

NOVEMBER 2, 2007

# Canada's University Innovation Leaders

A supplement prepared by RESEARCH Infosource Inc., an Impact Group company

**RESEARCH INCOME INCREASES** — Research income at Canada's Top 50 Research Universities got back on track in Fiscal 2006, increasing by 6.4%, compared with only 3.2% the year before. Total income grew to

## Canada's Top 50 Research Universities 2007

Rank		University	Sponsored Research Income			Full-time Faculty**	Research Intensity	Province
2006	2005		FY2006 \$000	FY2005 \$000	% Change 2005-2006	2005-2006 #	\$ per Full-time Faculty \$000	
1	1	University of Toronto* ++	\$763,541	\$708,642	7.7	2,361	\$323.4	Ontario
2	2	Université de Montréal*	\$447,158	\$429,286	4.2	1,887	\$237.0	Quebec
3	5	University of British Columbia*	\$421,993	\$359,544	17.4	2,127	\$198.4	British Columbia
4	3	McGill University*	\$397,136	\$423,051	-6.1	1,533	\$259.1	Quebec
5	4	University of Alberta*	\$382,810	\$396,867	-3.5	1,518	\$252.2	Alberta
6	6	McMaster University*	\$331,575	\$344,979	-3.9	1,140	\$290.9	Ontario
7	7	University of Calgary*	\$262,215	\$271,513	-3.4	1,425	\$184.0	Alberta
8	9	Université Laval*	\$258,948	\$231,097	12.1	1,353	\$191.4	Quebec
9	8	University of Ottawa*	\$244,003	\$238,370	2.4	1,020	\$239.2	Ontario
10	10	University of Western Ontario*	\$225,946	\$179,883	25.6	1,302	\$173.5	Ontario
11	11	Queen's University*	\$173,696	\$155,512	11.7	792	\$219.3	Ontario
12	13	University of Guelph	\$149,640	\$125,885	18.9	783	\$191.1	Ontario
13	12	University of Manitoba*	\$139,646	\$146,699	-4.8	1,188	\$117.5	Manitoba
14	14	University of Waterloo	\$127,472	\$117,298	8.7	909	\$140.2	Ontario
15	16	Dalhousie University*	\$106,895	\$105,332	1.5	987	\$108.3	Nova Scotia
16	15	University of Saskatchewan*	\$106,887	\$110,412	-3.2	1,041	\$102.7	Saskatchewan
17	19	University of Victoria	\$100,030	\$71,333	40.2	672	\$148.9	British Columbia
18	17	Université de Sherbrooke*	\$85,938	\$85,452	0.6	894	\$96.1	Quebec
19	21	Memorial University of Newfoundland*	\$77,189	\$61,472	25.6	855	\$90.3	Newfoundland
20	18	Carleton University	\$74,086	\$72,040	2.8	660	\$112.3	Ontario
21	22	Simon Fraser University	\$69,013	\$59,503	16.0	726	\$95.1	British Columbia
22	20	Université du Québec à Montréal	\$66,331	\$62,361	6.4	981	\$67.6	Quebec
23	23	York University	\$54,990	\$49,117	12.0	1,299	\$42.3	Ontario
24	24	Institut national de la recherche scientifique+	\$44,585	\$41,392	7.7	156	\$285.8	Quebec
25	25	University of New Brunswick	\$44,030	\$38,677	13.8	558	\$78.9	New Brunswick
26	31	Laurentian University*	\$38,572	\$16,554	133.0	408	\$94.5	Ontario
27	26	Concordia University	\$36,361	\$37,056	-1.9	804	\$45.2	Quebec
28	28	University of Windsor	\$26,018	\$24,118	7.9	495	\$52.6	Ontario
29	36	École de technologie supérieure+	\$24,671	\$11,973	106.1	150	\$164.5	Quebec
30	27	University of Regina	\$22,901	\$24,998	-8.4	390	\$58.7	Saskatchewan
31	30	Royal Military College of Canada	\$20,190	\$18,100	11.5	148	\$136.4	Ontario
32	41	Trent University	\$18,008	\$9,958	80.8	246	\$73.2	Ontario
33	29	Lakehead University*	\$16,727	\$18,431	-9.2	276	\$60.6	Ontario
34	43	University of Northern British Columbia	\$15,909	\$8,365	90.2	177	\$89.9	British Columbia
35	33	Brock University	\$15,626	\$13,431	16.3	489	\$32.0	Ontario
36	35	University of Lethbridge	\$13,857	\$12,679	9.3	318	\$43.6	Alberta
37	32	Université du Québec à Chicoutimi	\$13,765	\$14,604	-5.7	213	\$64.6	Quebec
38	42	University of Prince Edward Island	\$12,682	\$9,746	30.1	219	\$57.9	Prince Edward Island
39	37	Ryerson University	\$12,193	\$10,771	13.2	600	\$20.3	Ontario
40	34	Université du Québec à Trois-Rivières	\$12,165	\$13,052	-6.8	330	\$36.9	Quebec
41	40	Université du Québec en Abitibi-Témiscamingue	\$11,693	\$10,028	16.6	96	\$121.8	Quebec
42	39	Université du Québec à Rimouski	\$10,232	\$10,251	-0.2	174	\$58.8	Quebec
43	45	St. Francis Xavier University	\$9,718	\$7,870	23.5	237	\$41.0	Nova Scotia
44	38	Wilfrid Laurier University	\$9,197	\$10,264	-10.4	438	\$21.0	Ontario
45	44	Université de Moncton	\$8,690	\$8,165	6.4	342	\$25.4	New Brunswick
46	47	Nova Scotia Agricultural College+	\$6,930	\$5,600	23.8	57	\$121.6	Nova Scotia
47	48	Saint Mary's University	\$6,634	\$4,619	43.6	234	\$28.4	Nova Scotia
48	46	Acadia University	\$5,865	\$5,990	-2.1	216	\$27.2	Nova Scotia
49	49	University of Winnipeg	\$4,563	\$4,399	3.7	219	\$20.8	Manitoba
50	51	Cape Breton University	\$4,263	\$3,989	6.9	108	\$39.5	Nova Scotia

### Notes:

1. Sponsored research income: includes funds to support research paid either in the form of a grant or by means of a contract from a source external to the institution.
2. Financial data were obtained from Statistics Canada.
3. Faculty data were obtained from Statistics Canada, Conférence des recteurs et des principaux des universités du Québec (CREPUQ) and the RESEARCH Infosource Canadian University R&D Database. For confidentiality reasons, Statistics Canada randomly rounds the figures either up or down by a multiple of "3".
4. Data are provided for the main university/college including its affiliated institutions, where applicable.
5. All institutions are members of the Canadian Association of University Business Officers (CAUBO).

\* Has a medical school + Not a full-service university \*\* Includes full, associate and assistant faculty only ++ Sponsored research income administered by affiliated hospitals was reported one fiscal year in arrears

RESEARCH Infosource Inc. is Canada's source of R&D intelligence.

For more information or to order copies of our in-depth report **Canada's Top Research Universities Report 2007** go to [www.researchinfosource.com](http://www.researchinfosource.com)  
Telephone: (416) 481-7070 ext. 23; Fax: (416) 481-7120.

For advertising information, please contact Arlene Dwyer at (416) 481-7070 ext. 23 or [arlene@impactg.com](mailto:arlene@impactg.com)  
© RESEARCH Infosource Inc. 2007. Unauthorized reproduction prohibited.

## Research Universities of the Year 2007

Three universities gain RESEARCH Infosource's designation of *Research University of the Year* in their category for their performance on a balanced set of input and output/impact measures for FY2006. These full-service universities demonstrated superior achievement both in earning research income and in publishing research in leading Canadian and international scientific journals.

Rank	Medical/Doctoral	Score*	Rank	Comprehensive	Score*	Rank	Undergraduate	Score*
1	University of Toronto	100.0	1	University of Guelph	83.6	1	Royal Military College of Canada	77.2
2	McGill University	74.3	2	University of Waterloo	78.9	2	Trent University	76.1
3	University of British Columbia	67.2	3	University of Victoria	68.8	3	University of Northern British Columbia	65.4

\*The Score in each category is out of a possible 100 points based on the following indicators and weighting: 2 input measures: total sponsored research income (25.0%), and faculty research intensity (25.0%); 2 output measures: total number of publications (16.67%) and publication intensity in leading journals (16.67%), and 1 impact measure: publication impact (16.67%). For each measure, the top ranking institution is assigned a score of 100 and the other institutions' scores are calculated as a percentage of the first ranking institution. See [www.researchinfosource.com](http://www.researchinfosource.com) for details.



Continued from page 1

\$5.53 billion, up from \$5.2 billion in Fiscal 2005. Overall, 36 universities reported increases in research income and 14 reported declines. However, the overall amount of money being invested in university research grew more slowly than in the first half of the decade, when annual increases of between 12-24% were the norm. Research income growth was somewhat limited in Fiscal 2006 by modest growth both in Corporate (4.7%) and total Government (5.3%) funding. In contrast, Non-corporate funding increased sharply (12.3%) and returns from Endowments/investments grew even more (23.6%). However, despite their faster rate of growth the latter two categories accounted for only 15% of the total.

In Fiscal 2006, Federal government sources accounted for 49% of total funding, up from 47% in Fiscal 2005. However, Provincial funding contributed only 18% of the total, a drop from 21% in Fiscal 2005. The lower Provincial share of total was due to a -6.5% investment decline in Fiscal 2006. Research funding at Canadian universities paid for by Foreign governments expanded by 21.5%, but accounted for only 2% of total funding.

