

Performance Measures 2004

December 2004

iCORE now supports 15 research teams

In 1998 the government of Alberta embarked on an important and visionary Information and Communication Technology (ICT) strategy for the province. iCORE, as a key part of that strategy, contributes to the growing strength of ICT and many other sectors of the Alberta economy.

iCORE has set itself some simple yet significant performance targets. The targets are: (1) To attract one new research chair, one new research professor, and two new industry chairs each year in order to achieve a steady state of thirty world-class iCORE Chairs and Professors in ICT by 2010, (2) To attract and retain the best new graduate students each year in areas that support ICT research and industry.

These targets are easy to measure, but there are other **outputs** and longer term **outcomes** that indicate whether iCORE is having the ultimate **impact** that it desires.

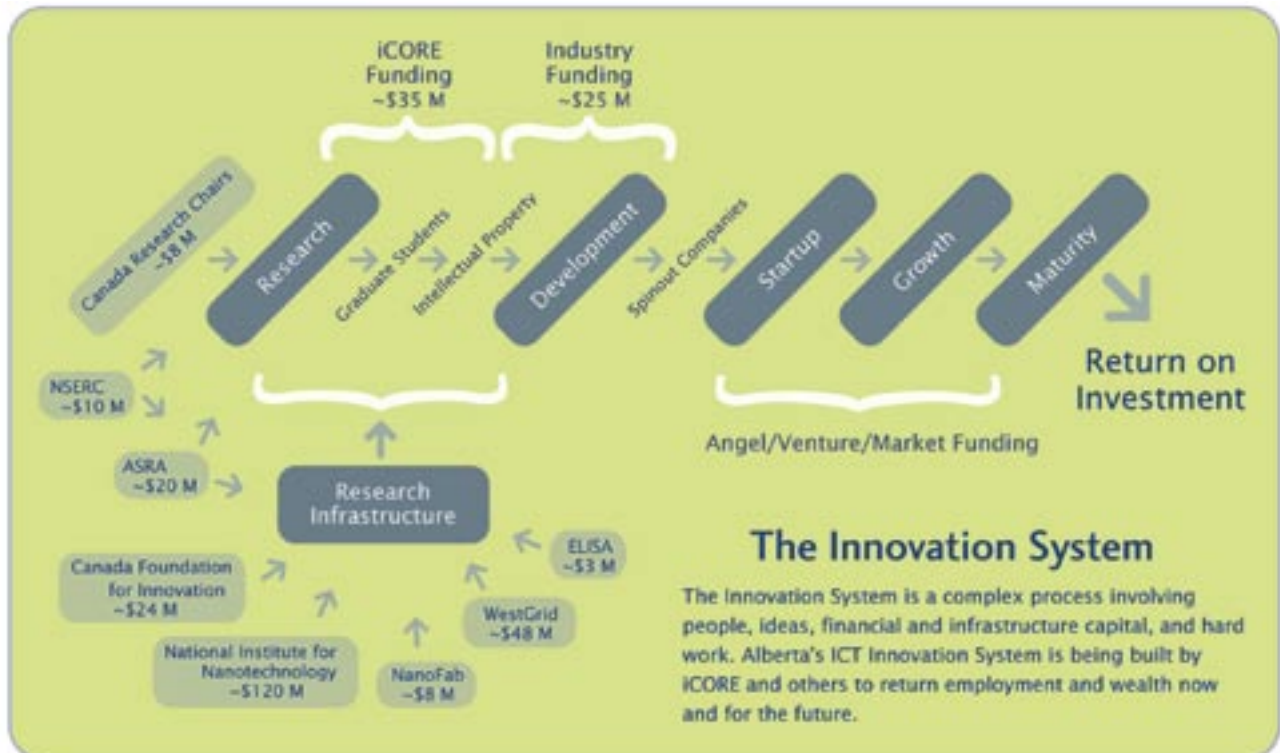
iCORE's programs were started in FY 2000-2001. The first report on performance measures was published in the fall of 2002. Last year, in the fall of 2003, a standardized set of performance measures was determined that reports on a number of indicators in the areas of:

- High Quality People
- Intellectual Capital
- Economic Impact

This year we report on these measures and compare them to last year's measures. These measures primarily reflect the direct outputs of iCORE's programs which focus on the human capital research needs of the innovation system. iCORE is one part of the overall ICT strategy for the province of Alberta. The outcomes of the province's ICT strategy (in terms of job growth and GDP for example) are reported in the annual report for Innovation and Science.

