

## View from above

Ottawa has become a world leader in geospatial technology and remote sensing, analysing everything from ice floes to the tiles on a space shuttle

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Earlier this summer, PCI Geomatics won a major contract with a German company to provide image processing from a constellation of satellites to track trends in vegetation growth for the German agriculture industry.

PCI Geomatics, with one of its two Canadian headquarters based in Gatineau, is considered a world leader of geospatial information gathering and analysis. PCI's proprietary software will deliver data to Munich-based RapidEye AG covering four million square kilometres of terrain using special sensors designed to track vegetation. RapidEye's customers range from insurance companies and farmers to food producers.

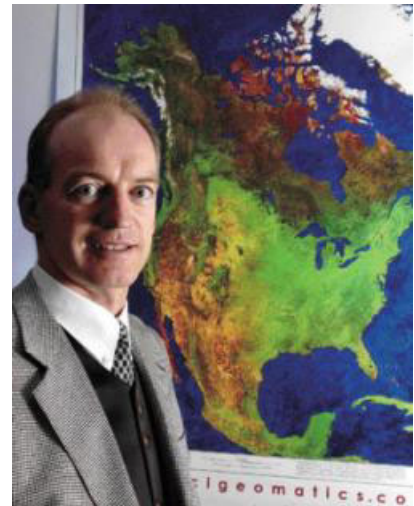
One major application of the software will be an assessment of insurance claims from property damage, says Terry Moloney, vice-president of operations for PCI Geomatics.

"If there was a hailstorm, for example, they would have to go into all the fields to examine damage and assess insurance claims. Now they can actually monitor that by (satellite) imagery on an ongoing basis and do an assessment throughout the fields."

Founded in 1982, PCI Geomatics began building and selling software to clients around the world when the geospatial industry was still young and its potential was only just becoming understood. PCI Geomatics, with a staff of 100 split between Gatineau and Richmond Hill, is in good company.

Canada has become a world leader in innovative geospatial technology grounded in what is the probably the country's original occupation: land exploration. An estimated 30,000 Canadians are employed in a sector that is geared to the collection, extraction and analysis of geographic information. It has a market worth about \$4 billion.

All that will continue to grow especially as geographic information technology is taken up by the world's major database integrators and software providers, from IBM to Microsoft.



CREDIT: Wayne Cuddington, The Ottawa Citizen

PCI Geomatics VP Terry Moloney with one of the Gatineau firm's satellite images. An estimated 30,000 Canadians work in geospatial technology -- the collection, extraction and analysis of geographic information.

To understand how the technology is evolving, consider a recent Miramax film, *Ella Enchanted*. Our heroine Ella gets lost exploring the forest. She grabs a medieval roadmap and commands: Show me a map! Out of the dusty pages arises a three-dimensional model revealing her location in a topographic display with demographic features and positional markers.

This magical portrait appears in *Information Highways* magazine as an illustration of how Canada's geospatial technology works in cybercartography.

Substitute a personal digital assistant, accessible to an Internet-based geobrowser, for the medieval roadmap, and the magic is practically upon us.

From the earliest years when Canada's vast landscape was still very much a blank space, the world's great explorers undertook the challenge of attempting to map and understand the huge Canadian terrain.

The effort is still underway. Canadians are considered among the world's most skilled map makers and map readers who have developed and exploited a large array of high-technology tools. Satellite imagery, geographic information processing (GIS) software, laser cameras, computer-generated and Internet-ready multi-media cartography are only some tools of the trade. All involve the capture of geographic information using technology that includes creating digital elevation models from remote sensing technologies.

Much of the work has been done in partnerships with the government of Canada through various programs from the GeoConnections program to the Canada Centre for Remote Sensing, a leading federal laboratory devoted to receiving satellite data for various applications.

CCRS helped spawn a generation of scientists who initially learned to use infrared and microwave light waves to study geographic characteristics. CCRS later expanded out of a co-operative agreement with the United States to obtain and interpret satellite data.

Canada's industry grew yet again post-1995 with the launch of Radarsat-1, Canada's Earth observation and environment satellite.

Satellite data of surface characteristics from ice movement to swelling flood waters is captured, extracted, interpreted and sold by Canadian companies in products and services around the world. Radarsat-2 is expected to be launched late next year as its predecessor begins to wind down.

GeoConnections, set up with a hefty mandate as a five-year, \$60-million program within Natural Resources Canada, was designed to establish a uniform geospatial data infrastructure.

"Whether you call it a pipeline or a railway, you have to ensure you have a common set of standards and policies with regards to the application of geospatial information," says Irwin Itzkovitch, with responsibility for GeoConnections as assistant deputy minister with Natural Resources Canada.

More than that, GeoConnections was initiated to support development of technologies by Canadian companies. "These companies develop what government needs through partnership with the private sector," says Mr. Itzkovitch. "At the same time, they are building the capacity both in the provinces and the private sector, which then develop products and services to sell globally."

The Canadian Space Agency also contributes to the growing industry with a collaborative agreement 25 years ago with the European Space Agency. Canada's contributions to CSA programs are returned in the form of contracts to Canadian industry, which in turn opens domestic technology to wider exposure.

As a result, Canadian expertise is widely recognized around the world. "We are at the leading edge in a lot of the technologies," says Fraser Taylor, director of Carleton University's Geomatics and Cartographic Research. A pioneer in computerized map making and cyber cartography, he sits on a variety of international committee dedicated to national and global geographical technologies. "The work we are

doing with GeoConnections and geospatial data is considerably ahead of any other nation in the world in this field just as the Atlas of Canada -- as an online atlas -- is ahead of the rest of the world."

