Brief to the House of Commons Standing Committee on Finance 2007 Federal pre-Budget Consultations

Noreen Golfman, President
Canadian Federation for the Humanities and Social Sciences
Fall, 2007

Executive Summary

We are in a highly competitive environment in which success is increasingly measured by how well a country turns innovation into commercialization. Canada's ability to compete and to improve and sustain economic performance and well-being will depend on our ability to innovate and create. Our ability to innovate and create depends on a well-educated, skilled, networked and imaginative workforce.

The Canadian Federation for the Humanities and Social Sciences believes that investment in research, training and postsecondary education provides the basis for the kind of innovation that meets the human, environmental, social and material needs of Canadians.

As an organization dedicated to research, scholarship, and teaching in the humanities and social sciences and to a better understanding of the importance of such work for Canada and the world, the Federation will focus its recommendations to the Committee on measures dealing with research and postsecondary education.

While research and education have a material dimension, they equally have human, environmental and social dimensions, all of which contribute to the prosperity and well-being of Canadians. Investment in research and postsecondary education must be supported as one of the most fundamental and essential public goods a country can provide to its citizens. The federal government must support these endeavours at a high level of public funding.

Recommendations

RECOMMENDATION 1
That the Government of Canada increase research funding to the federal research granting councils by amounts beyond the level of inflation.

RECOMMENDATION 2
That the Government of Canada remove the imposition of external targeting measures on the base budgets of the granting councils.

RECOMMENDATION 3
That the Government of Canada increase the amount of provincial transfers to pre-program review levels to assist in strengthening the capacity of Canada's postsecondary institutions.

RECOMMENDATION 4
That the Government of Canada create a separate transfer for postsecondary education to improve the accountability of federal investment, while allowing flexibility for the provinces to determine priority spending within these envelopes.

RECOMMENDATION 5
That the Government of Canada continue its investment in the Canada Graduate Scholarship program by creating additional scholarships for graduate students allocated according to the proportion of students enrolled by discipline.

RECOMMENDATION 6
That the Government of Canada increase funding for the indirect costs program to reimburse an average of 40 per cent of the indirect costs associated with research funded by the federal granting agencies.

The Value of Humanities and Social Sciences Research

What the humanities and social sciences call creativity, science and technology calls invention or discovery.[1] To their credit, our colleagues in science and technology have done a superb job convincing many politicians that investing in basic research will lead to the creation of marketable products. In turn, these products will contribute to the building of a strong economy, an economy that will provide good jobs and higher standards of living to workers and their families.[2]

However, the federal government's own science and technology strategy wisely recognizes that S&T is a joint study and "encompasses the traditional disciplines in the natural sciences – the study of nature; the social sciences, humanities and health sciences – the study of human beings; and engineering – the creation and study of artifacts and systems."[3] This acknowledges that you don't just invent something in a lab, transfer it to industry, market a product and everyone's quality of life goes up.

Publicly funded, university-based research in the humanities and social sciences makes a valuable contribution. This research looks beyond commercialization and analyses the far-reaching impacts of innovation on Canadian society.

For example, Canadian life science research and development has been hugely beneficial for Canadians and the world. From the discovery of insulin to the invention of canola, Canadian innovation in life sciences underpins more than 40 per cent of the Canadian economy and supports Canada's wealth and enviable quality of life – 6th in the world according to the UN Development Program (UNDP 2006), and 15th highest GDP per capita according to the International Monetary Fund (IMF 2007).

This field is growing by leaps and bounds. Canadian innovators are leading the way in biotechnology, genomics, stem cell research and nanotechnogy with developments in the fields of medicine, agriculture, food products and the environment, to name just a few.

These convergent technologies will effect profound societal change. And so the end game cannot be wealth creation alone.

There is a field of research called E3LS that studies the interaction between these new technologies and the Ethical, Economic, Environmental, Legal and Social issues they raise.[4] Canada has developed internationally envied research capacity in this field of study. The purpose of E3LS research is to facilitate the responsible research and development, commercialization and public acceptance (or non-acceptance) of new technologies in and by society. Research in the humanities and social sciences directly informs the human values of this critical relationship between science and society.

While the humanities and social sciences can and do work cooperatively with science and technology, they are not handmaidens to science. The most challenging issues of our time cannot be solved by science alone.

Social issues such as polygamy, childhood obesity and gun violence; public policy issues such as income redistribution and an aging population; foreign policy opportunities; business and political ethics, and environmental problems, such as over-use of water and electrical power, need

---

[1] *Imagine Australia: The Role of Creativity in the Innovation Economy*, Government of Australia, December 2005, p.6.
[2] Stephen Harper in *Mobilizing Science and Technology to Canada's Advantage*, Government of Canada, 2007, p. 1.
[3] *Mobilizing*, p. 101.
[4] http://www.gels.ca/index.php

innovative, creative solutions that will come from the development of human competence and imagination.

Increasingly, research in the humanities and social sciences is leading the way. Notably, SSHRC funded research at the University of Alberta is studying the costs and contributions of an aging population, an issue of increasing importance to Canadian society. The project brings together sociologists, gerontologists, social workers and nursing scientists. It also has specialists in contemporary literature and history on its team. The literature specialist is examining the portrayal of the elderly in modern fiction, the historian the evolution of long-term care policy. The project will influence government policy in areas such as benefits for caregivers.

Many of these projects are multi-disciplinary and collaborative.

The humanities and social sciences will for the first time, advance the 2007-2008 International Polar Year initiatives. Canadian researchers are contributing to a variety of studies, including the economic and cultural sustainability for polar residents, environment-friendly tourism, the environmental and social impacts of oil, gas and mineral exploration, and the sustainable use of local resources.

University-based research in the humanities and social sciences contributes in varied and vigourous ways to the strengthening of Canadian society through the analysis of complex issues, thereby creating a real advantage for Canada.

Research into language acquisition and cultural identity at the University of Ottawa, research into cyber-bullying at the University of Calgary, research at the Université du Québec en Outaouais into how early childhood education may shape the talent of Nobel laureates, and research into the management of coastal resources at Memorial University in Newfoundland, are examples of SSHRC funded, university-based research that will inform and guide the policy-makers of the future.

Success in the social sciences, and especially in the humanities, cannot always be measured by counting patents or inventions. How can we measure the wealth generated by arts programs graduates such as Margaret Atwood, Jean-Louis Roux, Robert Bateman, Adrienne Clarkson, and Northrop Frye? What is the dollar value of building a fair and just society? Canadian legal experts helped Russia re-write their Constitution following the break up of the Soviet Union, advised Rwanda on their Criminal Code, and are currently in Jamaica assisting in the creation of a new justice program.

Sometimes, the road from creativity to economic profit is serendipitous. Graduates from arts programs routinely move into well-paying and long-term jobs on the cutting edge of all sorts of creative and profitable enterprises.

The process of creation is elusive. An educated, innovative mind, fostered in a culture of creativity, is a potent stimulant. The unfettered, curious human mind has limitless potential.

Recommendations

RECOMMENDATION 1
That the Government of Canada increase research funding to the federal research granting councils by amounts beyond the level of inflation.

We fully support the statement made in the federal government's 2006 fiscal update that acknowledges that "Federal granting councils fund projects that provide students with opportunities to work with the best minds and participate in groundbreaking research. This

experience prepares students to add tremendous value to Canadian businesses, health science centres, and Canada's health, social service and other organizations once they graduate." We acknowledge the increases the 2007 federal budget provided to the granting councils.

However, the budgets of the granting councils are not keeping pace with the requirements of the research community or with international competitors who are aggressively investing in their research sectors.

A new generation of academics is taking its place in Canadian universities. In the last five years, Canadian universities hired more than 12,000 new professors and over the next five years more than 28,000 new professors will enter the system.[5] New and exciting research studies are opening as faculty members are being encouraged to broaden their research activities. This has put added pressure on the granting councils, which cannot meet the surge in requests for funding.

The inability to fund so many worthy Canadian research projects means that the potential to innovate is being wasted and puts us further behind our international competitors.

RECOMMENDATION 2
That the Government of Canada remove the imposition of external targeting measures on the base budgets of the granting councils.

The 2007 federal budget provided an additional $11 million to the Social Sciences and Humanities Research Council of Canada (SSHRC), $37 million to the Natural Sciences and Engineering Research Council (NSERC), and $37 million to the Canadian Institutes for Health Research (CIHR).

However, the increases to SSHRC and NSERC are tied to government-determined priorities. In SSHRC's case, these government-determined priorities are research in management, business and finance. These priorities were made without the input of the research community.

We understand that it is sound science and technology policy to invest in selected, strategic areas along with the continued investment in foundational basic research. However, tying SSHRC's entire increases to government-mandated priorities effectively reduces the amount of funding for important, excellent foundational research because the base budget stays flat, unable to accommodate inflationary and demand pressures.

RECOMMENDATION 3
That the Government of Canada increase the amount of provincial transfers to pre-program review levels to assist in strengthening the capacity of Canada's postsecondary institutions.

Enrolment in Canadian universities surpassed the one-million mark for the first time during the academic year 2004-05 with the greatest increase in enrolment taking place in the humanities and social sciences.[6] Fifty-three per cent (20,515) of full-time professors and 55 per cent (49,250) of full-time graduate students at Canadian universities work in the humanities or social sciences.[7] These are the people – the managers, entrepreneurs, teachers, public servants, and political leaders – who will nourish and lead the knowledge society.

---

[5] *Moving Forward as a Knowledge Council.* Social Sciences and Humanities Research Council of Canada. 2006.
[6] http://www.statcan.ca/Daily/English/061107/d061107a.htm
[7] *At a Glance.* Social Sciences and Humanities Research Council of Canada. 2007.

The capacity of postsecondary educational institutions was significantly damaged by cuts to transfer payments that began in the 1990s. Approximately $2.4 billion of the Canada Social Transfer has been identified in support of postsecondary education for the fiscal year 2007-08. To bring this amount to pre-program review levels would require an immediate increase of nearly $2 billion.

RECOMMENDATION 4
That the Government of Canada create a separate transfer for postsecondary education to improve the accountability of federal investment, while allowing flexibility for the provinces to determine priority spending within these envelopes.

In addition to restoring funding, we support a dedicated transfer to the provinces and territories for postsecondary education. We encourage the government to build on the positive step taken in the 2007 federal budget which earmarked $800 million for postsecondary education within the Canada Social Transfer. We recommend that a separate transfer be directed toward the operating costs of the postsecondary education sector, with a long-term commitment at a guaranteed level of support. The design of this transfer requires federal, provincial and territorial agreement to ensure that the funds are invested in a transparent fashion while respecting the provinces' jurisdiction in setting their own priorities.

RECOMMENDATION 5
That the Government of Canada continue its investment in the Canada Graduate Scholarship program by creating additional scholarships for graduate students allocated according to the proportion of students enrolled by discipline.

We encourage the federal government to build on the provision in the 2007 budget, which made possible an additional 1,000 new scholarships. When the Canada Scholarship Program was announced in 2003, the scholarships were allocated according to enrolment proportion at the graduate level among the granting councils; 60 per cent for humanities and social sciences; 30 per cent for natural and engineering sciences; and 10 per cent for health sciences. This allocation recognized the equal value of graduate studies across all disciplines and validated what research in the humanities and social sciences contributes to our communities and our country. However, of the new scholarships announced in the 2007 budget, only 20 per cent are for the humanities and social sciences.

This recent allocation does not acknowledge that 55 per cent of graduate students work in the humanities and social sciences. Publicly-funded research is being conducted at 204 Canadian universities and colleges in areas such as health, aging, economic development, globalization, the environment, language acquisition, comparative religions, law, ethics, literature and history (SSHRC). This research improves Canadians' quality of life and increases Canada's competitiveness.

RECOMMENDATION 6
That the Government of Canada increase funding for the indirect costs program to reimburse an average of 40 per cent of the indirect costs associated with research funded by the federal granting agencies.

The indirect costs of research include, among other things, operating and maintaining facilities, managing information, meeting regulatory requirements and supporting knowledge transfer. As noted by the federal government, "By undertaking these activities, institutions provide the environment needed to realize the greatest possible benefits from the direct research support

provided by the granting councils".[8] We acknowledge that the 2007 budget allocated an additional $15 million each year to the Indirect Costs of Research program. However, this amounts to only 17.6 per cent of the additional direct funding of $85 million to the three granting councils. Indirect costs are widely acknowledged to total roughly 40 per cent of the direct costs of research. A previous Standing Committee on Finance recommended this as the "appropriate level for funding indirect costs [because it] would provide levels of support competitive with that found in other G7 nations."[9]

Conclusion

The federal government has quite rightly placed a strong emphasis on funding science and technology. Scholars in the humanities and social sciences support this investment. However, Canada's economic and social future relies as much on its human sciences as it does on its natural, engineering and health sciences. Success involves human potential, human excellence. It requires the skills of people and the creation of intellectual capacity.

The Canadian Federation for the Humanities and Social Sciences believes that investment in postsecondary education, training, research and development is an essential public good and essential to Canadians' quality of life and to our ability to compete internationally and contribute to the global society.

About the Federation

The Canadian Federation for the Humanities and Social Sciences promotes research, scholarship, teaching and sharing of knowledge in the humanities and social sciences. Founded during World War II, the Federation has, for over 60 years, nurtured cultural, political and intellectual freedom in Canada, helped shape public policy, fostered teaching in our disciplines at all levels of education, enhanced intellectual productivity, and applied humanities and social science scholarship to the public good. We represent more than 50,000 researchers, 69 universities and 66 associations of specialized scholars, graduate students and practitioners across Canada – the largest single segment of Canada's research community. (www.fedcan.ca)

The Federation organizes the annual "Congress of the Humanities and Social Sciences", formerly known as the Learneds which draws together more than 6,000 researchers, scholars and graduate students from across Canada and abroad. The "Breakfast on the Hill" lecture series for parliamentarians and federal decision-makers is a hallmark event held in Ottawa for the past 15 years. The Federation also manages the Aid to Scholarly Publications Program which provides subsidies for the publication of approximately 180 scholarly books each year. Over its 65-year history, this program has supported nearly 5,000 works by Canadian scholars, including Antonine Maillet, Northrop Frye, Sylvia Ostry, Thomas Flanagan and Harold Adams Innis, to name just a few.

[8] *The Budget Plan 2007*. Government of Canada, p. 202.
[9] *Canada: people, places and priorities*. Report of the Standing Committee on Finance. Ottawa: November 2002. Recommendation 14

Submission to the Senate Standing Committee on Social Affairs, Science and Technology

Regarding Mobilizing Science and Technology to Canada's Advantage

Noreen Golfman, President
Canadian Federation for the Humanities and Social Sciences
January 2008

Summary of Points

The social sciences and humanities can and do contribute in direct and meaningful ways to the achievement of the priorities of the government, and to the public good. The Federation believes that this contribution should be clearly recognized and supported in the science and technology strategy.

Research does have a material dimension, but equally it has human, environmental and social dimensions, all of which contribute to the prosperity and well-being of Canadians. Investment in the social sciences and humanities, and not only in the health sciences and new technologies, must be supported as one of the most fundamental and essential public goods a country can provide to its citizens.

Given the important role the social sciences and humanities can play in helping the government achieve its goals, the Federation believes that policy and decision-makers should have access to the most balanced recommendations possible. This can be achieved through greater representation from the social sciences and humanities disciplines on the Science, Technology and Innovation Council, as well as on other advisory boards, councils, and in submissions to Senate and House of Commons committees.

The federal government should take advantage of the excellent opportunity presented by researchers in the humanities and social sciences to contribute to the innovation economy.

Humanities and social sciences have a place in the innovation system, and the business sector must be encouraged to more fully embrace partnerships with the humanities and social sciences that benefit both the economy and the public.

Research of national interest from the point of view of social, economic, health and environmental benefits isn't the exclusive province of science and technology. In fact, many of the issues identified in the strategy require a close consideration of the human and social component to ensure the greatest benefit to Canadian society.