The numbers given in this report reflect the active amounts of people and funding supported by iCORE, and the new amounts of intellectual capital created this year. This year we conferred four more awards to support a total of 15 lead researchers (two researchers have two awards) who work together with over 500 other researchers, postdocs and graduate students. These teams have acquired a total of \$137 million in research funding from iCORE's investment of \$35 million.

Publications, patents, partnerships and funding are growing significantly. Alberta's percentage of NSERC students in computer science and electrical and computer engineering has declined somewhat, but at 15 percent is still above the per capita expectations. In the future, as we build up reliable yearly data, we will provide more trends, cumulative impact, and analysis of results in this annual report.



Summary of Performance Indicators

To gauge success, iCORE measures its performance in several major areas:		2003	2004
HIGH QUALITY PEOPLE (Active)	Number of active iCORE awards	13	17
	Number of additional faculty members on iCORE research teams	33	59
	Number of active graduate students and postdocs on iCORE research teams	203	269
	Number of graduate student scholarships	195	255
	Percentage of graduate students who intend on staying in Alberta after graduation	65	67
INTELLECTUAL CAPITAL (New)	Refereed journals and conference papers	360*	477*
	Books or chapters	16	11
	Patents	5	6
ECONOMIC IMPACT (Active)	iCORE investment	\$28 M	\$35 M
	Additional funding acquired directly by iCORE research teams	\$73 M	\$102 M
	Direct leverage	3.6 times	3.9 times
	Funding acquired with iCORE research team collaboration	\$120 M	\$120 M
	Indirect leverage	7.9 times	7.4 times
	Spinout companies	4	5

*this number includes some duplicates that were co-authored by more than one iCORE researcher

High Quality Vision

iCORE RESEARCH ADVISORY COMMITTEE	iCORE BOARD															
<p>The iCORE Research Advisory Committee (IRAC) is made up of five members who have extensive academic and industry research experience in a range of information and communication technologies. These five scientists and industry experts from around the globe were assembled as a select group to advise iCORE on future directions. Members include:</p> <p>DR JAMES GOSLING Chief Scientist, Java Vice President and Fellow Sun Microsystems</p> <p>DR DAVID JEFFERSON Computer Scientist Lawrence Livermore National Laboratory</p> <p>DR ERIC GEORGE MANNING Professor of Computer Science University of Victoria</p> <p>DR WILLIAM R. PULLEYBLANK Director of IBM Exploratory Systems IBM Research</p> <p>DR RICHARD E. TAYLOR Professor of Physics Stanford University, Nobel Laureate</p>	<p>iCORE's high-profile board of directors is selected from experienced industry, government and academic leaders. 2003-04 board members include:</p> <table border="0"> <tr> <td>DAN BADER Corporate CIO Government of Alberta</td> <td>BARRY MEHR Deputy Minister Alberta Innovation and Science</td> </tr> <tr> <td>DR MURRAY CAMPBELL Manager, Intelligent Information Analysis Department IBM TJ Watson Research Center</td> <td>DR SEAMUS O'SHEA Vice President (Academic) and Provost University of Lethbridge</td> </tr> <tr> <td>DR PETER C. FLYNN Poole Chair in Management for Engineers Faculty of Engineering University of Alberta</td> <td>DR DENNIS SALAHUB Vice President (Research) University of Calgary</td> </tr> <tr> <td>DR PETER HACKETT President and CEO Alberta Ingenuity Fund</td> <td>J.R. (ROLF) SHERLOCK (VICE CHAIR) Senior Partner BVIS Consulting Services</td> </tr> <tr> <td>DH.S. (SCOBAY) HARTLEY Vice President, Linvest Resources Corp. CEO, Welwyn Resources Ltd.</td> <td>DR ROGER S. SMITH (CHAIR) Professor Emeritus, School of Business University of Alberta</td> </tr> <tr> <td>MARY HOFSTETTER President and CEO The Banff Centre</td> <td>DR BRIAN UNGER President and CEO iCORE</td> </tr> <tr> <td>DR GARY KACHANOSKI Vice President (Research) University of Alberta</td> <td>SAMUEL ZNAIMER Senior Vice President Ventures West</td> </tr> </table>		DAN BADER Corporate CIO Government of Alberta	BARRY MEHR Deputy Minister Alberta Innovation and Science	DR MURRAY CAMPBELL Manager, Intelligent Information Analysis Department IBM TJ Watson Research Center	DR SEAMUS O'SHEA Vice President (Academic) and Provost University of Lethbridge	DR PETER C. FLYNN Poole Chair in Management for Engineers Faculty of Engineering University of Alberta	DR DENNIS SALAHUB Vice President (Research) University of Calgary	DR PETER HACKETT President and CEO Alberta Ingenuity Fund	J.R. (ROLF) SHERLOCK (VICE CHAIR) Senior Partner BVIS Consulting Services	DH.S. (SCOBAY) HARTLEY Vice President, Linvest Resources Corp. CEO, Welwyn Resources Ltd.	DR ROGER S. SMITH (CHAIR) Professor Emeritus, School of Business University of Alberta	MARY HOFSTETTER President and CEO The Banff Centre	DR BRIAN UNGER President and CEO iCORE	DR GARY KACHANOSKI Vice President (Research) University of Alberta	SAMUEL ZNAIMER Senior Vice President Ventures West
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High Quality People

