

GLOBALLY-RECOGNIZED CLUSTERS IN THE TORONTO REGION: IT SECURITY & CRYPTOGRAPHY

THE TORONTO REGION IS ...

- The second largest financial services cluster in North America and the third largest ICT cluster
- A growing hub of more than 100 companies that provide IT security products and services, including industry leaders such as: Bioscript, Certicom Co., Cisco Systems Canada, Digital Cement, IBM Canada, McAfee Canada, Microsoft Canada, Open Text Corporation, Pharma Algorithms, SAP Canada, Symantec Canada, Teranet, and Thomson Reuters
- The location of a sophisticated customer base that includes major financial institutions (Royal Bank of Canada, Manulife Financial, and Toronto Stock Exchange, to name a few), and corporations such as Pitney Bowes, Alcatel-Lucent, Research in Motion, Xerox Canada, and COM DEV
- Home to the University of Toronto and the University of Waterloo which are ranked among the top 10 universities in North America and are the top two Canadian universities to publish articles relating to IT security and cryptography
- Producing a highly-educated and highly skilled workforce – over 13,400 graduates from key university and college programs in 2006:
 - 11,200 university graduates (all levels) in computer science, physical science, engineering and mathematics, an 18 per cent increase from 2005
 - 2,225 technology graduates from colleges/institutes of technology, a 70 percent increase from 2005

ADVANTAGES

- A world-leading economic region – named one of the world's top 10 economic centres by Standard & Poor's in 2007, and ranked number two in Foreign Direct Investment magazine's 2007 Top City Regions of the Future
- 7.2 million people live in the Toronto Region, making it the 4th largest urban region in North America
- Canada's largest centre for research and education – location of 35% of all R&D conducted in Canada
- 1.8 million workers (25-64 years of age) with a university degree or college certificate – the most educated population in the G8
- Close to a well-developed transportation infrastructure – air, rail and highway corridors – that easily moves people and goods to cities in the US Midwest and Northeast

Growing Number of University Graduates

Program	Bachelor		Masters		Doctorate	
	2005	2006	2005	2006	2005	2006
Computer Engineering	231	244	82	84	15	15
Electrical Engineering	431	455	158	159	25	29
Software Engineering	58	59	18	20	4	5
Computer Science	1355	1579	166	129	35	29
Mathematics	519	686	124	157	20	27
Engineering Science/ Engineering Physics	240	234	96	83	21	24
Total	2834	3256	644	632	119	129

Source: CUDO, 2007

WORLD-CLASS RESEARCH AND EDUCATION

- Toronto Region universities are a hub of research excellence recognized by the National Science and Engineering Research Council (NSERC):
 - 24 of 41 Canada Research Chairs in Cryptography
 - 30 of 98 Canada Research Chairs in IT Security
 - 7 of 19 Canada Research Chairs in Computer Security
- Toronto Region produces almost half (44%) of all IT security and cryptography publications originating from Canadian universities, and one third of all citations
- Over 40 computer science, engineering and mathematics programs are offered at Toronto Region universities and colleges/institutes

“...So just in terms of scale...and focus on computer science, Waterloo stands out, even on a global basis stands out very, very well...There are many years where Waterloo is the university we hired the most people from of any in the world, and Waterloo has always been in the top five every year...”

Bill Gates,
Founder and Chairman, Microsoft Inc.

- A centre of advanced research and development based in Toronto Region universities, including:
 - **University of Waterloo:** Institute for Quantum Computing; Canadian Centre of Arts and Technology; Centre for Applied Cryptographic Research; Institute for Computer Research; Centre for Computational Mathematics in Industry and Commerce; Giga-to-Nanoelectronics (G2N) Centre; and Pattern Analysis and Machine Intelligence (PAMI)
 - **University of Toronto:** Fields Institute for Research in Mathematical Sciences, Centre for Applied Power Electronics; Intelligent Transportation Systems (ITS) Centre and Testbed; Adaptive Technology Resource Centre; Emerging Communications Technology Institute; Knowledge Media and Design Institute; Nortel Institute for Telecommunications; Bell University Labs; and Ontario Network on the Regional Innovation System
 - **McMaster University:** Centre for Emerging Device Technologies and Centre for the Effective Design of Structures
 - **Ryerson University:** Rogers Communication Centre and Institute for Innovation and Technology Management (IITM)
 - **University of Ontario Institute of Technology:** Hacker Research Lab
- World-class independent research centres include: Canadian Institute for Advanced Research (CIFAR); Perimeter Institute for Theoretical Physics; and Guelph-Waterloo Physics Institute (GWPI)

Top 10 Publishers (North America) on Computer Fraud, Risk and Security and Cryptography by University from 2000-2007

Institution	Number of publications
Harvard University	213
University of Texas	182
Stanford University	157
University of Washington	132
University of Toronto	116
University of Waterloo	115
University of California, Los Angeles	114
Columbia University	113
University of Maryland	113
University of Wisconsin	113

Source: ISI

WEB LINKS

Toronto Region Research Alliance
www.trra.ca

McMaster University
www.mcmaster.ca

Ryerson University
www.ryerson.ca

University of Ontario Institute of Technology
www.uoit.ca

University of Toronto
www.utoronto.ca

University of Waterloo
www.uwaterloo.ca

Canadian Institute for Advanced Research
www.cifar.ca

Perimeter Institute for Theoretical Physics
www.perimeterinstitute.ca

Fields Institute for Research in
Mathematical Sciences
www.fields.utoronto.ca

“The Toronto Region is home to one of the largest and most productive concentrations of research and development talent in the world, and serves as a portal to all of North America’s major markets and institutions.”

Dan Fortin,
President, IBM Canada Ltd.

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