THE \$100 MILLION CLUB EXPANDS

Seventeen universities – up from 16 last year – can now boast annual research income of more than \$100 million. New to the list in Fiscal 2006 is University of Victoria. U. Vic is one of only 3 institutions that achieved this result without the benefit of a medical school - units that attract significant research investment. In

The \$100 Million Club		
2006 Rank	University	Research Income \$000
1	University of Toronto*	\$763,541
2	Université de Montréal*	\$447,158
3	University of British Columbia*	\$421,993
4	McGill University*	\$397,136
5	University of Alberta*	\$382,810
6	McMaster University*	\$331,575
7	University of Calgary*	\$262,215
8	Université Laval*	\$258,948
9	University of Ottawa*	\$244,003
10	University of Western Ontario*	\$225,946
11	Queen's University*	\$173,696
12	University of Guelph	\$149,640
13	University of Manitoba*	\$139,646
14	University of Waterloo	\$127,472
15	Dalhousie University*	\$106,895
16	University of Saskatchewan*	\$106,887
17	University of Victoria	\$100,030
*Has a medical school		

total, research income at the 17 biggest research universities increased by 6.8% in Fiscal 2006, slightly more than the 6.4% all-university average. Income grew at 11 of the 17 leaders, but declined at 6 institutions.

UNEVEN PROVINCIAL PERFORMANCE

There was considerable variation in the results by province, with some jurisdictions performing much better than the national average, and some not as well. Seven universities located in the Prairie Provinces performed noticeably less well than their counterparts in other parts of the country. Manitoba (-4.6%), Saskatchewan (-4.2%) and Alberta (-3.3%), all saw declines in their research income between Fiscal 2005 and 2006. In comparison, on both the East and West Coasts, universities managed double-digit income growth: East Coast - New Brunswick (12.5%), PEI (30.1%) and Newfoundland (25.6%) and West Coast (21.7%). The 17 universities in Ontario also increased their income (8.9%), out-pacing the national average (6.4%). For a second year running Quebec universities lagged the national growth rate, increasing their research income by only 2.9%.

GAINERS AND LOSERS

A number of standout universities increased their research income substantially above the national rate in Fiscal 2006. Many of them are smaller institutions. Leading the pack was Laurentian University, where research income jumped by an impressive 133.0%. École de technologie supérieure (106.1%), University of Northern British Columbia (90.2%) and Trent University (80.8%) all made notable gains, as did 6 other institutions.

Other institutions did not fare as well, usually as a result of short-term conditions. Research income declined by up to -10.4% at one institution.

Top 50 – Leading Provinces	
Province	% of Total
Ontario (17)	42
Quebec (12)	25
Alberta (3)	12
British Columbia (4)	11

INTENSITY GROWTH BACK ON PACE

After increasing by only 0.1% in Fiscal 2005, research intensity – research income per full-time faculty position – rebounded in Fiscal 2006, growing by 3.9% overall. However, this was the second-weakest result in the decade. Growth in total research income of 6.4%, combined with faculty expansion of 2.4%, yielded the modest increase in intensity. On average, each Canadian university attracted \$155,600 of research income per faculty in Fiscal 2006, up from \$149,800 in Fiscal 2005.

Three leading universities vied for the research intensity

crown. University of Toronto led the pack, bringing in \$323,400 per full-time faculty position. Closely on its heels were McMaster University (\$290,900) and McGill University (\$259,100). In total, 13 full-service institutions bettered the national per-faculty income average \$155,600.

LARGER ROLE FOR NON-MEDICAL UNIVERSITIES

Universities with medical schools traditionally top the research income tables because they are able to attract investment from a wider range of funders. However, 34 universities without medical schools increased their share of total research spending to 20% of the total, up from 18% the year before. Non-medical institutions' income rose by 16.3%, compared with only 4.2% at the universities with medical schools. The sixteen universities with medical schools still dominate the funding scene, however, accounting for 80% of the total.

RESEARCH UNIVERSITIES OF THE YEAR

Each year RESEARCH Infosource shines the spotlight on 3 Research Universities of the Year (see our website [www.researchinfosource.com](http://www.researchinfosource.com) for additional information). These leading institutions stand out on a balanced scorecard of research input and output/impact indicators.

This year, kudos go to: University of Toronto in the Medical/Doctoral category, University of Guelph in the Comprehensive category and Royal Military College in the Undergraduate category.

THIS YEAR AND NEXT

Research income growth at Canada's universities returned to a more normal path in Fiscal 2006 (6.4%), following a hold-the-line increase in Fiscal 2005 (3.2%). Some will view this as a glass half-empty, when compared with the double-digit increases at the beginning of the decade. Others will welcome the predictability of steady if unspectacular growth.

Because federal and provincial governments are the largest single funders of university research, their investments tend to define the performance of the system. But less well known is the important but expanding role of Non-corporate sources. This category includes non-government grants/contracts and donations/bequests from individuals, along with funding by not-for-profit organizations and foundations. These have been expanding quickly in recent years, indicating a growing generosity on the part of private funders.

Between 1999 and today, total funding of university research in Canada expanded by close to 150%, a rate that is clearly not sustainable in the long term. We can forecast that new investment will be needed to replace and renew some of the capital stock that resulted from earlier rounds of investment. Other funds will be needed to finance a growing number of researchers. As the largest funders, governments will need to stay the course.

Top 10 Research Intensive Universities**			
2006 Rank		Research Intensity (\$ per full-time faculty)	
Research Intensity	Overall	University	\$000
1	1	University of Toronto*	\$323.4
2	6	McMaster University*	\$290.9
3	4	McGill University*	\$259.1
4	5	University of Alberta*	\$252.2
5	9	University of Ottawa*	\$239.2
6	2	Université de Montréal*	\$237.0
7	11	Queen's University*	\$219.3
8	3	University of British Columbia*	\$198.4
9	8	Université Laval*	\$191.4
10	12	University of Guelph	\$191.1
*Has a medical school **Includes full-service institutions only			

Top 10 Universities by Growth			
2006 Rank		% Change 2005-2006	
Income Growth	Overall	University	
1	26	Laurentian University*	133.0
2	29	École de technologie supérieure+	106.1
3	34	University of Northern British Columbia	90.2
4	32	Trent University	80.8
5	47	Saint Mary's University	43.6
6	17	University of Victoria	40.2
7	38	University of Prince Edward Island	30.1
8	10	University of Western Ontario*	25.6
9	19	Memorial University of Nfld*	25.6
10	46	Nova Scotia Agricultural College+	23.8
*Has a medical school +Not a full-service university Apparent ties due to rounding			

Bottom 10 Universities by Growth			
2006 Rank		% Change 2005-2006	
Income Growth	Overall	University	
1	44	Wilfrid Laurier University	-10.4
2	33	Lakehead University*	-9.2
3	30	University of Regina	-8.4
4	40	Université du Québec à Trois-Rivières	-6.8
5	4	McGill University*	-6.1
6	37	Université du Québec à Chicoutimi	-5.7
7	13	University of Manitoba*	-4.8
8	6	McMaster University*	-3.9
9	5	University of Alberta*	-3.5
10	7	University of Calgary*	-3.4
*Has a medical school			

Promoting involvement and partnerships that support commercialization opportunities.

# A New Tool for Commercial Research



The Canadian Light Source, our national centre for synchrotron light research, can help your company improve existing products, develop new ones, meet regulatory requirements and improve productivity.

From mining, biotechnology, the environment and health, to agriculture, nanotechnology, manufacturing and oil and gas, synchrotron science is a unique and invaluable tool for industrial research.



Canadian Light Source Inc.

[www.lightsource.ca](http://www.lightsource.ca)  
101 Perimeter Road, Saskatoon, SK, S7N 0X4  
Phone: 306-657-3500 Email: [cls@lightsource.ca](mailto:cls@lightsource.ca)





# UNIVERSITY OF SASKATCHEWAN

## Where great minds meet.

**Great minds meet in the middle of the Canadian prairie** where, over the past 100 years, the University of Saskatchewan in Saskatoon has built a reputation for excellence in teaching, learning, discovery and service.

**Great minds meet at world-class facilities** that testify to the University of Saskatchewan's commitment to research and innovation. At the Canadian Light Source synchrotron, the Community-University Institute for Social Research and the Vaccine and Infectious Disease Organization (VIDO), to name a few, a collaborative approach to research not only enriches the academic experience of our students but creates new knowledge across a broad range of disciplines.

**Great minds meet at a unique intersection of the life sciences.** With a full range of health science colleges, including a renowned veterinary college that serves Western Canada, opportunities abound for medical researchers to work with wildlife veterinarians, engineers to work with biologists and nutritionists to work with chemists and plant scientists.

**Great minds meet where they are encouraged to be great.** As one of Canada's leading medical doctoral universities, the University of Saskatchewan recognizes the value of research and its results. Commercialization of innovative products and ideas developed at the University was the strategy behind the establishment of Innovation Place on the north edge of campus. There, one of North America's most successful research parks is home to a high-tech community that takes research from the lab to the marketplace.

**Great minds meet where they can make a difference.** Partnerships between the University of Saskatchewan and local communities, industry, governments and other great minds from around the world are key to improving economic, social and cultural life at all levels of society.

The University of Saskatchewan. Where great minds meet.

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



# BY PUSHING BEYOND TRADITIONAL BOUNDARIES, GALILEO REDEFINED THE WAY WE SEE THE WORLD.



## RESEARCH AT YORK IS DOING THE SAME THING.

York University is a leading research innovator in Canada. By working across disciplines and in collaboration with partners beyond the university, researchers at York are able to develop innovative ideas and work with policy makers and practitioners to create meaningful change and a more globally competitive Canada.

Examples of York's current collaborations aimed at spurring innovation and regional economic growth include the Innovation Synergy Centre in Markham (ISCM), which helps Canadian companies realize their full growth potential and become globally competitive. Similarly, YORKbiotech, a regional innovation network and not-for-profit community development corporation, uses the power of convergence to help its partners deliver innovative, real-world solutions to real-world challenges. A third initiative, The Consortium on New Media, Creative and Entertainment R&D in the Toronto Region (CONCERT) will drive the creative potential of the region by facilitating innovative collaborations between the arts, technology and business.

These three initiatives are indicative of the unique and relevant way in which York Research is helping to shape Canada's competitiveness and global influence. To learn more about how York's approach to research is redefining university research in Canada and fueling Canada's growth, visit [www.research.yorku.ca](http://www.research.yorku.ca).



