, over the period.

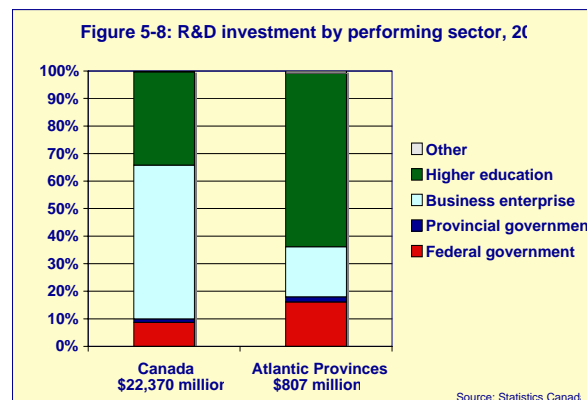
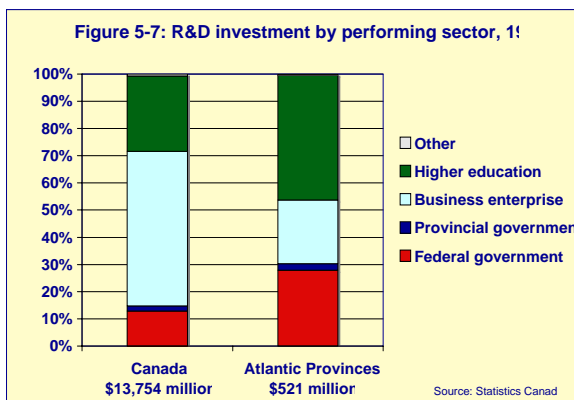
Funding from the Councils supports specific research projects, as well as four complementary initiatives:

- Network of Centres of Excellence (building networks among researchers from various fields and sectors)
  - Canada Research Chairs Program (funding to support institutions in recruiting leading researchers to increase capacity and attract sponsored research)
  - Indirect Costs Program (funding for the indirect costs of increasing research capacity, a major constraint for smaller institutions)
  - Canada Graduate Scholarships (funds to renew faculty at Canadian universities).
- **Special funds:** these provide support for specific projects and infrastructure
- Canada Health Services Research Foundation (funds management on policy research in health services and nursing)
  - Canada Foundation for Innovation (matching funds to renew the research infrastructure of Canadian institutions)
  - Atlantic Innovation Fund (funding to strengthen Atlantic Canada’s development of knowledge-based industry, ideally through collaborative efforts)
- **Provincial funding:** each province has created specific funding mechanisms to support university R&D (mainly to provide matching funds to gain access to federal programs, and also discipline specific funds and programs to support collaboration).
- New Brunswick – University Infrastructure Trust Fund, Research Development Fund, Research Innovation Fund, Programs in Partnerships
  - Nova Scotia – Nova Scotia Research & Innovation Trust Fund, Nova Scotia Health Research Foundation
  - Newfoundland and Labrador – Industrial Research and Innovation Fund, Newfoundland and Labrador Centre for Applied Health Research
  - Prince Edward Island – Research and Development Initiative, Prince Edward Island Health Research Program.

### 3. UNIVERSITIES LEAD R&D IN ATLANTIC CANADA

#### *University role as R&D performer has expanded over time*

In 2003, the Atlantic universities performed R&D with a total cost (direct and indirect) of **\$510 million**. This represents **63%** of the R&D performed in Atlantic Canada, a proportion that has increased by one-third since the late 1990s (Figures 5-7 and 5-8).



The relative importance of universities to regional R&D activity is clear from the comparative data in Figures 5-7 and 5-8. The regional and national data for 1995 and 2003 reveal the following key points:

- ❑ R&D performed by the university sector increased from just over 45% to 63% of the total conducted in the Atlantic Region between 1995 and 2003. This is almost *double* the share at the national level, where R&D conducted by universities increased slightly, rising from just under to just over 30%.
- ❑ The share conducted by the private sector in Atlantic Canada dropped from 23% to about 18%, while R&D performed by governments dropped from 30% to 17%.
- ❑ The relative strength of the business sector at the national level is obvious. It remained stable at 55% of R&D activity in 1995 and 2003. R&D performed at the national level by governments dropped from 15% to about 10%.

At a provincial level, Nova Scotia leads in R&D performed, accounting for about 50% of the regional total (Table 5-1). New Brunswick and Newfoundland and Labrador follow at 25 and 20%, respectively, with Prince Edward Island performing about 5% of the regional total. The distribution of R&D performance by sector is comparable across provinces, with universities accounting for more than half in each case. Business occupies a distant second in Nova Scotia and New Brunswick, and ranks third behind the federal government in Newfoundland and Labrador and Prince Edward Island.

	Nova Scotia	New Brunswick	Prince Edward Island	Newfoundland and Labrador	Total	
	\$ millions					%
Federal	65	30	12	23	130	16
Provincial	6	4	0	5	15	2
Business	78	43	7	19	147	18
University	259	113	23	114	510	63
Other	2	4	0	0	6	1
	410	194	42	161	807	100

Source: Statistics Canada, Cansim, Table 358-0001 Totals may not add due to rounding

### ***Funded research focuses mainly on natural sciences***

Research performed at universities is primarily basic in nature (rather than applied), driven mainly by the curiosity of the researcher, conducted or supervised by faculty members working individually or in teams (often in collaboration with researchers at other universities or in industry and government), covers hundreds of disciplines and thousands of topics, and may or may not be sponsored (through grants or contracts). Beyond these observations, few generalities are possible because, other than for funded research, data capturing the full array of research activities are not systematically compiled.

Research funded by the three federal granting councils (NSERC, CIHR and SSHRC) is weighted heavily towards the natural sciences including health. This is presumably because these areas offer the greatest potential for commercialization (in keeping with the Innovation Strategy), and also because conducting research in these areas imposes relatively high costs.

The Atlantic universities have gained ground over the past five years in absolute terms, as well as relative to universities elsewhere in Canada.

- NSERC funding has almost doubled, with the share of the national total rising from 7.2% to 7.9%.
- CIHR funding has almost tripled, though the share of the national total remains at about 3% (this reflects the fact that most of the CIHR funding goes to medical schools and the Atlantic Provinces have just two).
- SSHRC funding has more than tripled, and the regional share has increased from 4.5% to 6.8%.

**Table 5-2**  
**Research revenues received by Atlantic universities**  
**by granting council and province, 1997 and 2002, (\$000s)**

	NSERC		CIHR		SSHRC	
	1997	2002	1997	2002	1997	2002
Nova Scotia	10,507	19,404	4,490	9,969	1,106	4,474
Newfoundland and Labrador	5,054	10,167	1,011	4,210	278	1,237
New Brunswick	4,828	7,569	9	695	606	1,425
Prince Edward Island	399	1,183	48	536	73	299
Total	20,788	38,323	5,558	15,410	2,063	7,435
Canada total	286,760	482,289	183,903	479,589	45,772	109,615
Atlantic % of Canada total	7.2%	7.9%	3.0%	3.2%	4.5%	6.8%

Source: Canadian Association of University Business Officers (CAUBO) as reported in MPHEC, *R&D Funding in Atlantic Universities, 2005*.

## **Some emerging challenges for universities**

Universities in Atlantic Canada lead the R&D effort in part because they have the commitment and capacity (researchers and infrastructure) to do so, but in part by default – because the business sector makes such limited investments in R&D compared with the rest of Canada. This is not to suggest that all businesses in the Region lack the interest and capacity to conduct R&D and commercialize results. But few do so because of the structure of the economy, the small size and limited R&D budgets of most firms, and the absence of a well developed R&D climate in the Region.

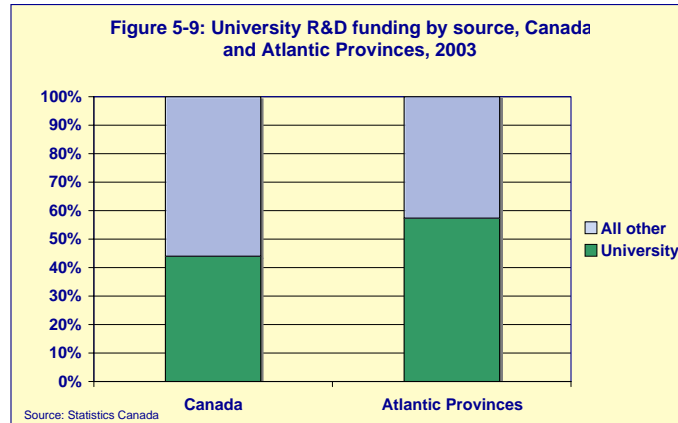
If commercialization is accepted as one of the main returns on R&D investment, then the relatively low proportion of R&D conducted by private firms in the Atlantic Provinces should provide cause for some concern. This is because the number of innovation opportunities produced by private R&D is estimated to be substantially higher than that from public R&D for an equivalent dollar value of R&D performed.<sup>19</sup>

This is not to suggest that there should be a shift away from university research, after all, this research serves many other purposes than commercialization. Rather, the comparison is intended to underscore the need for greater involvement of private firms in conducting, or at least collaborating, in the R&D process. Universities have the capacity to make a substantial contribution to the transition.

<sup>19</sup> Analysis of U.S. data indicates private R&D has 15 times greater influence than public R&D in developing innovative capacity (defined as the “potential to produce a stream of commercially relevant innovations”). See Cornford, A and Lipsey, R. *Benchmarking Innovative Capacity: Practice and Policy*, 2005. (unpublished manuscript)

In the absence of greater participation of private firms in university conducted R&D, universities – and the economy more generally – are presented with several challenges:

- ❑ **Meeting regional R&D expectations:** in the absence of a significant business sector R&D presence in the Atlantic Region, universities play the major role in conducting basic research, and also research that underpins economic development. This role places substantially higher expectations on Atlantic universities than experienced by their counterparts elsewhere in Canada where the business sector plays a stronger R&D role, both as funder and performer. Figure 5-9 indicates universities in the Atlantic Provinces rely relatively more heavily on their own resources in supporting R&D than universities in Canada generally (57 vs. 44%). An important question is whether the Atlantic universities are structured to meet regional R&D expectations, given their size, resources and educational objectives. If the business sector is to succeed in enlarging its R&D and commercialization role, then the educational objectives of higher education must extend to developing receptor capacity within the private sector. There is a continuing education role here for universities as well as community colleges.