An educated, innovative mind, fostered in a culture of creativity, is a potent stimulant. Innovative, creative solutions come from the development of human competence and imagination. However, competitive advantage and leadership on the world stage come from a broad and deep understanding of the world and the people that inhabit it.

I. Introduction

The Canadian Federation for the Humanities and Social Sciences welcomes the release of the federal government's science and technology strategy, *Mobilizing Science and Technology to Canada's Advantage*. Investment in and support for research and innovation is necessary to ensure that Canada can succeed in an increasingly competitive international arena.

The strategy focuses almost exclusively on two areas: promoting private sector research and development, and the commercialization of academic research. While the government indicates that it will continue to support basic research, it intends to adopt a more strategic approach of setting research priorities and a more focused research agenda. The main thrust of the strategy is clear. If knowledge can be used to support an entrepreneurial advantage, if research can result in a marketable product, then it will be supported by federal investment.

The social sciences and humanities can and do contribute in direct and meaningful ways to the achievement of the priorities of the government. The Federation believes that this contribution should be clearly recognized and supported in the science and technology strategy.

It is not necessarily a direct line from invention to industry to an increase in the quality of life of Canadians. **Although research does have a material dimension, equally it has human, environmental and social dimensions, all of which contribute to the prosperity and well-being of Canadians. Investment in the social sciences and humanities, and not only in the health sciences and new technologies, must be supported as one of the most fundamental and essential public goods a country can provide to its citizens.** The end game is as much about a better Canada as it is about a more economically competitive Canada.

1. Defining Science

There has been a growing acceptance among scholarly associations and councils that a narrow definition of science in the policy-making process is no longer desirable or feasible. Science has come to be defined in much broader terms, as knowledge across a range of subjects and methodologies. Indeed, both the Association of Universities and Colleges of Canada and the Council of Canadian Academies, in their submissions to the government in the consultation process for the Science and Technology Strategy, point out that considerations of science and its impact for Canada

should include the social sciences and humanities; that governmental priorities in the realm of science and technology should be defined as broadly as possible; and that the social sciences and humanities should be active partners in the priority-setting process from the earliest stages of the strategy (Committee, 1 and AUCC, i).

Despite such advice, current policies and governmental strategies tend to favour support for technology and the "hard" sciences over the humanities and social sciences. For example, the government recently eliminated the three existing external advisory bodies in favour of a 17-member *Science, Technology and Innovation Council,* with members appointed by the federal government. The council, which reports directly to the Minister of Industry, is tasked with providing the Minister "with evidence-based policy advice on science and technology issues and will produce regular national reports that measure Canada's ... performance against international standards of excellence" (Canada, 15). The current membership of this council, on which the Minister is depending for policy advice, is heavily weighted with representatives from the natural and health, or "hard" sciences. **Given the important role the social sciences and humanities can play in helping the government achieve its goals, the Federation believes that policy and decision-makers should have access to the most balanced recommendations possible. This can be achieved through greater representation from the social sciences and humanities disciplines on the Science, Technology and Innovation Council, as well as on other advisory boards, councils, and in submissions to Senate and House of Commons committees.**

While the science and technology strategy does acknowledge that the humanities and social sciences can play a role in our innovation system, it does not recognize the magnitude of this role. While it is tempting to regard science, engineering and technology as the drivers of rising standards of living and consequential social benefits, the humanities and social sciences allow us to understand the consequences of moving to a knowledge-based economy, to assess issues touching the lives of ordinary Canadians, and to understand the impact of human behaviour on the world around us.

II. The Science and Technology Strategy

The science and technology strategy states that it aims to build three advantages:

1. **An entrepreneurial advantage**: translating knowledge into commercial applications.
2. **A knowledge advantage**: positioning Canada at the leading edge of important developments that generate health, environmental, societal and economic benefits.

3. **A people advantage**: growing the best-educated, most skilled and most flexible workforce in the world.

There are many ways the social sciences and humanities can and do contribute to the national economy and the well-being of Canadians. **The Federation's position is that the federal government should take advantage of the excellent opportunity presented to it by the humanities and social sciences to contribute to the innovation economy.**

1. The Entrepreneurial Advantage

The first advantage – **the entrepreneurial advantage** – emphasizes the conversion of knowledge gained through first-class research into commercial applications. More specifically, the strategy encourages the private sector to increase its financial support to research in science and technology.

The Federation's position is that the humanities and social sciences have a place in the innovation system and that the business sector must be encouraged to more fully embrace partnerships that benefit both the economy and the public.

Little data exists on private sector support of research in the humanities and social sciences, but a reading of press materials provided by universities across Canada regarding financial support to academe strongly suggests that partnerships between business and the social sciences and humanities have traditionally taken the form of bursaries, scholarships and prizes, rather than investment in specific research projects with the expectation of a commercial application.

An example is the new $20,000 graduate scholarship in Technology and Society at the University of Ottawa created in March 2007, to be awarded to a graduate student who is studying the impact and relevance of technology on public policy, democratic processes, international development or society (http://www.media.uottawa.ca/mediaroom/news-details_1106.html).

New partnerships similar to the ones envisioned in the strategy are developing as members of the businesses and the academic community recognize the practical benefits of humanities and social sciences research to the economy and to society. For example:

- In February 2007, York University announced the creation of The Consortium on New Media, Creative and Entertainment Research and Development in the Toronto Region (CONCERT), a partnership of multinational, mid-sized and small companies in the entertainment, screen-based and other creative industries with academia, government and industry. CONCERT will

> grow the region's entertainment, screen-based and other innovation-driven creative industries into a globally competitive cluster, to allow the Greater Toronto Area to capture a larger share of the lucrative worldwide entertainment market (http://www.yorku.ca/ylife/2007/03-March/03-12/concert-031207.htm).

Businesses are beginning to realize that partnering with researchers in the humanities and social sciences also provides important opportunities to assess future markets, and to understand user behaviours and needs. For example:

- The TAPoR initiative, a partnership between IBM Canada, the University of Toronto and McMaster University, allows researchers to conduct lexical research such as text analysis that would have been impossible to do manually. In return, IBM has gained useful insights into how a major part of its future market – colleges and universities – uses computers and into how text-analysis applications now dominate the web itself (http://www.news.utoronto.ca/bin6/071010-3438.asp).

The government is more likely to achieve the objectives it has laid out in the science and technology strategy if it recognizes the mutually beneficial partnership of humanities and social sciences and business and if it does more to promote this kind of partnership. An entrepreneurial advantage is created when the private sector successfully partners with the humanities and social sciences in "finding new solutions and new processes to business models and operational challenges rather than waiting for the serendipitous benefits of laboratory science to trickle down, or out, to the real world" (Cunningham, 4).

2. The Knowledge Advantage

The second advantage – **the knowledge advantage** – proposes positioning Canada at the leading edge of important developments that generate health, environmental, societal and economic benefits. The strategy identifies four main areas of research:

- environmental science and technology;
- natural resources and energy;
- health and related life sciences and technologies; and
- information and communication technologies.

The Federation's position is that research of national interest from the point of view of social, economic, health and environmental benefits isn't the exclusive province of science and technology. In fact, many of the issues identified in the strategy require a

close consideration of the human and social component to ensure the greatest benefit to Canadian society.

Current research projects provide excellent examples of the contribution the social sciences and humanities are already making to these fields. For example:

- Current research in science and technology acknowledges the necessity of studying the impact of the ethical, economic, environmental, legal and social implications of new technologies. This research, variously known as EEELS or ELSI research, directly addresses issues of national importance, such as the improvement of Canadians' quality of life, public safety, and global influence. Genome Canada, for example, has dedicated a portion of its budgets to EEELS research, all of which falls squarely in the realm of the social sciences and humanities (http://www.genomecanada.ca/xresearchers/researchPrograms/projects/index.asp?o=d&d=6&l=e).
- David Castle, who has a PhD in philosophy and is the Canadian Research Chair in Science and Society at the University of Ottawa, is conducting research into societal resistance to technological advances, and developing analytical frameworks for use in innovation assessment and recommendations for governance (http://www.chairs.gc.ca/web/chairholders/viewprofile_e.asp?id=2154).
- In December 2007, James Ford, a post-doctoral fellow in the Department of Geography at McGill University, received one of three Networks of Centres of Excellence (NCE) Young Innovator Awards for his work on climate change and his efforts to share the results of that work with a wider audience. Ford's research focuses on the vulnerability of Inuit populations to climate change. He has published 11 peer-reviewed papers, collaborated with Inuit communities and institutions, advised northern governments and agencies on policy development, and contributed to media debates on climate change. In addition, through his work with the NCE's ArcticNet project, he has helped communities and industry reduce the economic impact of climate change (http://www.mcgill.ca/newsroom/news/?ItemID=28135).
- The Canadian Institute for Advanced Research (CIFAR) is currently conducting economics research into measuring the well-being of a society. In addition to challenging broad economic ideas, their research will bring revolutionary new ideas on the economics of gender, politics, and cultural minorities. New insights and explanations "will impact on public policy at every level, from local to international" (http://www.cifar.ca/web/home.nsf/pages/socialinter).

Research in the humanities and social sciences is integral to the success of any science and technology strategy, and Canadian research is well-placed to lead the way. Indeed, the original report from which the government drew its recommendations, generated by the Council of Canadian Academies, identified areas in the social sciences and humanities in which Canada is strong and growing: media, multimedia, animation and gaming, visual and creative arts, as well as emerging interdisciplinary fields such as Aboriginal health, aging and gender and health (Committee, 5-10).

Research into language acquisition and cultural identity at the University of Ottawa, research at the Université du Québec en Outaouais into how early childhood education may shape the talent of Nobel laureates, and research into the management of coastal resources at Memorial University are all examples of how the humanities and social sciences contribute to the knowledge economy by creating a knowledge advantage. While it is unlikely that any one of these research projects will deliver a commercially marketable product or result in a patent, their contribution to the economy and to the public good cannot be disputed.

3. The People Advantage

The third and final advantage outlined in the science and technology strategy – **the people advantage** – centres on enhancing opportunities for science and technology graduates, increasing the supply of highly qualified and globally connected science and technology graduates to businesses and organizations, and increasing the enthusiasm for science and technology among Canadians.

The Federation's position is that an educated, innovative mind, fostered in a culture of creativity, is a potent stimulant. Innovative, creative solutions come from the development of human competence and imagination. However, competitive advantage and leadership on the world stage come from a broad and deep understanding of the world and the people that inhabit it.

The Federation believes it is short-sighted to be overly focused on the acquisition of technical skills, which can quickly become obsolete. In addition to technical skills and knowledge, future Canadian workers will also need skills that can be gained effectively through the humanities and social sciences. For example, workers will need to be able to:

- communicate effectively, and in more than one language;
- understand human behaviour and apply that understanding to their research;
- understand differences among cultures and be able to negotiate those differences;
- understand market forces and fluctuations; and

- understand the impact of new and innovative products and services on the environment, the economy and society in general.

We need problem-solvers as much as we need inventions. Jim Balsillie, co-chief executive officer of Research in Motion, said, "To be world players, we need to understand the world" (B2). He recently created the Canadian International Council, which has initiated a fellowship program designed to attract both eminent, established researchers as well as Canada's most promising young minds and provide them the opportunity to help guide Canada on pressing foreign policy problems. CIC Fellows will devote 6 to 12 months of their time to work on a research project focused on a particular foreign policy issue. The goal of each project is to produce a viable set of policy recommendations (http://www.canadianinternationalcouncil.org/fellowships.php). He has also endowed both the Centre of International Governance Innovation (CIGI) and the Balsillie School of International Affairs – both at the University of Waterloo – which will bring the best minds from around the world to collaborate, find solutions and educate the next generation of international policy makers.

At McMaster University, Chancellor Lynton Wilson recently gave $10 million to the university's liberal arts programs, saying. "These disciplines are important in the development of the next generation of entrepreneurs, policy makers, innovators and politicians, who, in turn, will make us competitive and compassionate on a global scale" (http://www.mcmaster.ca/opr/html/opr/media/main/NewsReleases/2007/Wilsongiftannouncement.html).

4. Investing in the Humanities and Social Sciences

A recent Statistics Canada report shows that residents of cities with university degrees are key drivers of a city's employment growth, and that attracting scientists and engineers to cities contributes most to that growth (Beckstead, Brown and Gellatly, 7). Importantly, the study includes social and related scientists in its definition of scientists and engineers, meaning economists, political scientists, psychologists, sociologists, anthropologists, and others. The study found that if a city had a higher proportion of university-educated employees, in particular graduates of the programs described above, the annual average growth was 2 percent, compared to cities with lower concentrations of university-educated workers, which grew at an annual average rate of 1.6 percent.

The Statistics Canada study adds to a larger body of research linking the importance of human capital to the growth of cities; research that shows that our ability to perform economically depends on our

ability to innovate and create, and that our ability to innovate and create depends on a well-educated, skilled, networked and imaginative workforce (Florida, 743-755).

There is evidence as well that investing in the social sciences and humanities is one of the keys to Canada's survival and success in the global economy. Statistical analysis shows that in a global economy, in which creative thinking, teaching and managerial skills are valued, social sciences and humanities graduates may have an advantage over contemporaries in other fields. Cost-benefit analysis shows the rate of return to society on investment in the social sciences (9%) and education (10.2%) outstrips the rate of return for engineering (7.9%) as well as the rate of return for math and the physical sciences (7.4%) (Allen, 39).

The same study shows the rate of return to society on investment in the humanities (7.8%) is on a par with that of engineering and slightly higher than the rate of return for math and the physical sciences. As well, a background in social sciences and humanities appears to have a major impact on earning power. From their twenties to their fifties, those who graduate in humanities see their incomes rise, on average, by 78%. Graduates in social sciences see their incomes rise 106% over the same period (Allen, 41, 27).

Graduates in the social sciences and humanities therefore contribute in an important way to the economy. They are integral to innovation, progress and social well-being.

5. The Federation's Role

Federal government support to post-secondary research is achieved through: budgetary allocations to the three granting councils, the Canadian Institutes for Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC) and the Social Sciences and Humanities Research Council (SSHRC); investments in government programs such as the Graduate Scholarship Program and the Indirect Costs Program; transfers to the provinces and territories for post-secondary education; and through policy directions that govern these financial disbursements. Recent fiscal strategy emphasizes accountability, visibility and value for money of federal investments. **The Canadian Federation for the Humanities and Social Sciences assists in highlighting the federal government's investments in post-secondary education and research through two of its main programs:**

- The Congress of the Humanities and Social Sciences (formerly known as the Learneds) is the largest annual academic gathering in Canada; its multidisciplinary character marks it as unique in the world. Congress is an intellectual festival; an important meeting place where

new and established academics and researchers can share their groundbreaking ideas and debate the most important questions of the day. Congress highlights in a very national forum the research in the social sciences and humanities that is made possible through federal grants and Canada Research Chairs. Through community outreach efforts, the Federation engages local community members – cultural, business, aboriginal, alumni and others -- and brings them to Congress. Media coverage of Congress reflects the enormous local, regional and national interest in the social sciences and humanities. At Congress 2007, hosted by the University of Saskatchewan, an estimated 212 newspaper articles, television, radio and online pieces appeared.

- The Federation hosts the Breakfast on the Hill seminar series 6 times a year, which brings ground-breaking researchers in the humanities and social sciences to the Hill to engage MPs, Senators and their staffs, government officials and policy-makers, NGOs and the media on the critical issues of the day. This non-partisan forum features a variety of disciplines and viewpoints on subjects such as Canada's combat role in Afghanistan, racial profiling, immigration, the exchange rate, and the changing Canadian family. In the 2007-08 Parliamentary year, 549 people came to gain insight on various policy matters through outstanding, topical and federally-funded Canadian research.

6. Conclusion

The federal government has quite rightly placed a strong emphasis on science and technology, recognizing the advantages that can be created by innovation. Scholars in the humanities and social sciences encourage this investment, and the Federation will continue to advise Parliamentarians on the budgetary decisions that support research (http://www.fedcan.ca/english/pdf/publications/FinanceBrief2008.pdf).