## First in research growth nation-wide!

**Fifty years ago, Laurentian University was created to bring knowledge to northern Ontario. Today, Laurentian is exporting expertise and creativity beyond Canada's borders.**

Building on its success delivering excellent undergraduate education, Laurentian is a growing graduate and research institution, with six doctoral programs complementing 20 diploma and master's programs. Laurentian now boasts 14 research centres and six Canada Research Chairs.

Research funding now surpasses \$38 million per year and LU researchers contribute to the environment, health, mining and many other areas.

Laurentian is a mirror of Canada itself, as it is one of only two bilingual universities in the country. Among its 9,000 full-time and part-time students there is a significant Native student population, as well as a growing number of international students.

The university is an investment of choice as it adds new facilities and expands its program offerings, partnerships and research activities.

- The Living with Lakes Centre, a leading-edge environmentally friendly facility, will soon be built to house two decades of internationally renowned research on freshwater ecology.
- The Northern Ontario School of Medicine – launched in collaboration with Lakehead University in 2005 – promotes northern and rural health education and research.
- The Centre for Excellence in Mining Innovation, a partnership between the university, government and the private sector, was recently established.



Northern Ontario  
School of Medicine



**Laurentian University**  
**Université Laurentienne**  
*Learning. It's in our Nature.*

SUDBURY ONTARIO CANADA  
1 800 461 4030  
[www.laurentian.ca](http://www.laurentian.ca)

# Research, Results, Relevance

**Ryerson University's research goal is straight forward: use fundamental and applied research to develop innovative solutions for the community and workplace.**

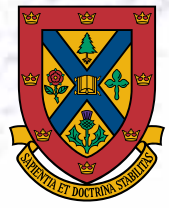
On our campus you'll see research initiatives that span the needs of today's society. Bruce Elder (Fellow of the Royal Society of Canada and 2007 Governor General's Award-winner in Visual and Media Arts) is renowned for his groundbreaking research in film-making. Bin Wu (NSERC Industrial Research Chair in Power Electronics) is conducting innovative research to develop motor drives that will cut energy consumption and boost productivity. At Ryerson, these researchers and many others are searching for knowledge that makes a difference.

We're continuing to expand our research resources. At the same time, we're looking for researchers and partners to join us in our quest. If you're interested in finding out more about the potential Ryerson has to offer, please contact the Office of Vice-President, Research and Innovation at [www.ryerson.ca/research](http://www.ryerson.ca/research)

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







Queen's  
UNIVERSITY

# A World Without Bullying



**DR. WENDY CRAIG, Department of Psychology, Queen's University**

Co-Director, PREVNet (Promoting Relationships and Eliminating Violence)  
CIHR Career Award  
CIHR Net Grant Award  
SSHRC/Ontario Mental Health Foundation/Hospital for Sick Children Foundation

**Did you know that 60% of childhood bullies have at least one criminal conviction?**

Dr. Craig and her collaborators have shown that kids who bully, and those they victimize, experience long-term personal effects, which translate into substantial financial costs to society. Through intervention, education and ongoing research, Dr. Craig is determined to make a change.

Outstanding graduate students and world-class researchers at Queen's set ideas in motion and create a profound impact on the world around them everyday.

Queen's is at the forefront of breakthroughs in virtually every discipline, attracting exceptionally talented students and faculty from all over the world.

*think* Research  
*think* Queen's

To learn more about Queen's University researchers visit:  
<http://www.queensu.ca/research/>

To learn more about Graduate Studies at Queen's, or to apply, visit: [www.queensu.ca/sgs](http://www.queensu.ca/sgs)



Research

Graduate  
Studies





H. Douglas Barber,  
O.C., Ph.D., D.Sc., F.C.A.E., P.Eng.  
Distinguished Professor-in-Residence  
McMaster University

**CAN R&D SAVE CANADA** is a legitimate question in relation to Canada's economy because our position in the prosperity of nations has been in decline for thirty years. Our performance in the world's knowledge-based economy runs a continuous deficit subsidized by our resource-

The federal government's recent Science & Technology Strategy singles out commercialization of university research and more private sector R&D as key priorities to increase Canada's competitiveness. RESEARCH Infosource solicited opinions from several leading Canadians on whether R&D can "save" Canada.

based economy. Is there a silver bullet that will transform that picture?

Our public investments in education and research place us in the top ranks of the developed economies. However, we place in the bottom ranks in our performance in the knowledge-based economy. There is something wrong with this picture.

Our private sector enterprises, populated by people who are the product of our public sector investments, make investments in R&D that place them in the bottom ranks (Canada's business expenditure on R&D ranks below the OECD average). It is easy to conclude that this is the problem and increased private sector R&D will save Canada.

However, the short answer to the question is "no". It's like asking if a bigger propeller could have saved the Titanic. No single component can do it

alone. We all know that a delightful dinner is about getting it all together in the correct proportions, at the right time in the right ambience.

Canada is a prosperous country. With 6.5% of the world's resources that would be expected. However, to reverse the decline we need to succeed in the knowledge-based economy where developed minds are the asset. This will be a challenge with 0.5% of the world's population.

In the knowledge-based economy, with few minds, Canada must be very selective and very good in creating value for the world if it is to increase trade and prosperity. To prosper we must specialize and utilize the world's knowledge and technology to create the best value for our global customers. In special areas we will add significantly to the world's knowledge and technology. But we will

always have to draw on the world's supply of knowledge and technology because, with 0.5% of the world's minds, what we can do is limited.

To prosper sustainably we must succeed so well in our specialties that we become the number one, or at worst number two, supplier. We then must use the intimacy and confidence we have cultivated to understand our customers' evolving needs. That understanding becomes the base for continuing to adopt, develop, and adapt what we do to remain the best supplier.

Commerce is a very complex system of relationships, resources and capabilities. In this system the technical and scientific skills of R&D are necessary but not sufficient for success. Indeed, in successful knowledge-based enterprises, R&D is typically less than 15% of what needs to be done and it has to

be responsive to customer and business needs.

Unless R&D is an integrated part of the whole enterprise it can be a spoiler instead of a builder. Many start up and early stage enterprises in Canada fail for this reason. Trained in Canada's research environment, they can be unaware of the other essential elements of their business and fail to focus on customers. We seem to have an endemic arrogance about research, development and technology that prevents us from modifying our models of successful knowledge-based commerce to balance all the elements.

Successful commercial enterprises receive their funding from customers. Sales income funds all the activities in this complex system. It is not possible to increase R&D expenditures outside of that context. If we asked the ques-

tion "Can Increased Profitable Sales Save Canada?" we could answer affirmatively with high confidence.

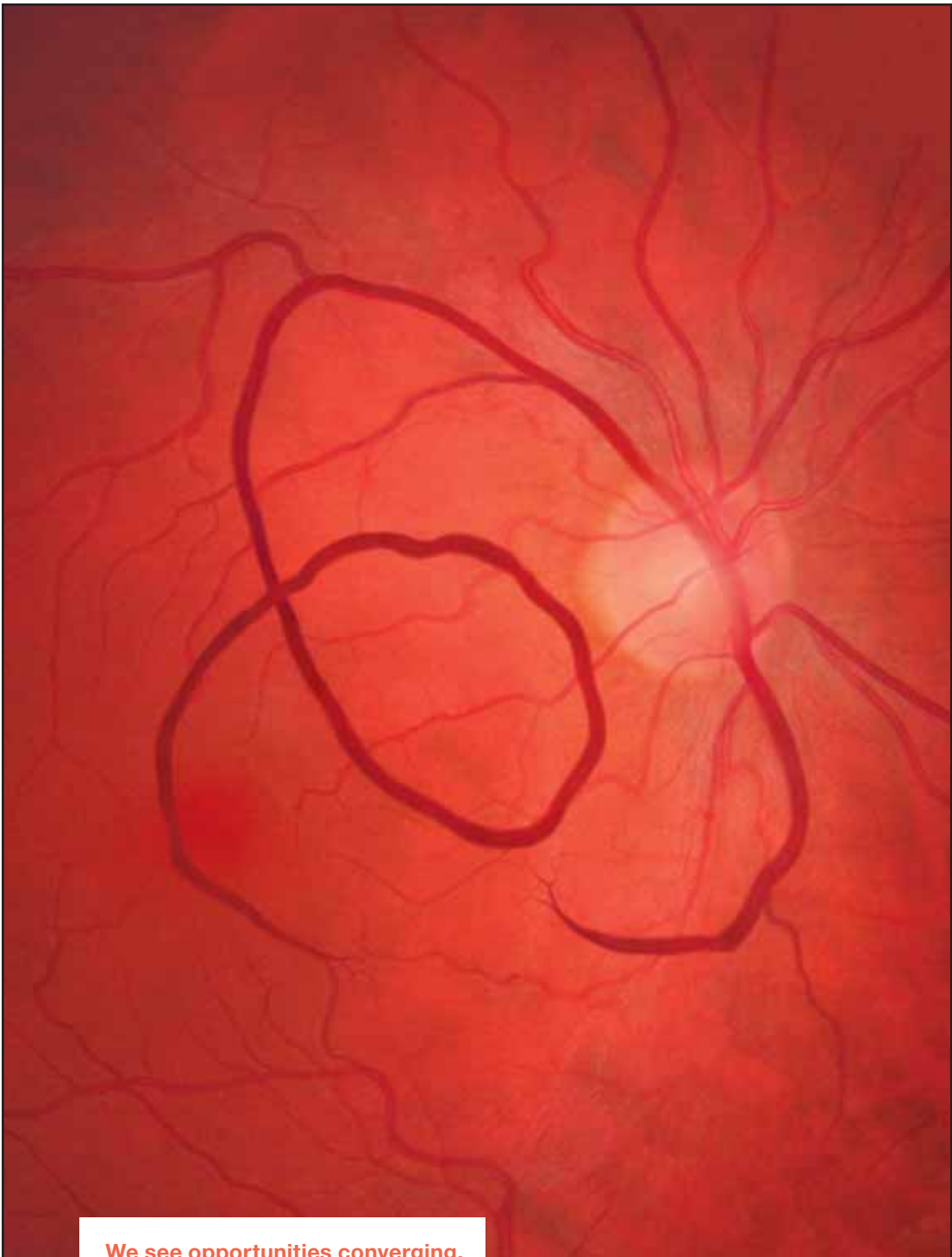
Our capabilities in science and technology are strong. Our capabilities in commerce are amongst the weakest in the developed world. Simply put that means we do not value sales. So we don't have the drive to understand and develop skills for the human and cultural dimensions of the multinational value exchange that the knowledge-based economy requires.