- ❑ **Delivering core functions:** a corollary of the resource question is the impact that conducting research has on other university functions, teaching in particular. There would appear to be little question that research benefits not just society by increasing knowledge and through the eventual commercialization of results, but generates considerable benefits for students (and their eventual employers) who are exposed to cutting edge discoveries and processes. But as Figure 5-9 indicates, the Atlantic universities pay a price for their R&D leadership – resources that go to indirect support of R&D are not available to serve other functions. This is not to suggest that the Atlantic universities should cut back on research, but rather to note that unless research is adequately funded from external sources, the universities face difficult decisions on how their resources should be utilized.
- ❑ **Securing R&D funding:** the Atlantic universities have enjoyed considerable success in securing funding from the granting councils and through the various Innovation Strategy initiatives. But the lack of a private sector with a capacity to conduct or support R&D means this success is less than it could be because some of the new initiatives require the university to come up with matching funds. The provinces have introduced various programs to address the matching fund requirement. These programs have proven most helpful to the Region’s universities, but the limited fiscal capacity of the provincial governments means the programs fall short of the levels of provincial support available in central and western Canada.



- ❑ **Transferring and commercializing the results:** much of the research conducted in universities is basic, driven primarily by the researcher's own interests in advancing knowledge and understanding about the subject at hand. Advancing economic wealth may be the least of the researcher's objectives. Research results may or may not have commercial application, and even if they do, they may emerge only after many years or decades of work and in ways not foreseen when the research began.

Nonetheless, in light of the nature and magnitude of public R&D funds currently available to universities, there is an expectation that universities will play a pivotal role in developing and sustaining innovation capacity.<sup>20</sup> To do this may lead researchers to take on different kinds of research (greater emphasis on applied or commercially applicable research driven by private sector interests or needs), but will certainly require investment in the capacity to transfer results if the full economic and social benefits of research are to be realized. This last requirement applies to universities across Canada, but presents more of a challenge for the Atlantic universities because of the relatively weak commercialization capacity within the private sector in the Region. The case for an approach that builds on partnership, accordingly, is much stronger.

### ***New initiatives to meet the challenges***

The Atlantic universities have received support to meet these challenges through the new federal initiatives aimed at strengthening research capacity. These initiatives provide funding to staff new research positions (Canada Research Chairs) as well as funds to renew research infrastructure and to cover the indirect costs of research.

How successful these programs will be in terms of improving research capacity and meeting commercialization objectives remains to be seen. While observers within the university research community credit these programs with improving the research environment, they also identify some on-going concerns.<sup>21</sup>

- ❑ **Canada Foundation for Innovation (CFI):** Between 1997 and 2004, the federal government invested some \$2 billion under CFI to renew and develop university research infrastructure. Contributions in most cases are limited to 40% of the cost of facilities and equipment, requiring universities to find matching funds. The Atlantic universities received 4% of the funds allocated (about \$80 million). The requirement to match funds has presented universities with a major hurdle, given the limited resources available from the private sector and the limited fiscal capacity of the provincial governments.
- ❑ **Indirect Costs Program (ICP):** The ICP was developed to support the indirect costs of research (a major constraint at smaller universities). Since its inception in 2001, ICP has invested almost \$650 million, with Atlantic universities receiving just under 8% (or \$49 million). This is in line with population and graduate enrolment figures. Funding is linked to a university's previous granting council success. As a consequence, the bulk of funds (almost 95%) accrues to the Region's larger, research intensive universities.

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<sup>20</sup> Innovative capacity is not just new knowledge, but a continuous stream of locally commercially relevant information.

<sup>21</sup> An excellent review of the performance, strengths and weaknesses of the various support mechanisms may be found in MPHEC, *R&D Funding in Atlantic Universities*, 2005.

- Atlantic Innovation Fund (AIF):** The Atlantic Canada Opportunities Agency (ACOA) introduced the \$300 million AIF in 2000 to strengthen regional innovation capacity. It was renewed in 2005 with an additional \$300 million. The fund is open to universities, research institutions and the private sector. It includes private-institutional collaboration as one of its eligibility criteria, a measure intended to encourage greater R&D participation by the private sector (this fund also incorporates a matching fund criterion). It also encourages collaboration among regional institutions in order to leverage available funding and strengthen projects and results.

The distribution of chairs and funds follows closely the funding success under the granting councils, with the provinces with medical-doctoral universities securing the greatest support (Table 5-3). The AIF is a regional fund, with universities securing 40% of total project funding.

**Table 5-3**  
**Research revenues received by Atlantic universities**  
**under new federal programs, 2002**

	Research Chairs (number)	Research		
		CFI	Indirect Costs (\$000s)	AIF
Nova Scotia	52	36,123	n.a.	35,650
Newfoundland and Labrador	15	24,211	11,400	43,200
New Brunswick	24	14,737	n.a.	28,100
Prince Edward Island	3	5,106	n.a.	14,200
<b>Total</b>	<b>94</b>	<b>80,177</b>	<b>11,400</b>	<b>121,150</b>
Canada total	1,348	2,034,312	647,750	-
Atlantic % of Canada total	7.0%	3.9%	1.8%	-

Source: Canadian Association of University Business Officers (CAUBO) as reported in MPHEC, *R&D Funding in Atlantic Universities, 2005*.

## 4. R&D – THE BASIS FOR INNOVATION AND GROWTH

### *Increasing university commercialization capacity*

An estimated \$52.2 billion has been invested in research conducted by Canadian higher education institutions between 1994 and 2003 (Table 5-4). The federal and provincial governments accounted for one-third the total investment, with the universities themselves contributing about half to cover the indirect costs of research (and these are also largely public funds).<sup>22</sup>

**Table 5-4**  
**Investment in research performed by higher education, 1994-2003**

Source of funds	Atlantic Provinces		Canada	
	\$ millions	% of total	\$ millions	% of total
Governments	892	26.9	17,459	33.4
Higher education	2,028	61.1	25,564	49.0
Business & other	397	12.0	9,185	17.6
<b>Total</b>	<b>3,317</b>	<b>100.0</b>	<b>52,208</b>	<b>100.0</b>

Source: Statistics Canada

<sup>22</sup> Statistics Canada, *Estimation of Research and Development Expenditures in the Higher Education Sector, 2003-2004*.

In Atlantic Canada, the corresponding figures are \$3.3 billion and \$2.0 billion. In other words, for each \$1.00 invested by governments, the private sector and universities to cover the direct costs of university research in the Atlantic Provinces, the universities allocate \$1.60 to cover indirect costs. These are funds not available to support other university functions.

Investing sums of this magnitude naturally raises questions about the benefits Canadians are deriving from the research conducted by higher education (“bang for the buck”). While the general proposition is well founded that R&D is a good thing because it provides the basis for innovation leading to improved competitiveness and enhanced standards of living, there is also ample evidence that the rate of innovation varies depending on the circumstances under which it is conducted. Indeed, two things are clear from the review of the literature and interviews conducted as part of this study:

- ❑ the path from basic research to product or process development, and finally commercialization, is neither direct nor quick nor *automatic*
- ❑ the impact of R&D on innovative capacity (and hence on economic growth) will be greater if the R&D is private sector driven.

Accelerating the process of transferring the intellectual property (IP) resulting from research to specific applications (commercial or otherwise) is a matter of considerable concern to all those with a stake in research and its contribution to economic and social development. Leveraging the innovation potential of publicly funded research is one of the key challenges cited by the federal government in its Innovation Strategy.

Universities in the Atlantic Provinces are addressing this challenge by increasing their commercialization capacity:

- ❑ Each university has within the past few years established an IP support office whose objectives include assisting researchers in identifying private sector research partners, identifying opportunities for technology transfer, assessing IP for market potential, filing patent applications, marketing technology opportunities, and negotiating licence agreements.
- ❑ Collaborating on technology transfer issues through “Springboard”, a formal network of 14 of the Region’s universities created to advance commercialization of research. Springboard is an enabling and coordinating body providing: specialized technology transfer resources and support services, training for technology transfer professionals, access to proof of concept and legal funds. Its aims are to accelerate the commercialization process through: more and better-trained university technology transfer personnel, support services for marketing and licencing technologies, an increase in the number of disclosures, facilitation of opportunities to work with industry, and support for spin-off companies.

Several indicators are used to chart progress in increasing commercialization capacity within the higher education sector. These include expenditures on IP management, value of research contracts with the private sector, number of disclosures, patent applications, revenue from licenced technology, and spin-off companies created. The information for 2003 in Table 5-5 indicates the contribution Canadian universities are making to their capacity to commercialize technology. Note, these are not indicators of the economic results of innovation, but of the initial steps (inputs and activities) needed to produce such results.

**Table 5-5**  
**Commercialization results, higher education sector, 2003**

	Atlantic	Canada
Expenditures on IP management (\$ thousands)	1,869	36,419
Sponsored research (\$ millions)	186	4,282
Research contracts (\$ millions)	66	810
Income from IP (\$ thousands)	626	55,525
Inventions (number)		
Disclosed	51	1,133
Protected	28	527
Patents held	49	3,047
Spin-off companies (number)	63	876
Licences and options	n.a.	1,756

Source: Statistics Canada, *Survey of Intellectual Property Commercialization in the Higher Education Sector, 2003*

Judged by these same input indicators, the performance of the Atlantic universities is likewise encouraging. For several indicators, the Atlantic universities hold a relative position in line with population and graduate enrolment figures (7%). Among the key points to note for the Atlantic universities:

- ❑ **Expenditures on IP management:** they spent \$1.9 million, 5% of the national total of \$36.4 million.
- ❑ **Research contracts:** they held contracts valued at \$66 million, 8% of the national total of \$810 million.
- ❑ **Spin-off companies to date:** they created 63, just over 7% of the national total of 876.
- ❑ **Income from IP:** they earned \$626,000, just over 1% of the \$55 million earned at the national level. This relatively low figure is attributable largely to the weak receptor capacity of the private sector.
- ❑ **Inventions:** they disclosed 51 and protected 28, each about 5% of the national figures of 1,133 and 527, respectively.