iCORE RESEARCH TEAMS

The total number of researchers actively engaged on iCORE research teams has grown to over 500. 17 research awards to 15 people have been funded as of March 31, 2004:

NETWORKS AND WIRELESS

NORMAN C. BEAULIEU, Electrical and Computing Engineering, U of A
iCORE Chair, *Wireless Communications Laboratory*

CHRISTIAN SCHLEGEL, Electrical and Computer Engineering, U of A
iCORE Professor, *High-Capacity Digital Communications Laboratory*

GÉRARD LACHAPELLE, Geomatics Engineering, U of C
iCORE Chair, *Wireless Location Research Group*

GRAHAM JULLIEN, Electrical and Computer Engineering, U of C
iCORE Chair, *Advanced Technology Information Processing Systems*

JAMES W. HASLETT, Electrical and Computer Engineering, U of C
iCORE/NSERC/TRLabs Industrial Research Chair
Wireless Science and Technology Initiative

HUGH WILLIAMS, Mathematics and Statistics, U of C
iCORE Chair, *Algorithmic Number Theory and Cryptography*

CAREY WILLIAMSON, Computer Science, U of C
iCORE Professor, *Broadband Wireless Networks, Protocols, Applications, and Performance*
iCORE/NSERC/Telus Mobility Industrial Chair
Wireless Internet Traffic Modelling

NANOSCALE AND QUANTUM INFORMATICS

MICHAEL BRETT, Electrical and Computer Engineering, U of A
iCORE Professor, *Nanoscale Engineering Physics*
iCORE/NSERC/Micralyne Industrial Research Chair
Thin Film Engineering

MARK FREEMAN, Physics, U of A
iCORE Professor, *Nanoscale Engineering Physics*

ROBERT A. WOLKOW, Physics, U of A
iCORE Chair, *Nanoscale Information and Communication Technologies*

BARRY SANDERS, Physics, U of C
iCORE Professor, *Quantum Information Science*

INTELLIGENT SOFTWARE SYSTEMS

JONATHAN SCHAEFFER, Computing Science, U of A
iCORE Chair, *High-Performance Artificial Intelligence Systems*

GUENTHER RUHE, Computer Science/Electrical and Computer Engineering, U of C
iCORE Professor, *Software Engineering Decision Support*

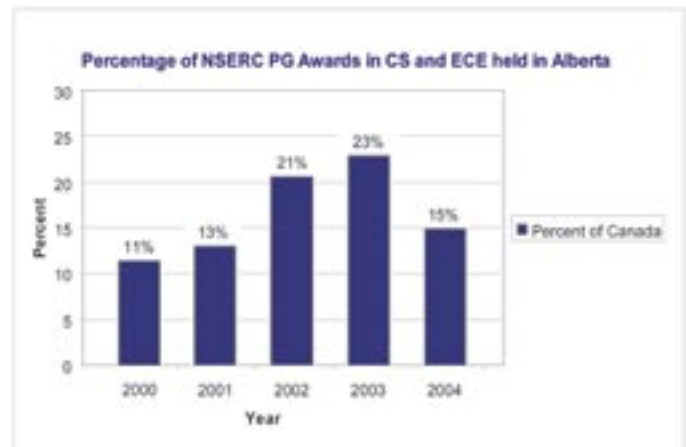
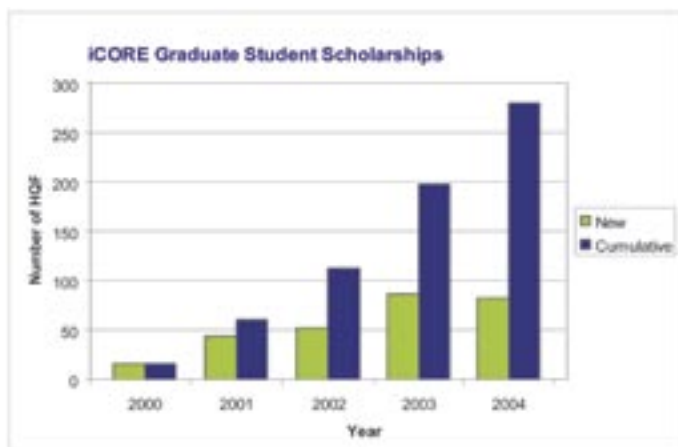
RICHARD SUTTON, Computing Science, U of A
iCORE Chair, *Reinforcement Learning and Artificial Intelligence*