How good could it be? Canada in 2004 was tied for 16th place in the world in R&D spending as a fraction of GDP. If we were in 5th position, as a successful R&D business investor, our export sales would be up over \$100 Billion and highly skilled jobs up over 500,000.

Can R&D save Canada? Not without people who can navigate the complex system of relationships, resources and capabilities – both human and technical – required to create value for global customers and be among the best.

The solution is to strengthen our capabilities in commerce while maintaining our strong capabilities in science and technology.

*Submit comments at  
[www.researchinfosource.com](http://www.researchinfosource.com)*



We see opportunities converging.

**What do you see?** Across Ontario, diverse scientific fields are coming together in an explosion of medical and biotech innovation. Who's the link? Ontario Centres of Excellence. Since 1987, OCE has been making the connections, providing the guidance and investing the seed funding that turns discoveries into commercial successes in five key market sectors: communications and information technology, earth and environmental technologies, energy, materials and manufacturing, and photonics. And when people and innovations across sectors converge, there's no stopping the growth that can emerge. See it for yourself at **[oce-ontario.org](http://oce-ontario.org)**.



Ontario Centres of  
Excellence  
Where Next Happens



A LEADING UNIVERSITY  
A UNIVERSITY OF LEADERS

The creative spirit of men and women  
guided by their own daring.

A culture that promotes excellence.

A space for the exercise of leadership.

Internationally recognized for its innovations in research and pedagogy, the Université de Sherbrooke is fully dedicated to educating, guiding and supporting society's leaders.



UNIVERSITÉ DE  
SHERBROOKE

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



At Canada's Top  
Comprehensive University . . .

The Bioeconomy  
Matters!

Fuelling the Future

Biomaterials research will revolutionize the use of renewable agricultural commodities to develop consumer products ranging from car parts to building and packaging materials to fuels.

To benefit Canada's environment and to strengthen its advantage in the new economy, U of G announces Dr. Amar Mohanty's appointment as the Ontario Premier's Research Chair in Biomaterials and Transportation.

An international leader in the field of biomaterials, he will also direct the Bioproducts Discovery and Development Centre, a new facility that will be the hub for U of G's bioproducts research, transforming the way we see life.

Join us in helping to fuel the future.

[www.alumni.uoguelph.ca/bioeconomy](http://www.alumni.uoguelph.ca/bioeconomy)





Can R&D Save Canada?

# Innovation in Canada: Can We Reverse the Politics of Thin-and-Thinner?



David Naylor  
President  
University of Toronto

**HOW READY IS CANADA** to develop a stronger innovation economy? Not very, according to a recent report from the Conference Board. In patents per-capita, Canada languishes in 14th place out of 17 OECD national comparators. And our R&D spending in relation to GDP ranks 12th, due largely to lagging private sector investment.

Canada is second only to the USA in per capita venture capital investment. But individual US investments are typically three times greater; and Canada, alone in the OECD, invests a bigger percentage of its GDP in early stage financing than in expansion financing. In other words, our investments start thin and get thinner.

The thin-and-thinner metaphor, unfortunately, also applies to the way we prepare our citizens for the global knowledge economy. Canada ranks 18th out of 27 OECD nations for university participation rates. As well, compared to the United

States, Canada awards a third fewer doctoral degrees and half as many master's degrees per-capita.

Despite those warning signs, we have many of the right ingredients. Successive federal governments and some provincial governments have primed the research pump effectively. Our natural resource base is generating healthy revenues to support diversification. Our tolerant and compassionate society remains a magnet for talented immigrants. Furthermore, as Toronto's Richard Florida has cogently argued in response to Thomas Friedman's thesis, the world of innovation is not so much flat as spiky. Urban clusters drive the global knowledge-based economy, and about 80% of Canadians now live in urban areas.

We also have outstanding researchers and impressive capacity in our universities and academic hospitals to educate the next generation of innovators. As one marker, ISI Thomson

data show that researchers at the University of Toronto publish more than their counterparts at any institution in North America except Harvard. Moreover, in quality of research outputs, many Canadian universities compete credibly on the world stage. The challenge, in other words, is not so much turning dollars into research, but turning research into dollars.

What then can governments do?

First, governments should fund basic research and related personnel more generously. From lasers to Teflon, countless economically-important advances have piggy-backed serendipitously on basic research. Those research dollars must flow primarily on the basis of excellence adjudicated by peer review.

Second, governments should simplify the mandates of public research agencies. Research agencies today are often asked to review and fund targeted research, promote commercialization, and oversee

matching programs and networks with industry. They do not excel at these tasks, and certainly lack resources for such expansive mandates. They are also on the wrong side of the supply-demand equation for commercialization.

Commercialization success depends instead on institutional investment in technology transfer, business-savvy leadership, and enough scale to draw investors and industrial partners. That's why it makes sense for governments to create jurisdiction-wide commercialization agencies and related infrastructure to foster convergence for knowledge translation.

Third, governments should tread carefully when funding industry-oriented research. These programs carry risks of market distortion and conflicts of interest. Collaborative programs for SMEs can be effective; and strategic funds targeting key sectors are hard to gainsay in a small country. But

all such initiatives require meticulous oversight from both a value-for-money and scientific perspective. And, given low private spending on R&D, the key role for government is probably the creation of a portfolio of tax incentives aligned to research investment.

Finally, let's remember that well-educated people are Canada's most important resource for catalyzing knowledge-based industries. We cannot diversify our economy unless we boost our output of Masters and PhD graduates dramatically. Thus, there is an acute need for the creation of regional and provincial systems that are appropriately resourced and diversified to support excellence in graduate education.

In a very short essay, these policy options are necessarily truncated and framed in simplistic terms. Some of these ideas may also run counter to conventional wisdom and political preferences in our fractious federation. I am fearful, however, that Canada's enviable standard of living and vaunted social programs will not be sustainable in the long haul unless we abandon the politics of thin-and-thinner in favour of the spiky topography of excellence and innovation.

Submit comments at  
[www.researchinfosource.com](http://www.researchinfosource.com)



UNIVERSITY OF PRINCE EDWARD ISLAND



aquatic health sciences, bioresources, cognition, comparative biomedicine, development & health, environment, island studies, new materials, neuroscience, population health

[upei.ca/research](http://upei.ca/research)

RESEARCH • INNOVATION • EDUCATION

- Investing in ideas and knowledge
- Attracting the world's best scholars and scientists

innovation

- Engaging students in research and scholarship
- Partnering with industry and community

**Brock University**  
St. Catharines, Ontario, Canada  
For more information call 905-688-5550 or visit [www.brocku.ca](http://www.brocku.ca)



**Stay ahead of the curve**

RESEARCH MONEY is Canada's leading science and research policy newsletter, keeping you abreast of fast-breaking developments in funding, programs and policies.

Recent coverage includes:

- NRC highlights new strategy
- Expert panel to study federal labs
- Alberta task force report boosts tech sector

**Delivered to your office, home or desktop 20 times a year.**

For a sample copy or to subscribe, visit [www.researchmoneyinc.com](http://www.researchmoneyinc.com) or call (416) 481-7070 ext. 21



ONE  
global challenge

Many  
solutions to explore

**As Canada Research Chair in Arctic System Science, David Barber explores the frontiers of global climate change. Leading one of the world's largest International Polar Year projects, he heads a team of more than 200 researchers from 16 countries examining the effects of global warming on the environment and peoples of the Arctic.**

The team focuses on circumpolar flaw leads (CFL), areas of open water created when the Arctic ice pack moves away from coastal ice. The CFL project builds on years of outstanding northern research at the University of Manitoba.

Dr. Barber, a graduate of the University of Manitoba, is one of our many scientists, scholars, artists and engineers finding innovative ways to address some of the most important challenges facing Canada and the world in the 21st century.

INNOVATIVE RESEARCH PROGRAMS. LEADING EDGE FACILITIES.  
A SUPPORTIVE ENVIRONMENT THAT INSPIRES EXCELLENCE.

ONE UNIVERSITY. MANY FUTURES.  
[umanitoba.ca](http://umanitoba.ca)



UNIVERSITY  
OF MANITOBA

Can R&D Save Canada?

# Completing the Cycle: Transforming Research Back into Money



Jeffrey Dale  
President & CEO  
Ottawa Centre for Research and Innovation

**THE OTTAWA REGION** provides a community perspective on how to create and sustain a globally competitive economy based on innovation. R&D is just part of the cycle of innovation - all aspects of the ecosystem must be present for our economy to flourish. I will use Ottawa as an example, but we will win or lose this challenge as a nation.

Ottawa is blessed with strong public academic research based in our universities and colleges. Many federal research laboratories are located here. Public investments in R&D total over \$1B annually in our region.

Nortel, largest R&D performer in Canada, has its main global research centre here. Many of Nortel's innovations and the innovations of many local start-ups come directly from research that was started in our public institutions. Some 32 of the top 100 Corporate R&D spenders in Canada have R&D operations here.

The Ottawa Region ranked first in

the last year's RESEARCH Infosource survey on Research Communities, having the highest per capita private sector investments in R&D. We ranked first in Canada with the highest percentage of natural and applied science and related occupations in our workforce. From a pure promotional perspective, R&D is a powerful tool we use in our economic development efforts.

While R&D is a key strength of our region it is also our biggest challenge.

Ottawa and Canada have been very good at converting money into research, but we need to be equally effective at converting our research into globally competitive products and services.