Despite the challenges imposed by the commercialization environment in the Region, the IP managers at the Atlantic universities expressed optimism that improved performance could be expected in the next few years as research capacity continues to improve with the infusion of funds under the various federal programs, and as the universities and researchers become more adept at effecting the transfer of technology. A key ingredient in improving technology transfer lies in the quality of the R&D partnerships with private sector interests.

## Quantifying the benefits

Transferring technology, of course, is an intermediate result – a step (albeit an important one) on the path to realizing longer-term economic and social growth and development objectives. It is in light of their contribution to these longer-term objectives that investments in R&D would be judged as beneficial. Conducting an analysis that weighs the costs and benefits is fraught with difficulties.

Though the general relationship between innovation and growth and development seems well established, the path linking them is not well defined. Results may take years to emerge and may not show up where originally expected. These factors combined with substantial data gaps make the overall economic value of research difficult to quantify.

Nonetheless, attempts have been made to quantify the benefits of university research. In a 2005 update of a study originally conducted for the AUCC in 1998<sup>23</sup>, Professor Fernand Martin of the University of Montreal estimates that university research in 2004 increased Canadian GDP by about **\$50 billion**.<sup>24</sup> This impact, referred to as the *dynamic impact*, occurs primarily through the effect of research on total factor productivity (TFP) – the economic growth resulting from increases in efficiency and productivity of labour and capital. In essence, the dynamic impact measures improvements in TFP resulting from *advances in knowledge and the increased ability of the workforce to apply it*. More specifically, the impact in Martin's analysis works mainly through university graduates who help firms become more efficient and productive, and help them to introduce new products and processes.

In light of the approach used to estimate the dynamic impact on GDP at the national level, it would not be unreasonable to assume that the regional impact would occur in proportion to the share of national higher education R&D conducted in the Atlantic Provinces (6% based on 2003 data). Using this approach, we can estimate the dynamic impact at the regional level at **\$3.0 billion**, or about 6% of the national impact in 2004. While admittedly a rough guide to the magnitude of the impact, it provides at least an indication of the increased productivity resulting from the entry of new graduates into the workforce, as well as the contribution of research to increasing the value of output of other factors of production.

## 5. LEVERAGING THE R&D INVESTMENT

### Key factors

Universities contribute most to economic development through what they *produce*, not what they consume. Universities produce knowledge. Knowledge is produced by conducting research, and also by equipping students with the abilities to put knowledge to work. Both form part of the innovation process. In their seminal study of the importance of innovation to sustaining growth and development, Porter and Stern identify several factors contributing to a high capacity to innovate.

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<sup>23</sup> Martin, F. 1998. *The Economic Impact of University Research*, AUCC Research File, March 1998, Volume 2, No. 3. The estimate is carried out in four main steps. First a value is assigned to the economic growth attributable to TFP, in this case 20% of total growth (GDP) based on OECD studies. Second, the growth in TFP attributable to R&D is calculated. Third, the increased value of human capital is calculated as the increased income of graduates attributable to university education. Fourth, the share of total R&D accounted for by universities (30%) is applied to the share of GDP growth attributable to R&D, less an adjustment for the cost of training graduates.

<sup>24</sup> As reported in AUCC, *Momentum, the 2005 report on university research and knowledge transfer*.

Among these, four stand out in the context of this report:

## 1. Aggregate personnel employed in research and development

*A critical determinant of the underlying innovative capacity of an economy is the **overall supply of scientific and technically trained individuals** available. Both private and public entities engage the skills of these individuals, **whose continuing learning** builds on their formal training. An intermediate measure of the more fundamental process by which individuals choose to invest in scientific and technical skills, the level of personnel employed in R&D-related activities in a nation reflects the baseline level of human resources which can be utilized for purposes of innovation across the economy.<sup>25</sup>*

## 2. Share of Gross Domestic Product spent on secondary and tertiary education

*The availability of high quality workers, with both technical and non-technical backgrounds, is an additional and basic element of a nation's common innovation infrastructure. Investment in higher education creates a **base of highly skilled personnel** upon which firms and other institutions across the economy can draw; in both formal R&D activities and more informal problem solving, skilled workers are better **able to recognize, choose and execute innovation-oriented strategies** in the pursuit of economic advantage.*

## 3. Percentage of R&D expenditures funded by private industry

*...the extent of R&D funding by private firms is a reflection of whether cluster-specific conditions are conducive to investment. Across clusters, **the more favourable the innovation environment, the higher national private R&D spending** will be.*

## 4. Percentage of R&D performed by universities

*...one commonality across countries is the **leading role that universities play in mediating the relationship between private industry and elements of the innovation infrastructure**. A strong university sector provides an important conduit through which basic, fundamental research results serve to catalyze the emergence of innovation-oriented domestic clusters. Conversely, by placing pressure on universities to **conduct relevant research** and produce high quality students with specific technical skills, private funding and involvement in the university sector serve to foster a key reverse linkage from the clusters to the common innovation infrastructure.*

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<sup>25</sup> Porter, M. and Stern, S., 1999. *The New Challenge to America's Prosperity: Findings from the Innovation Index*, Council on Competitiveness, Washington. p. 26-28.

## ***What universities need to do***

From the standpoint of how the Atlantic universities can enhance their role in promoting regional economic development, these conclusions, as well as those emerging from the study by Cornford and Lipsey on innovative capacity cited earlier, carry important implications for universities, but also for other stakeholders in the quest for economic growth and development.

- **Produce highly qualified people:** Universities must continue to focus on what matters most in driving economic development – supplying highly qualified people to the workforce by providing students with excellence in post-secondary education. Highly qualified people – technical and managerial – lead, enable and sustain innovation in our economy. We need more of them, and more of them to stay in the Region.

*What's needed:* Adequate funding to ensure universities attract the best faculty and students. Also, programs to accelerate the technology transfer rate to industry by accelerating the entry of new graduates into local industry. Such programs could include support for first jobs in science and technology as well as supporting R&D internships in industry.

- **Conduct locally relevant research:** With the bulk of publicly funded research in universities driven mainly by the researcher's interests in pure or basic research, there may be little connection to applied problems facing local industry. While choice of research subject must continue to be a matter of academic freedom, an unavoidable implication is fewer innovations that benefit the local economy. *If* extracting greater economic benefit from research funding is a matter of priority, and this seems to be the case judging from the recent efforts by all universities to facilitate commercialization, then greater emphasis must be placed on conducting locally relevant research.

*What's needed:* The answer is not to tamper in any way with academic freedom, but to find ways of realigning research priorities so that local, applied problems become a legitimate subject of enquiry. Facilitating and strengthening partnerships with industry is essential. Consideration could also be given to changing the university reward system so that measurable commercialization performance indicators are added to conventional criteria such as publications and thesis supervision in tenure and promotion decisions.

- **Expand university-industry research partnerships:** Industry R&D results in a substantially higher rate of commercialization output than publicly funded research, in part because it is applied rather than basic, and in part because university research is conducted to meet objectives other than commercialization. Universities recognize that playing a more substantial role in supporting economic development means increasing the number and scope of research projects they conduct in partnership with industry. This is widely accepted as a major challenge in Atlantic Canada given the weak industry R&D environment, but it is a challenge that must be met if universities are to make meaningful strides in stepping up their contribution to economic growth and development.

***What's needed:*** Genuine partnering in defining research needs and objectives, as well as the details of the research program including expected results and disposition of the IP. This represents a shift in approach away from the “supply push” model where researchers look for transfer opportunities once results are in hand, to a “demand pull” model based on a defined need and requiring close collaboration among industry and university partners at the earliest stages of planning. Building partnerships and alliances represents just one of the elements of a broader strategic approach to improving innovation outcomes,<sup>26</sup> and to be successful requires buy-in *and investment in innovation capacity* not just from universities and industry, but from government (to create a fiscal framework conducive to innovation), other research institutions (to lend support through people and facilities), and funding agencies (to provide support and share risks at the early stages of research).

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<sup>26</sup> Others include promoting clusters of excellence, building receptor capacity, building alliances, and developing a culture of innovation and commercialization. See, Cornford, A., Gardner Pinfold, Marlin Consultants, *Innovation and Commercialization in Atlantic Canada*, ACOA, 2002; and, Gardner Pinfold, *Innovation and Commercialization: A Nova Scotia Perspective*, ACOA, 2003.



# VI

## UNIVERSITY SUCCESS STORIES

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### 1. OVERVIEW

The Atlantic universities have conducted thousands of research projects over the years covering a broad spectrum of disciplines. Much has been learned in the process, and many research initiatives have led to applied results, and many of these to commercial success as knowledge and technologies are transferred to industry through various forms of innovation. Each in its way contributes to productivity, thereby strengthening growth and development in the Region.

The universities also demonstrate leadership and commitment to economic and social development through various community initiatives. These range from continuing education programs targeted broadly and narrowly, provision of legal aid services, community health programs, arts programs and business and advisory services. Community initiatives also include faculty volunteer activities many of us take for granted – articles to local newspapers on health, economics or political issues, and appearances on radio and television programs aimed at informing the public about science, arts and current affairs.

The examples outlined in the following sections represent a small sample of the many concrete ways in which the universities benefit the economy and society in Atlantic Canada. We divide the examples into two sections: Research & Development and Community. R&D is further subdivided into three categories: products and processes (innovative technologies and methods), alliances (joint initiatives aimed at leveraging funds, facilities and researchers), and spin-offs (companies created to apply the technologies).

### 2. RESEARCH & DEVELOPMENT

#### *Products and Processes*

Innovation and applied research at universities can result in patented or licensed technologies and processes. The Atlantic universities have had successes in the health sciences, biotechnology, fisheries, remote sensing, and information technology sectors.

- Software advances stemming from research at **Acadia University** have resulted in a revolutionary design to assist in music teaching and learning, allowing students using digitally connected acoustic pianos to play several pianos in real-time, assisted by videoconferencing. This process effectively puts students and their long-distance teachers in the same room. A coordinated effort between several faculties including computer science, music, and the Acadia Institute for Teaching and Technology, and along with partners in the private sector and a not-for-profit corporation, this commercialized research eliminates geographical barriers between teachers and students, and will improve learning in remote communities.
- Researchers at **Cape Breton University (CBU)** are implementing a pilot program using voice recognition to transcribe lectures to handheld devices or classroom screens. The

technology uses an IBM application in what is called the Liberated Learning Initiative. The initiative, resulting from a partnership between CBU, Saint Mary's University in Halifax, and IBM, will benefit the hearing impaired and students with audio and visual disabilities, allowing for class notes and other information to be instantly translated to text or published to the web, and has many potential applications outside the university setting, including for example, museums, galleries and interpretative centres.

