



# C-CORE Expands to Ottawa Area

After several months of negotiation, C-CORE is pleased to announce the purchase of Kanata-based Vantage Point International (VPI) assets. VPI was a privately held company specializing in radar related services to defence, space and environmental monitoring clients. The deal closed on May 30th, 2008.

C-CORE President and CEO, Dr. Charles Randell, sees VPI's employees and business lines as an excellent fit with C-CORE's strategic plan for expansion in the earth observation (EO) sector and Government security markets. "The VPI client base broadens C-CORE's markets in Defence R&D and Earth Observation (satellite) and places us physically closer to those markets in Canada. The EO sector offers companies of our size an impressive growth opportunity. The Government Defence and Security sectors are a relatively new area for C-CORE and this acquisition expands our client base in this business." said Dr. Randell.



C-CORE Ottawa – Suite 210, 400 March Road, Kanata ON



C-CORE's  
Director of Ottawa Operations –  
Stephen Churchill

The acquisition makes C-CORE one of Canada's largest providers of satellite surveillance and application development services. It also adds considerable depth to the corporation's radar expertise. The combined capabilities and resulting corporate strength coupled with a permanent presence in Ottawa expands the level and scope of support C-CORE can provide its clients.

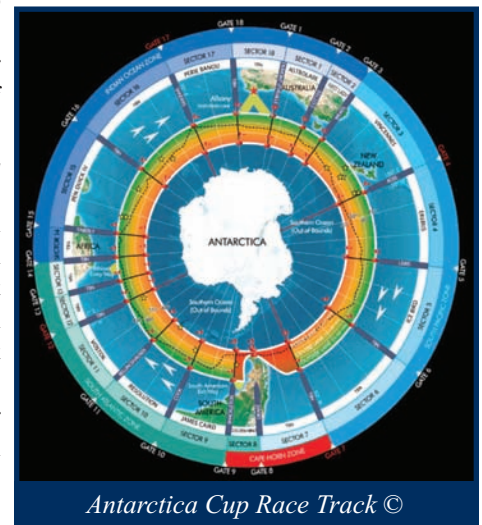
Long-time C-CORE employee, Stephen Churchill, was appointed the Director of Ottawa Operations.

Stephen has made the transition to Ottawa and has settled into the Constance Bay area, north of Kanata. Stephen extends an invitation to our friends, new and old, to drop by the new C-CORE office in Kanata, meet the staff and experience the espresso.

## Iceberg Detection in the Antarctic

C-CORE was contacted in January 2008 by the Antarctica Cup Ocean Race Team to provide satellite radar-based iceberg detection services. The Antarctica Cup Ocean Race was in its inaugural year and was the first race to circumnavigate the continent of Antarctica

and the first race to cross the South Atlantic. Through Polar View, an initiative of the European Space Agency, C-CORE was able to provide an iceberg detection service over the South Atlantic. This project marked the fourth international yacht race that C-CORE has participated in, after being successful in the Oryx Quest, Volvo and VELUX 5 Oceans races.