As Canadians we are quick to ask our Federal and Provincial governments to provide solutions to this challenge, but public policy is not enough. Canada needs leadership and vision from all sectors of our economy to drive toward a future based on innovation and global competitiveness.

We need to celebrate entrepreneurship and our entrepreneurs. We need to be proud of their successes and supportive when they fail. We must enthusiastically promote the creation of new knowledge and the development of a multi-skilled workforce. Our post secondary education system must deliver on both of these goals. We need parents, students, faculty and businesses to create a culture of life long learning.

Success in a global economy means adapting to change. California's Silicon Valley reinvented itself several times despite having a high cost structure. Innovation strengthens the ability to survive a downturn and refresh the industrial base of a region.

The Federal Government recently released *Mobilizing Science and Technology to Canada's Advantage*. Government cannot provide all of the solutions to create a Nation of Innovation, but it can set a policy framework that will support innovation.

Research is the birthplace of ideas and knowledge but ideas must create new wealth. It is critical that we continue to "prime the pump" and support public investments in R&D. Federal and provincial governments need to provide predictable and sufficient funding to our granting councils and federal labs to support the creation of new knowledge. Certainly there are funds flowing into public research institutions, but the manner in which it is done and lengthy timeframes weakens the overall investment by causing uncertainty and inconsistency.

For 25 years we have had the federal Scientific Research and Explorative Development (SR&ED) Tax Credit program to encourage our private sector to invest in R&D. Once a globally competitive program, today it is out of date. Start ups still benefit, but the program fails to encourage much of our industrial economy from investing in R&D. The Department of Finance

recently announced a review of the program. This is encouraging. Industry must now step up and provide input.

Many of our R&D performers in Canada will tell you that while they create knowledge and new innovative products and services in Canada, they are often unable to secure public institutions as reference customers. As a result, many ideas funded by Canadians have been commercialized in markets elsewhere. This is a complex issue, but hiding behind NAFTA's procurement rules is not a solution. We need to support innovation created in Canada. We need to create a procurement system at the federal, provincial and municipal level that recognizes a "Canadian Innovation Advantage". As taxpayers we are all paying for our investments in R&D, let's follow through and realize the return on our investments.

Canada has had no difficulty harnessing its natural resources and selling them to the world. Huge wealth resulted and continues to do so. Now it is time to invest our wealth in our future. R&D can save Canada, but only if we complete the cycle of turning Money into Research and Research back into Money.

Submit comments at  
[www.researchinfosource.com](http://www.researchinfosource.com)





Mike Lazaridis  
President and Co-Chief Executive Officer  
Research In Motion

**THIS YEAR** Research In Motion (RIM) will devote more than \$250M to research and development, an investment that will earn us a place in RESEARCH Infosource's top ten Canadian R&D performers. We will outspend our industry peers on a size adjusted basis and continue to deliver the quality of experience and innovations that our customers associate with the BlackBerry brand. We also joined the ranks of the ten largest handset manufacturers in the world.

Can R&D Save Canada?

# Prepare Our Population Broadly for Success

Recent RIM achievements include the launch of BlackBerry smartphones with great style and advanced functionality including GPS, WiFi and sophisticated multimedia capabilities. We just announced BlackBerry Unite!, a special product for families and small groups. BlackBerry has recently become the first wireless platform in the world to achieve Common Criteria EAL 2+ security certification.

Our company's future depends on how well we turn ideas into marketable products and services. RIM continues to pursue advances in our field with tenacity, determination and the best people available. But R&D alone cannot create a successful company. At RIM we are also experts in product management, manufacturing, supply chain, quality control, alliances and partner relations, customer service,

finance, marketing, organizational development and all of the related functions that contribute to a complete, high quality customer experience and rapid growth. Our approach to the development of each of these, however, shares common elements with our R&D organization.

Most importantly, there is a determined commitment to recruit, develop and retain the very best people we can find. When we launched BlackBerry in 1999 our entire staff was just 250, including all the people who designed, built, and sold our products. Today we number more than 7000. I am proud to say that despite such rapid growth our hiring standards have not fallen at all – in fact they have increased. Paradoxically, it is not easy to get a job at RIM even though we are growing rapidly.

We are also meticulous about our

work. In the challenging field of wireless R&D, rigor is an absolute necessity. That same approach of thinking through problems, bringing theory and experience to bear, running the numbers and acting on the basis of fact is deeply rooted at RIM. Even the choice of the name "BlackBerry" followed a rigorous process involving expert consultants, detailed searches, and focus group testing.

I believe that Canada has an almost limitless opportunity to prosper over the coming decades if we concentrate on what we do at RIM: producing and attracting the very best people, supporting their work fully, and applying ourselves rigorously to the problems and opportunities we face.

Our investments in university research over the past fifteen years, for example, have already initiated a virtuous circle. Generous funding of research

and state of the art research facilities attract great researchers. They in turn attract great students who gain new knowledge and capabilities through their studies and interaction. Upon graduation they enter society and commercialize – in the broadest sense – everything they have learned. The added wealth created by commercial activity generates the capacity to reinvest in research and the cycle continues.

A critical point is that commercialization is done mainly by graduates after they leave the university. We must not fall into the trap of forcing our research universities to commercialize directly. That is the job of the private sector.

Look at Waterloo. Through our success in business, my partners and I were able to establish the Perimeter Institute for Theoretical Physics and the Institute for Quantum Computing at the University of Waterloo. To date, we have raised nearly \$500 million from private philanthropy and generous matching support from our governments to jump start this venture.

From a standing start Waterloo has become one of the world's preeminent centres for quantum research, an area that will have profound impact on

semiconductor technology, cryptography, and nanotechnology. We have attracted incredible talent to the region and now boast the largest concentration of quantum researchers in the world. For impatient skeptics who say "show me the ROI" we are already witnessing early returns from Waterloo's famous entrepreneurial community – including high value job creation, investors and company builders alike. This virtuous circle will complete and reseed itself many times over.

Now is the perfect time for Canada and Canadians to invest boldly in our collective future. The dollar is strong, our natural resources are in demand, and our public finances are solid. Private companies that do R&D at levels below their industry's norms should take stock and join the game. Our governments should significantly top up our research granting councils and encourage additional, meaningful philanthropic and public investments like we have made in Waterloo.

And above all, we should continue to strive to have the best prepared population in the world.

Submit comments at  
www.researchinfosource.com

At the U of C, scientists have practical answers to Canada's global warming challenge. Scientists like David Keith, Canada Research Chair in Energy and the Environment. For years, he and his students have researched the real-world applications of proven solutions like carbon capture. They have shown how we can dramatically reduce our nation's global warming impact. Success will take effort from all Canadians. So let's do it. Visit [ucalgary.ca](http://ucalgary.ca)



## We can solve global warming. So let's do it.

David Keith is director of the ISEEE Energy and Environmental Systems Group, and a professor in the Schulich School of Engineering and the Department of Economics at the U of C.



CALGARY'S UNIVERSITY IS RANKED TOP 10 IN CANADA FOR RESEARCH INCOME, FUNDRAISING, ENDOWMENT, RESEARCH COMPETITIONS AND NATIONAL AWARDS.



## HAVE A SIP ON US

Water. It is essential to human life. It drives economic sustainability and determines global competitiveness. McMaster researchers are investigating water – in both developed and developing countries – from every angle. From pollutants to ecosystems, from management to public policy, from quantity to quality, from its impact on our wealth to its effect on our health. So raise a glass to research and our commitment to clean water wherever you are in the world. At McMaster, our quest for a sustainable future knows no boundaries.



Biochemist Alba Guarne (centre), PhD student Yu Seon Chung (left) and research assistant Melanie Gloyd are investigating how the E. Coli bacteria spreads in water.



Can R&D Save Canada?

# Are the Glory Days Gone for Good?



John Roese  
Chief Technology Officer  
Nortel

**ARE THE GLORY DAYS** of Canada's leadership in communications research and development gone for good? As the CTO of one of Canada's largest communications technology company, that's a question I ask myself a lot.

Our ability to compete globally as a nation is predicated on many things, but near the top of the list is our ability to innovate. And to innovate is to invest in – and excel at – R&D. Canada was for many years considered a world leader. It was right here in Canada where Information and Communications companies built national networks that were the envy of the world. Wireless, fibre optics, high-speed Internet access – all brought to Canadians by Canadian innovators. But now we are slipping behind. A recent Conference Board report card benchmarks Canada as 14th out of 17 countries in innovation because of a lack of focus and drive.

Moreover, in this new millennium, the widening productivity gap relative to our major trading partner, the U.S., largely reflects slower innovation, lack of scale economies and business organization, according to Statistics Canada.

Few would dispute that productivity

and competitiveness are driven by technological progress and deployment of information communications technologies (ICT). ICT as an enabler of broad economic development has surpassed that of the value of the sector itself. It is little wonder according to the Economist Intelligence Unit that many governments around the globe are devoting considerable energy to the growth of ICT. The Economist study places Canada 9th among 22 top tier countries in ICT competitiveness.

Achieving this strategic focus becomes more critical with each passing day. Why? Because the communications industry is moving towards a new era where our fully connected society will become a hyperconnected one. The number of network connections will far exceed the number of people using the network. We refer to this trend as Hyperconnectivity. Imagine if every chronically ill patient could cost-effectively receive real-time medical monitoring at home through sensors that continually feed vital signs into a broadband network, alerting emergency personnel if a health condition suddenly deteriorates. This is just one of many examples of the benefits of living in a Hyperconnected era.

For Canada, there is significant opportunity to shore up our competitive fortunes both globally and at home if we act now, just as the wave of Hyperconnectivity is beginning to form. Hyperconnectivity must create opportunity, not chaos, in the knowledge economy. We must develop and pursue a coordinated strategy that brings the benefits of both Hyperconnectivity and ICT to every Canadian business, of every size, in every sector. The volume of R&D investment in Canada must increase and all levels of government must work to grow it further.