However, Canada's economic and social future relies as much on its human sciences as it does on its natural, engineering and health sciences. Success involves human potential and human excellence.

The Federation believes that the social sciences and humanities can and do contribute in meaningful ways to our ability to compete internationally and contribute to the global society and the public good.

Main Works Cited:

Allen, Robert C. "The Employability of University Graduates in the Humanities, Social Sciences and Education: Recent Statistical Evidence." Discussion Paper No. 98-15. British Columbia: University of British Columbia, 1998.

Association of Universities and Colleges of Canada. AUCC Submission to the Minister of Industry and the Minister of Finance on the Development of a Science and Technology Strategy for Canada. Ottawa: AUCC, 2007.

Balsillie, Jim. "To Be World Players, We Need to Understand the World." The Globe and Mail 10 September 2007, B2

Beckstead, Desmond, W. Mark Brown and Guy Gellatly. Cities and Growth: The Left Brain of North American Cities: Scientists and Engineers and Urban Growth. Ottawa: Industry Canada, 2008.

Committee on the State of Science and Technology in Canada. The State of Science and Technology in Canada. Ottawa: Council of Canadian Academies, 2006.

Cunningham, Stuart. "Oh, the Humanities! Australia's Innovation System is Out of Kilter."Symposium. 37 (2007): 4-6

Florida, Richard. "The Economic Geography of Talent." Annals of the Association of American Geographers. 92:4 (2002): 743-755.

Canada. Industry Canada. Mobilizing Science and Technology to Canada's Advantage. Ottawa: Industry Canada, 2007.

The Canadian Federation for the Humanities and the Social Sciences

The Canadian Federation for the Humanities and Social Sciences promotes research, scholarship, teaching and sharing of knowledge in the humanities and social sciences. It is a membership-based organization made up of 67 scholarly associations and 72 universities and colleges, and comprising more than 50,000 scholars, students and practitioners across Canada.

The Federation:

- acts as representative and convenor of the largest research community in Canada;
- annually organizes The Congress, the largest multidisciplinary gathering of scholars in North America;
- administers a program that supports the publication of 185 scholarly books per year;
- awards scholarly book prizes each year;

- runs a series of lectures on Parliament Hill to bring humanities and social science research to policy-makers;
- addresses professional matters, including research ethics;
- undertakes research projects to help advance Canada's humanities and social science fields.

The Federation is a non-profit, charitable organization, governed by an Executive Committee and Board of Directors made up of scholars from its member groups with a permanent secretariat based in Ottawa.

Canada needs more grad students if we are to remain competitive; There is no better way to ensure economic growth than to invest in people; [Final Edition]

CLAIRE M. MORRIS. **The Gazette**. Montreal, Que.: Feb 25, 2008. pg. A.17

Abstract (Summary)

The simple truth is that there's no better way to ensure our continued economic growth and prosperity than by investing in people, and graduate students should be a high priority. The reality is that we're in a global race for research talent - and this has serious implications for Canada's ability to compete in the global marketplace.

Proportionally speaking, our U.S. neighbours award twice as many master's degrees per capita as we do and 35 per cent more doctoral degrees in the key 25- to 39-year-old cohort. Canada also lags behind many other OECD countries in producing doctoral graduates. And emerging economic powers like India and China are educating more graduate students than ever before. India has an ambitious program to quadruple its number of universities to 1,500 by 2015, and China has seen its number of graduate students increase by an average of 26 per cent annually since 2000.

Many economists believe that Canada's relative undersupply of people with graduate education (especially compared to the U.S.) is a barrier to increasing our country's international competitiveness and productivity. Producing more advanced degree holders for the workforce will become even more critical for Canada's economy in the next 10 years because of massive retirements among the baby-boomer generation. Growing demand for graduates and an increasing need to replace highly skilled workers as baby boomers retire, combined with insufficient domestic production of new advanced-degree holders, means Canada cannot meet upcoming labour market need.

Full Text (765 words)

Advanced degree holders are the lifeblood of our knowledge-based economy. These highly skilled individuals are one of the primary ways for transferring knowledge from universities to other sectors, and their strong analytical and research abilities make them invaluable in today's labour market.

The simple truth is that there's no better way to ensure our continued economic growth and prosperity than by investing in people, and graduate students should be a high priority. The reality is that we're in a global race for research talent - and this has serious implications for Canada's ability to compete in the global marketplace.

Proportionally speaking, our U.S. neighbours award twice as many master's degrees per capita as we do and 35 per cent more doctoral degrees in the key 25- to 39-year-old cohort. Canada also lags behind many other OECD countries in producing doctoral graduates. And emerging economic powers like India and China are educating more graduate students than ever before. India has an ambitious program to quadruple its number of universities to 1,500 by 2015, and China has seen its number of graduate students increase by an average of 26 per cent annually since 2000.

Many economists believe that Canada's relative undersupply of people with graduate education (especially compared to the U.S.) is a barrier to increasing our country's international competitiveness and productivity. Producing more advanced degree holders for the workforce will become even more critical for Canada's economy in the next 10 years because of massive retirements among the baby-boomer generation. Growing demand for graduates and an increasing need to replace highly skilled workers as baby boomers retire, combined with insufficient domestic production of new advanced-degree holders, means Canada cannot meet upcoming labour market need.

To meet these challenges, we need to increase the number of our master's and doctoral graduates by at least 30 per cent.

Over the past decade, Canada has increasingly relied on immigration to meet a significant portion of the growing demand for advanced-degree holders, but this supply is not guaranteed, especially as global competition for talent

increases.

So what is the solution? All governments, federal and provincial, must make it a priority to increase the number of Canadians with advanced degrees. Substantial investments are needed to ensure our graduate programs are the first choice for the best and brightest in Canada and top students from abroad.

In its last budget, the federal government added 1,000 new Canada Graduate Scholarships to enable more students to pursue advanced degrees. This is definitely a step in the right direction. Further expanding this program by an additional 4,000 scholarships for Canadian master's and doctoral students over the next three years would help attract and retain the critical thinkers and innovators needed for our research community and economy.

We also need to look beyond our borders. Let's encourage more international students to pursue graduate education in Canada by establishing a prestigious scholarship program with the goal of attracting 2,500 students from abroad. This program would not only serve as a magnet for exceptional students to study in Canada, it would also promote reciprocity with other OECD countries that provide prestigious scholarships for Canadians to study away from home.

It's worth remembering that international graduate students studying in Canada provide tangible benefits to our economy. They continue to benefit us whether or not they choose to remain in Canada. By making connections and forming relationships during their graduate education, they are laying the foundation for future trade, research and diplomatic networks that are increasingly important in the global economy.

Scholarships, however, are only half of the equation. We also need to provide graduate students with opportunities to engage in relevant research and to contribute their knowledge to the private and public sectors through internships and co-op placements.

Increasing financial support for faculty research grants through the federal research granting agencies will make it possible for more graduate students to hone their research skills and gain valuable experience by participating in professors' research projects. Incentives for research-based internships and co-op placements would also allow organizations from all industries and sectors to benefit from the specialized knowledge and enthusiasm of graduate students.

Canada will face critical labour-market shortages in the coming decades. If we are serious about ensuring our country's long-term economic growth and continued prosperity, we must address our competitive and demographic challenges. By enhancing our programs for Canadian and international graduate students, we'll be investing in a better future for all Canadians. And that will clearly be money well invested.

Claire M. Morris is president and CEO of the Association of Universities and Colleges of Canada.

Credit: Freelance

Indexing (document details)

Author(s):	CLAIRE M. MORRIS
Document types:	COLUMN
Column Name:	*CLAIRE M. MORRIS*
Section:	*Editorial / Op-Ed*
Publication title:	The Gazette. Montreal, Que.: Feb 25, 2008. pg. A.17
Source type:	Newspaper
ISSN:	03841294
ProQuest document ID:	1436055951
Text Word Count	765
Document URL:	http://ezproxy.library.yorku.ca/login?url=http://proquest.um i.com/pqdweb?did=1436055951&sid=4&Fmt=3&clientId=5220&RQT=30 9&VName=PQD

Canadian Federation of Students
Fédération canadienne des étudiant(e)s

NEWS RELEASE

For Immediate Release
Tuesday, February 26, 2008

Graduate students welcome increase in graduate scholarships

OTTAWA—The announcement of new scholarship money for graduate students will increase access to graduate research positions in Canada and will allow more graduate students to conduct innovative research.

"Graduate student research in Canada is under-funded, and this budget takes small steps to address that," said Graham Cox, Chairperson of the National Graduate Caucus of the Canadian Federation of Students, "Graduate students play a large role in both basic research and faculty renewal—two cornerstones in maintaining healthy public universities."

The government announced an additional 500 Canada Graduate Scholarships available for PhD students, providing $50,000 per year for up-to three years of study. In addition, 250 scholarship holders will now be able to get funding to study abroad for one semester.

Budget 2008's investments in the granting councils were slim and unbalanced. Although the majority of graduate students (53%) carry out research in the social science and humanities, scholarships announced in the budget favour science and technology research areas over the social sciences and humanities by more than five to one.

"The Conservative government has to get passed the idea that it has a role in meddling with the university research agenda. Intervening by setting the priorities for independent research goes against the principles of academic freedom and scholarly inquiry," said Cox.

The National Graduate Caucus is Canada's voice of graduate students, uniting over 60,000 graduate students from all ten provinces.

- 30 -

For more information, please contact:
Graham Cox, NGC Chairperson (506) 292-6503
Meghan Gallant, NGC representative on the national board (647) 407-5048

Antidepressants don't work? How depressing!; Equally upsetting is that scientific studies of the drugs were hidden; [Final Edition]

JANET BAGNALL. **The Gazette**. Montreal, Que.: Feb 29, 2008. pg. A.15

Abstract (Summary)

Researchers from Canada, the U.S. and Britain got hold of the published and unpublished clinical trials and data used by drug companies. In the U.S., the Food and Drug Administration requires that information on all industry-sponsored trials be submitted to it as a step toward licensing approval. The study looked at six commonly prescribed antidepressants.

The researchers sought both published and unpublished trials in an effort to eliminate bias in the study findings. Yet, researchers wrote that in nine trials (out of a total of 47) information was missing in the mandatory disclosure. All nine trials in question failed to show a "statistically significant benefit" for the drug over a placebo.

A second U.S. study, this one from 2006, looked at financial ties between the pharmaceutical industry and scientists who did revisions of the Diagnostic and Statistic Manual of Mental Disorders, the bible for mental-health professionals. Examining the interests of 170 DSM panel members, researchers found that more than half had one or more financial ties to pharmaceutical companies. The most common association was **research funding**.

» Jump to indexing (document details)

Full Text (693 words)

At least as depressing as the news that antidepressants don't work on most patients is how much money Canadians have been throwing away on these apparently worthless pills.

Spending on antidepressants in Canada, already substantial at $31.4 million in 1981, by 2000 had increased exponentially to $543.4 million, a 2002 study showed.

At a time when Canada's health-care costs are apparently out of control or, according to medicare's critics, unsustainable, throwing away hundreds of millions of dollars on ineffective medicine is not useful.

Canada is not the only country to fall victim to the Prozac Nation craze. Around the world 40 million people have been prescribed

popular antidepressants like Prozac. By the mid-1990s, Prozac's sales reached $2 billion a year.

But the more important question is why were these drugs prescribed if they didn't work? How was it possible that medical practitioners didn't know these antidepressants were ineffective?

Here, the story gets interesting. This week, a study was published, which was the first one based on studies and data obtained through U.S. freedom-of-information legislation.

Researchers from Canada, the U.S. and Britain got hold of the published and unpublished clinical trials and data used by drug companies. In the U.S., the Food and Drug Administration requires that information on all industry-sponsored trials be submitted to it as a step toward licensing approval. The study looked at six commonly prescribed antidepressants.

The study, published in the Public Library of Science Medicine, compared trial results between patients given a placebo (a sugar pill) and patients prescribed antidepressants. Researchers found that patients on placebos improved as much as those taking antidepressants. The exceptions were patients who were severely depressed.

"This means that depressed people can improve without chemical treatments," Irving Kirsch, at the University of Hull in Britain and one of the study's authors, was quoted as saying.

The researchers sought both published and unpublished trials in an effort to eliminate bias in the study findings. Yet, researchers wrote that in nine trials (out of a total of 47) information was missing in the mandatory disclosure. All nine trials in question failed to show a "statistically significant benefit" for the drug over a placebo.

This is not the first time drug companies have been criticized for burying information that shows their products in an unfavourable light.

The Journal of the American Medical Association has published research showing that 38 per cent of independently researched studies of drugs came to unfavourable conclusions about the drugs. This is more than seven times the rate of unfavourable findings in studies funded by the pharmaceutical industry.

Because most clinical trials published in the world's major medical journals are sponsored by the pharmaceutical companies, medical practitioners or lay people, who try to keep up on new developments are not necessarily going to be able to find the unvarnished truth.

Seventy-five per cent of clinical trials published in the Lancet, the New England Journal of Medicine, Journal of the American Medical Association and the Annals of Internal Medicine are sponsored by the industry, the Independent newspaper reported.

Conflicts of interest are another problem. They seem to be only too present. A 2003 U.S. analysis of 789 articles in major medical journals found that a third of the lead authors had financial interests in their research. Specifically, the authors received patents, share or payments from the companies for working as advisers or directors. As few as two per cent of researchers disclosed their conflicting interests.

A second U.S. study, this one from 2006, looked at financial ties between the pharmaceutical industry and scientists who did revisions of the Diagnostic and Statistic Manual of Mental Disorders, the bible for mental-health professionals. Examining the interests of 170 DSM panel members, researchers found that more than half

had one or more financial ties to pharmaceutical companies. The most common association was **research funding**.

This is an argument for having a far greater number of drug trials run by independent research organizations or individual researchers. These trials should be funded either by government or by agencies proven to be independent of any ties to the pharmaceutical industry.

That's worth at least $500 million. Surely.

jbagnall@thegazette.canwest.com

Credit: The Gazette

Indexing (document details)

Author(s):	JANET BAGNALL
Document types:	Column
Column Name:	*Janet Bagnall*
Section:	*Editorial / Op-Ed*
Publication title:	The Gazette. Montreal, Que.: Feb 29, 2008. pg. A.15
Source type:	Newspaper
ISSN:	03841294
ProQuest document ID:	1437682731
Text Word Count	693
Document URL:	http://ezproxy.library.yorku.ca/login?url=http://proquest.umi.com.ezproxy.library.yorku.ca/pqdweb?did=1437682731&sid=6&Fmt=3&clientId=5220&RQT=309&VName=PQD

http://thevarsity.ca/article/3219

Welcome to your corporate campus

Why all this wrangling over academic freedom? Can't academia and industry come to a reasonable compromise? According to U of T chemistry professor emeritus John Valleau, the fundamental principles of universities and corporations inherently conflict

Alex Kazia, Naushad Ali Husein, Jade Colbert
Published on April 10 2008

If scholars practice the uncompromising application of reason, Valleau says they need a special social structure that allows them to test their hypotheses by trading ideas inspired by other scholars: the university. To work for the benefit of society, the university also needs protection from that society.

The benefit society gets from this is innovation. Buzzword though it is, Valleau stands by it. Valleau maintains that what academics actually do is innovate—a revolutionary activity.

"The word 'innovation' is an interesting one," he says. His definition of innovation means more the "bringing goods to market." Innovations benefit society when they are treated as public goods, says Valleau. "The scholarly researcher is supported by the public, works in a public institution, uses public equipment, and the results are surely open to the public. Furthermore, knowledge is not profitable. It is not diminished by use if shared. It should be part of the common knowledge. That, I think, is the principle of scholarly activity."

"What scholars do is they test the limits of their understanding. With theories, you can never prove a theory, you c a n only disprove it or discuss what range it covers, and so on. What one can do is to test the limits of our understanding, and in doing that, one creates new paradigms of understanding."

Unlike academics, powerful people have an interest in maintaining the status quo, to not be supplanted by up-and-comers. The revolutionary quality of true innovation, therefore, poses a serious threat to industry and government alike.