Antarctica Cup Race Track ©

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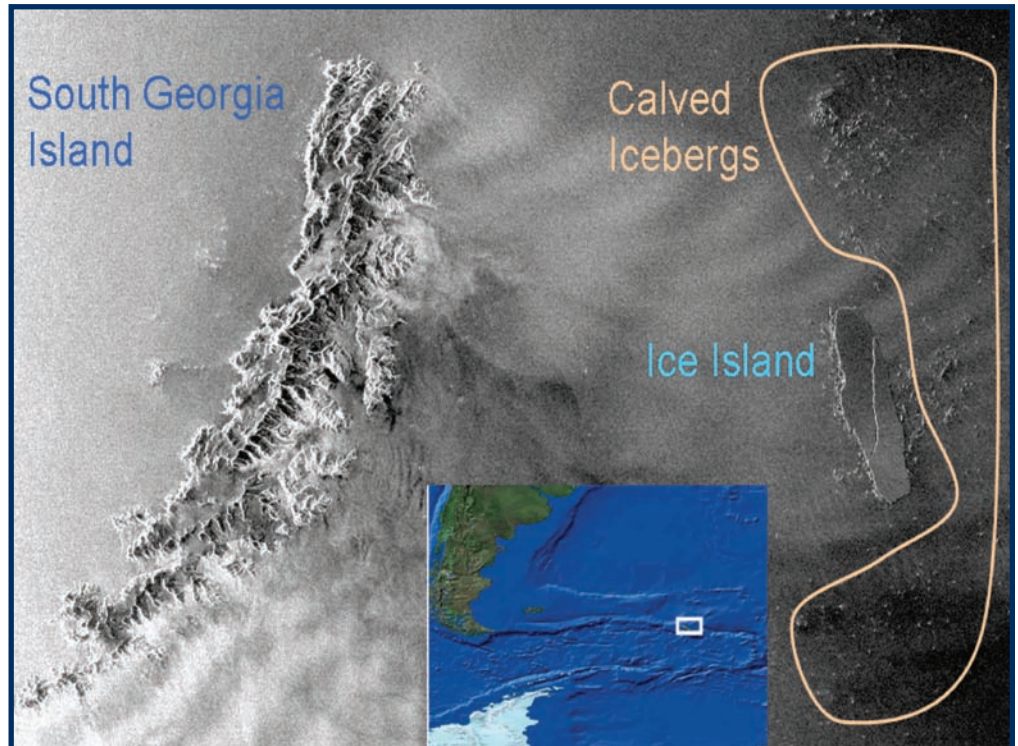
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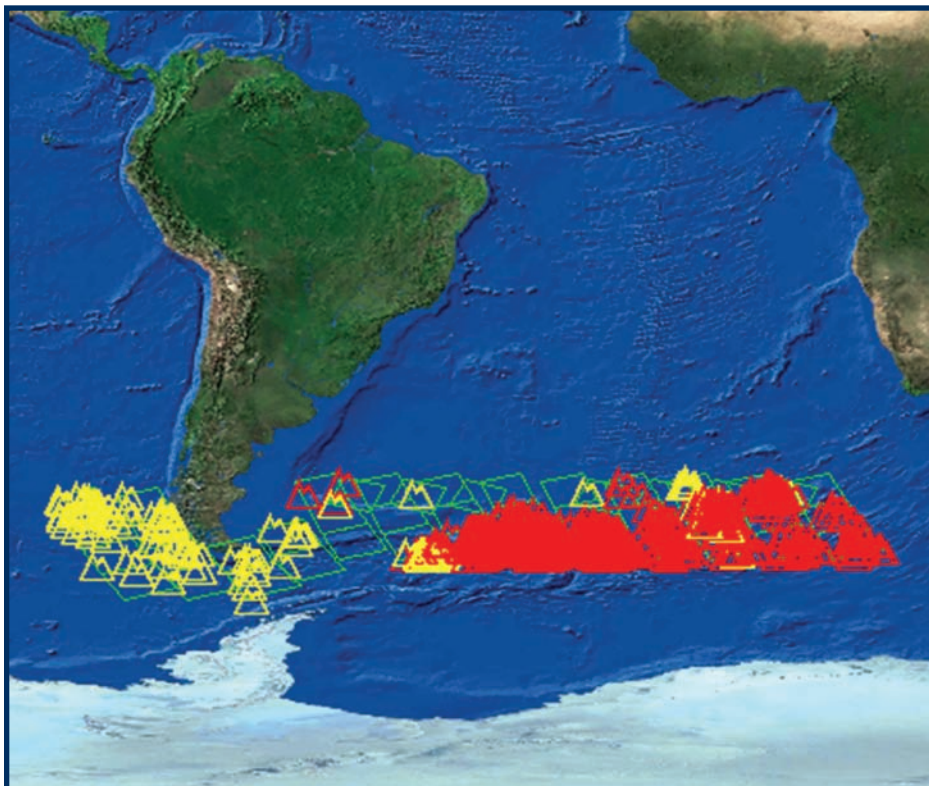
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The area required for surveillance spanned over 5 million square kilometres of ocean. To cover this great expanse, ENVISAT ASAR Wide Swath was chosen. The use of radar data was useful for penetrating cloud cover and collecting data day and night. The iceberg detection process first involves C-CORE's proprietary automated iceberg detection software followed by a manual quality control. The service was useful for identifying larger icebergs and areas of high iceberg density that should be avoided by the competitors.