- ❑ Researchers at **Dalhousie University's** Institute for Research in Materials are designing and testing a comprehensive diagnostic protocol for assessing the health of roads and bridges. Using a variety of precision electronic techniques, the team can assess road thickness variation and levels of stress on roads and bridges. Atlantic Infrastructure Monitoring Inc., a joint venture with a locally based engineering firm, will commercialize this assessment technique. Researchers at the Institute have also developed a synthetic material that greatly strengthens concrete and can be used instead of reinforcing steel in some applications. The technology is now being used in Canada and around the world. Technologies such as these can be used to extend the life of infrastructure, improve public safety, and reduce maintenance costs.
- ❑ The Industrial Support Office (Bureau de soutien à l'innovation) at the **Université de Moncton** is focusing efforts on establishing and strengthening linkages between the institution and the private sector. Their aim is to include not only science and engineering, but also the humanities in research and commercialization support, with proactive goals of capitalizing on discoveries within the university and putting into place mechanisms to advise, protect, and support researchers. Recent university research has resulted in the generation of the province's first comprehensive wind atlas, which promises to be a vital tool in the move towards renewable (wind) energy in the province.
- ❑ Promoting collaborative learning, **Mount Saint Vincent University's (MSVU)** E-Learning in Communities of Practice initiative focuses on "tacit" learning, an important vehicle for transferring experience and information. Researchers at MSVU are developing a program to facilitate ongoing training and education, enabling simulations (such as fires and other emergency services). The collaborative learning utilizes interaction and feedback to maximize individual contribution and provide up-to-date information on technology and protocols. MSVU is partnering with Sierra Systems and the College Communautaire de Nouveau-Brunswick to commercialize the product after the conclusion of the R&D phase.
- ❑ **Nova Scotia Agricultural College's (NSAC)** Wild Blueberry Research Centre outside Truro is helping to increase the production and yield of blueberries, an important export for Nova Scotia companies. The research initiative (a partnership with NSAC, a large local blueberry producer, the provincial government, and a producers association) emphasizes production sustainability and increased crop yield. Already the industry reports an increase of 50% in buds per blueberry plant, and it is believed these innovative techniques to management will increase Nova Scotia's market share.

- ❑ Researchers at **Saint Mary's University's** CN Centre for Occupational Health and Safety are focusing on the human issues contributing to health and safety, including using occupational health psychology. One researcher is bringing his experience on North Sea oil-production platforms to Nova Scotia, developing techniques for measuring safety culture with applications in high-reliability organizations (such as primary health care). Partnerships between industry, government and the university have engaged the health care sector, the energy sector, as well as other institutions in the province. The focus on practical outcomes from their research allows for meaningful improvements in occupational health and safety in the public and private sector.
- ❑ Researchers at **St. Francis Xavier University** are working to commercialize products in the areas of petroleum science, drilling fluids, high performance computing and mathematics, and biofilms control. Research in biofilms – biological entities able to survive in extreme conditions in nature – can be beneficial in the east coast oil and gas industry as well as in advanced foods and materials. Developing a better understanding of the structure and dynamics of biofilms means ways to modify their behaviour could be designed, resulting in improved performance of facilities such as pipelines that can be adversely affected through the build-up of biofilms.
- ❑ Recent commercialization success from the **University of New Brunswick (UNB)** include the marketing of a wood polymer composite (originally designed for use in Canada) in Norway as an alternative to the use of tropical hardwoods and pressure treated lumber. Two companies, including one in North America, will serve as commercial partners to produce and market the product. Another commercialized invention from UNB is a technology to minimize linehaul costs in the trucking industry. A university mathematician and a transportation engineer partnered with a local hauling company to design a software application that optimizes routing and scheduling.
- ❑ Research in the area of bioactive compounds at the **University of Prince Edward Island** is targeting the health-promoting attributes of blueberries and other plants, with the aim of targeting other foods and products around the world. Published findings from the research have indicated measurable cardiovascular benefits of consuming low-bush blueberries, and now the aim is to determine how foods produce these health benefits and if there are any products which could be created from this knowledge.
- ❑ The Burnside Ecological Industrial Park is an innovative initiative between **Dalhousie University's School for Resource and Environmental Studies** and the business community in Burnside, the Region's largest industrial park. The project is designed to remedy energy and product waste, minimize the park's ecological footprint, and improve the use of inputs through trade and communal relationships. The Burnside Ecosystem Model assembles a variety of business entities, built through process interrelationships including servicing and materials flow such as waste recovery and recycling, repair, and remanufacturing. Over the past ten years, the Park has continued to strive towards upholding the covenants of creating an attractive and efficient business environment by applying sound planning and management standards.

## Alliances

- ❑ **Telecom Applications Research Alliance (TARA)** – Located in Halifax, TARA is a private enterprise made up of an alliance of members and affiliates providing leading-edge telecommunications research and development equipment in addition to seed investment funding and business mentoring resources. Its affiliate members include eight of the Region's universities and several member organizations.

TARA hosts Canada's only Cisco Certified Internetworking Expert (CCIE) Certification Lab, as well as the Master of Engineering in Internetworking program in affiliation with Dalhousie University (DalTech). TARA's Networking Through Partnership reflects the organization's unique role as both a place to develop applications and services for telephone and Internet-based computer networks as well as a place to form dynamic connections with other member organizations.

While TARA's reach has expanded throughout the world, the bulk of its research activity remains in Atlantic Canada and has been pioneering private sector investment in the Region. TARA invests in future research through the awarding of \$5,000 scholarships to students throughout Atlantic Canada, fostering strong relationships between students, their universities and TARA's member companies by providing both mentorship and commercial opportunities.

- ❑ **The Genesis Centre at Memorial University** is a support network developed to help Newfoundland and Labrador's knowledge-based businesses/entrepreneurs create high-growth enterprises. It provides a wide range of resources and services for its clients with a long-term goal of preparing its clients to become "investor ready". Since opening its doors, Genesis has accepted 31 companies employing almost 190 people. A recent success story is the licensing agreement between North Atlantic Biopharma Inc. (NABPI) and Guangzeng Pharmaceutical Group of Guangdong, China to bring a seal oil-based pharmaceutical product to market in China. NABPI, founded in 2001, is owned by four professors at Memorial University, but China's use of seal oil could result in a new industry with province wide economic implications. Most of Genesis's other clients are either students at the University or clients from around the province.
- ❑ **C-CORE** is an international corporation providing innovative engineering solutions to clients in the natural resources sector. Its ongoing R&D program incorporates new technologies into these solutions to ensure cost effective results. Located on **Memorial University of Newfoundland's** St. John's campus, it began 30 years ago as a research institute within the Engineering faculty, and now operates at arm's length from the University with a Board of Directors of senior industry leaders and representatives from government and the university. C-CORE has over 70 industry clients and partners, many located in the United States and Europe, producing commercially viable services and products for the oil and gas sector.

C-CORE, along with the Faculties of Engineering and Business, provides hands-on training for more than 50 graduate and undergraduate students per year working on industrial projects and gaining an understanding of industrial operational environments. Many are later employed in the province's energy sector. C-CORE has spun off businesses, for example Instrumar, which employs 60 people and has developed Fiber Sensor, a new technology used in the textile industry.

The corporation's 60 full-time employees are mainly engineers with core competency strengths in intelligent systems, remote sensing, ice engineering and geotechnical engineering that are needed primarily in the oil and gas, mining and pipeline sectors. The Corporation's revenues (99% contract-based) have increased annually to a level of \$6.5 million in 2004, making the Corporation totally self-funded. C-CORE is in the top 5% in terms of corporation size in Canada and the province.

- **Marine Institute of Memorial University of Newfoundland** – The Marine Institute is one of only two such institutions in Canada to focus on advanced marine technology in the areas of education, applied research and technology development in support of the ocean and marine industries. The Marine Institute has over 1,000 full-time students and an additional 5,400 students enrolled in short-term industrial response courses.

The Marine Institute undertakes R&D, transferring this knowledge to local industries to improve their productivity and ability to generate revenues. It engages in research and education contracts, bringing economic activity to the provincial economy, including a contract with the Department of National Defense, with GDP impacts in 2002 of over \$10 million. A recent report<sup>26</sup> places the Institute's cumulative economic contribution to the provincial economy at approximately \$47 million.

- **Clusters** – The National Research Council (NRC) is working to develop Canada's innovation system and support sustained economic growth in regions and communities across Canada. Its goal is to help build and sustain the critical mass of resources – research, technological, financial and human – needed for successful innovation clusters in several communities across the country. To this end, part of the NRC strategy is to connect its core research strengths, knowledge and partnership networks with the commercial development and product-oriented activities of industry, and where advantageous with universities, to produce an innovation formula.

NRC research institutes lie at the core of its collaboration and innovation efforts. Their connection with other NRC components – the national knowledge infrastructure of the Canada Institute for Scientific and Technical Information (CISTI), NRC's nation-wide Industrial Research Assistance Program (IRAP) and the Canadian Technology Network (CTN) – forms the backbone of NRC's national innovation infrastructure. The full strength of this national capability flows in to the development of community-based technology clusters. Institutes in Atlantic Canada are:

- Dalhousie – Institute for Marine Biosciences;
- UPEI – Institute for Nutrisciences and Health;
- UNB – Institute for Information Technology; and
- Memorial University – Institute for Ocean Technology.

- **Interuniversity Services Inc. (ISI)** is a company designed to identify and promote opportunities for the Atlantic universities to efficiently and cost-effectively acquire goods and services (such as contracting, consulting, technical servicing and facilitating). Focusing on the benefits of industrial alliances, ISI operates in supply management, HR services, and technical services to share expertise, manage service agreements, coordinate employee benefits, and in offering full-time scientific equipment repair and maintenance. ISI procures goods and services valued at about \$50 million annually, saving its members an estimated \$7 million.