So how did we get to the present state of things? "First of all, you cut back the funding for scholarly work until it's a pittance," he says. "And then offer to reinstate the funding, but only under special conditions."

U OF T THE WEED

Janice Newson, York University sociology professor and co-author of Universities Mean Business, agrees with Valleau's assessment of the situation. While visible signs of corporate presence are only now appearing, she says, corporations have been highly involved in Canadian universities for at least three decades. Newson characterizes corporatization as a weed: "In the '90s the tubers began to send up shoots, and the shoots were names on university buildings that belong to big corporations." A few instances from the 1990s offer hints to the present underlying corporate culture at Simcoe Hall.

In 1997, Northern Telecom donated $8 million to found the NorTel Institute of Telecommunications, a master's program, and two research chairs. The terms of the agreement relating to NorTel Institute researchers' intellectual property rights were not made public at the original announcement. Investigation by The Varsity and the U of T Faculty Association showed that while U of T still owned the intellectual property from Institute research programs, the licensing option for Institute products go immediately to NorTel. More alarming, perhaps, is that intellectual property not pertaining to a researcher's specific project can still belong to U of T, and by extension, NorTel. As per U of T's inventions policy, faculty and their grad students do not hold any of these rights. Neither does the taxpayer. Through this donation NorTel has effectively set up its own lab, which also uses university resources.

In 2000, the pharmaceutical company Shering Canada Inc., producers of Claritin, donated $34.5 million to the Alzheimer's research program led by the U of T Centre for Research in Neurodegenerative Diseases Network and the Hospital for Sick Children. A better term for the largest "gift" in Canadian history might be "intellectual property agreement," as it grants Shering-Plough (Shering Canada's parent company) exclusive worldwide licenses to produce and sell the products and technology developed through the program. The coup de grace for scholarly independence, however, came with the secretive deal pertaining to Joseph L. Rotman's donation to the School of Management. The university matched Rotman's $15-million gift to found and endow six faculty chairs based on the recommendations of the Rotman Foundation. The faculty was also renamed the Rotman School of Management.

Rotman stipulated that the management school must have "special status" within the university. This status means that business education must remain a focus at U of T and the faculty is protected from budget cuts. At the same time, many of the rules applying to other faculties at U of T simply don't apply to Rotman. In some circumstances, for

example, the foundation had the right to bypass Governing Council (to which Rotman was appointed by the Ontario government in 1995) and have the chair of the Association of American Universities dictate policy to the university. Joseph Rotman is also allowed to stipulate which public relations firm the faculty uses. A final term of the agreement was that the terms of the agreement were to be kept confidential.

After The Varsity obtained a copy of the agreement in 1997 and published its details, public outcry forced the Governing Council to renegotiate with Rotman, amending the agreement to meet the basic demands of the U of T Faculty Association. What the initial agreement showed, however, was Simcoe Hall's blindness to questions of conflict of interest, and its unwillingness to present its deals with corporations to university members in a transparent way.

Incidentally, at the time Rotman was on the board of, among other things, Barrick Gold Corp., whose CEO, Peter Munk, donated $6.4 million that same year.

The Varsity made public the conditions of that agreement, which had been signed two years previously without consultation with the academic board, after obtaining the contract through U of T's Access to Information Policy. The $6.4-million donation, to be paid over 10 years, came with conditions, stipulating that a council set up for the centre would have to cooperate with the Barrick Gold international advisory board. Another condition forbade the university from cutting Munk Centre funding for 30 years, which would amount to an opportunity cost for other departments during periods of government cutbacks. Like the Rotman agreement, this contract was amended subsequent to outcry from the UTFA.

Yet allegations that the Munk Centre has an institutional bias haunts it still. When in 1997 George Bush was given an honourary degree by U of T, many called it a conflict of interest (Bush was highly connected with Barrick Gold at the time). This year, a committee of senior administrators deemed posters representing Munk in an unfavourable light as "potentially defamatory" and, in an unprecedented move, ordered that they be torn down.

"What [the Munk Centre] most seems to serve as," says Valleau, "is a platform for Janice Stein [director of the centre] to, unchallenged, offer support to the government or the Liberal Party, and to have the prestige of a major institute at the University of Toronto to back up what she says, never challenged by people at the Munk Centre or elsewhere at the university."

U OF T THE FRAUD ARTIST

In the summer of 2000 the residents of Wiarton, Ontario, complained about suspicious odors in their drinking water. Throughout June and August they noticed yellow and orange spots and bleach marks in their laundry. The Ontario Clean Water Agency received calls from 33 Wiarton residents with complaints from during this time. "Many

refused to drink the water that marked their clothing," said an August 23 report in the Globe & Mail about the issue.

Meanwhile, unknown to the residents, U of T professor Robert Andrews was heading an experiment under contract with the chemical company ERCO Worldwide, pilot-testing chlorine dioxide as a water purifier on Wiarton's water supply. The study's aim was to test a newly patented chlorine dioxide generator, the SPC ERCO R101, and to examine whether chlorine dioxide could replace ordinary chlorine as a water disinfectant.

Following the complaints, the experiment was abandoned two weeks before its scheduled Sept. 4 completion date. Despite this, the study was declared a success that "exceeded the project objectives and expectations" in a report by Andrews and Georges Ranger, a patent-holder for the generator being tested in the study. None of the journal articles published on the study mentioned any of the residents' complaints.

"No customer taste and odor complaints were reported during the study period," said an article on the Wiarton study published in the Journal of Environmental Engineering and Science, despite the fact that these complaints were reports in several dailies, and a letter that appeared in the weekly Wiarton Echo.

Forty per cent of respondents reported bleach spots in their laundry in a Sept. 23 survey. Thirty-five per cent reported noticing adverse changes in tap-water quality. Some reported the deaths of small animals. Despite these results, Andrews and Ranger described the water supplied to citizens during the study as "significantly superior compared to chlorine" and "likely the best-quality drinking surface water in Ontario" in a paper in 2001.

In 2003, ERCO boasted that the SPC ERCO R101 represented a growth opportunity for the company. They talked of expanding into "industrial and municipal water treatment" as an avenue for sales.

When The Varsity contacted Andrews for comment, he was surprised to hear from us. "That was all done a long time ago, and I really have nothing to add," he said. Far from being concluded, however, the matter is now being heard in federal court, thanks to a whistleblower who was Andrews' Master's student. His complaints don't end at Wiarton.

U OF T THE PLAGIARIST

In March of 1998, the Natural Sciences and Engineering Research Council of Canada awarded Christopher Radziminski a two-year, $31,400 scholarship. He was admitted to a Master's of Applied Science program in civil engineering at U of T. Here, he became part of the new "Drinking Water Research Group," beginning his thesis in the summer of 1999 on the disinfection of drinking water and focusing on an alternative to chlorine called chlorinedioxide. This was co-supervised by Robert Andrews and Christian Chauret.

In the summer of 2002, Radziminski found out that he was listed as an author on two publications without his knowledge or consent, based on research he had carried out. On Jan. 4, 2003, he filed a formal complaint to U of T's School of Graduate Studies, alleging "Incomplete and/or inaccurate presentation of results," and "extensive reproduction of work from [his] thesis without permission." SGS replied three weeks later, saying the matter was out of their jurisdiction.

Barry Adams, the chair of the civil engineering department, held an inquiry that, according to the faculty's own Framework of Ethics in Research, was to be concluded within 10 working days.

Nearly six months after filing his complaint, Radziminski got a reply from the department, dismissing his complaint.

Radziminski says, "When I first discovered the papers and then looked more deeply into the research in the papers...I naively believed that the university would take my allegations seriously, and that they would investigate."

Confused and discouraged, he wrote to the scientific journals involved, and on May 20, 2004, received a threatening letter from a Bay Street law firm retained by the University of Toronto, threatening to sue him for defamation for communicating with "third parties."

Eventually, one journal retracted its article, and the other censured both professors, prohibiting them for writing for or reviewing it or any of its associated journals for a certain period.

The Canadian Federation of Students National Executive met in October of 2004 and decided to support Mr. Radziminski's case, allocating funds for litigation. Explaining the unusual degree of support given to Radziminski, the federation noted that students are particularly vulnerable when bringing forward complaints of misconduct, because virtually no protection exists in Canadian academia for whistleblowers.

"I am actually quite shocked," said Radziminski of his experience. "There really is nothing that I have seen that exists to ensure research integrity in Canada."

A match made in heaven

The MaRS Discovery District calls itself "a non-profit innovation centre connecting science, technology and social entrepreneurs with business skills, networks and capital to stimulate innovation and accelerate the creation and growth of successful Canadian enterprises."

The centre often works closely with U of T. The U of T Asset Management Corporation and U of T Innovations Foundation, two subsidiaries of the university, are highly involved with MaRS . Ron Ventor, the interim director of UTIF, spoke giddily about the

facility. "In the research commercialization arena, this is the most exciting meeting place in the world," he said.

MaRS' CEO, Ilse Treurnicht, is married to U of T's president David Naylor. Four other members on the MaRS board of directors are staff or governors at U of T. The school has contributed $5 million to the nonprofit enterprise.

Much of MaRS 's activities are funded by the provincial government. A June 26, 2006 press release from the Ontario government states that the government has invested $46 million in MaRS . More than $50 million of Ontario government funds have been channeled into the facility since Dalton McGuinty became Ontario's first research and innovation minister.

In 2006 the Government of Ontario announced that it would put up $25 million a year for the Premier's Summit Award in Medical Research, to be administered by MaRS . The amount is matched by private funds, and are awarded each year to ten "internationally recognized leaders in medical research."

The award committee includes John Evans, president emeritus of U of T, as its chair, and NSERC president Suzanne Fortier as a member.

Science for sale

One of the most notable whistleblowers in U of T history is Nancy Olivieri, who was on the U of T medical faculty through her work for the universityaffiliated Sick Kids Hospital. Her case emerged in 1996 when the worldrenowned hematologist decided to breach a confidentiality agreement she had signed with Apotex Inc.

The Toronto-based pharmaceutical company funded Olivieri's research in deferiprone (an experimental drug for people with thalassaemia), but Olivieri started to lose faith in the drug and came to believe that it was causing serious side affects. Apotex disagreed and threatened legal action if she violated her contract by making her claims public.

After submitting her findings to the *New England Journal of Medicine*, Olivieri was removed from her hospital post. During this time, as she wrote in a letter to the Globe and Mail, neither the university nor the hospital gave her support as both were expecting large donations from Apotex. Olivieri was reinstated after a 1999 academic tenure and freedom committee of the Canadian Association of University Teachers commissioned a report that exonerated her, concluding her academic freedom was infringed when Apotex threatened legal action if she went public with her fears about deferiprone.

A 1999 scandal made the university's conflict of interest clear when then-U of T president Robert Prichard was caught lobbying the federal government on behalf of the company, asking that the government reconsider regulations on the generic drug producers that, Apotex claimed, would prevent them from fulfilling their promised $20-

million towards a proposed $90 million Centre for Cellular and Molecular Biology Research at U of T.

Merck 'misrepresented' risks and ghost-authored papers: studies

Paul Taylor. **The Globe and Mail**. Toronto, Ont.: Apr 16, 2008. pg. L.1

Abstract (Summary)

"I have to say that the FDA was on the ball," said Dr. [Bruce Psaty]. "Despite these efforts to minimize the appearance of risk, the FDA, in their review of the submitted data, identified a mortality rate and asked Merck about it," Dr. Psaty said.

Full Text (1068 words)

Merck & Co. appears to have played down or "misrepresented" the risk of dying for patients who took its once-popular pain medication Vioxx, according to a new study by researchers who reviewed court documents.

What's more, another study indicates Merck employees were the secret "ghost authors" of many trial results and academic papers used to promote the drug, which netted billions of dollars in sales.

Vioxx was pulled from the market in the fall of 2004 after research showed the medication increased the risk of heart attacks and strokes and that its use may have contributed to thousands of deaths.

The two new studies are being published in this week's edition of the Journal of the American Medical Association.

They are based on an analysis of court documents filed as part of subsequent lawsuits against the drug maker.

Last year, Merck agreed to pay $4.85-billion (U.S.) to settle most of the Vioxx claims.

The court documents provide a rare opportunity to see precisely how some blockbuster drugs are tested and marketed - and the results cast into doubt the integrity of medical science, says Catherine DeAngelis, editor of JAMA.

"It is just manipulation," she said, referring to the increasing use of industry-financed drug trials and ghost-written promotional articles to fuel pharmaceutical sales.

Merck issued a statement yesterday saying that "a full unbiased evaluation of the Merck papers shows that many of the conclusions put forward by the authors of the JAMA papers are incorrect."

However, Dr. DeAngelis pledged that all the material will be posted on the Internet "so anybody who questions the veracity of these two studies ... can go right to those sites and find everything they want."

One of the studies, which was written by researchers who served as paid consultants for those suing Merck, focused on two clinical trails in which Vioxx was tested on patients with Alzheimer's disease and dementia. The company was exploring the possibility that Vioxx, which was already on the market as a pain reliever, could help prevent the advance of Alzheimer's disease.

The researchers compared internal company documents with those submitted to regulators at the U.S. Food and Drug Administration as well as published studies.

They say the internal company documents suggest a threefold increase in deaths for patients taking Vioxx, compared with those getting a placebo. But this information was not passed on to the FDA in a clear and timely fashion, according to lead researcher Bruce Psaty of the University of Washington in Seattle.

"The counting methods that they submitted to the FDA appear to minimize the risk," said Dr. Psaty, referring to safety-update reports submitted to the FDA in 2001. For instance, the company did not initially report deaths of patients who had stopped taking the medication. "Adverse drug effects, however, may persist after drug discontinuation," Dr. Psaty and his co-author Richard Kronmal noted in their study.

"I have to say that the FDA was on the ball," said Dr. Psaty. "Despite these efforts to minimize the appearance of

risk, the FDA, in their review of the submitted data, identified a mortality rate and asked Merck about it," Dr. Psaty said.

In response, Merck officials expressed the opinion that there was not a safety issue and said the drug was "generally" well tolerated. They characterize the difference in death rates between the Vioxx and the placebo group as "small numeric differences ... most consistent with chance fluctuations."

Dr. Psaty said Merck was "either unwilling or unable to discern a safety problem." And some of the mortality data wasn't submitted to the FDA until 2003.

Yesterday, Merck said it still stands by its original interpretation that there was no pattern suggesting the elevated deaths in the Vioxx group were connected to the drug. A statement issued by the company said "some of the deaths were caused by car accidents, poisoning, infections and other causes that are not related to Vioxx."

The second JAMA study, which was also conducted by researchers involved in the litigation against Merck, deals with the murky world of guest authorship and ghost writers of clinical trial and review papers.

Their analysis of the court documents reveals that Merck staff or hired hands designed, conducted and wrote up the results of a series of Vioxx studies and then looked for academics and physicians willing to put their names on the papers before they were submitted to journals for publication.

"When a few academic investigators ... are putting their names on the publication it [gives] the sense that it was objectively designed and there is an air of independence to the trial," said the study's lead author, Joseph Ross of Mount Sinai School of Medicine in New York.

He said the guest authors might have made some editing changes to a final manuscript for a study. But "nobody knows how fairly or truly objectively it was conducted. It questions the rigour of trial," Dr. Ross said.

Physicians were also asked to lend their names and credibility to ghost-written review articles that promoted the use of Vioxx.

Dr. Ross said the documents indicate guest authors were routinely paid honorariums by Merck, but this information was not always disclosed in the published study or review articles.

"It is almost like plagiarism." Dr. Ross said in an interview. "They are not being honest about their contributions. They are putting their names on papers they didn't actually design and conduct."

JAMA's Dr. DeAngelis uses a stronger word, calling it a form of "prostitution."

But Dr. Ross is not saying that every Vioxx study was ghostwritten.

One pivotal Vioxx study, known as the VIGOR trial, carried the name of a high-profile Canadian physician: Claire Bombardier, director of rheumatology at the University of Toronto.