A limited number of targets were detected in the early stages of monitoring. Then using one of the images on March 1, 2008 a massive ice island measuring 42km by 12 km was detected in the middle of the race track, just east of South Georgia Island. The iceberg was in the process of breaking up, as evidenced by the central crack and the nearly three thousand surrounding icebergs.



*Ice Island Located east of South Georgia Island*



*Satellite Coverage and Iceberg Detections using ENVISAT*

Subsequent imagery revealed that there were thousands of icebergs spanning over 3000 kilometres of the racetrack. As a result, the race directors decided to close the southern lane of the racetrack in the interests of safety. Due to delays in the progress of this year's solo competitor, RADARSAT-1 ScanSAR Wide imagery was planned to provide duplicate coverage over the race track.

Through this project, C-CORE was able to bring the advantages of satellite technology to the ground level of the end user. Solo competitor Fedor Konyukhov commented that he wished the C-CORE iceberg detection service was available for the entire race track for the peace of mind it provided, Race Director Bob Williams described the service as "invaluable" and a "must service" for future events on the Antarctica Cup Racetrack.

Overall, this project has served to further establish C-CORE as a world leader in satellite radar iceberg detection. As we enter the summer, we are gearing up for more iceberg detection services and are anticipating involvement in new international yacht races.

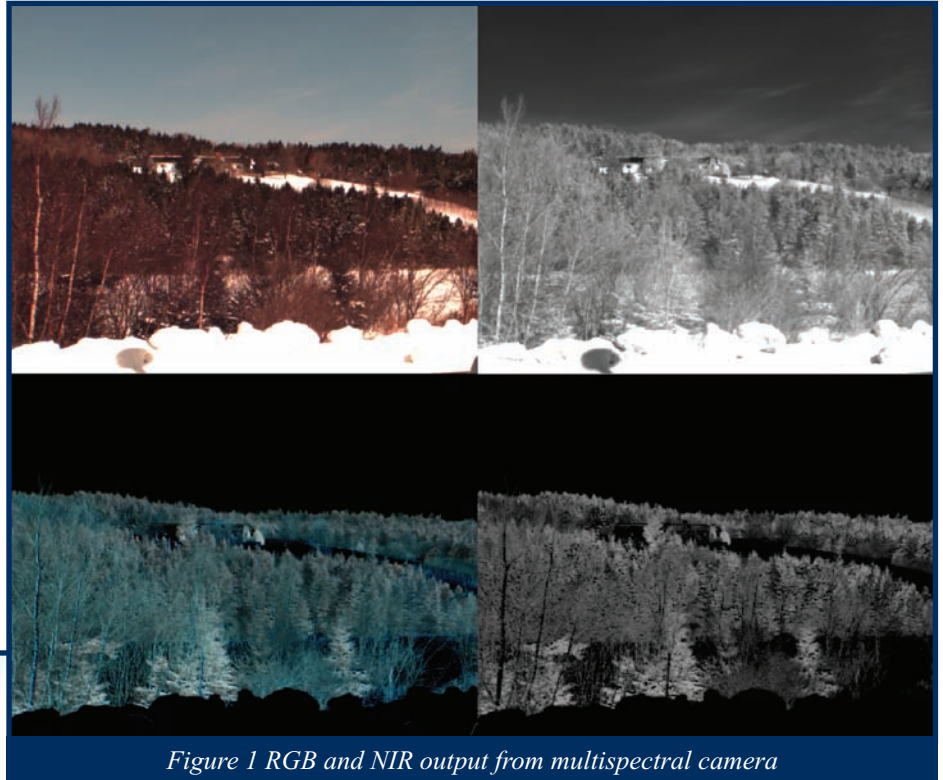
## Vegetation Discrimination for UGV Navigation

C-CORE is working for Defence Research and Development Canada (DRDC) to develop a real-time vegetation discrimination capability for unmanned ground vehicles (UGV). UGVs autonomously explore outdoor environments by sensing their environment, creating three dimensional representations and navigating towards defined objectives, while intelligently avoiding obstacles. Currently, UGV sensors have difficulty in distinguishing between “real” obstacles such as rocks, berms, water and man-made structures, and traversable terrain cover such as grass, foliage, dry vegetation and bark. As a result, terrain with vegetation can be interpreted as obstacles. Falsely identifying vegetation as obstacles doesn't imperil a UGV; however, it imposes artificial limits on vehicle mobility. C-CORE's work will substantially improve UGV mobility in areas with dense vegetation.