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<sup>26</sup> Institute for the Advancement of Public Policy, Inc, October 2004

## Spinoffs

Commercialized research often moves outside the home institution(s) and takes on a life of its own. These companies become employers of educated and skilled workers who, in turn, contribute to the quality and growth of industry in the local economy. Spun-out companies maintain strong ties to the university environment, fostering the innovative spirit of research and development. Many universities in the Region hope to spin out companies based on current research within their institutions. Some examples of companies who have been spun out are:

- ❑ **Dalhousie University** – Satlantic Inc., is a remote sensing company that custom designs, manufactures and sells a wide range of precision sensors and systems for the study of aquatic environments. Satlantic won the 2005 Nova Scotia Exporter of the Year award as well as the Export Growth Through Partnership award. Exports comprise 90% of Satlantic's business, and the company employs 55 people in their Halifax office. The company is heralded as a successful university-industry partnership and has gone on to support further research within the university.
- ❑ Researchers at **Mount Allison University** have recently licensed a patented technology to a Swedish company to measure cellular stress on salmon and other fish. The technology allows resource managers to gauge ecosystem health through the design of global antibodies – custom tools which detect proteins across non-mammalian species. Spun out of Mount Allison in 2004, the company offers protein-detection expertise as a service, allowing for more cost effective analysis of biological systems.
- ❑ **Université de Moncton** – In the past, UdeM has spun out the local microelectronics company SPIELO, as well as Nanoptics, which specialized in terminal printers for the retail sector, and Dovico, developers of a commercial software tool for time management. Currently, researchers at UdeM conduct research in the areas of thin films, developing advanced optical materials and devices as well as techniques and instruments to improve processes in the optics, ophthalmic and photonic industries.
- ❑ A partnership between a Dalhousie researcher and a local seafood company in Nova Scotia is now contributing to the science of marine-based health and nutrition products. A distillation technology developed by a professor emeritus at the Canadian Institute of Fisheries Technology at **Dalhousie University** sparked the creation of Ocean Nutrition Canada (ONC), with the help of parent company Clearwater Fine Foods. Now fully spun-out, ONC employs around 300 people in Nova Scotia and has a branch division in Wisconsin, producing the MEG-3 purified fish oil ingredient in nutritional supplements for the global market. ONC continues to research bioactive ingredients from the marine environment in search of other marine natural products.
- ❑ Out of research at the **University of New Brunswick** has come Interactive Visualization Systems (IVS 3D), a software company which has developed a tool for 3D marine visualization. The software suite is being used by commercial, academic, and military clients in geological and hydrographic surveys, mine clearance and beach landing surveys, among other applications. Through research originally funded by NSERC, IVS 3D was incorporated in 1995 and now employs 8 people in Canada.

- Research into development of Transgenic Technology for Aquaculture applications at **Memorial University's** Ocean Science Centre led to the 1994 spin-off of Aqua Bounty Canada, Inc, a subsidiary of Aqua Bounty Technologies. Aqua Bounty technologies specializes in therapeutics and feed additives for aquaculture industry, as well as the development of transgenic technologies to improve the salmon (and other species) aquaculture industry by promoting health and cutting time-to-market. In Canada, Aqua Bounty employs 30 in its Newfoundland and Prince Edward Island locations.
- Researchers at **Dalhousie University** created the company ImmunoVaccine Technologies (IVT), to work with the fishing industry to build on its development of a vaccine to control the grey seal population off Nova Scotia. Today, IVT's lab at the BioSciences Centre in Halifax continues to develop and improve animal contraceptive vaccines and the VacciMax vaccine platform (as a quick and effective delivery mechanism), and is involved in trials with Pfizer Animal Health to commercialize the product. IVT also works in conjunction with partners at other universities, Dalhousie Medical School, and pharmaceutical companies conducting pre-clinical trials of human products for the future, employing 14 people, half of whom are scientists.

### 3. COMMUNITY

#### *Acadia Centre for Estuarine Research*

The Acadian Centre for Estuarine Research, now 20 years old, focuses on water quality and quantity issues, including impacts on aquatic ecosystems. The Centre works with local community groups like the Clean Annapolis River Project and with other volunteer groups on watershed protection programs, and has helped develop the most comprehensive watershed monitoring database in the country.

Each year some 20 researchers take on projects at the Centre – researchers from government, the public sector, government agencies, and academia. The focus has moved from basic estuarine research to one more “community-activity” focused, and taking on more international projects every year. The Centre plays a leadership role in estuarine research, supporting communities and environmental protection groups with small and medium-sized projects, and taking on larger-budget projects to help expand their resources and fund the purchase of newer equipment.

#### *Cape Breton University's Mi'kmaq Resource Centre*

The Mi'kmaq Resource Centre is a repository consisting entirely of material written about the Mi'kmaq people or by Mi'kmaq people. It includes all types of media, including old reel-to-reel tapes, cassettes, CDs, and videos done by Mi'kmaq people – all historically and culturally significant. A number of government papers (e.g., Marshall decision) as well as aboriginal rights papers, documents, and copies of the Mi'kmaq news (which once reported on the events and the history of the Mi'kmaq people until the 1970s) are available to researchers around the world.

The Centre was established in 1996 because there was no material in local libraries regarding the Mi'kmaq people and their history. Today, educators, researchers and the public have available to them an extensive holdings list in Mi'kmaq studies. The Centre has been visited by Members of Parliament, Departmental Ministers, and by international political figures.

Visitors to the Centre are able to see the history and, for Mi'kmaq visitors, their family in the resources, giving a glimpse of the history of the communities. The Resource Centre also holds a number of ethnographies, and covers most every community in Atlantic Canada, specializing in the 13 reserves in Nova Scotia.

## ***University of Prince Edward Island***

Researchers at the Institute of Island Studies (IIS) focus on the analysis of progressive public policy in the economy, culture, and environment of PEI and other small islands. Researchers at IIS also work with other island nations on important issues such as fisheries and resource management in coastal communities. Collaborative processes between the institution, government and local communities have resulted in improvements and innovation in the field of agriculture, leading to the planting of more environmentally-friendly crops and the reduction of industrial pesticides that contribute to chronic human illnesses.

## ***Dalhousie Legal Aid Service***

The Dalhousie Legal Aid Service (DLAS) began operating in June of 1970, devoting time and resources to representing community members in cases of poverty law, young offender law, family law, legal reform, and lending assistance to the community where legal reform is either not possible or not pragmatic. Since that time, and through many changes to funding and mandates, it has served the community by representing hundreds of people and many community groups in need of legal advice and services.

Benefiting not only those in need of legal aid, DLAS also serves as a springboard for many of today's young upstart barristers. Each year 16 students from the Dalhousie Law School get hands-on experience through Dalhousie Legal aid, working with expert lawyers in the field of poverty law.

Today, a staff of 5 lawyers supervise students and perform case work and law reform, benefiting low income earners, building legal capacity in the system, and facilitating social change. DLAS prides itself on giving people the tools to represent and advocate for themselves.

## ***University of King's College – Halifax Humanities 101***

Following in the footsteps of a successful initiative in the Lower East Side of Manhattan, Dr. Thorne of the St. George Round Church initiated in Halifax a special community program in learning. Supported by all HRM universities, Halifax Humanities 101 is based on the *Clemente great books program*, started in the United States in the mid-1990s. The course is directed at the underprivileged, in an attempt to offer people who might not ordinarily have thought of themselves as intellectuals an opportunity to study and grow through reflection on and analysis of the major books in the Western tradition.

In 2005, the program accepted 32 applicants into the two classes per week course. Because of the intended student demographic, books, transportation, and childcare are provided free of charge. King's is participating in a number of ways, hiring students to provide some day-care support and faculty, and having students volunteer as instructors and tutors.



The Halifax Humanities 101 program is a pilot program in Nova Scotia, hoping to expand into other areas of the municipality and possibly into Cape Breton. Organizers are working towards broadening the support net and strengthening their course offerings in the future.

### ***Mount Saint Vincent University – Centre for Women in Business***

Supported by the Atlantic Canada Opportunities Agency, the MSVU Centre for Women in Business is part of the network of University Business Development Centres focusing on the needs of a specific cross-section of the business marketplace: entrepreneurial women. The Centre is housed at the University and invites both new entrepreneurs and established businesspeople to be members and attend events and workshops.

Recent trends show that women starting businesses do so in a certain manner, with a need to network and access appropriate training. The Centre partners with chartered banks, the Credit Union, the Chamber of Commerce, the Business Development Bank of Canada, as well as local economic development organizations to the mutual benefit of newcomers to the business community and established entrepreneurs.

Through the delivery of business advisory services, networking nights, special events, and a workshop series, the Centre targets the needs of women in the business community, allowing them access to local networks and skills development and training opportunities. The ultimate aim of the Centre is to get upstart businesses to a point where they can move their products and services outside the immediate area, and become employers of others.

### ***NSCAD University Press***

The country's only university press devoted to the visual arts, the NSCAD University Press began its revival in 2001, after having operated from 1972 to 1987. The press originally printed four publications, and plans to run two new publications (in addition to several reprints) in the coming year. Subjects of new publications include a compendium of international papers on ceramics (including Garth Clark), Canadian war artist and illustrator Eric Aldwinckle, and Saskatoon's Dr. Lynne Bell, who specializes in the Aboriginal art and artist community.

Driven by the growth of the institution and the desire to highlight it in the international setting, the University Press fulfils a need for such publications, drawing attention to literary works regarding the visual arts as well as NSCAD's own contribution to the arts community.

### ***Saint Mary's University Small Business Development Centre***

The Saint Mary's University Small Business Development Centre (SMUBDC) was established in 1989 in the Burnside Industrial Park, to aid planning and skills development in new businesses and industry. Since that time, it has moved to Barrington Street in Halifax where its three divisions (consulting, programming and skills development and International) caters to small and medium sized businesses in Nova Scotia and internationally.

The Consulting division houses full-time consultants as well as about 90 MBA students from the Sobey School of Business at Saint Mary's University. The course-based consulting project has grown in popularity, now attracting 70-80% of all MBA students at the University. In 2004, 32 student projects were completed for small enterprises in the Halifax area, at costs more accessible to businesses with limited resources. A recent survey showed that such projects received a 75% client approval rating, helping to build the SMUBDC's reputation in the community.

SMUBDC offers beneficial services to both the community and to MBA graduates who can now enter the marketplace with hands-on management, research and development, marketing, skills assessment, and financial consulting experience. The Centre continues to connect with the business and student community through the organization of conferences, organizing business concept competitions, and bringing connecting businesspeople with the university environment.