"Let me dispel any doubt. Our paper was not 'ghostwritten,' " Dr. Bombardier said in an e-mail statement in response to the JAMA studies. She added that she, along with her co-authors, worked "diligently" on the paper.

"We were, and remain, proud of the important contribution our article made to medical science."

In an interview, Dr. DeAngelis called this "a sad day."

"I don't blame the pharmaceutical companies. I blame us because none of this would have happened if physicians and clinical scientists would just say no."

She noted that the court case has focused attention on Merck and Vioxx.

"But don't think for one minute that only Merck is guilty of this because they are not."

Indexing (document details)

Author(s):	Paul Taylor
Document types:	News
Section:	*Globe Life*
Publication title:	The Globe and Mail. Toronto, Ont.: Apr 16, 2008. pg. L.1
Source type:	Newspaper
ISSN:	03190714

Research Money Serving Canada's science, technology, innovation and investment community with in-depth reports and analysis

RE$EARCH MONEY

Volume 22 Number 6
April 16, 2008

It's just $1.5 million — less than the amount it takes to keep our fighting men and women in Afghanistan fuelled with Tim Horton's coffee. But that shortfall in the budget of the S&T division at Statistics Canada could jeopardize our understanding of how innovation works and what can be done to improve this country's performance.

Behind all good policy is a sound statistical underpinning of relevant data — in this case constantly refreshed indicators for S&T and innovation (STI) — that gauge the inputs and outputs of the innovation process. Canada has been a world leader in developing these indicators but gaps are beginning to emerge due to sunsetting funding to support specific work.

The fractured nature of STI funding speaks volumes about the regard in which these statistics are held at the bureaucratic and political levels. Yet without hard, concrete data, how are policy makers supposed to react to the rapidly evolving world in which we live?

The most obvious gap in the current suite of STI indicators is biotechnology development and usage. This survey has been suspended until further notice due to the closure of a secretariat within Industry Canada.

Which begs the obvious question. Why aren't STI indicators part of StatsCan's base budget and why hasn't Treasury Board seen fit to authorize the necessary funding? Canada leadership in this area is recognized internationally. It's time to ensure that governments, industry and citizens are better equipped statistically to secure their place in the vanguard of the emerging global knowledge economy.

Mark Henderson, Editor

Canada's ability to generate key science, technology and innovation indicators threatened by budget cuts

A funding shortfall at Statistics Canada is undermining its ability to generate new and existing data sets for science, technology and innovation (STI) and threatening Canada's preeminent position in the field internationally. The critical situation comes to light as Dr Fred Gault retires after nearly a quarter century as head of the Agency's Science, Innovation and Electronic Information Division (SIEID) that drove the development of a system of STI indicators which have had a major influence internationally.

The most recent survey in jeopardy is the biannual biotechnology development and usage survey — the longest running survey of its kind in the OECD. The biotechnology survey also includes nanotechnology, which is a fundamental emerging technology platform that is not well understood.

Also falling by the wayside are a number of surveys associated with the former Connectedness agenda of the previous Liberal government. The most prominent of those unable to go forward is the survey of electronic commerce and technology.

After years of soliciting funds from within StatsCan and externally from other departments and the provinces, SIEID's budget is set to decline from $6 million in FY07-08 to $4.5 million for FY08-09. That places Gault's successor — Paula Thomson — in the unenviable position of identifying and securing new funding sources or downsizing staff.

"Her first challenge is to deal with some mix of the budget and the staff because if we don't add some more money to the budget we're going to have

continued on page 2

In This Issue

Publications Mail Registration No. 1705822

continued from page 1

to release staff," says Gault, adding that Thompson has a strong track record of dealing with external clients. "We spent over a decade building up the knowledge to do what we do and it is embedded in the 60 people (in the division). If we start reducing those people, that knowledge goes and it will take a decade to get in back."

Like many surveys conducted by the SIEID, the biotechnology survey was funded by sources outside StatsCan, in this case through the Canadian Biotechnology Strategy. But that Industry Canada program was cancelled last year, leaving the survey in limbo. Gault says Industry Canada is working to establish a consortium of federal departments and agencies willing to pool resources to launch another survey this year. In the meantime, a survey on bioproducts and functional foods will go forward with separate funding from Agriculture and Agri-Food Canada.

The surveys associated with the Connectedness agenda largely focused on outputs, namely the penetration of various electronic communications technologies in the business and home communities. As STI indicators have evolved, researchers have come to acknowledge that the results of inputs such as R&D are as important as the funding and industry development that produced them. This understanding has been slow to permeate the policy and political levels, however, making it difficult to garner support for their statistical tracking.

"You can argue for R&D (statistical funding) because R&D people understand it's a good thing ... The government supports the doing of it through SR&ED (the federal R&D tax incentive program) and a number of other good programs. So clearly it's important and the statistics, while not well supported, at least are there," says Gault. "What we have difficulty doing — which is something I've never quite understood — is getting strong support for technology use surveys, use and practices. For the advanced technology survey which is in the field at the moment, we had to fund it by going to the provinces and a couple of departments. We also put a lot of our own resources into it."

StatsCan's expansion of STI indicators began in the early 1990s when a new statistical program was recommended by an advisory committee established at Gault's urging. The program was incorporated into the 1996 federal S&T strategy along with an infusion of resources that led to a systems approach to STI and growing international recognition.

"Delivering that in 1998 was a high point for the program ... we developed the framework and expanded our statistics and it's guided us ever since," says Gault.

Enhancing Canada's reputation in the global arena has been Gault's chairmanship of the National Experts on Science and Technology Indicators (NESTI), a subsidiary of the OECD's Committee for Scientific and Technological Policy. Gault has chaired NESTI for the past six years during which time Ottawa played host to the Blue Sky Forum — an international gathering to to further the development of STI indicators that capture the rapidly evolving nature of innovation.

R$

Gault leaves enduring statistical legacy

Canada's success in achieving leadership in science, technology and innovation (STI) statistics is largely due to the tenacity of Dr Fred Gault, who retired this week after a 24-year career at Statistics Canada. Since joining the agency in 1984, Gault has overseen the development of a powerful set of STI indicators that has put Canada on the map internationally and helped to establish a small but influential group of researchers examining the complexities of innovation as a local and regional phenomenon.

Garnering support for STI data gathering has never been a top priority of government, yet Gault has succeeded in drawing financial support from a wide range of governments, departments and agencies to fund a growing range of STI-related surveys. One of his most significant achievements was to build up the STI division after brutal budget cuts under the government of Brian Mulroney.

"The cuts took a very broad sword to the budget of Statistics Canada and virtually eliminated the entire S&T budget," says Dr David Wolfe, co-director of the Univ of Toronto's program on globalization and regional innovation systems. "By sheer force of will he scraped together enough money to keep the division going. He created the S&T Advisory Committee which led to a broad conceptual framework. Fred was also doing this kind of work at the OECD and has been a hugely influential force at that level."

Dr Stephen Fienberg headed up the S&T Advisory Committee at StatsCan and he concurs that Gault was instrumental in laying the foundations for today's powerful set of STI indicators.

"Fred was engaged from top to bottom. If it wasn't for him it would not have worked," says Fienberg, a professor of statistics and social science at Carnegie Mellon Univ in Pittsburgh. "The innovation survey was mimicked by everyone and that was just a piece of it. It had to fit with a process model of inputs and outputs."

"Fred has taken STI indicators from

Continued on page 3

RE$EARCH MONEY

Published 20 times annually by Research Money Inc, a division of *The Impact Group*.

MANAGING EDITOR
Mark Henderson
CONSULTING EDITOR
Debbie Lawes
PUBLISHERS
Jeffrey Crelinsten & Ron Freedman
Research Money is a business intelligence newsletter providing information and analysis of issues relating to research & development, science & technology, innovation and investment. It examines public policy, including funding programs and tax incentives, as well as private non-profit and corporate research activities.
PAP Registration No. 10674

EDITORIAL OFFICE
Telephone: (613) 728-0600
Email: mhenderson@sympatico.ca
BUSINESS OFFICE
Research Money Inc.
78 Sullivan Street,
Toronto ON M5T 1C1.
Telephone: (416) 481-7070
Fax: (416) 481-7120
Email: info@researchmoneyinc.com
International Standard Serial Number
ISSN 0833-1677.

SUBSCRIPTION RATES
Single (Corporate, Library) - $625
Second Copy - $300 Additional Copies - $200
Bulk Sales (10 + copies) - call for special rate
Individual researchers - call for personal rate
Full Web Access (including back issues)
- add $70 to price for each subscription
SUBSCRIBE AT: www.researchmoneyinc.com

Association of Universities and Colleges of Canada

Association des universités et collèges du Canada

AUCC submission to House of Commons Standing Committee on Industry, Science and Technology

April 18, 2008

Association of Universities and Colleges of Canada  Association des universités et collèges du Canada

Established in 1911, the Association of Universities and Colleges of Canada represents 92 Canadian public and private not-for-profit universities and university-degree level colleges. Our mandate is to foster and promote the interest of higher education, both within Canada and abroad.

Introduction

Canadians' standard of living depends increasingly on our competitiveness in the global knowledge economy. To maintain and enhance the standard of living Canadians currently enjoy, we must secure our position among the world leaders in research. Universities educate the highly qualified researchers who are increasingly in demand across the economy; and the university sector is the only sector that performs research for all other sectors. Universities account for more than one-third of the national research effort in Canada – a higher proportion than in all other G-7 countries. University research is more geographically dispersed than private sector and government research in Canada, and consequently plays a critical role in the economic and social development of all regions of the country.

University research is a Canadian success story, but this was not always the case. Investments over the past decade by successive federal and provincial governments of all stripes and by universities themselves have turned Canada from a country at risk of experiencing a major "brain drain" to one that is benefiting from a "brain gain".

These have included investments in each of the four foundational elements of university research: the production of new ideas; the development, attraction and retention of highly qualified research talent; the acquisition and operation of cutting edge research infrastructure; and the provision of essential institutional support for the research effort. While significant, Canada's gains in university research over the past ten years remain fragile. Our competitors in the G-7 and newly emerging competitors like Russia, China and India are investing heavily in research – including university research – to increase their competitiveness in the global race to attract high-paying jobs, research talent and investment.

In February 2007, AUCC submitted a series of proposals to the government related to the development of a science and technology strategy for Canada. AUCC called for the development of a strategy that would ensure the conditions for excellence in university research, develop new research talent and promote enhanced collaboration and linkages among universities, government and the private sector. AUCC welcomed the release in May 2007 of the federal Science and Technology Strategy, with its call for more partnerships and its commitment to maintaining Canada's G-7 leadership in public research and development performance.

The federal S & T Strategy outlines three Canadian advantages that it intends to foster: a People Advantage, a Knowledge Advantage, and an Entrepreneurial Advantage. To maximize these advantages, Canada will need to overcome several major challenges. This country's universities are key partners in addressing these challenges and are prepared to work with other sectors to develop the talent, basic research, applied research and commercialization Canada requires to compete in the global knowledge economy.

The S & T Strategy reinforces the importance of all four foundational elements of university research. Balanced investments in all four elements are essential to maintain and increase our competitiveness in university research. As well, the S & T Strategy places considerable emphasis on developing private sector research and commercialization capacity while maintaining Canada's leadership in public R & D performance, and on identifying research areas where Canada can be a world leader, while also acknowledging the need for broad strength in basic research.

This brief to the House of Commons Standing Committee on Industry, Science and Technology puts forward AUCC's ideas for the ongoing implementation of the S & T Strategy and discusses AUCC's perspective on the four principles outlined in the S & T Strategy.

Implementing the S & T Strategy

Ultimately, the success of the S & T Strategy will depend most fundamentally on people – on the development, attraction and retention of talented individuals with research skills. Universities are committed to helping Canada build the best-educated, most-skilled and most flexible workforce in the world, as called for in the S & T Strategy.

Talent

Over the next decade, we expect the knowledge economy to create significantly more jobs for advanced degree holders. Furthermore, retirements of advanced degree holders currently in the labour market will generate large scale replacement demand. A number of analysts and industry and government leaders have identified the relative under-production of graduate degrees in Canada as a barrier to increasing our international competitiveness and productivity. Canada's key international competitors are awarding proportionally more graduate degrees. For example, in 2005, American universities awarded twice as many master's degrees per capita (in the 25 to 35 year-old cohort) as Canadian universities and 30 percent more doctoral degrees per capita than their Canadian counterparts. The OECD reports that Canada trails far behind the leading nations in terms of doctoral graduates.

Over the past two decades, the Canadian economy generated a significant number of jobs for people with post-graduate degrees – primarily master's and PhD graduates – an increase of more than 90 percent. During this period, Canada did not produce nearly enough advanced degree holders to meet this job growth and relied increasingly on immigrants who had completed advanced degrees elsewhere to fill the gap.

In future, the knowledge economy is expected to create even more jobs for graduates with advanced degrees. As well, retirements will create additional demand for advanced degree-holders. By 2016, AUCC estimates that the combination of job growth and replacement demand will generate employment opportunities for more than 500,000 graduates with advanced degrees. Even if Canada is able to maintain currently high levels of immigration of advanced degree-holders, their net contribution to employment levels will only be about 150,000 over the decade (assuming current labour force participation and emigration levels for these immigrants). To make up the difference, domestic production of advanced degree holders will have to increase by more than 35 percent over the next decade. After stagnating in the mid-1990s, full-time master's and PhD enrolment has risen rapidly from 65,000 students in 1996 to 102,000 students in 2006. This is a 57 percent increase over the decade, with most of that growth having taken place since the fall of 2000.

As an immediate priority, Canada must recruit more domestic students into graduate programs and attract more top international graduate students to fuel Canada's pipeline of highly qualified personnel. In this regard, AUCC was pleased to see the creation of the new Georges Philias Vanier Graduate Scholarships for top Canadian and international doctoral students announced in the 2008 federal budget.

Direct Costs of Research

The government's economic plan, *Advantage Canada* recognized the important role that university-educated researchers play in knowledge transfer in the Canadian economy:

"The research undertaken at Canadian universities creates new ideas and technologies that enrich our economy and society. Internationally renowned Canadian research in fields such as health,

information and communications technologies, energy and environmental technologies helps to solve social and environmental problems. As recent graduates enter the labour market, they transfer this new knowledge from universities to businesses. World-class Canadian research also creates exactly the kinds of jobs we need to be a leader in key economic sectors."

Investment in the direct costs of research, through the three federal research granting agencies, is crucial and Canada will need to increase these investments significantly to maintain our G-7 leadership in public research investment over time – a key facet of the S & T Strategy's knowledge advantage. Further, these investments help develop the people advantage as approximately 30 percent of faculty research grant support flows to graduate students and, in some cases, undergraduate students who benefit from participation in the research projects.

Institutional Costs of Supporting Research Excellence

The least visible and least understood of the four foundational elements of university research is support for the institutional or "indirect" costs of research. It must be remembered that there are real costs that universities must meet to create the conditions for research excellence. These include the costs of operating and maintaining research facilities; managing the research process, from preparation of proposals to accountability and reporting; complying with regulatory and safety requirements; and managing intellectual property and promoting knowledge transfer.

The federal government currently pays a portion of these institutional support costs through the Indirect Costs Program. It is important that these costs be fully covered at internationally competitive levels for all Canadian universities in order to derive the full value of other federal investments in university research. Under the current program, the overall rate of reimbursement is in the range of 25 percent of direct costs -- approximately half of the average rate negotiated in the U.S. AUCC welcomed the recent funding increase of $15 million to the Indirect Costs Program in the 2008 federal budget. However, the overall rate of reimbursement has remained nearly constant at 25 percent. This is far short of the minimum rate of 40 percent required if Canada's universities are to provide internationally competitive conditions to support research excellence.

Research Infrastructure

Continued federal funding for cutting-edge research infrastructure is a crucial element in creating and maintaining the knowledge advantage. Infrastructure is critically important to the productivity of researchers and the success of many of the projects for which they are receiving support. World-class research infrastructure is essential for educating students, attracting and retaining researchers, and building "critical mass" in the context of research and innovation clusters. It can also serve wider communities through networking – for example, high performance computing and broadband networking are key to enhancing productivity and expanding the range of research that can be done and the problems that can be solved in many fields.