*Figure 2 Typical UGV*

Numerous techniques could be applied to vegetation discrimination but the most promising approach relies on techniques from the field of remote sensing an area in which C-CORE has many experts. The remote sensing field has long used multispectral analysis as a tool



*Figure 1 RGB and NIR output from multispectral camera*

to discriminate between vegetation and non-vegetation. Multispectral cameras acquire images at specific wavelengths that correspond to the reflection and absorption properties of green-leaf vegetation. Specifying the appropriate wavelengths enhance the difference between vegetation and non-vegetation, thus providing the basis for a discrimination process.

The top frames in Figure 1 show the red-green-blue (RGB) and near-infrared (NIR) output of a multispectral camera. The bottom frames show the processed images produced by combining the RGB and NIR output to enhance the vegetation; the bottom left shows output using the NIR and all color channels of the RGB image, the bottom right shows the NIR combined with just the red channel (a traditional NDVI calculation). The enhanced green leaf vegetation in the processed imagery is apparent, while the sky, snow and most man-made structures are suppressed. The design of this system is based on the Flux Data FD-1665 multispectral FireWire camera; the software interface designed for this system is based on the open source libdc1394 camera control library. Figure 2 shows a typical UGV that will benefit from the vegetation discrimination capability.

## Ice Engineering is Hot at C-CORE

C-CORE has experienced significant growth in recent years in part due to the increasing interest in exploring and developing hydrocarbon resources in Arctic regions. C-CORE has been providing ice engineering services in nearly all Arctic regions including the Canadian and US Arctic (Beaufort and Chukchi Seas), Russian Arctic (Barents, Pechora, and Kara Seas), West Greenland as well as the Caspian Sea and Sakhalin Island. There has also been an increase in East Coast activities as industry contemplates further hydrocarbon development on the Grand Banks and offshore Labrador.

Over the past three years the size of C-CORE's Ice Engineering team has doubled and is firmly established as a world leader in this field for a variety of services including: ice loads, subsea structure and pipeline risk and protection, ice management, and environmental characterization.

As oil and gas exploration and development continues in these harsh northerly regions, C-CORE will be there to address industry challenges and to continue world-class applied research and technology development. The provision of new data and the advancements of state of knowledge are creating new opportunities for industry.



*C-CORE Icebergfinder.com Team*

## C-CORE Recognized Again

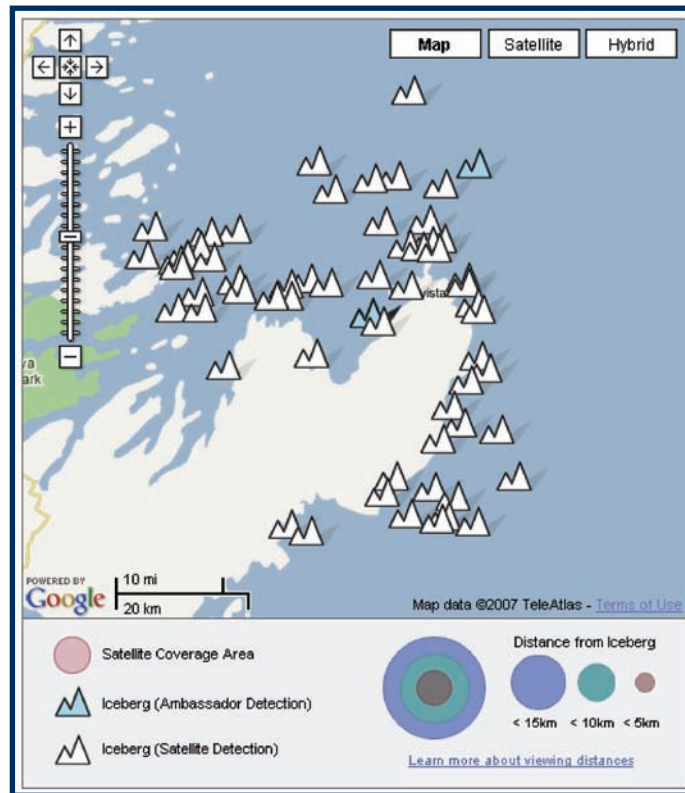
The 1st Annual Canadian e-Tourism Awards were held in Vancouver, BC, on November 8, 2007. The Icebergfinder.com website was the proud recipient of the Gold and Platinum Awards for Best Tourism Innovation. The Gold award was presented for the Best Tourism Innovation in a Large Private Sector while the Platinum Award was presented for overall Best Innovation in the Large, Small and Public Sector categories.