### ***St. Thomas University – Theatre St. Thomas***

Theatre St. Thomas (TST) at St. Thomas University is a key contributor to the arts and culture community in Fredericton. Operating on the initiative of students interested in drama, the theatre (Black Box Theatre) holds weekly workshops for students and performs several one-act plays by Fredericton playwrights, one to two major productions each year, and has recently added a summer theatre festival. Recent productions of TST include David Ives' *All in the Timing* and Arthur Miller's *The Crucible*. By engaging local talent and offering entertainment to the community while providing unique formative experiences to its students, Theatre St. Thomas forms an important part of the University and Fredericton's arts community.

### ***University of New Brunswick – Community Health Clinic***

The Faculty of Nursing at UNB opened the Community Health Clinic (CHC) in 2002, prompted by a need in the Fredericton community to provide care and advice to the homeless and addicted population. The Brunswick Street clinic offers services including health assessment, health promotion, referrals, immunization, counseling on lifestyle issues, harm reduction practices and the management of chronic illness, and health tests.

For some 30 to 40 nursing students each year, the CHC affords an opportunity for hands-on training, experience in community outreach, and to work with and train peer educators in the community in a "living laboratory". Nurses get to know the community while promoting the clinic and its resources and services to the homeless. Each year sees close to 700 nursing-visits to the homeless community.

Partnerships with the community, for example the Multicultural Association and the peer training program, are extremely important to the CHC. The CHC partners with the United Way, the Chamber of Commerce, and with other post-secondary institutions. It plans to continue along its current path, securing funding sources and finding new partners, continuing to benefit both the School of Nursing and the urban community.

## ***University of Prince Edward Island – AVC Teaching Hospital***

The Atlantic Veterinary College (AVC) teaching hospital, located in Charlottetown, takes on approximately 6,000 animal-care cases per year, ranging from standard domestic pet procedures to special cases concerning endangered species. The hospital does not compete with local veterinary services, but instead operates with the dual mission of treating local and special cases, and serving as an incubator/lab for students at the Veterinary College.

Each year some 60 students (not including visiting students and interns and residents) gain experience at the teaching hospital. The hospital prides itself in taking on procedures that were not considered previously, as well as making strides in veterinary treatments such as open heart/chest surgery and ophthalmology.

The presence of the school (and the hospital) has also elevated the level of vet-clinic care around the Island, as graduates of the AVC decide to remain on PEI and in the Region, bringing improved practices closer to Atlantic Canadians.

## ***Université Sainte-Anne – Building and Protecting Acadian Culture***

The Université Sainte-Anne, with its six campuses across Nova Scotia and PEI, strives to enrich their university offerings with the unique opportunity to live, learn and work within the Acadian culture. The University's core programming in arts, sciences and business, as well as its distance learning, continuing education, and French immersion programmes increase accessibility and set it apart from other institutions. Université Sainte-Anne's strengths reside in its specialization in and dedication to the francophone community in the Maritimes.

## ***Memorial University – SafetyNet***

SafetyNet at Memorial University is a Community Alliance for Health Research with funding from the Canadian Institutes for Health Research, Memorial University, the Newfoundland and Labrador Workplace Health Safety and Compensation Commission, and the NRC Institute for Ocean Technology. SafetyNet conducts research on marine and coastal occupational safety and health, with partners in medicine, social work, nursing, the natural and marine sciences, and engineering.

The SafetyNet Alliance brings together the public sector, the private sector, and coastal communities to offer evidence-based, practical recommendations for innovations in diagnostic and therapeutic methods, regulatory regimes, and the training of health professionals, workers, and managers. Current areas of research interest include 9 projects in the areas of Fisheries, Oil and Gas, and Human Cold Working Conditions.

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# ***ANNEX***

## ***University Fact Sheets***

Due to differences in accounting approach to meet specific requirements, the expenditure and revenue data in this Annex may differ from the information contained in the main body of the report.

**ACADIA UNIVERSITY**  
**Nova Scotia**  
[www.acadiau.ca](http://www.acadiau.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	4,246	4,134	-3%
<b>Student Origin</b>			
In-Province	60%	45%	-15%
Other Atlantic Provinces	21%	10%	-11%
Elsewhere in Canada	11%	26%	+15%
International	8%	18%	+10%
<b>Student Accommodation</b>			
On-Campus	44%	37%	-7%
Off-Campus	56%	63%	+7%
<b>Degrees Awarded</b>			
Undergraduate	796	960	+21%
Graduate / Professional	111	123	+11%
<b>Alumni</b>			
In-Province		49%	
Elsewhere in Canada		39%	
International		12%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2003*</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	34,437	54,679	+59%
Direct research	1,511	3,389	+124%
Ancillary and Other	13,825	38,206	+176%
<i>Total</i>	<i>49,773</i>	<i>96,274</i>	<i>+93%</i>
<b>Revenues</b>			
Government Grants	22,771	25,643	+13%
Tuition	14,236	33,896	+138%
Private & Investment	3,903	10,606	+172%
Ancillary & Other	10,232	18,526	+81%
<i>Total</i>	<i>51,142</i>	<i>88,671</i>	<i>+73%</i>
<b>COMMUNITY IMPACT</b>	<b>Acadia</b>	<b>Wolfville</b>	<b>%</b>
<b>Population</b>	4,817	3,658	132%
<b>Employment</b>	683	1,605	43%
<b>Income (000s)</b>	\$36,680	\$59,400	62%

Source: Acadia University

\*2004-05 data not available in this format when this Annex was compiled.



## ATLANTIC SCHOOL OF THEOLOGY

Nova Scotia

[www.astheology.ns.ca](http://www.astheology.ns.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	102	148	+45%
<b>Student Origin</b>			
Local	30%	45%	+15%
Elsewhere in Province	21%	10%	-11%
Other Atlantic Provinces	21%	25%	+4%
Elsewhere in Canada	14%	10%	-4%
International	14%	10%	-4%
<b>Student Accommodation</b>			
On-Campus	15%	10%	-5%
Off-Campus	85%	90%	+5%
<b>Degrees Awarded</b>			
Graduate / Professional	14	13	-7%
<b>Alumni</b>			
In-Province		40%	
Elsewhere in Canada		55%	
International		5%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	1,678	1,955	+17%
Research			
Ancillary and Other	203	250	+23%
<i>Total</i>	<i>1,881</i>	<i>2,205</i>	<i>+17%</i>
<b>Revenues</b>			
Government Grants	797	760	-5%
Tuition	286	380	+33%
Private & Investment	539	539	0%
Ancillary & Other	280	618	+121%
<i>Total</i>	<i>1,902</i>	<i>2,297</i>	<i>+21%</i>
<b>COMMUNITY IMPACT</b>	<b>AST</b>	<b>Halifax RM</b>	<b>%</b>
<b>Population</b>	174	359,111	0.05%
<b>Employment</b>	26	182,455	0.01%
<b>Income</b>	\$294,250	\$7,250,000	4.1%
<i>HRM Universities (000s)</i>			

Source: Atlantic School of Theology

<b>CAPE BRETON UNIVERSITY</b>			
Nova Scotia			
<a href="http://www.capebretonu.ca">www.capebretonu.ca</a>			
<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	3,423	3,584	+5%
<b>Student Origin</b>			
Local	81%	73%	-8%
Elsewhere in Province	11%	10%	-1%
Other Atlantic Provinces	4%	5%	+1%
Elsewhere in Canada	3%	5%	+2%
International	2%	7%	+5%
<b>Student Accommodation</b>			
On-Campus	6%		
Off-Campus	94%		
<b>Degrees Awarded</b>			
Undergraduate	356	578	+62%
Graduate / Professional			
<b>Alumni</b>			
In-Province		78%	
Elsewhere in Canada		17%	
International		6%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating		35,977	
Research		3,826	
Ancillary and Other		2,666	
<i>Total</i>		42,469	
<b>Revenues</b>			
Government Grants		16,449	
Tuition		14,967	
Private & Investment		50	
Ancillary & Other		11,673	
<i>Total</i>		43,139	
<b>COMMUNITY IMPACT</b>	<b>CBU</b>	<b>CBRM</b>	<b>%</b>
<b>Population</b>	3,910	105,968	4%
<b>Employment</b>	326	35,115	1%
<b>Income (000s)</b>	\$27,722	\$918,690	3%

Source: Cape Breton University

**DALHOUSIE UNIVERSITY**  
**Nova Scotia**  
*www.dal.ca*

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	10,920	15,814	+45%
<b>Student Origin</b>			
Local	44%	32%	-12%
Elsewhere in Province	18%	17%	-1%
Other Atlantic Provinces	16%	13%	-3%
Elsewhere in Canada	19%	28%	+9%
International	3%	8%	+5%
<b>Student Accommodation</b>			
On-Campus	18%	17%	-1%
Off-Campus	82%	83%	+1%
<b>Degrees Awarded</b>			
Undergraduate	1,761	2,116	+20%
Graduate / Professional	778	1,248	+60%
<b>Alumni</b>			
In-Province		48%	
Elsewhere in Canada		42%	
International		10%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	125,370	246,340	+96%
Research	34,807	78,688	+126%
Ancillary and Other	37,479	56,351	+50%
<i>Total</i>	<i>197,656</i>	<i>381,379</i>	<i>+93%</i>
<b>Revenues</b>			
Government Grants	111,103	170,272	+53%
Tuition	34,431	103,606	+201%
Private & Investment	22,861	55,584	+143%
Ancillary & Other	28,591	69,035	+141%
<i>Total</i>	<i>196,986</i>	<i>398,497</i>	<i>+102%</i>
<b>COMMUNITY IMPACT</b>	<b>Dalhousie</b>	<b>Halifax RM</b>	<b>%</b>
<b>Population</b>	19,254	359,111	5%
<b>Employment</b>	3,440	182,455	2%
<b>Income,</b>	\$294,250	\$7,250,000	4%
<i>HRM Universities (000s)</i>			