But merely doing more R&D on its own will not save Canada. We need to better leverage our R&D distribution channels, effectively moving knowledge from researchers in universities and government labs to the innovators in industry. We need to focus more on transforming ideas into products for the marketplace.

Canadian public policy must rally around restoring technology innovation as a Canadian strength – one we will not relinquish in the face of global competition. The challenge presented by the Economist Intelligence Unit Report is simple: if we are to be competitive, then Canada must strengthen its innovation eco-system and make it a strategic focus of public policy at all levels of government.

A starting point is to move quickly on restoring the incentive mechanism of the federal R&D tax credit program, making it accessible to all companies performing R&D in Canada by introducing the refundability option recently recommended by a Parliamentary Committee. Other elements of the eco-system that many nations are addressing (and that Canada must too) include high speed broadband such as WiMAX, 4G and LTE, innovation support through government procurement, human capital, intellectual property rights, collaborative research funding, and an investment-friendly business environment.

Such public policy would be well served to recognize that the international success of Canadian companies in R&D has a large pull-through effect on start-ups and small businesses at home.

I certainly applaud the Prime Minister and his Government's commitment to improve Canadian innovation in the recently released Science and Technology Strategy. We now need to collectively build on this progress. We need to address the importance of ICT as the core competency for competitiveness in this hyperconnected era and to recognize that ICT - where we must choose to lead on R&D, innovation and commercialization - underpins all other sectors.

So the answer to my question – “Are the glory days gone for good?” – is an obvious “no.” But we have to act quickly and decisively by improving our strength in ICT, which will go directly to enhancing Canada's overall competitiveness globally and our standard of living.

Submit comments at  
[www.researchinfosource.com](http://www.researchinfosource.com)

# Ottawa Leading the way for R&D in Canada

#1

- ▶ R&D spend per capita
- ▶ Research scientists and engineers per capita

## Ottawa – Canada's Innovation Capital

**OCRI**  
LEADING THE WAY FOR OTTAWA.



# INFLUENCING THE WORLD THROUGH RESEARCH

The University of Windsor is home to researchers whose work makes a difference. For example, Dr. Anne Snowdon is a lead researcher on a multidisciplinary team conducting a \$1.7-million study of how parents use child safety seats. Prof. David Tanovich's book on racial profiling is considered the most comprehensive of its kind in Canada. Dr. Lisa Porter has identified a protein that may enable cells to multiply rapidly and become cancerous. And Dr. Edwin Tam is part of a national research project working to increase the amount of recycled content in automobiles.

At UWindsor, we're taking responsibility for the future through research that matters to you and the world you live in.

To learn more, visit [uwindsor.ca/research](http://uwindsor.ca/research).

University  
of Windsor  
*thinking forward*





Continued from page 10

Top 100 spending has fallen in 3 of the last 5 years. Last year's decline occurred despite a modest 3.2% increase in corporate revenues (among 94 companies where revenue data were available). Falling R&D spending combined with increased revenues at these companies meant that research intensity – R&D spending as a percent of revenues – fell even faster, declining by -6.9%, to 3.5% overall compared with 3.7% in Fiscal 2005.

The underlying picture is somewhat worse. When R&D giant Nortel Networks is removed from the equation, the performance of the remaining 99 firms weakens. R&D spending at the other 99 leading companies declined by -4.2%, and their research intensity fell to 2.9%, without the moderating effect of Nortel's results. Nortel's revenues expanded by 1.6%, but its R&D spending declined by -2.2%, which was less than the Top 100 decline. Nortel's research intensity fell to 17.0% from 17.6%, still much more than the all-industry average. Nortel's result lessened the overall decline in Top 100 performance. Second place performer BCE Inc. experienced a -7.3% drop in revenues in Fiscal 2006, but lowered R&D spending by -13.0%. BCE's spending dragged down the Top 100 overall result; without BCE, R&D spending at the other 99 companies' dropped by -2.4%, compared with -3.8% with BCE included.

Fiscal 2006 R&D spending increased or remained the same at 56 of the Top 100 companies, and dropped at the other 44 firms. This was a very different result from 2005, when spending increased among 69 of the Top 100 firms and declined at only 30 companies (in Fiscal 2005, one company was newly formed).

### THE \$100 MILLION CLUB

Fiscal 2006 saw 24 companies join RESEARCH Infosource's \$100 Million Club, an elite group of firms that spent over \$100 million each on R&D in Fiscal 2006. The \$100 Million Club includes a broad blend of technology, pharmaceutical/biotechnology, manufacturing, services and resource companies. The Club includes 15 Canadian companies and 9 foreign subsidiaries. New to the \$100 Million Club is Abitibi Consolidated (\$150 million of R&D spending). Returning to the Club are EnCana Corporation, Sanofi Pasteur and Tembec.

Club members accounted for 73% of all Top 100 spending, the same as in Fiscal 2005. Combined revenues among the Club members increased by a healthy 7.1%, which was better than the 3.2% total increase for the 94 Top 100 firms that reported revenues. However, Club members' total R&D spending dropped by -3.6%; disappointing, but less than the overall Top 100 decline of -3.8%. Of some concern is that despite strong revenues, R&D spending dropped at 11 of the 24 leading firms and increased or remained the same at 13 companies.

The \$100 Million Club		
2006 Rank	Company	Industry
1	Nortel Networks	Comm/telecom equipment
2	BCE	Telecommunications services
3	Magna International	Automotive
4	Pratt & Whitney Canada (fs)	Aerospace
5	ATI Technologies +	Computer equipment
6	IBM Canada (fs)	Software and computer services
7	Alcan	Mining and metals
8	Atomic Energy of Canada	Energy/oil and gas
9	Bombardier	Aerospace
10	Alcatel-Lucent (fs)	Comm/telecom equipment
11	Research In Motion	Comm/telecom equipment
12	Apotex.	Pharmaceuticals/biotechnology
13	GlaxoSmithKline Canada (fs)	Pharmaceuticals/biotechnology
14	Ericsson Canada (fs)	Comm/telecom equipment
15	Abitibi-Consolidated	Forest and paper products
16	EnCana	Energy/oil and gas
17	Pfizer Canada (fs)	Pharmaceuticals/biotechnology
18	Cognos	Software and computer services
19	TELUS	Telecommunications services
20	Tembec	Forest and paper products
21	Merck Frosst Canada (fs)	Pharmaceuticals/biotechnology
22	Biovail	Pharmaceuticals/biotechnology
23	Sanofi Pasteur (fs)	Pharmaceuticals/biotechnology
24	PMC Sierra (fs)	Electronic parts and components
fs = Foreign subsidiary (includes R&D expenditures for Canadian operations only)		
+ Not current name		

### INDUSTRY PERFORMANCE

Information technology companies in 5 sub-sectors continued to dominate Top 100 spending, accounting in total for 53% of the Top 100 spending total. Twelve firms in the Communications/telecom equipment sub-sector (which includes Nortel Networks) led the way, accounting for 26% of the Top 100 total, with \$3 billion in spending in Fiscal 2006.

The next highest spending sector was Pharmaceuticals/biotechnology, in which 31 companies invested \$1.89 billion, accounting for 17% of the total Top 100 R&D spending, up from \$1.87 billion in Fiscal 2005. The Pharma/bio leader

was Canadian company Apotex, for which RESEARCH Infosource reports on worldwide spending (\$178.8 million). Some top multinational R&D spenders in this sector, where we include only in-Canada R&D spending were GlaxoSmithKline Canada (\$177 million), Pfizer Canada (\$131.8 million), Merck Frosst Canada (\$114.1 million) and Sanofi Pasteur (\$105.4 million). The important contribution of the Pharma/bio sector becomes more apparent when Nortel's spending is omitted from the Communications/telecom equipment sector total. Then, the Pharma/bio sector accounts for 20% of total Top 100 R&D spending and Comm/telecom equipment drops to 9%.

R&D spending increased in 6 of the 11 leading sectors represented by the Top 100 performers, and declined in the other 5 sectors. However, the rate of decline was sharper than the rate of increase. The best-performing sector was Forest and paper products, where 3 firms expanded their R&D spending by 16.2% in total.

### THE TOP 10 R&D INTENSIVE FIRMS

Fiscal 2006 was not a good year for research intensity. Only 37 of 90 included companies increased their research intensity (R&D spending as a percent of revenues), compared with 47 companies in 2005. Six of the 10 most research-intensive companies were in the Pharma/bio sector. These firms are typically startup or early stage companies that are investing heavily in new products without a corresponding revenue stream.

### GAINERS AND LOSERS

Fiscal 2006 saw strong gains in R&D spending among 4 companies in the Energy/oil and gas sector. Western Oil Sands led all firms in growing its R&D spending by 347.2%. Firms such as Penn West Energy (68.4%), Syncrude (53.0%) and Petro Canada (47.8%) also reported outstanding R&D growth.

Not all companies fared well in R&D performance last year. A number of brand name firms in their sector witnessed substantial declines in R&D spending.

### LOOKING AHEAD

Unlike the previous year, Fiscal 2006 was not a good year for corporate research. For Fiscal 2005 we reported “*Spending was up overall and two-thirds of the Top 100 companies expanded their commitment to research*”. What a difference 365 days make. Fiscal 2006 R&D spending increased or remained the same at 56 of the Top 100 companies, and dropped at the other 44 firms. But overall spending declined by -3.8% against a 3.2% growth in revenues.

Manufacturing aside, the Canadian economy was firing on all cylinders – unemployment at record lows and strong corporate profits. What is going on with industrial R&D? Understandably, the tech bust of 2000-01 took the wind out of the sails of corporate R&D spending, not only in Canada but also worldwide. However, that was 5 fiscal years ago. Subsequently, we have seen R&D spending drop in 3 of the last 5 years. Something more systemic is responsible for declining corporate R&D performance.