Icebergfinder.com was developed in 2005 by C-CORE, in conjunction with the Canadian Space Agency, the European Space Agency, Hospitality Newfoundland and Labrador, Atlantic Canada Opportunities Agency (ACOA), zedIT, and the Department of Tourism, Culture and Recreation. The website reports up to date locations

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of icebergs along the east coast of Newfoundland and Labrador and is geared toward tourists and the tourism industry. Satellite surveillance is used to locate the icebergs which are then mapped using the Google Maps Application. The website cleanly merges the advanced satellite technology with the familiar Google Maps Application providing an easy to navigate website.

The website also features an iceberg guide providing general knowledge on the best times and places to view icebergs around Newfoundland and Labrador, along with information on iceberg origins and FAQ. Educational content on how icebergs are detected using satellite technology is also provided.



This marriage of satellite technology, web technology and the tourism industry resulted in winning two Canadian e-Tourism Awards. Hosted by the Canadian e-Tourism Council, the awards recognize excellence in website design, online campaigns and innovation for three sectors: public, private and small- and medium-sized enterprise. The Best of Innovation category focus was on applications and strategies that created value to consumers, solved problems, and took into account consumer and travel trends. Judged on “WOW factor”, use of technology and consumer relevance, Icebergfinder.com was best in show for Large Private Sector and overall for Large, Small and Public Sector categories. Congratulations to the team on Icebergfinder.com!



*Dr. Phillips (right) accepts his award from Kerry Rowe, President, Engineering Institute of Canada*

## Canadian Pacific Railway Medal

C-CORE’s Principal Consultant, Geotechnical Engineering, Dr. Ryan Phillips, was recognized by the Engineering Institute of Canada as the 2008 Canadian Pacific Railway award winner recognizing outstanding Canadian engineers. First awarded in 1988, this award was established in 1987 during the Institute's centennial through the generosity of CP Rail to honour its past achievements in engineering and in the development of Canada.

The CPR Medal is awarded in recognition of many years of leadership and service at the regional, branch and sectional levels by members of the Societies within the Institute. C-CORE congratulates Dr. Phillips on winning this prestigious award.

## C-CORE Wins Distinction in Innovation Award

C-CORE's role as a leader in innovation and the corporation's contribution to the Province has been recognized by the Government of Newfoundland and Labrador. On Friday April 18, 2008 C-CORE was awarded The Distinction in Innovation Award which acknowledges individuals or groups that are fostering new ideas to positively impact the province and its people. The winner is chosen based on the individual or organization who has taken a leadership role to further enhance Newfoundland and Labrador's rich, innovative culture and pursue its associated benefits.

C-CORE was one of 11 nominees for the 2008 award. Susan Kennedy, C-CORE's Vice President-Operations accepted the award and stated C-CORE was proud to win the award given all the great things happening in Newfoundland and Labrador.



*C-CORE's Vice President - Operations,  
Susan Kennedy  
accepts the award from the  
Minister of Innovation Trade and Rural Development,  
Trevor Taylor*



C-CORE is an innovative engineering solutions provider based in St. John's, NL, Canada.

We publish *C-CORE News* twice a year for our partners, clients, and associates.