Source: Dalhousie University

<b>UNIVERSITY OF KING'S COLLEGE</b>			
Nova Scotia			
<a href="http://www.ukings.ns.ca">www.ukings.ns.ca</a>			
<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	691	1,043	+51%
<b>Student Origin</b>			
In-Province	50%	42%	-8%
Other Atlantic Provinces	13%	7%	-6%
Elsewhere in Canada	35%	47%	+12%
International	2%	4%	+2%
<b>Student Accommodation</b>			
On-Campus	31%	25%	-6%
Off-Campus	69%	75%	+6%
<b>Degrees Awarded</b>			
Undergraduate	176	186	+6%
Graduate / Professional			
<b>Alumni</b>			
In-Province			
Elsewhere in Canada			
International			
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	5,064	9,968	+97%
Research	11	33	+200%
Ancillary and Other	1,641	2,559	+56%
<i>Total</i>	<i>6,716</i>	<i>12,560</i>	<i>+87%</i>
<b>Revenues</b>			
Government Grants	2,427	2,969	+22%
Tuition	2,036	5,437	+167%
Private & Investment	863	1,072	+24%
Ancillary & Other	1,585	3,043	+92%
<i>Total</i>	<i>6,911</i>	<i>12,521</i>	<i>+81%</i>
<b>COMMUNITY IMPACT</b>	<b>King's</b>	<b>Halifax RM</b>	<b>%</b>
<b>Population</b>	1,122	359,111	0.3%
<b>Employment</b>	61	182,455	0.03%
<b>Income,</b>	\$294,250	\$7,250,000	4.1%
<b>HRM Universities (000s)</b>			

Source: University of King's College

**MEMORIAL UNIVERSITY OF NEWFOUNDLAND**  
**Newfoundland and Labrador**

*www.mun.ca*

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	15,673	18,325	+17%
<b>Student Origin</b>			
Local	50%	51%	+1%
Elsewhere in Province	45%	36%	-9%
Other Atlantic Provinces	1%	5%	+4%
Elsewhere in Canada	1%	5%	+4%
International	2%	4%	+2%
<b>Student Accommodation</b>			
On-Campus	13%	13%	
Off-Campus	87%	87%	
<b>Degrees Awarded</b>			
Undergraduate	2,197	2,294	+4%
Graduate / Professional	340	579	+70%
<b>Alumni</b>			
In-Province		72%	
Elsewhere in Canada		24%	
International		4%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	172,363	229,864	+33%
Research	24,834	69,918	+182%
Ancillary and Other	31,936	44,404	+39%
<i>Total</i>	<i>229,133</i>	<i>344,186</i>	<i>+50%</i>
<b>Revenues</b>			
Government Grants	167,402	216,332	+29%
Tuition	34,242	52,408	+53%
Private & Investment	11,963	17,957	+50%
Ancillary & Other	17,291	53,798	+211%
<i>Total</i>	<i>230,898</i>	<i>340,495</i>	<i>+47%</i>
<b>COMMUNITY IMPACT Memorial</b>		<b>St. John's</b>	<b>%</b>
<b>Population</b>	23,040	172,915	13%
<b>Employment</b>	5,439	80,090	7%
<b>Income (000s)</b>	\$196,625	\$3,135,000	6%

Source: Memorial University of Newfoundland

<b>UNIVERSITÉ de MONCTON</b>			
<b>New Brunswick</b>			
<a href="http://www.umoncton.ca">www.umoncton.ca</a>			
<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	7,483	6,400	-14%
<b>Student Origin</b>			
In- Province	90%	89%	-1%
Other Atlantic Provinces	2%	2%	
Elsewhere in Canada	6%	4%	-2%
International	2%	5%	+3%
<b>Student Accommodation</b>			
On-Campus	11%	13%	+2%
Off-Campus	89%	87%	-2%
<b>Degrees Awarded</b>			
Undergraduate	1,088	945	-13%
Graduate / Professional	142	169	+19%
<b>Alumni</b>			
In-Province		28%	
Elsewhere in Canada		64%	
International		8%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	59,192	75,080	+27%
Research	4,822	6,561	+36%
Ancillary and Other	22,990	22,426	-2%
<i>Total</i>	<i>87,004</i>	<i>104,067</i>	<i>+20%</i>
<b>Revenues</b>			
Government Grants	57,495	64,648	+12%
Tuition	13,305	23,684	+78%
Private & Investment	1,753	2,449	+40%
Ancillary & Other	11,788	16,750	+42%
<i>Total</i>	<i>84,341</i>	<i>107,531</i>	<i>+27%</i>
<b>COMMUNITY IMPACT</b>	<b>UdeM</b>	<b>Moncton</b>	<b>%</b>
<b>Population</b>	7,705	61,046	13%
<b>Employment</b>	1,305	22,330	6%
<b>Income (000s)</b>	\$62,540	\$1,085,000	6%

Source: Université de Moncton

## MOUNT ALLISON UNIVERSITY

New Brunswick

[www.mta.ca](http://www.mta.ca)

<b>STUDENTS</b>	<b>1996</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	2,600	2,478	-5%
<b>Student Origin</b>			
In- Province	34%	35%	+1%
Other Atlantic Provinces	37%	35%	-2%
Elsewhere in Canada	26%	23%	-3%
International	3%	6%	+3%
<b>Student Accommodation</b>			
On-Campus	47%	44%	-3%
Off-Campus	53%	56%	+3%
<b>Degrees Awarded</b>			
Undergraduate	458	481	+5%
Graduate / Professional	4	1	-75%
<b>Alumni</b>			
In-Province		28%	
Elsewhere in Canada		64%	
International		8%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
	<b>(\$000s)</b>	<b>(\$000s)</b>	
<b>Expenditures</b>			
General Operating	22,273	28,918	+30%
Research	1,905	1,595	-16%
Ancillary and Other	13,871	17,068	+23%
<i>Total</i>	<i>38,049</i>	<i>47,581</i>	<i>+25%</i>
<b>Revenues</b>			
Government Grants	16,725	17,219	+3%
Tuition	7,576	14,193	+87%
Private & Investment	3,063	2,718	-11%
Ancillary & Other	10,875	14,831	+36%
<i>Total</i>	<i>38,239</i>	<i>48,961</i>	<i>+28%</i>
<b>COMMUNITY IMPACT</b>	<b>MTA</b>	<b>Sackville</b>	<b>%</b>
<b>Population</b>	2,820	5,361	53%
<b>Employment</b>	342	2,330	15%
<b>Income (000s)</b>	\$24,370	\$91,850	27%

Source: Mount Allison University

<b>MOUNT SAINT VINCENT UNIVERSITY</b>			
<b>Nova Scotia</b>			
<i>www.msvu.ca</i>			
<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	3,696	4,592	+24%
<b>Student Origin</b>			
Local		53%	
Elsewhere in Province		22%	
Other Atlantic Provinces		8%	
Elsewhere in Canada		5%	
International		10%	
<b>Student Accommodation</b>			
On-Campus	6%	8%	+2%
Off-Campus	94%	92%	-2%
<b>Degrees Awarded</b>			
Undergraduate		587	
Graduate / Professional		469	
<b>Alumni</b>			
In-Province		65%	
Elsewhere in Canada		30%	
International		5%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	19,992	34,467	+72%
Research	1,542	1,239	-20%
Ancillary and Other	7,489	8,404	+12%
<i>Total</i>	<i>29,023</i>	<i>44,110</i>	<i>+52%</i>
<b>Revenues</b>			
Government Grants	16,668	15,454	-7%
Tuition	7,585	20,457	+170%
Private & Investment	2,111	1,753	-17%
Ancillary & Other	2,565	6,354	+148%
<i>Total</i>	<i>28,929</i>	<i>44,018</i>	<i>+52%</i>
<b>COMMUNITY IMPACT</b>	<b>MSVU</b>	<b>Halifax RM</b>	
<b>Population</b>	5,227	359,111	2%
<b>Employment</b>	635	182,455	0.3%
<b>Income,</b>	\$294,250	\$7,250,000	4%
<b>HRM Universities (000s)</b>			

Source: Mount Saint Vincent University



## UNIVERSITY OF NEW BRUNSWICK

New Brunswick

[www.unb.ca](http://www.unb.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	12,338	12,725	+3%
<b>Student Origin</b>			
In- Province	78%	68%	-10%
Other Atlantic Provinces	12%	11%	-1%
Elsewhere in Canada	7%	8%	+1%
International	4%	12%	+8%
<b>Student Accommodation</b>			
On-Campus	13%	20%	+7%
Off-Campus	87%	80%	-7%
<b>Degrees Awarded</b>			
Undergraduate	1,681	2,130	+27%
Graduate / Professional	439	486	+11%
<b>Alumni</b>			
In-Province		53%	
Elsewhere in Canada		38%	
International		9%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	109,776	154,766	+41%
Research	18,402	36,692	+99%
Ancillary and Other	17,331	32,681	+89%
<i>Total</i>	<i>145,509</i>	<i>224,139</i>	<i>+54%</i>
<b>Revenues</b>			
Government Grants	89,344	115,621	+29%
Tuition	30,532	66,362	+117%
Private & Investment	15,646	15,679	+0.2%
Ancillary & Other	17,331	26,944	+55%
<i>Total</i>	<i>152,853</i>	<i>224,606</i>	<i>+47%</i>
<b>COMMUNITY IMPACT</b>	<b>UNB</b>	<b>F'ton/SJ</b>	<b>%</b>
<b>Population</b>	14,818	117,221	13%
<b>Employment</b>	2,093	55,475	4%
<b>Income,</b>	\$115,270	\$925,000	12.5%
<b>UNB &amp; St. Thomas (000s)</b>			

Source: University of New Brunswick

## NOVA SCOTIA AGRICULTURAL COLLEGE

Nova Scotia

[www.nsac.ca](http://www.nsac.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	616	596	-3%
<b>Student Origin</b>			
In- Province	70%	71%	+1%
Other Atlantic Provinces	26%	21%	-5%
Elsewhere in Canada	3%	4%	+1%
International	1%	4%	+3%
<b>Student Accommodation</b>			
On-Campus	35%	32%	-3%
Off-Campus	65%	68%	+3%
<b>Degrees Awarded</b>			
Undergraduate	73	63	-14%
Graduate / Professional	3	7	+133%
<b>Alumni</b>			
In-Province		68%	
Elsewhere in Canada		28%	
International		4%	
 <b>FINANCIAL</b>	 <b>1995</b>	 <b>2004</b>	 <b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	12,378	16,550	+34%
Research	4,784	5,755	+20%
Ancillary and Other	2,062	2,496	+21%
<i>Total</i>	<i>19,224</i>	<i>24,801</i>	<i>+29%</i>
<b>Revenues</b>			
Government Grants	14,468	17,756	+23%
Tuition	1,901	3,142	+65%
Private & Investment			
Ancillary & Other	2,904	3,889	+34%
<i>Total</i>	<i>19,273</i>	<i>24,787</i>	<i>+29%</i>
 <b>COMMUNITY IMPACT</b>	 <b>NSAC</b>	 <b>Truro</b>	 <b>%</b>
<b>Population</b>	836	44,276	2%
<b>Employment</b>	240	20,250	1.2%
<b>Income (000s)</b>	\$16,384	\$135,164	12%