For one thing, the past 5 years have seen an increase in corporate mergers and acquisitions. Brand name Canadian companies have disappeared, and this surely does not bode well for R&D investment, as their new owners inevitably rationalize company-wide R&D spending. For another, economic growth is being driven by the oil & gas and mineral and metals sectors, industries that have traditionally low levels of R&D spending. And manufacturing – which is typically a hotbed of R&D investment – has been hit hard by the fall of the US dollar, squeezing profit margins and leaving fewer funds available for R&D, precisely at a time when more investment in innovation is required. Also, federal and provincial government support programs for corporate R&D are past their “best before”

dates. We need a substantial rethink of our corporate innovation support programs, most of which were designed decades ago when circumstances were quite different.

Ultimately, though, responsibility for investment in research and innovation lies with corporate leaders. The evidence is that research investment has not been top of mind for them. In 2006, when money was cheap and plentiful, corporate attention appeared to be focussed on deal making rather than on organic business growth. Will a tightening of money markets and increased global competition refocus business owners and managers on their core business? Stay tuned.

Top 10 Research Intensive Companies*			
2006 Rank	Research Intensity	Overall Company	R&D as % of Revenue
1	42	Neurochem	1,833.7
2	93	ProMetic Life Sciences	608.2
3	80	Isotechnika	539.5
4	84	Resin Systems	501.3
5	91	Azure Dynamics	305.0
6	56	Cardiome Pharma	210.2
7	60	Westaim	141.4
8	79	MethylGene	139.7
9	87	Labopharm	117.9
10	41	Ballard Power Systems	104.9
* \$1 million or more of revenue			

Top 100 – Leading Industries	
Industry	R&D Spending (% of Total)
Communications/telecom (12)	26
Pharmaceuticals/biotechnology (31)	17
Telecommunications services (3)	14
Aerospace (5)	8
Energy/oil and gas (13)	8
Software and computer services (8)	6
Automotive (1)	6

Top 10 Companies by Growth			
2006 Rank	R&D Growth	Overall Company	% Change 2005-2006
1	76	Western Oil Sands	347.2
2	65	BioMS Medical	232.8
3	85	MEGA Brands	149.2
4	84	Resin Systems	146.4
5	96	MOSAID Technologies	97.3
6	50	Cascades	71.5
7	94	Penn West Energy	68.4
8	35	Syncrude Canada	53.0
9	45	Aspreva Pharmaceuticals	48.0
10	66	Petro-Canada	47.8

Bottom 10 Companies by Growth			
2006 Rank	R&D Growth	Overall Company	% Change 2005-2006
1	100	Xstrata (fs)	-58.4
2	67	Vasogen	-54.3
3	57	Zarlink Semiconductor	-46.2
4	41	Ballard Power Systems	-35.2
5	29	Suncor Energy	-31.5
6	40	MDS	-31.0
7	38	QLT	-29.2
8	36	CVRD Inco (fs)	-27.9
9	77	Husky Injection Molding Systems	-26.6
10	17	Pfizer Canada (fs)	-26.3
fs = Foreign subsidiary (includes R&D expenditures for Canadian operations only)			

Over the past century  
the face of Canada  
has changed.

So have we.

Since our company was founded in Canada nearly a century ago, the face of our country has changed – and so have the health needs of Canadians. Yesterday, we pioneered innovative products and techniques that changed the lives of diabetic patients, improved cardiovascular outcomes and that helped eliminate diseases such as smallpox, polio and diphtheria and overall extended life expectancy in Canada. Today, 2,200 dedicated employees at our pharmaceutical division in Laval and at our vaccines division in Toronto are using groundbreaking methods and technology to find cures and treatments for current health challenges. But one thing has not changed – our commitment to providing essential, innovative medicines and vaccines that help people improve their health and the quality of their lives. Because health matters to all Canadians.

[www.sanofipasteur.ca](http://www.sanofipasteur.ca) [www.sanofi-aventis.ca](http://www.sanofi-aventis.ca)

sanofi pasteur

The vaccines division of sanofi-aventis Group

sanofi aventis

Because health matters

# AN ENGINE OF OUR ECONOMY

A global leader in propulsion systems for business, general aviation and regional aircraft, and helicopters

Manufacturing and engineering facilities across Canada

Over \$2 billion contribution to the Canadian GDP per year

7,000 employees in Canada

No. 1 research and development investor in Canadian aerospace, dedicating over \$400 million per year

Partnership with 20 Canadian universities on 600 R&D projects

Over 40,000 engines flying in 190 countries



Pratt & Whitney Canada

A United Technologies Company

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



RESEARCH Infosource Inc. is Canada's leading firm providing business intelligence information and analysis for science, technology, research & development and innovation. Data used for this table were extracted from our Canadian Corporate R&D Database, a proprietary database. Companies wishing to be included in future editions of the Top 100 List and Database, or who wish to adjust their figures should contact us directly. For more information or to order copies of our in-depth report Canada's Top Corporate R&D Spenders Report 2007, go to [www.researchinfosource.com](http://www.researchinfosource.com).

Telephone (416) 481-7070 ext. 23  
Fax (416) 481-7120

For advertising information, please contact  
Arlene Dwyer at (416) 481-7070 ext. 23 or  
[arlene@impactg.com](mailto:arlene@impactg.com)

NOVEMBER 2, 2007

Canada's Corporate  
Innovation Leaders

A supplement prepared by RESEARCH Infosource Inc., an Impact Group company

**R&D SPENDING IN THE DOLDRUMS** – Research and development (R&D) spending by Canada's Top 100 Corporate R&D Spenders fell by a disappointing -3.8% in Fiscal 2006, to \$11.4 billion from \$11.9 billion in Fiscal 2005. This means that