The Canada Foundation for Innovation is the primary vehicle through which federal support for research infrastructure is delivered. It normally funds 40 percent of a project's costs with provincial governments, research institutions and private sector partners funding the remaining costs. CFI employs a rigorous competitive process that draws on top experts from across Canada and from abroad to assess project applications.

As a result, CFI has funded a wide range of excellent and highly innovative research infrastructure projects and enjoyed broad based support across Canada. CFI's contributions to

Canada's university research effort have attracted attention from around the world. AUCC is pleased the 2007 federal budget renewed funding for another round of competitions through CFI.

Further, infrastructure can be fully and efficiently utilized only when the operating and maintenance costs are adequately covered. This has been a problem in Canada, particularly in relation to a number of the very large-scale research infrastructure projects that have been undertaken in recent years. Examples include the Canadian Light Source project in Saskatoon, the Research Icebreaker the Amundsen, the Sudbury Neutrino Observatory and the NEPTUNE project in Victoria. CFI's Infrastructure Operating fund has been a partial source of such funding, but in general, the handling of operation and maintenance of these projects has been far too *ad hoc* with project managers sometimes forced to cobble together operating funding from a variety of sources on a short-term basis. AUCC is supportive of a long-term solution to the funding issues related to the ongoing operating costs of big science projects.

Responding to the S & T Strategy's four principles

Promoting World-Class Excellence

AUCC agrees with the federal government's contention that, "In today's fiercely competitive global economy, merely being good is not good enough." The marketplace for graduate students and professors is both highly competitive and global in nature. Universities across the country know that they must constantly compete and improve if they are to succeed. The peer-reviewed and competitive nature of the federal research granting councils and CFI encourages researchers to achieve excellence across a broad range of disciplines. In its recent report entitled *The State of Science & Technology in Canada*, the Council of Canadian Academies points to Canada's research strength across a broad array of disciplines, particularly as measured in terms of published research. AUCC believes the training of the next generation of researchers and providing for the emergence of new areas of excellence will require continued nurturing of this solid base of research strength that Canada enjoys in a wide range of areas and ensuring that all regions have research capacity. Excellence and rigorous peer review must remain central to federal investments in research but, at the same time, research excellence is not associated only with some specific areas of research or geographical locations.

Focusing on Priorities

AUCC supports the government's plan to continue to play an important role in supporting basic research across a broad range of disciplines while at the same time enhancing success by targeting more basic and applied research in areas of strength and opportunity. A "bottom-up" approach to priority-setting is already well-underway in this country. The Canadian system allows for substantial autonomy and flexibility, in which universities and researchers can be and arguably, are – encouraged to be entrepreneurial and innovative in finding, creating, and pursuing opportunities.

In part, as a result of the requirements of both the CFI and the Canada Research Chairs program that universities develop research plans, the institutions have been encouraged to identify developing areas of strength – including areas that are relevant to the circumstances and economies of the regions and provinces, as well as national priorities. In preparing our brief to the federal government in anticipation of the S&T Strategy, AUCC reviewed 69 of these institutional research plans. While the institutions identify a wide range of research strengths and priorities, consistent with the Council of Canadian Academies' finding that Canada enjoys research strength across a broad range of disciplines, it is also interesting to note that there was a strong correlation between areas of particular concentration across the institutional research plans and the four

macro areas of Canadian research strength identified in the CCA report – i.e., natural resources, information and communications technologies, health and related life sciences, and environmental S & T. All four of these areas were identified as priorities in the S & T Strategy.

Encouraging Partnerships

Canada has made significant strides in recent years in developing research linkages between universities and the private sector. Canada is first in the G-7 for the share of private sector research investments going to universities and second in the G-7 for the share of university research funded by the private sector. Over the period 1996 to 2006, investments by the private sector in university research grew by 168 percent. Since 2001, the private sector has increased its investments in university research at a rate four times faster than investments in its own research.

Despite these improvements, more can be done to enhance university-private sector linkages (as well as those with the public and not-for-profit sectors), particularly in relation to knowledge transfer. In knowledge transfer and in applying the results of research, clusters are increasingly important, both in Canada and around the world. While much of the focus has been on clusters that have been built up within larger communities and regions, it has still been possible for many smaller communities in Canada to create more focused clusters in specific areas and for linkages to be made across Canada on specific areas of excellence.

Universities play a key role in clusters, both through their regular programs and their research in general, and also through centres, institutes, and research and innovation parks that bring university researchers together with researchers and applications-focused personnel from other sectors. Investments in research infrastructure have, in many cases, been useful as "magnets" in helping to build up key research capabilities in areas important to the clusters.

Since the inception of the Networks of Centres of Excellence (NCE) program in 1988, networking has become a key element of Canada's research and innovation policy. Over the years, close to thirty NCEs have emerged as convincing examples of how to mobilize scientific excellence between academia, federal and provincial departments and agencies, and the private sector through commercial objectives and public-private collaborations. AUCC welcomed the government's decision to build upon the NCEs to strengthen links between postsecondary institutions and the private sector and to create the new Centres of Excellence for Commercialization and Research.

Enhancing Accountability

Canadians expect and deserve to see the benefits of public investments in university research. AUCC is committed to improving the visibility, accountability and transparency of federal investments in university research. In 2005, AUCC released *Momentum*, our first periodic public report on the impacts of university research in Canada. We will be releasing a new edition of *Momentum* in October of this year. This latest edition will focus on partnerships, in particular what Canadian universities are doing, both nationally and internationally, with governments, innovative businesses, the not-for-profit sector and the international community. *Momentum is* one of our many ongoing efforts to communicate to decision makers and Canadians the importance of university research and its contribution to Canada's economic and social well-being.

Canadian Federation of Students
Fédération canadienne des étudiant(e)s
CFS FCE

NEWS RELEASE

For Immediate Release
Thursday April 24, 2008

Federal Court Ruling Confirms Minimal Oversight of Corporate-Sponsored University Research

OTTAWA—A federal court judge has stalled a former graduate student's attempts to have an investigation into a drinking water experiment the University of Toronto conducted in Wiarton, Ontario under contract to a private chemical company.

The Wiarton experiment was terminated prematurely after citizen complaints of foul taste, odour, and laundry bleaching were reported by the national news media, but publications authored by those involved claimed that "no odour or taste complaints were received during the study period". This information was thus unavailable to Health Canada when it subsequently proposed updates to federal drinking water guidelines.

"The federal government agency entrusted with nearly one billion dollars for university research shrugs and says that it has a limited role in ensuring research integrity," said Chris Radziminski, who submitted his concerns about Wiarton with evidence obtained through freedom of information requests to the federal Natural Sciences and Engineering Research Council (NSERC). "Somehow the federal court accepted this unbelievable position."

After NSERC had refused repeatedly to order an investigation by the University, the Canadian Federation of Students took NSERC to federal court, but Justice O'Keefe ruled that NSERC did not act improperly by dismissing students' concerns. The Court further ruled that NSERC acted reasonably in accepting the University's treatment of the allegations pertaining to the Wiarton research—despite the University's failure to address the allegations.

NSERC has provided over half a million dollars of direct funding to the principal University researcher, including a prestigious industry-university partnership award for his work in drinking water with the corporate partner involved in Wiarton. Even while the federal court case was in progress, NSERC awarded the professor an Industrial Research Chair.

"Although the federal government spends billions of dollars on university research, the Canadian public and the international community have very little guarantee that our research is conducted ethically or professionally," said Angela Regnier, former National Deputy Chairperson of the Canadian Federation of Students and affiant in the case. "Federal guidelines are meaningless if they are not enforced."

"This ruling exposes a major hole in Canadian research oversight. Unlike other countries, Canada apparently has no watchdog organisation to intervene when substantial allegations of corporate interference in university research are uncovered," concluded Regnier, "With significant accelerations to commercialisation in universities in Canada, research integrity is at serious risk."

The Canadian Federation of Students is Canada's largest national students' organisation. It is composed of more than 80 university and college students' associations in ten provinces with a combined membership of over one-half million students.

For more information, please contact:

Angela Regnier, Affiant: 647 989-4780
Chris Radziminski, former U of T graduate student: 604 683-0281
Ian Boyko, Government Relations Coordinator: 613 232-7394 ext. 22

Statistics Canada Statistique Canada

Canada

Science Statistics
May 2008 edition
88-001-X

Analysis

Intense global competition, the new economy and fast changing technology have made research and development (R&D) a top priority for many countries including Canada. In this light, R&D personnel play a pivotal role in any government strategy to strengthen and expand Canada's R&D capacity. This issue sheds some light on the nature of the evolution of the number of people who perform R&D activities in Canada from 1996 to 2005.

The number of people engaged in R&D in Canada (i.e., researchers, technicians and supporting staff) increased by 3.8% from 2004 to 2005, but this growth rate is relatively sluggish when compared to the 5.3% rate recorded in 2004 or the 9.6% increase posted between 1999 and 2000 (153,350 to 168,130) (table 1-1). In 2005, 8 out of every 10 (83%) new R&D personnel was a researcher (table 3-2).

Between 1996 and 2005, the number of people engaged in R&D posted an impressive growth of 48.8%. This increase was largely precipitated by the swelling of the ranks of researchers (48.4%) and technicians (55.2%) (table 3-2). Increases in the number of natural sciences and engineering researchers (55.6%) accounted for much of the rise in the total number of researchers over this period (table 3-2). During this same time frame, 4 out of every 5 new natural sciences and engineering researchers were employed in the business enterprise sector (table 1-4). [1]

In 2005, the number of personnel engaged in R&D in the business enterprise sector increased by 2.9% (about half of the growth rate of 5.8% chalked between 2003 and 2004) (tables 1-1 and 1-4), while those in the higher education sector (the second largest employer of R&D personnel) experienced a modest growth of 4.1%, a lower rate than what was recorded for this sector from 2003 and 2004 (5.5%) (tables 1-1 and 1-5).

Importantly, between 1996 and 2005, the business enterprise sector witnessed its share of the total number of personnel engaged in R&D increase from 55% in 1996 to 64% in 2005 (tables 1-4 and 3-2). On the other hand, during the same period, the higher education sector experienced a decline in its share of R&D personnel from 32% in 1996 to 27% in 2005 (tables 1-5 and 3-2). Although the number of R&D personnel in higher education institutions has been rising over the years, the business enterprise sector has seen a much larger increase in the number of R&D personnel it has employed.

In 2005, researchers accounted for 63% of all the personnel engaged in R&D in Canada, however, British Columbia (70%) Alberta (66%) and Ontario (64%) were the only provinces to record higher proportions of researchers among their R&D personnel (table 2-1).

The business enterprise sector provided employment to 81,960 researchers in 2005 and almost half (49%) of the 6,460 new researchers (tables 1-4 and 3-2). The higher education sector employed 43,420 researchers in 2005 and almost one-third (32%) of the new researchers (table 1-5). Also, during the period spanning 1996 to 2005, the number of doctoral students engaged in R&D in the higher education sector increased by 7,727 people (33.2%) (table 4-3).

In 2005, Ontario and Quebec employed 3 out of every 4 personnel engaged in R&D (75%) as their researchers amounted to 62,060 and 39,000 respectively. This may be related to the fact that these two provinces host a significant percentage of the R&D performing organizations in Canada (tables 2-2 and 3-2).

Among countries with similar methods of measuring R&D personnel, Canada has an impressive rate of researchers per 1,000 persons in the labour force. For example, in 2004, Canada's rate was 7.7 researchers per 1,000 persons in the labour force, while the United Kingdom and France posted rates of 5.7 and 8.0 respectively (table 4-1).

The natural sciences and engineering sector is the most important field of science in which federal government R&D personnel are active (table 1-2). The number of R&D personnel employed by the federal government fluctuated between 1996 and 2005, however, in 2005 there was an impressive growth of 11.2% in the numbers of such personnel (table 1-1).

Date modified: 2008-05-06

Table 1

National Gross Domestic Expenditures on Research and Development, in the total sciences, Canada

Funding sector	Performing sector						
	Federal government	Provincial governments	Provincial research organizations	Business enterprise	Higher education	Private non-profit organizations	Total
	millions of dollars						
2007 Total sciences							
Total	**2,338**	**299**	**25**	**15,773**	**10,433**	**116**	**28,984**
Federal government	2,280	1	1	330	2,787	38	**5,437**
Provincial governments	5	288	12	97	1,067	13	**1,482**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	53	10	11	12,874	881	11	**13,840**
Higher education	.	.	.	.	4,758	.	**4,758**
Private non-profit organizations	.	.	.	.	813	36	**849**
Foreign	.	..	1	2,472	127	18	**2,619**
2006 Total sciences							
Total	**2,298**	**293**	**25**	**15,360**	**9,974**	**116**	**28,067**
Federal government	2,240	1	1	321	2,664	38	**5,266**
Provincial governments	6	282	12	94	1,020	13	**1,428**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	51	10	11	12,537	842	11	**13,463**
Higher education	.	.	.	.	4,549	.	**4,549**
Private non-profit organizations	.	.	.	.	778	36	**814**
Foreign	.	..	1	2,408	122	18	**2,548**
2005 r Total sciences							
Total	**2,414**	**277**	**23**	**15,356**	**9,518**	**112**	**27,699**
Federal government	2,341	1	1	321	2,542	37	**5,244**
Provincial governments	9	266	12	94	973	13	**1,367**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	64	10	10	12,534	803	10	**13,431**
Higher education	.	.	.	.	4,340	.	**4,340**
Private non-profit organizations	.	.	.	.	742	35	**777**
Foreign	.	..	0	2,407	116	17	**2,541**
2004 r Total sciences							
Total	**2,083**	**265**	**25**	**14,947**	**9,058**	**103**	**26,480**
Federal government	2,027	1	1	271	2,337	12	**4,648**
Provincial governments	7	256	14	62	1,039	15	**1,393**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	49	8	10	12,247	755	13	**13,082**
Higher education	.	.	.	.	4,147	.	**4,147**
Private non-profit organizations	.	.	.	.	685	50	**735**
Foreign	.	..	0 s	2,367	96	13	**2,476**
2003 r Total sciences							
Total	**2,083**	**254**	**24**	**14,039**	**8,143**	**92**	**24,635**
Federal government	2,027	1	1	299	2,182	15	**4,524**
Provincial governments	8	245	14	76	1,018	17	**1,378**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	48	8	9	11,612	679	14	**12,371**
Higher education	.	.	.	.	3,589	.	**3,589**
Private non-profit organizations	.	.	.	.	599	38	**637**
Foreign	.	..	0 s	2,051	76	8	**2,136**
2002 r Total sciences							
Total	**2,190**	**256**	**26**	**13,541**	**7,455**	**63**	**23,532**
Federal government	2,124	2	1	300	1,817	6	**4,250**
Provincial governments	11	245	15	53	828	20	**1,172**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	55	9	9	11,369	643	12	**12,098**
Higher education	.	.	.	.	3,462	.	**3,462**
Private non-profit organizations	.	.	.	.	604	24	**628**
Foreign	.	..	1	1,819	101	1	**1,921**

Table 1 – continued

National Gross Domestic Expenditures on Research and Development, in the total sciences, Canada