HONG ZHANG, Computing Science, U of A
iCORE/NSERC/Syncrude/Matrikon Industrial Research Chair
Intelligent Sensing Systems

	2003	2004
Number of faculty members on iCORE research teams	33	59
Number of graduate students and postdocs on iCORE research teams	203	269
Number of other team members	97	188

GRADUATE STUDENTS

iCORE provides scholarships to exceptionally high quality graduate students from Canada and the world. Most of these students will remain in Alberta and have a cumulative economic impact far above the cost of the iCORE investment.



	2003	2004
Percentage of graduate students who intend on staying in Alberta after graduation	65	67

Partnerships

Collaborations are an endorsement by other researchers that a researcher brings value to a larger project. iCORE researchers have many connections with colleagues around the world, and are actively involved in collaborative research projects. Details on these partnerships and industry projects can be found in the annual iCORE Research Report.

	2003	2004
PARTNERSHIPS WITH RESEARCHERS	84	135
PARTNERSHIPS WITH INDUSTRY	49	40

Awards

iCORE awardees are recognized by other adjudicated processes, reinforcing the excellence of the research supported by iCORE in Alberta. iCORE's Chairs and Professors have earned several prestigious awards.

NUMBER OF MAJOR AWARDS BY ICORE RESEARCHERS	14	14
Canada Research Chairs	6	6
Steacie Fellowships	3	3
Royal Society of Canada Fellows	2	2
IEEE Fellows	2	2
Fellow of the American Association of Artificial Intelligence	1	1

Intellectual Capital

The output of iCORE researchers is an indicator of the level of achievement in research. These measures reflect the breadth and quality of intellectual property produced, which yields both intellectual and economic returns.

PUBLICATIONS	376	477
Academic journals	164	184
Conference papers	196	282
Books or chapters	16	11
PATENTS		
Since iCORE award	5	6

Economic Impact

iCORE's economic impact is measured by the amount of additional research funding that is attracted and leveraged by iCORE funding. iCORE has been very successful in attracting research investment to Alberta. For every dollar that iCORE has invested, the excellence of the people and the confidence around the research program has led to the investment of an additional 2.9 dollars directly from other sources. This significant increased input into R&D activity in Alberta will cause other activity and impact in the broader innovation system.

	2003	2004
ICORE INVESTMENT TO DATE	\$28 M	\$35 M
FUNDING ACQUIRED DIRECTLY BY ICORE CHAIRS AND PROFESSORS	\$73 M	\$102 M
Federal		
Canada Foundation for Innovation	\$19 M	\$24 M
Canada Research Chair	\$7.5 M	\$8 M
Natural Sciences and Engineering Research Council	\$2.5 M	\$10 M
Provincial		
Universities	\$2.5 M	\$2.5 M
Alberta Science and Research Authority and Alberta Ingenuity Fund	\$11 M	\$20 M
Industry		
Private sector partners	\$22.5 M	\$25 M
Other	\$8 M	\$12.5 M
FUNDING ACQUIRED WITH ICORE RESEARCH TEAM COLLABORATIONS	\$120 M	\$120 M
National Research Council	\$60 M	\$60 M
Alberta Innovation and Science	\$60 M	\$60 M
DIRECT LEVERAGE	3.6 times	3.9 times
DIRECT AND INDIRECT LEVERAGE	7.9 times	7.4 times
SPINOUT COMPANIES	4	5

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