## Canada's Top 100 Corporate R&amp;D Spenders 2007

Rank		Company	R&D Expenditures			Revenue	Research Intensity	Industry
2006	2005		FY2006 \$000	FY2005 \$000	% Change 2005-2006	FY2006 \$000	R&D as % of Revenue**	
1	1	Nortel Networks Corporation*	\$2,199,020	\$2,248,730	-2.2	\$12,949,153	17.0	Comm/telecom equipment
2	2	BCE Inc.	\$1,394,000	\$1,602,000	-13.0	\$17,713,000	7.9	Telecommunications services
3	3	Magna International Inc.*	\$652,108	\$823,888	-20.8	\$27,422,538	2.4	Automotive
4	4	Pratt & Whitney Canada Corp. (fs)	\$481,000	\$472,000	1.9	\$3,000,000	16.0	Aerospace
5	5	ATI Technologies Inc.* +	\$458,157	\$451,372	1.5	\$2,758,417	16.6	Computer equipment
6	6	IBM Canada Ltd. (fs)	\$360,000	\$343,000	5.0	\$5,000,000	7.2	Software and computer services
7	7	Alcan Inc.*	\$249,502	\$275,033	-9.3	\$26,811,258	0.9	Mining and metals
8	8	Atomic Energy of Canada Limited	\$246,144	\$264,092	-6.8	\$390,116	63.1	Energy/oil and gas
9	9	Bombardier Inc.*	\$196,199	\$212,030	-7.5	\$16,802,825	1.2	Aerospace
10	11	Alcatel-Lucent (fs)	\$187,167	\$194,000	-3.5	nd		Comm/telecom equipment
11	17	Research In Motion Limited*	\$178,767	\$122,590	45.8	\$2,342,875	7.6	Comm/telecom equipment
12	12	Apotex Inc.	\$178,757	\$183,141	-2.4	\$1,018,159	17.6	Pharmaceuticals/biotechnology
13	14	GlaxoSmithKline Canada (fs)	\$177,008	\$135,535	30.6	\$1,020,995	17.3	Pharmaceuticals/biotechnology
14	10	Ericsson Canada Inc. (fs)	\$152,000	\$201,000	-24.4	\$553,000	27.5	Comm/telecom equipment
15		Abitibi-Consolidated Inc.	\$150,000	\$150,000	0.0	\$4,851,000	3.1	Forest and paper products
16	23	EnCana Corporation*	\$140,488	\$96,933	44.9	\$18,598,105	0.8	Energy/oil and gas
17	13	Pfizer Canada Inc. (fs)	\$131,764	\$178,730	-26.3	\$2,189,793	6.0	Pharmaceuticals/biotechnology
18	15	Cognos Incorporated*	\$130,127	\$128,354	1.4	\$995,173	13.1	Software and computer services
19	16	TELUS Corporation	\$130,000	\$125,000	4.0	\$8,681,000	1.5	Telecommunications services
20	26	Tembec Inc.	\$118,900	\$94,411	25.9	\$3,332,000	3.6	Forest and paper products
21	18	Merck Frosst Canada Ltd. (fs)	\$114,137	\$117,019	-2.5	\$532,623	21.4	Pharmaceuticals/biotechnology
22	20	Biovail Corporation*	\$108,283	\$107,692	0.5	\$1,214,087	8.9	Pharmaceuticals/biotechnology
23	27	Sanofi Pasteur Limited (fs)	\$105,400	\$92,837	13.5	\$135,800	77.6	Pharmaceuticals/biotechnology
24	22	PMC Sierra, Ltd.* (fs)	\$105,332	\$103,072	2.2	\$199,259	52.9	Electronic parts and components
25	25	Hydro-Quebec	\$98,000	\$96,000	2.1	\$11,161,000	0.9	Electrical power and utilities
26	21	CAE Inc.	\$96,331	\$107,643	-10.5	\$1,107,200	8.7	Aerospace
27	24	AstraZeneca Canada Inc. (fs)	\$89,931	\$96,703	-7.0	\$1,170,928	7.7	Pharmaceuticals/biotechnology
28	35	sanofi-aventis Canada Inc. (fs)	\$76,896	\$72,246	6.4	\$725,663	10.6	Pharmaceuticals/biotechnology
29	19	Suncor Energy Inc.	\$74,000	\$108,000	-31.5	\$15,816,000	0.5	Energy/oil and gas
30	38	Imperial Oil Limited	\$73,000	\$68,000	7.4	\$24,505,000	0.3	Energy/oil and gas
31	39	Novartis Pharmaceuticals Canada Inc. (fs)	\$69,000	\$65,000	6.2	nd		Pharmaceuticals/biotechnology
32	34	CGI Group Inc.	\$68,600	\$78,200	-12.3	\$3,477,623	2.0	Software and computer services
33	40	Wyeth Pharmaceuticals (fs)	\$68,576	\$60,600	13.2	\$622,115	11.0	Pharmaceuticals/biotechnology
34	28	Honeywell Canada (fs)	\$68,061	\$92,131	-26.1	\$1,326,254	5.1	Aerospace
35	50	Syncrude Canada Ltd.	\$67,923	\$44,400	53.0	nd		Energy/oil and gas
36	52	CVRD Inco Limited (fs)	\$67,800	\$94,100	-27.9	\$9,820,000	0.7	Mining and metals
37	33	Open Text Corporation*	\$67,121	\$78,922	-15.0	\$464,484	14.5	Software and computer services
38	30	QLT Inc.*	\$63,995	\$90,382	-29.2	\$198,570	32.2	Pharmaceuticals/biotechnology
39	43	Aastra Technologies Limited	\$60,431	\$52,325	15.5	\$600,536	10.1	Comm/telecom equipment
40	31	MDS Inc.	\$60,000	\$87,000	-31.0	\$1,140,000	5.3	Health services
41	29	Ballard Power Systems Inc.*	\$59,284	\$91,466	-35.2	\$56,504	104.9	Energy/oil and gas
42	45	Neurochem Inc.	\$58,624	\$50,495	16.1	\$3,197	1,833.7	Pharmaceuticals/biotechnology
43	56	Janssen-Ortho Inc. (fs)	\$58,311	\$56,279	3.6	\$730,784	8.0	Pharmaceuticals/biotechnology
44	41	NOVA Chemicals Corporation*	\$57,839	\$60,580	-4.5	\$7,393,198	0.8	Chemicals and materials
45	64	Aspreva Pharmaceuticals Corporation*	\$54,381	\$36,736	48.0	\$243,587	22.3	Pharmaceuticals/biotechnology
46		Nexen Inc.	\$53,000	\$54,000	-1.9	\$3,936,000	1.3	Energy/oil and gas
47	58	Angiotech Pharmaceuticals, Inc.*	\$51,480	\$38,757	32.8	\$357,327	14.4	Pharmaceuticals/biotechnology
48	44	Motorola Canada Limited (fs)	\$51,000	\$51,000	0.0	nd		Comm/telecom equipment
49	46	Mitel Networks Corporation*	\$50,014	\$50,160	-0.3	\$439,010	11.4	Comm/telecom equipment
50	74	Cascades Inc.	\$47,175	\$27,500	71.5	\$3,403,000	1.4	Forest and paper products
51	47	Novellis Inc.*	\$45,364	\$49,676	-8.7	\$11,169,750	0.4	Mining and metals
52	59	Axcan Pharma Inc.*	\$45,125	\$38,596	16.9	\$331,517	13.6	Pharmaceuticals/biotechnology
53	49	Gennum Corporation	\$44,918	\$44,666	0.6	\$147,336	30.5	Electronic parts and components
54	48	MacDonald, Dettwiler and Associates Ltd.	\$44,501	\$49,038	-9.3	\$1,052,506	4.2	Aerospace
55	55	Shell Canada Limited	\$44,000	\$41,000	7.3	\$14,651,000	0.3	Energy/oil and gas
56	54	Cardiome Pharma Corp.	\$43,438	\$41,499	4.7	\$20,668	210.2	Pharmaceuticals/biotechnology
57	32	Zarlink Semiconductor Inc.*	\$42,529	\$78,996	-46.2	\$164,331	25.9	Comm/telecom equipment
58	63	DALSA Corporation	\$41,918	\$36,840	13.8	\$186,304	22.5	Electronic parts and components
59	62	Bayer Inc. (fs)	\$41,106	\$36,850	11.5	\$755,629	5.4	Pharmaceuticals/biotechnology
60	61	Westaim Corporation	\$39,015	\$37,666	3.6	\$27,591	141.4	Electronic parts and components
61	57	Boehringer Ingelheim (Canada) Ltd./Ltée. (fs)	\$39,000	\$39,400	-1.0	\$303,307	12.9	Pharmaceuticals/biotechnology
62	69	Constellation Software Inc.*	\$37,222	\$30,342	22.7	\$239,022	15.6	Software and computer services
63	60	Sierra Wireless, Inc.*	\$36,398	\$36,821	-1.1	\$250,959	14.5	Electronic parts and components
64	51	Cangene Corporation	\$35,652	\$44,312	-19.5	\$109,336	32.6	Pharmaceuticals/biotechnology
65	122	BioMS Medical Corp.	\$35,185	\$10,573	232.8	\$0		Pharmaceuticals/biotechnology
66	80	Petro-Canada	\$34,000	\$23,000	47.8	\$18,911,000	0.2	Energy/oil and gas
67	36	Vasogen Inc.	\$32,732	\$71,635	-54.3	\$0		Pharmaceuticals/biotechnology
68	67	AEterna Zentaris Inc.*	\$32,494	\$33,446	-2.8	\$46,943	69.2	Pharmaceuticals/biotechnology
69	76	ConjuChem Inc.	\$30,280	\$25,963	16.6	\$239		Pharmaceuticals/biotechnology
70	70	Corel Corporation*	\$29,354	\$28,519	2.9	\$200,952	14.6	Software and computer services
71	73	Emergis Inc.	\$29,100	\$28,200	3.2	\$170,000	17.1	Telecommunications services
72	75	Psion Teklogix Inc. (fs)	\$27,500	\$26,600	3.4	\$396,000	6.9	Software and computer services
73	72	Pharmascience Inc.	\$26,640	\$28,271	-5.8	\$265,625	10.0	Pharmaceuticals/biotechnology
74	78	Westport Innovations Inc.	\$25,628	\$24,402	5.0	\$43,552	58.8	Transportation
75	71	Tundra Semiconductor Corporation	\$25,540	\$28,416	-10.1	\$74,523	34.3	Electronic parts and components
76		Western Oil Sands Inc.	\$25,112	\$5,616	347.2	\$983,560	2.6	Energy/oil and gas
77	68	Husky Injection Molding Systems Ltd.*	\$23,136	\$31,502	-26.6	\$1,060,673	2.2	Machinery
78	77	Xerox Canada Inc. (fs)	\$22,486	\$24,889	-9.7	\$1,163,864	1.9	Machinery
79	91	MethylGene Inc.	\$22,384	\$18,737	19.5	\$16,026	139.7	Pharmaceuticals/biotechnology
80	82	Isotechnika Inc.	\$22,151	\$22,584	-1.9	\$4,106	539.5	Pharmaceuticals/biotechnology
81	88	EXFO Electro-Optical Engineering Inc.*	\$22,101	\$19,238	14.9	\$145,452	15.2	Comm/telecom equipment
82	98	Theratechnologies Inc.	\$22,049	\$14,987	47.1	\$197		Pharmaceuticals/biotechnology
83	81	SR Telecom Inc.	\$21,854	\$22,757	-4.0	\$87,455	25.0	Comm/telecom equipment
84	139	Resin Systems Inc.	\$21,815	\$8,852	146.4	\$4,352	501.3	Chemicals and materials
85	142	MEGA Brands Inc.*	\$21,133	\$8,481	149.2	\$620,746	3.4	Other manufacturing
86	85	CMC Electronics Inc.*	\$20,000	\$20,400	-2.0	\$208,000	9.6	Comm/telecom equipment
87	83	Labopharm Inc.	\$18,716	\$22,451	-16.6	\$15,874	117.9	Pharmaceuticals/biotechnology
88	90	ratiopharm inc. (fs)	\$18,536	\$18,814	-1.5	nd		Pharmaceuticals/biotechnology
89	93	Workbrain Corporation* +	\$18,470	\$16,610	11.2	\$109,451	16.9	Software and computer services
90	94	Rio Tinto Iron & Titanium Inc. (fs)	\$18,000	\$16,000	12.5	\$904,000	2.0	Mining and metals
91	105	Azure Dynamics Corporation	\$17,600	\$13,200	33.3	\$5,771	305.0	Transportation
92	107	Teck Cominco Limited	\$17,000	\$13,000	30.8	\$6,539,000	0.3	Mining and metals
93	95	ProMetic Life Sciences Inc.	\$16,098	\$15,082	6.7	\$2,647	608.2	Pharmaceuticals/biotechnology
94	89	Ontario Power Generation Inc.	\$16,000	\$19,000	-15.8	\$5,725,000	0.3	Electrical power and utilities
94		Penn West Energy Trust	\$16,000	\$9,500	68.4	\$2,100,900	0.8	Energy/oil and gas
96	152	MOSAID Technologies Incorporated	\$15,518	\$7,867	97.3	\$63,899	24.3	Comm/telecom equipment
97	108	Miranda Technologies Inc.	\$15,300	\$12,883	18.8	\$106,675	14.3	Computer equipment
98	97	Xantrex Technology Inc.*	\$15,043	\$15,052	-0.1	\$179,255	8.4	Energy/oil and gas
99	114	Trican Well Service Ltd.	\$14,831	\$11,216	32.2	\$847,472	1.8	Energy/oil and gas
100	66	Xstrata (fs)	\$14,600	\$35,136	-58.4	nd		Mining and metals

## Notes:

1. We have attempted, wherever possible, to provide gross R&amp;D expenditures before deduction of investment tax credits or government grants.

2. FY2005 R&amp;D expenditure figures may have been adjusted, as more accurate information became available.

3. Canadian-owned company results include worldwide R&amp;D expenditures; foreign subsidiaries (fs) include R&amp;D expenditures for Canadian operations only.

4. We have attempted, wherever possible, to provide revenue figures net of interest and investment income.

\* Converted to CDN\$ at average 2006 = 1.1341, 2005 = \$1.2116 (Bank of Canada)

+ Not current name

nd = Not disclosed

\*\* \$1 million or more of revenue

fs = Foreign subsidiary (includes R&amp;D expenditures for Canadian operations only)