Funding sector	Performing sector						
	Federal government	Provincial governments	Provincial research organizations	Business enterprise	Higher education	Private non-profit organizations	Total
	millions of dollars						
2001 r Total sciences							
Total	**2,103**	**253**	**23**	**14,266**	**6,424**	**63**	**23,132**
Federal government	2,044	0	1	458	1,587	6	**4,096**
Provincial governments	6	241	12	51	712	20	**1,043**
Provincial research organizations	.	.	0 s	.	.	.	0 s
Business enterprise	53	11	9	10,931	603	10	**11,619**
Higher education	.	.	.	.	2,928	.	**2,928**
Private non-profit organizations	.	.	.	.	510	26	**536**
Foreign	.	..	1	2,826	84	1	**2,912**
2000 r Total sciences							
Total	**2,080**	**189**	**66**	**12,395**	**5,793**	**58**	**20,581**
Federal government	2,023	0	2	239	1,293	3	**3,560**
Provincial governments	3	189	38	45	587	16	**878**
Provincial research organizations	.	.	1	.	.	.	**1**
Business enterprise	54	0	18	8,589	553	10	**9,225**
Higher education	.	.	.	.	2,892	.	**2,892**
Private non-profit organizations	.	.	.	.	418	27	**445**
Foreign	.	..	7	3,522	50	1	**3,580**
1999 r Total sciences							
Total	**1,859**	**173**	**60**	**10,399**	**5,082**	**63**	**17,638**
Federal government	1,814	0	1	309	1,085	7	**3,216**
Provincial governments	4	173	34	57	482	16	**767**
Provincial research organizations	.	.	3	.	.	.	**3**
Business enterprise	41	0	19	7,391	460	6	**7,917**
Higher education	.	.	.	.	2,649	.	**2,649**
Private non-profit organizations	.	.	.	.	349	31	**380**
Foreign	.	..	3	2,642	57	3	**2,705**
1998 r Total sciences							
Total	**1,743**	**155**	**61**	**9,682**	**4,370**	**77**	**16,088**
Federal government	1,691	0	3	262	863	11	**2,830**
Provincial governments	4	155	34	56	372	19	**640**
Provincial research organizations	.	.	0 s	.	.	.	0 s
Business enterprise	49	0	21	6,865	411	9	**7,355**
Higher education	.	.	.	.	2,339	.	**2,339**
Private non-profit organizations	.	.	.	.	335	37	**372**
Foreign	.	..	3	2,499	50	1	**2,552**
1997 r Total sciences							
Total	**1,720**	**156**	**58**	**8,739**	**3,879**	**82**	**14,635**
Federal government	1,654	0	4	355	793	7	**2,813**
Provincial governments	3	156	30	77	370	20	**656**
Provincial research organizations	.	.	1	.	.	.	**1**
Business enterprise	63	0	19	6,557	381	11	**7,030**
Higher education	.	.	.	.	1,971	.	**1,971**
Private non-profit organizations	.	.	.	.	324	43	**367**
Foreign	.	..	4	1,749	40	1	**1,794**
1996 r Total sciences							
Total	**1,792**	**163**	**79**	**7,997**	**3,697**	**89**	**13,817**
Federal government	1,701	0	4	292	809	8	**2,814**
Provincial governments	4	163	44	102	298	18	**629**
Provincial research organizations	.	.	0	.	.	.	**0**
Business enterprise	86	0	24	5,941	335	10	**6,395**
Higher education	.	.	.	.	1,905	.	**1,905**
Private non-profit organizations	.	.	.	.	313	45	**358**
Foreign	.	..	7	1,662	37	8	**1,714**

Table 3

National Gross Domestic Expenditures on Research and Development, in the natural sciences and engineering, Canada

Funding sector	Performing sector						
	Federal government	Provincial governments	Provincial research organizations	Business enterprise	Higher education	Private non-profit organizations	Total
	millions of dollars						
2007 Natural sciences							
Total	**2,207**	**268**	**25**	**15,773**	**8,363**	**111**	**26,748**
Federal government	2,149	1	1	330	2,330	37	**4,848**
Provincial governments	5	257	12	97	854	12	**1,238**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	53	10	11	12,874	848	10	**13,806**
Higher education	.	.	.	.	3,542	.	**3,542**
Private non-profit organizations	.	.	.	.	661	34	**695**
Foreign	.	..	1	2,472	127	18	**2,619**
2006 Natural sciences							
Total	**2,173**	**263**	**25**	**15,360**	**7,995**	**111**	**25,928**
Federal government	2,116	1	1	321	2,228	37	**4,703**
Provincial governments	6	252	12	94	816	12	**1,193**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	51	10	11	12,537	811	10	**13,430**
Higher education	.	.	.	.	3,386	.	**3,386**
Private non-profit organizations	.	.	.	.	632	34	**666**
Foreign	.	..	1	2,408	122	18	**2,548**
2005 r Natural sciences							
Total	**2,289**	**248**	**23**	**15,356**	**7,629**	**102**	**25,647**
Federal government	2,217	1	1	321	2,126	34	**4,700**
Provincial governments	9	237	12	94	779	10	**1,140**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	64	10	10	12,534	774	10	**13,401**
Higher education	.	.	.	.	3,231	.	**3,231**
Private non-profit organizations	.	.	.	.	603	31	**634**
Foreign	.	..	0	2,407	116	17	**2,540**
2004 r Natural sciences							
Total	**1,965**	**241**	**25**	**14,947**	**7,280**	**98**	**24,555**
Federal government	1,909	1	1	271	1,960	11	**4,152**
Provincial governments	7	232	14	62	831	14	**1,160**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	49	8	10	12,247	728	12	**13,054**
Higher education	.	.	.	.	3,110	.	**3,110**
Private non-profit organizations	.	.	.	.	556	48	**604**
Foreign	.	..	0 s	2,367	96	13	**2,476**
2003 r Natural sciences							
Total	**1,963**	**229**	**24**	**14,039**	**6,544**	**87**	**22,887**
Federal government	1,907	1	1	299	1,846	14	**4,068**
Provincial governments	8	220	14	76	814	15	**1,148**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	48	8	9	11,612	654	13	**12,345**
Higher education	.	.	.	.	2,669	.	**2,669**
Private non-profit organizations	.	.	.	.	485	37	**523**
Foreign	.	..	0 s	2,051	76	8	**2,136**
2002 r Natural sciences							
Total	**2,073**	**236**	**26**	**13,541**	**6,041**	**59**	**21,975**
Federal government	2,007	2	1	300	1,588	5	**3,903**
Provincial governments	11	225	15	53	663	19	**985**
Provincial research organizations	.	.	0 s	.	.	.	**0 s**
Business enterprise	55	9	9	11,369	619	11	**12,073**
Higher education	.	.	.	.	2,577	.	**2,577**
Private non-profit organizations	.	.	.	.	493	23	**516**
Foreign	.	..	1	1,819	101	1	**1,921**

Table 3 – continued

National Gross Domestic Expenditures on Research and Development, in the natural sciences and engineering, Canada

Funding sector	Performing sector						
	Federal government	Provincial governments	Provincial research organizations	Business enterprise	Higher education	Private non-profit organizations	Total
	millions of dollars						
2001 r Natural sciences							
Total	**2,010**	**234**	**23**	**14,266**	**5,150**	**59**	**21,742**
Federal government	1,951	0	1	458	1,356	6	3,772
Provincial governments	6	223	12	51	570	18	880
Provincial research organizations	.	.	0 s	.	.	.	0 s
Business enterprise	53	11	9	10,931	578	9	11,617
Higher education	.	.	.	.	2,150	.	2,150
Private non-profit organizations	.	.	.	.	412	25	436
Foreign	.	..	1	2,826	84	1	2,912
2000 r Natural sciences							
Total	**1,995**	**171**	**66**	**12,395**	**4,591**	**55**	**19,273**
Federal government	1,938	0	2	239	1,106	3	3,288
Provincial governments	3	171	38	45	470	15	742
Provincial research organizations	.	.	1	.	.	.	1
Business enterprise	54	0	18	8,589	531	10	9,202
Higher education	.	.	.	.	2,092	.	2,092
Private non-profit organizations	.	.	.	.	342	26	367
Foreign	.	..	7	3,522	50	1	3,580
1999 r Natural sciences							
Total	**1,774**	**160**	**60**	**10,399**	**4,020**	**54**	**16,468**
Federal government	1,729	0	1	309	943	7	2,989
Provincial governments	4	160	34	57	386	13	654
Provincial research organizations	.	.	3	.	.	.	3
Business enterprise	41	0	19	7,391	440	6	7,897
Higher education	.	.	.	.	1,909	.	1,909
Private non-profit organizations	.	.	.	.	285	26	311
Foreign	.	..	3	2,642	57	2	2,704
1998 r Natural sciences							
Total	**1,667**	**139**	**61**	**9,682**	**3,466**	**68**	**15,083**
Federal government	1,615	0	3	262	751	10	2,641
Provincial governments	4	139	34	56	297	17	548
Provincial research organizations	.	.	0 s	.	.	.	0 s
Business enterprise	49	0	21	6,865	393	8	7,336
Higher education	.	.	.	.	1,697	.	1,697
Private non-profit organizations	.	.	.	.	278	32	310
Foreign	.	..	3	2,499	50	1	2,552
1997 r Natural sciences							
Total	**1,651**	**140**	**58**	**8,739**	**3,147**	**73**	**13,809**
Federal government	1,585	0	4	355	692	6	2,642
Provincial governments	3	140	30	77	296	18	564
Provincial research organizations	.	.	1	.	.	.	1
Business enterprise	63	0	19	6,557	365	10	7,014
Higher education	.	.	.	.	1,486	.	1,486
Private non-profit organizations	.	.	.	.	268	38	306
Foreign	.	..	4	1,749	40	1	1,794
1996 r Natural sciences							
Total	**1,724**	**147**	**79**	**7,997**	**2,992**	**80**	**13,018**
Federal government	1,633	0	4	292	708	7	2,645
Provincial governments	4	147	44	102	238	16	551
Provincial research organizations	.	.	0	.	.	.	0
Business enterprise	86	0	24	5,941	320	9	6,380
Higher education	.	.	.	.	1,429	.	1,429
Private non-profit organizations	.	.	.	.	260	41	301
Foreign	.	..	7	1,662	37	7	1,712

Table 5

National Gross Domestic Expenditures on Research and Development, in the social sciences and humanities, Canada

Funding sector	Performing sector						
	Federal government	Provincial governments	Provincial research organizations	Business enterprise	Higher education	Private non-profit organizations	Total
	millions of dollars						
2007 Social sciences							
Total	**131**	**31**	.	.	**2,070**	**5**	**2,236**
Federal government	131	.	.	.	457	1	**589**
Provincial governments	.	31	.	.	213	1	**244**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	33	1	**34**
Higher education	.	.	.	.	1,216	.	**1,216**
Private non-profit organizations	.	.	.	.	152	2	**154**
Foreign	.	.	.	.	.	.	.
2006 Social sciences							
Total	**124**	**30**	.	.	**1,979**	**5**	**2,139**
Federal government	124	.	.	.	436	1	**562**
Provincial governments	.	30	.	.	204	1	**235**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	31	1	**32**
Higher education	.	.	.	.	1,162	.	**1,162**
Private non-profit organizations	.	.	.	.	146	2	**148**
Foreign	.	.	.	.	.	.	.
2005 r Social sciences							
Total	**124**	**30**	.	.	**1,889**	**10**	**2,053**
Federal government	124	.	.	.	416	3	**544**
Provincial governments	.	30	.	.	195	3	**227**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	29	.	**29**
Higher education	.	.	.	.	1,109	.	**1,109**
Private non-profit organizations	.	.	.	.	139	4	**143**
Foreign	.	.	.	.	.	.	.
2004 r Social sciences							
Total	**118**	**24**	.	.	**1,778**	**5**	**1,925**
Federal government	118	.	.	.	377	1	**496**
Provincial governments	.	24	.	.	208	1	**233**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	27	1	**28**
Higher education	.	.	.	.	1,037	.	**1,037**
Private non-profit organizations	.	.	.	.	129	2	**131**
Foreign	.	.	.	.	.	.	.
2003 r Social sciences							
Total	**120**	**25**	.	.	**1,599**	**5**	**1,748**
Federal government	120	.	.	.	336	1	**456**
Provincial governments	.	25	.	.	204	2	**230**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	25	1	**26**
Higher education	.	.	.	.	920	.	**920**
Private non-profit organizations	.	.	.	.	114	1	**114**
Foreign	.	.	.	.	.	.	.
2002 r Social sciences							
Total	**117**	**20**	.	.	**1,414**	**4**	**1,557**
Federal government	117	.	.	.	229	1	**347**
Provincial governments	.	20	.	.	165	1	**187**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	24	1	**25**
Higher education	.	.	.	.	885	.	**885**
Private non-profit organizations	.	.	.	.	111	1	**112**
Foreign	.	.	.	.	.	.	.

Table 5 – continued

National Gross Domestic Expenditures on Research and Development, in the social sciences and humanities, Canada

Funding sector	Performing sector						
	Federal government	Provincial governments	Provincial research organizations	Business enterprise	Higher education	Private non-profit organizations	Total
	millions of dollars						
2001 r Social sciences							
Total	**93**	**18**	.	.	**1,274**	**4**	**1,389**
Federal government	93	.	.	.	231	.	**324**
Provincial governments	.	18	.	.	142	2	**163**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	25	1	**26**
Higher education	.	.	.	.	778	.	**778**
Private non-profit organizations	.	.	.	.	98	1	**99**
Foreign	.	.	.	.	.	.	.
2000 r Social sciences							
Total	**85**	**18**	.	.	**1,202**	**3**	**1,308**
Federal government	85	.	.	.	187	.	**272**
Provincial governments	.	18	.	.	117	1	**136**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	22	.	**23**
Higher education	.	.	.	.	800	.	**800**
Private non-profit organizations	.	.	.	.	76	1	**77**
Foreign	.	.	.	.	.	.	.
1999 r Social sciences							
Total	**85**	**13**	.	.	**1,062**	**9**	**1,170**
Federal government	85	.	.	.	142	.	**227**
Provincial governments	.	13	.	.	96	3	**112**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	20	.	**20**
Higher education	.	.	.	.	740	.	**740**
Private non-profit organizations	.	.	.	.	64	5	**69**
Foreign	.	.	.	.	.	1	**1**
1998 r Social sciences							
Total	**76**	**16**	.	.	**904**	**9**	**1,005**
Federal government	76	.	.	.	112	1	**189**
Provincial governments	.	16	.	.	75	2	**93**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	18	1	**19**
Higher education	.	.	.	.	642	.	**642**
Private non-profit organizations	.	.	.	.	57	5	**62**
Foreign	.	.	.	.	.	.	.
1997 r Social sciences							
Total	**69**	**16**	.	.	**732**	**9**	**826**
Federal government	69	.	.	.	101	1	**171**
Provincial governments	.	16	.	.	74	2	**92**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	16	1	**16**
Higher education	.	.	.	.	485	.	**485**
Private non-profit organizations	.	.	.	.	56	5	**61**
Foreign	.	.	.	.	.	.	.
1996 r Social sciences							
Total	**68**	**16**	.	.	**705**	**9**	**799**
Federal government	68	.	.	.	101	1	**170**
Provincial governments	.	16	.	.	60	2	**78**
Provincial research organizations	.	.	.	.	.	.	.
Business enterprise	.	.	.	.	15	1	**16**
Higher education	.	.	.	.	476	.	**476**
Private non-profit organizations	.	.	.	.	53	4	**57**
Foreign	.	.	.	.	.	1	**1**

Table 1-5

Personnel engaged in research and development — Higher education sector, by occupational category

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
						number				
Total	**45,430**	**44,920**	**44,320**	**44,590**	**45,150**	**46,300**	**47,340**	**51,880**	**54,730**	**56,950**
Researchers	33,790	33,430	32,840	33,020	33,300	34,200	34,910	38,900	41,380	43,420
Technicians	6,090	6,010	6,010	6,060	6,200	5,980	6,140	6,410	6,580	6,670
Support staff	5,550	5,480	5,470	5,510	5,650	6,120	6,290	6,570	6,770	6,860
Natural sciences and engineering	**24,790**	**24,190**	**23,940**	**25,130**	**25,330**	**26,190**	**26,820**	**29,810**	**31,330**	**32,670**
Researchers	17,010	16,550	16,250	17,400	17,440	18,110	18,530	21,160	22,500	23,720
Technicians	4,420	4,340	4,370	4,400	4,490	4,440	4,560	4,750	4,850	4,920
Support staff	3,360	3,300	3,320	3,330	3,400	3,640	3,730	3,900	3,980	4,030
Social sciences and humanities	**20,640**	**20,730**	**20,380**	**19,460**	**19,820**	**20,110**	**20,520**	**22,070**	**23,400**	**24,280**
Researchers	16,780	16,880	16,590	15,620	15,860	16,090	16,380	17,740	18,880	19,700
Technicians	1,670	1,670	1,640	1,660	1,710	1,540	1,580	1,660	1,730	1,750
Support staff	2,190	2,180	2,150	2,180	2,250	2,480	2,560	2,670	2,790	2,830

Note(s): Personnel counts are reported as full-time equivalents (rounded to the nearest 10).