**President & CEO**  
Dr. Charles Randell

**Vice-President, Operations**  
Susan Kennedy

**Directors**  
Des Power  
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Tanya Ivany

**Deputy Director**  
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**Principal Consultant - Ice Engineering**  
Dr. Ian Jordaan

**Principal Consultant - Geotechnical Engineering**  
Dr. Ryan Phillips

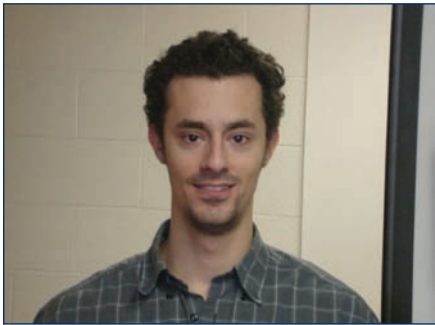
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## New Employees

**Perry Moore** joined our Ice Engineering team as a Project Engineer on October 29, 2007. Perry holds two engineering degrees – he graduated from Memorial University’s Bachelor of Engineering program in 1993 with a major in mechanical engineering, and then went on to complete a Bachelor of Engineering (Electrical) from Carleton University in 1998. Perry comes to C-CORE from GRI Simulations Inc. where he was actively involved in installing and integrating remote operated vehicle training simulators. Other prior experiences include work in fracture mechanics, small engine research and development, and CNC machining. When not busy with his engineering activities, Perry enjoys photography, playing guitar, and recording music.



**Aiman Al-Showaiter** joined our Geotechnical Engineering team as a Project Engineer on January 2, 2008. Aiman has a Bachelor of Civil Engineering and has recently completed a Master of Applied Science-Civil Engineering, both from Dalhousie University. Aiman completed an internship with C-CORE during the summer of 2007, and gained additional prior experience working as a Research Assistant and Site Inspection Engineer. Beyond his interest in numerical modeling, Aiman enjoys a variety of extracurricular sporting activities, fishing and reading.



**Karl Lambert** joined our Geotechnical Engineering team as a Project Engineer on February 18, 2008. Karl graduated from Memorial University’s Bachelor of Engineering program in 2007 with a major in civil engineering. Prior to coming to C-CORE, Karl gained valuable experience with organizations including Technip, Acergy and Kiewit Offshore Services. Extracurricular interests include chess and squash...the latter skill will no doubt prove useful if he decides to join C-CORE’s growing team of enthusiastic squash players!



**Bill Brinson** joined our Radar and Vision Systems team as a Project Engineer on June 2, 2008 as part of C-CORE’s acquisition of Vantage Point International in Ottawa. Bill graduated from the University of New Brunswick with a Bachelor of Science in Engineering under the Electrical and Computer Engineering program in 1999. Bill has been working for the greater part of nine years with clients at Defence Research & Development Canada and the Canadian Space Agency in various domains including synthetic aperture and bistatic radar, target tracking, electronic countermeasures and software development and benchmarking. He is also the go to IT guy at the Ottawa office. Bills extracurricular interests include softball, ball hockey, in-line skating, biking, and video gaming.

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## New Employees

**John Mulvie** joined C-CORE in June as part of the new Ottawa Office. While with Vantage Point his duties included manager of CIS ASAR processing and Geomatics analyst giving him experience in SAR and optical data processing and interpretation, data acquisition planning and ordering and the preparation of imagery for various projects and reports. John obtained a BA in Geography at Carleton University and a Remote Sensing Diploma at COGS. John enjoys falling off his bike, photography, historical-archaeological-anthropological readings and most things space related.



**Joey Chamberland** joined C-CORE's Radar and Vision Systems team in June as part of the new Ottawa Office. Prior to this Joey was the Vice-President of Engineering at Vantage Point International where he gained experience in radar related fields such as: tracking, data fusion, SAR planning and processing system development and research on emerging applications. Joey graduated from McGill University's Bachelor of Electrical Engineering program in 2002. When he is not working Joey can be found playing guitar in the park near his place, playing some type of team sport or in his kitchen cooking.



**Garrett Parsons** joined C-CORE in June as part of the new Ottawa Office. Working at Vantage Point International since December of 2006, he has gained experience in using SAR data for environmental monitoring, nuclear safeguards, and object detection and discrimination. Garrett graduated from the Electrical Engineering program at Memorial University of Newfoundland in 2002, and also had a work term at C-CORE in the summer of 2000. He is currently completing a M.Sc in Systems Science from the University of Ottawa. When he is not at work Garrett attempts to renovate his basement and outwit the groundhog that lives under his deck.

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