Source: Nova Scotia Agricultural College

**NSCAD UNIVERSITY**  
**Nova Scotia**  
[www.nscad.ca](http://www.nscad.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	557	949	+70%
<b>Student Origin</b>			
Local		50%	
Elsewhere in Province		0%	
Other Atlantic Provinces		8%	
Elsewhere in Canada		35%	
International		7%	
<b>Student Accommodation</b>			
On-Campus			
Off-Campus	100%	100%	
<b>Degrees Awarded</b>			
Undergraduate	156	197	+26%
Graduate / Professional	8	11	+38%
<b>Alumni</b>			
In-Province		52%	
Elsewhere in Canada		37%	
International		11%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	8,364	12,230	+46%
Research			
Ancillary and Other	424	660	+56%
<i>Total</i>	8,788	12,890	+47%
<b>Revenues</b>			
Government Grants	6,399	6,869	+7%
Tuition	1,886	4,675	+148%
Private & Investment	87	280	+222%
Ancillary & Other	422	998	+136%
<i>Total</i>	8,794	12,822	+46%
<b>COMMUNITY IMPACT</b>	<b>NSCAD</b>	<b>Halifax RM</b>	<b>%</b>
<b>Population</b>	1,142	359,111	0.3%
<b>Employment</b>	193	182,455	0.1%
<b>Income,</b>	\$294,250	\$7,250,000	4.1%
<b>HRM Universities (000s)</b>			

Source: NSCAD University

<b>UNIVERSITY OF PRINCE EDWARD ISLAND</b>			
<b>Prince Edward Island</b>			
<a href="http://www.upei.ca">www.upei.ca</a>			
<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	2,856	4,049	+42%
<b>Student Origin</b>			
In- Province	79%	81%	+2%
Other Atlantic Provinces	15%	11%	-4%
Elsewhere in Canada	5%	4%	-1%
International	2%	4%	+2%
<b>Student Accommodation</b>			
On-Campus	15%	11%	-4%
Off-Campus	85%	89%	+4%
<b>Degrees Awarded</b>			
Undergraduate	453	533	+18%
Graduate / Professional	55	91	+65%
<b>Alumni</b>			
In-Province		64%	
Elsewhere in Canada		30%	
International		6%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	39,501	61,208	+55%
Research	1,552	10,620	+584%
Ancillary and Other	3,623	10,587	+192%
<i>Total</i>	<i>44,676</i>	<i>82,415</i>	<i>+84%</i>
<b>Revenues</b>			
Government Grants	30,949	44,782	+45%
Tuition	7,331	18,558	+153%
Private & Investment	2,312	7,186	+211%
Ancillary & Other	6,265	12,742	+103%
<i>Total</i>	<i>46,857</i>	<i>83,268</i>	<i>+78%</i>
<b>COMMUNITY IMPACTS</b>	<b>UPEI</b>	<b>Ch'town</b>	<b>%</b>
<b>Population</b>	4,793	32,245	15%
<b>Employment</b>	744	15,255	5%
<b>Income (000s)</b>	\$44,650	\$525,400	8.5%

Source: University of Prince Edward Island

## UNIVERSITÉ SAINTE-ANNE

Nova Scotia

[www.usainteanne.ca](http://www.usainteanne.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	365	518	+42%
<b>Student Origin</b>			
Local	32%	32%	
Elsewhere in Province	36%	38%	+2%
Other Atlantic Provinces	25%	20%	-5%
Elsewhere in Canada	4%	5%	+1%
International	3%	5%	+2%
<b>Student Accommodation</b>			
On-Campus			
Off-Campus			
<b>Degrees Awarded</b>			
Undergraduate	54	45	-17%
Graduate / Professional			
<b>Alumni</b>			
In-Province		68%	
Elsewhere in Canada		28%	
International		4%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	5,821	15,814	+172%
Research		36	
Ancillary and Other	2,463	2,228	-10%
<i>Total</i>	<i>8,284</i>	<i>18,078</i>	<i>+118%</i>
<b>Revenues</b>			
Government Grants	2,820	10,362	+267%
Tuition	1,812	2,782	+54%
Private & Investment	163	204	+25%
Ancillary & Other	5,560	3,701	-33%
<i>Total</i>	<i>10,355</i>	<i>17,049</i>	<i>+65%</i>
<b>COMMUNITY IMPACTS</b>	<b>Sainte-Anne</b>	<b>Clare MD</b>	<b>%</b>
<b>Population</b>	642	9,067	7.1%
<b>Employment</b>	124	3,875	3.2%
<b>Income (000s)</b>	\$11,069	\$92,439	12%

Source: Université Sainte-Anne

<b>ST. FRANCIS XAVIER UNIVERSITY</b>			
<b>Nova Scotia</b>			
<a href="http://www.stfx.ca">www.stfx.ca</a>			
<b>STUDENTS</b>	<b>1995</b>	<b>2003</b>	<b>Change</b>
<b>Enrolment</b>	3,203	5,271	+65%
<b>Student Origin</b>			
In- Province	71%	64%	-7%
Other Atlantic Provinces	17%	15%	-2%
Elsewhere in Canada	13%	21%	+8%
<b>Student Accommodation</b>			
On-Campus		42%	
Off-Campus		58%	
<b>Degrees Awarded</b>			
Undergraduate		1,008	
Graduate / Professional		123	
<b>Alumni</b>			
In-Province		65%	
Elsewhere in Canada		32%	
International		3%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	28,927	51,787	+79%
Research	1,286	4,164	+224%
Ancillary and Other	11,187	24,856	+122%
<i>Total</i>	<i>41,400</i>	<i>80,807</i>	<i>+95%</i>
<b>Revenues</b>			
Government Grants		22,307	
Tuition		30,352	
Private & Investment		2,160	
Ancillary & Other		30,362	
<i>Total</i>		<i>85,181</i>	
<b>COMMUNITY IMPACT</b>	<b>StFX</b>	<b>Antigonish</b>	<b>%</b>
<b>Population</b>	5,655	4,754	119%
<b>Employment</b>	384	1,935	20%
<b>Income (000s)</b>	\$41,435	\$75,800	55%

Source: St. Francis Xavier University

## SAINT MARY'S UNIVERSITY

Nova Scotia

[www.smu.ca](http://www.smu.ca)

<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	9,658	11,975	+24%
<b>Student Origin</b>			
Local	62%	54%	-8%
Elsewhere in Province	19%	17%	-2%
Other Atlantic Provinces	6%	8%	+2%
Elsewhere in Canada	6%	6%	
International	7%	15%	+8%
<b>Student Accommodation</b>			
On-Campus	14%	12%	-2%
Off-Campus	86%	88%	+2%
<b>Degrees Awarded</b>			
Undergraduate	972	1,200	+23%
Graduate / Professional	234	259	+11%
<b>Alumni</b>			
In-Province		67%	
Elsewhere in Canada		25%	
International		8%	
 <b>FINANCIAL</b>	 <b>1995</b>	 <b>2004</b>	 <b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating		74,227	
Research		3,800	
Ancillary and Other		13,904	
<i>Total</i>		<i>91,931</i>	
<b>Revenues</b>			
Government Grants		27,806	
Tuition		50,813	
Private & Investment		8,072	
Ancillary & Other		15,943	
<i>Total</i>		<i>102,634</i>	
 <b>COMMUNITY IMPACT</b>	 <b>SMU</b>	 <b>Halifax RM</b>	 <b>%</b>
<b>Population</b>	13,975	359,111	4%
<b>Employment</b>	2,000	182,455	1%
<b>Income</b>	\$294,250	\$7,250,000	4.1%
<b>HRM Universities (000s)</b>			

Source: Saint Mary's University

<b>ST. THOMAS UNIVERSITY</b>			
<b>New Brunswick</b>			
<a href="http://www.stu.ca">www.stu.ca</a>			
<b>STUDENTS</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Enrolment</b>	2,234	3,234	+45%
<b>Student Origin</b>			
In- Province	77%	70%	-7%
Other Atlantic Provinces	20%	21%	+1%
Elsewhere in Canada	3%	4%	+1%
International	1%	5%	+4%
<b>Student Accommodation</b>			
On-Campus	20%	25%	+5%
Off-Campus	80%	75%	-5%
<b>Degrees Awarded</b>			
Undergraduate	368	571	+55%
Graduate / Professional			
<b>Alumni</b>			
In-Province		69%	
Elsewhere in Canada		29%	
International		2%	
<b>FINANCIAL</b>	<b>1995</b>	<b>2004</b>	<b>Change</b>
<b>Expenditures</b>	<b>(\$000s)</b>	<b>(\$000s)</b>	
General Operating	12,201	21,019	+73%
Research	49	483	+886%
Ancillary and Other	4,122	8,830	+114%
<i>Total</i>	<i>16,372</i>	<i>30,332</i>	<i>+85%</i>
<b>Revenues</b>			
Government Grants	7,552	9,691	+28%
Tuition	4,344	12,628	+191%
Private & Investment	2,072	2,297	+11%
Ancillary & Other	3,533	9,223	+161%
<i>Total</i>	<i>17,501</i>	<i>33,839</i>	<i>+93%</i>
<b>COMMUNITY IMPACT</b>	<b>STU</b>	<b>Fredericton</b>	<b>%</b>
<b>Population</b>	3,496	47,560	7%
<b>Employment</b>	262	25,000	1%
<b>Income,</b>	\$115,270	\$925,000	12.5%
<b>UNB &amp; St. Thomas (000s)</b>			

Source: St. Thomas University