Date modified: 2008-05-06

Table 358-0025[1]

Survey of intellectual property commercialization, by higher education sector indicators, annual (number unless otherwise noted)

Survey or program details:

Survey of Intellectual Property Commercialization in the Higher Education Sector - **4222**

Geography=Canada

Higher education sector indicators	1998	1999	2000	2001	2002	2003	2004	2005
Institutions engaged in intellectual property management (percent)[2,3]	62	61	..	66	..	72	76	..
Full-time equivalent employees engaged in intellectual property management[3,4]	186	178	..	221	..	255	280	..
Total operational expenditures for intellectual property management (dollars x 1,000)[3]	12,645	22,018	..	28,505	..	36,419	36,927	..
Number of research contracts[5]	5,081	5,748	..	8,247	..	11,432	14,324	..
Value of research contracts (dollars x 1,000)[5]	288,600	393,358	..	527,051	..	810,431	940,993	..
Number of invention disclosures[6,7]	661	893	..	1,105	..	1,133	1,432	1,475[p]
Number of inventions protected (that resulted in protection activity)[6,8]	379	549	..	682	..	527	629	744[p]
Number of inventions declined by the institution[6,9]						256	355	323[p]
Number of patent applications[10]	379	656	..	932	..	1,252	1,264	1,427[p]
Number of patents issued[10]	143	349	..	381	..	347	397	374[p]
Number of patents held[10]	1,252	1,915	..	2,133	..	3,047	3,827	3,953[p]
Number of new licenses and options[11,12]	243	232	..	354	..	422	494	577[p]
Number of active licenses and options[11,12]	788	1,165	..	1,424	..	1,756	2,022	2,216[p]
Income from intellectual property (dollars x 1,000)[2]	16,331	24,745	..	52,510	..	55,525	51,210	55,127[p]
Value of remaining equity held by the institution in publicly traded spin-offs (dollars x 1,000)[13,14]	22,500	54,560	..	45,120	..	52,351	49,872	..
Investment in spin-offs raised with the assistance of the institution (dollars x 1,000)[14]						54,640	56,421	..

Symbol legend:

.. Not available

p Preliminary

Footnotes:

1. The 1998 survey included universities only. In 1999 and subsequent years, research hospitals were included in the survey. Data were not collected for 2000 and 2002 since this survey was done on an occasional basis between 1998 and 2003.
2. Intellectual property refers to any creation of the human mind that can be protected by law. It includes inventions, works of literature, art, drama and music, computer software and databases, educational materials, industrial designs, integrated circuit topographies, new plant varieties and know-how.
3. Intellectual property management refers to the identification, protection, promotion or commercialization of the institution's intellectual property.
4. Full-time equivalent refers to the number of employees expressed as working full-time.
5. A research contract is research funding given to the institution by an external sponsor that has a deliverable attached to it. The deliverable may be, for example, a book, an invention or a report on the outcome of the research.
6. An invention is any patentable product, process, machine, manufacture or composition of matter, or any new

and useful improvement of any of these.

Invention disclosures refers to the number of inventions developed by researchers and reported to the institution.

Inventions protected refers to the number of inventions for which a protection activity, such as preparing a patent application, was started.

Inventions declined refers to the number of inventions rejected for commercialization by the institution.

A patent is a document that protects the rights of an inventor. Patents are granted by the governments of countries. They assure the inventor of the sole right to make, use and sell his/her invention in that country for a certain period of time, for example, 20 years for Canadian patents.

A license is an agreement with a client to use the institution's intellectual property for a fee or other consideration, such as equity in a company.

An option is the right to negotiate for a license.

In 1999 and 2001, this value includes universities only because the hospital component is confidential.

A spin-off company may be established to license the institution's technology, to fund research at the institution in order to develop technology that will be licensed by the company and/or to provide a service that was originally offered through a department or unit of the institution.

Source: Statistics Canada. *Table 358-0025 - Survey of intellectual property commercialization, by higher education sector indicators, annual (number unless otherwise noted)*, CANSIM (database), Using E-STAT (distributor). http://estat.statcan.ca.ezproxy.library.yorku.ca/cgi-win/cnsmcgi.exe?Lang=E&ESTATFile=EStat\English\CII_1_E.htm&RootDir=ESTAT/ (accessed: May 20, 2008)

Printer-friendly format

Date modified: 2007-07-26

CEOs Pushing Ayn Rand Studies Use Money to Overcome Resistance

By Matthew Keenan

April 11 (Bloomberg) -- Ayn Rand's novels of headstrong entrepreneurs' battles against convention enjoy a devoted following in business circles. While academia has failed to embrace Rand, calling her philosophy simplistic, schools have agreed to teach her works in exchange for a donation.

The charitable arm of BB&T Corp., a banking company, pledged $1 million to the University of North Carolina Charlotte in 2005 and obtained an agreement that Rand's novel ``Atlas Shrugged'' would become required reading for students. Marshall University in Huntington, West Virginia, and Johnson C. Smith University in Charlotte, North Carolina, say they also took grants and agreed to teach Rand.

The author, who died in 1982, used her self-righteous heroes to promote objectivism, a philosophy that embraces reason and individualism, while rejecting religion. While Rand, an advocate of free markets, would support a university's getting paid to teach her works, the idea riles academic ethicists.

``A corporation crosses a line and a university is complicit in crossing the line if it accepts money'' and accedes to a request to assign specific books, said Jonathan Knight, director of the program on academic freedom, tenure and governance for the American Association of University Professors, in Washington. ``It's unique in my experience.'' Knight has worked in the field for 31 years.

As universities seek ways to bolster finances, such as with top level sports teams, donations to dictate curricula are still rare. Yaron Brook, the executive director of the Ayn Rand Institute, a nonprofit organization in Irvine, California, that promotes objectivism, said some professors are re-evaluating Rand.

``We're definitely seeing more of an interest in the academic world,'' Brook said. He said he senses a softening of opposition from academics and sees more conferences and articles about Rand.

`Absolutist Ethics'

``Ayn Rand has a kind of absolutist ethics,'' Brook said. ``She believes in right or wrong, good and evil, but based on secular principles, not religious principles, and I think there's an appeal for that now.''

Alan Greenspan, later the U.S. Federal Reserve chairman, was among Rand's early disciples, in the 1950s. Mark Cuban, the billionaire owner of the National Basketball Association's Dallas Mavericks, calls Rand's ``The Fountainhead'' one of his favorite business books. John Allison, chief executive officer of BB&T, deems ``Atlas Shrugged'' the best defense of capitalism ever written, and requires managers to read it.

Rand believed American universities had been taken over in the 20th century by thinkers who rejected her notion that many of life's questions have one right answer, said Judith Wilt, an English professor at Boston College.

`Places for Discourse'

``Universities as places for discourse and argument and a kind of searching tend to be more interested in what Rand would call vagueness,'' said Wilt, 66, who is teaching a seminar on Rand and contemporaries such as John Steinbeck and Arthur Miller. ``Universities tend to be interested not in closing the argument, but in keeping it open.''

More News

- Hedge Funds in Swaps Facing Peril With Fourfold Rise in Junk Bond Defaults
- AstraZeneca, Bristol Help Push Biotechnology Deals to Record $27 Billion
- Brazil Buys More PCs Than TVs, Bolstering Hewlett, Dell as U.S. Sales Slow

Rand was born in Russia in 1905 and emigrated to the U.S. in 1926. Businessmen who were guided by their own consciences or self-interest were the heroes of her novels. ``The Fountainhead,'' published in 1943, tells the story of architect Howard Roark, who blows up a housing project he designed rather than compromise his vision.

`I Love It'

``I love it because it's so motivating,'' Cuban, 49, said in an e-mail. ``It's about an individual standing up for and believing in himself, ignoring what others think.''

In ``Atlas Shrugged,'' Rand describes the collapse of the U.S. economy when the most productive industrialists, led by John Galt, withdraw from society.

``Atlas Shrugged'' has sold 6 million copies since its first printing in 1957. After sales sagged to an average of 77,000 a year in the 1980s, they climbed steadily and topped 185,000 last year, the Rand institute said, citing publishers' data.

Allison's BB&T, based in Winston-Salem, North Carolina, in March pledged $2 million to establish the first U.S. chair in the study of objectivism, at the University of Texas at Austin.

That school and 27 others have accepted an aggregate $30 million from the bank's foundation in the last decade.

``These gifts are really about the study of capitalism from a moral perspective and all we want is to make Rand part of the dialogue,'' said Bob Denham, a spokesman for BB&T, the parent of Branch Banking & Trust Co.

The BB&T Charitable Foundation made a five-year, $1 million commitment to the University of North Carolina Charlotte in January 2005 after a dinner meeting between Allison and Claude Lilly, then dean of UNC Charlotte's business school.

`Required Reading'

The grant agreement described ``Atlas Shrugged'' as ``required reading'' in a course about the fundamentals of capitalism.

BB&T donated $500,000 last year to Johnson C. Smith University to help endow a professorship on capitalism and free markets, with lessons including ``Atlas Shrugged.'' It's the fourth endowed chair at the historically black college in Charlotte.

`` I don't believe I have to advocate that people accept Ayn Rand's philosophy,'' said Patricia Roberson-Saunders, who holds the chair. Roberson-Saunders, who will present Rand with other texts, said students will benefit from reading about a world view held by ``people with whom they will have to work and for whom they will have to work.''

Marshall announced in January that it received $1 million to establish the BB&T Center for the Advancement of American Capitalism. As part of the curriculum, an upper-level course will focus on ``Atlas Shrugged'' and Adam Smith's ``The Wealth of Nations.''

Marshall spokesman Dave Wellman wasn't immediately available for comment.

`Crossing the Line'

After BB&T mandated that some schools teach ``Atlas Shrugged,'' grant seekers became aware of Allison's interest and now tailor their applications by stating up front their interest in Rand, Denham said.

Scholars scoff at the Rand bounty, saying her ideas are too shallow to build courses around her.

``Rand could not write her way out of a paper bag,'' said Harold Bloom, a professor of the humanities and English at Yale University in New Haven, Connecticut. Bloom, 77, is the author of ``The Western Canon: The Books and School of the Ages'' (Harcourt, 1994), an examination of the most important works in Western literature. Rand isn't on the list.

To contact the reporter on this story: Matthew Keenan in Boston at mkeenan6@bloomberg.net.

Last Updated: April 11, 2008 00:01 EDT

NEWS

Data show extent of sexism in physics

Women are poorly represented in physics, making up just 10% of faculty in the United States, for example, but the reasons for this have proved contentious. Now a particle physicist claims to have hard data showing institutional sexism at an experiment at one of America's highest-profile physics labs.

Sherry Towers claims that female postdocs worked significantly harder than their male peers but were awarded one-third as many conference presentations proportionally. "There was this shocking difference," says Towers, who now studies statistics at Purdue University in West Lafayette, Indiana. "Particle physics really hasn't moved forward in 30 years."

Towers used data from publicly available work records to chart the careers of 57 postdoctoral researchers, including nine women, who worked on the 'DZero' particle detector at Fermilab in Batavia, Illinois, between 1998 and 2006. Towers herself worked as a postdoc on the project between 2000 and 2005. The findings of her survey were striking, she says. She claims that women did 40% more maintenance work than their male counterparts, and that female postdocs produced significantly more 'internal papers' per year. But based on that productivity they were only one-third as likely to be allocated conference talks as their male peers, she claims (http://arxiv.org/abs/0804.2026).

Conference presentations are critical to a young particle physicist's career. Papers from collaborations such as DZero have hundreds of authors in alphabetical order. Being given the chance to present results at a meeting is a major way for young researchers to stand out. "It's important," says Pauline Gagnon, a physicist with the ATLAS detector at CERN near Geneva, Switzerland. "Being able to give talks is a way of rewarding individuals for their work."

Most particle detectors have internal committees that allocate conference presentations to researchers. These committees are frequently male-dominated, and Towers believes this lies behind the discrimination. "I don't think for a second that there is a conscious bias going on," she says. But the committees "are in danger of being prone to patronage and cronyism". Male committee members are more likely to nominate male protégés to receive presentation time, she claims.

M. JONES

Sherry Towers assessed work data for an experiment at Fermilab.

Some are sceptical of the findings. "I wasn't convinced that the effect she has found is real," says Kevin Pitts, a particle physicist at the University of Illinois at Urbana-Champaign. Internal papers are not necessarily a direct measure of productivity, he argues, and the small number of physicists surveyed is not enough to prove systematic bias. But Pitts is quick to add that he has little doubt that females do suffer gender discrimination: "In fact," he says, "I have personally observed this on more than one occasion."

Female physicists contacted by *Nature* said Towers's data matched their personal experiences of institutional sexism in physics. "You often see a young guy with an older guy gossiping and having coffee, but never a woman," says Freya Blekman, a physicist on the CMS experiment at CERN. "I'm convinced," agrees Gagnon. "There is absolutely no shadow of a doubt in my mind." She says the ATLAS collaboration is thinking about how to address the problem in its own speakers' committee.

After Towers complained, Fermilab launched an internal review in autumn 2006, says Bruce Chrisman, the lab's chief operating officer. An edited copy of the review obtained by *Nature* found that the collaboration "followed its policies correctly". But the investigator, a senior female physicist, added that complaints of gender discrimination in the group "should not be summarily dismissed". There was a general feeling that females were being "passed over" for leadership roles, the report says.

DZero's leaders counter that bias, if it ever existed, is not plaguing the current collaboration. A survey of data between August 2006 and 2007 showed that women gave 17% of all talks despite making up just 12% of the collaboration, says DZero spokesman Dmitri Denisov.

Powers says the investigation didn't focus on postdocs and hasn't led to real changes at DZero. She wants the conference allocation system to be made more transparent and balanced. "The changes that need to be made are simple," she says. "It wouldn't cost them a dime."

And Towers says gender discrimination ultimately forced her out of particle physics. She adds that in 2004 her former employer, a prominent northeastern public university, tried to terminate her contract after she complained that she wasn't given adequate maternity leave. She has since filed a lawsuit against the university. ■

Geoff Brumfiel

Italian group claims to see dark matter — again

Physicists in Italy claimed last week to have seen particles of dark matter. Their announcement has got their rivals riled and raises questions about what constitutes evidence of a new particle.

Rita Bernabei of the National Institute of Nuclear Physics in Rome presented her team's latest results on 16 April at an international meeting of particle physicists in Venice, Italy. Their detector, DAMA/LIBRA (Dark Matter Large Sodium Iodide Bulk for Rare Processes), located deep under the country's Gran Sasso mountain, seems to be observing dark matter, Bernabei says.

Most agree that the experiment is picking up something: "They're seeing a signal, there's no doubt about that," says Tim Sumner of Imperial College London. But despite this, critics say that they don't believe the detector has found the elusive particles. "For me, it's not proof that they have seen dark matter," says Gilles Gerbier, a physicist at the Centre for Atomic Energy in Saclay, France. He adds that he's stumped by what's causing the signal.

Dark matter is believed by most physicists and astronomers to make up some 85% of the matter in the Universe. Most theories predict that it is some form of massive particle that interacts very rarely — if at all — with regular matter such as atoms. To date, most believe that dark matter has been spotted only indirectly via its pull on rotating galaxies and its effect on the shape of the early cosmos.

It's not the first time that Bernabei's team has made this claim. In 2000, they also claimed to have directly observed dark matter. The team uses ultrapure sodium iodide crystals, which theory predicts will give off flashes of light when they are struck by dark-matter particles. After several years of collecting data in the late 1990s, the group saw an increase in the number of flashes