It was the Canadian presence on a special commission to the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) that recommended digital geospatial imagery to conduct weapons verification. "We had built the confidence that commercial imagery is out there -- make the best use of it," says Jeff Tracey, who now is president of the Geomatics Industry Association of Canada.

Mr. Tracey worked for Calgary-based Intera in the 1980s. The Mapping Service division of Intera spun off into Intermap Technologies Inc., which creates 3-D mapping using Interferometric Synthetic Aperture Radar (IFSAR) and has a large staff in Ottawa. Mr. Tracey was seconded to the Department of Foreign Affairs and International Trade, where he was looking at satellite imagery technologies for arms control verification. He later went to Iraq as a member of the UN Security Council's team of weapons inspectors under Hans Blix.

Now as head of Canada's industry trade association, Mr. Tracey is witnessing a transition in the industry and the way the technology is being used. Both the association and the federal government through its GeoConnections program and its role in the federal-provincial Canadian Council on Geomatics have similar agendas.

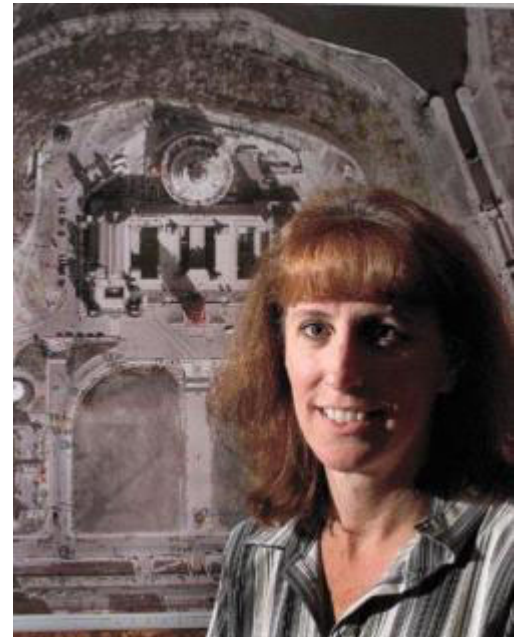
- Developing standards and technology infrastructure
- Increasing public awareness about the industry
- Steering students into geospatial technology as a career option.
- Improving opportunities for Canadian companies in an extremely competitive industry.

A major national conference involving GIAC, GeoConnections and other players is planned in Ottawa in early November to talk about some of these issues. "There is a sense of excitement in the industry and a change of direction now and we have to follow through on this," says Mr. Tracey.

Whole sectors including engineering, environment, energy, police and security, telecommunications, health care, forestry, fishing and now the large information technology enterprises all use geospatial data now as a business tool.

Government at all levels remain the major customer of geospatial technology. In just one federal department, Public Works and Government Services, some 150 staff in offices across the country use geospatial data to track, analyse and organize the federal government's property holdings. "In real estate, the most important part is location, location, location," says Julie Leese, director of PWGSC's real property branch. "Every single thing that is done is ultimately referenced to a location of something."

The federal government is the largest property and lease holder in the country with 30.6 million hectares of land and 46,000 buildings. "Look at the number of buildings and hectares of land that need to be managed," she says. "And we need to know what our interests are in that land: which departments are the custodians of that land, of different land parcels, where the easements are, the structures on its land."



CREDIT: Rod MacIvor, The Ottawa Citizen  
Julie Leese is with Public Works and Government Services. She says government workers across the country use geospatial data to track, analyse and organize the federal government's property holdings.

Geography is probably one of the best organizing principles in the integration and analysis of information. "Space is an ideal framework in which to bring together information on different topics," says Carleton's Taylor.

Geospatial technology has been used to analyse any number of disasters from the E. coli-contaminated water crisis in Walkerton, Ont., to the 1997 Manitoba and California floods. PCI Geomatics software, for example, helped the Walkerton Information Response Team by allowing scientists to identify, classify, and assess terrain, slope, drainage, vegetation, land use, water bodies, and man-made objects detected by satellites and aircraft in and around the town of Walkerton.

How vibrant the industry remains is the next challenge. "We're going through a fundamental change," says Mr. Tracey, of GIAC. "The industry is still strong but it's being integrated into other things."

This includes a new service known as location-based services -- LBS in industry jargon. LBS describes the navigation and location systems through satellite positioning that allows technology such as OnStar -- used to locate lost or stolen vehicles -- to operate.

In the U.S., new cellular telephones must be equipped with LBS so emergency and 911 dispatch can track a mobile user in trouble.

On another level, major systems integrators are incorporating geospatial technology into their applications. IBM and Oracle have developed geographic and locator data management products. Sierra Systems, a privately owned Canadian systems integrator with a staff of 1,000 in offices across the country, has a geospatial practice as part of its service offering.

"What we are doing is focusing on the users of spatial information while others tend to focus on the capture of spatial data," says Terry Tarle, head of Sierra Systems Spatial IT Practice in Ottawa. "It's really turned into a bit of a cottage industry."

PCI Geomatics is also reaching out and extending its technology into new areas, developing what it calls geocapacity information systems as a means of growing partnerships with large systems integrators to provide end-to-end solutions using geospatial IT, says Mr. Moloney.

At Carleton, Mr. Taylor sees this as a natural evolution of the industry. "The current jargon is enterprise-wide GIS and spatial IT," he says.

"If you keep GIS in separate quarters and do not integrate with information technology, we will lose out completely. All of my work is way beyond GIS. I'm an integrator -- not only integrating the technology but integrating the use of the technology."