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In Canada, high-tech clusters usually contain one or more key R&D-intensive industries along with other major and niche sectors. Here are some features of these clusters:

Canada's Technology Triangle

The four-city grouping of Guelph, Kitchener-Waterloo and Cambridge is so named due to its high concentration of R&D activities and technology-related businesses in a relatively small geographic area, which includes over 60 computer-related high-tech firms.

This area, in Canada's industrial heartland, draws its strength from respected universities and the region's historic manufacturing tradition. Tooling and machinery factories evolved in an earlier era to serve the Triangle's numerous manufacturing companies. That tradition lives on today, in high-tech form, in various advanced industrial machinery and supply operations.

The University of Guelph is one of Canada's largest research-intensive universities, emphasizing crop science, food and environmental technology. The University of Waterloo, a world-leader in computer software R&D, performs more contract research than any university in Canada.

The National Capital Region

With \$8 billion in annual revenues, \$5 billion in exports and 700 private technology companies, Ottawa-Hull has earned the name "Silicon Valley of the North." It is home to a luminous group - Nortel, Corel, Cognos, Newbridge Networks, Mitel, SHL System House and Digital Equipment among other international firms.

As one of the world's major centres for telecommunications R&D, a leader in satellite communications, a major centre for research in life sciences and a growing centre for environmental technologies, the region is seeing rapid growth in high-tech industries.

The largest concentration of activity is in telecommunications where total R&D expenditures exceed \$600 million annually. Industrial R&D is complemented by activities in private and government labs such as the National Research Council (NRC) and the region's three major universities. A fine quality of life and highly educated and skilled workforce are among its strengths.

Greater Vancouver

Vancouver is home to the majority of over 1,000 high-tech companies located in B.C..

The manufacturing field is dominated by communications, electronic equipment and computer manufacture. A host of young world-class firms are developing frontier products in fields such as biotechnology, alternative fuels technology, and computer software.

The depth of capabilities among its software producers is extensive, and ranges from database systems for the financial and hospital sectors; to mining and forestry modelling and advanced data communications.

The Vancouver region offers an enticing lifestyle and is an ideal springboard to lucrative Asia-Pacific markets.

Greater Toronto Area

Telecommunications and electronics, biotechnology and pharmaceuticals, multimedia and graphics design - these are the most prominent high-tech industries in and around Canada's largest metropolitan area.

Toronto is the fourth largest financial centre in North America. It is also home to headquarters of 58% of the country's top 50 foreign-owned companies.

It houses three universities, research centres for IBM and Xerox, among others, and many of Canada's major pharmaceutical companies. The University of Toronto is one of the largest medical schools in North America, with over 32 medical research institutes.

Greater Montreal Region

Montreal offers world-class capabilities in niche sectors such as telecommunications, aerospace and pharmaceuticals. The region has 575 companies managing R&D projects worth over \$1 billion annually, accounting for about 1/4 of all Canadian private sector R&D.

Telecommunications R&D amounts to \$200 million annually. This key sector and that of related computer and electronics industries, provides \$2.8 billion of combined output. Together, they contribute 21,500 jobs to the region.

It is also home to 350 software firms, many with world-class standing in systems management, business and computer animation.

Calgary

Calgary is home to the largest concentration of research facilities in Western Canada and is Canada's leading wireless technology development area. This includes Nortel's new-world centre for wireless technology and a handful of multi-national research operations. On the energy side, it is the world's chief centre of operations for high-tech companies servicing the oil industry.

Emerging applications of local high-tech capabilities include; telecommunications, geomatics, healthcare, wireless systems and distance education through multi-media. Behind this is an impressive network of computer scientists, geologists, geophysicists, mathematicians and engineers.

Total output in 1995 for high-tech sectors, within Calgary and Southern Alberta, was \$5 billion, exports were around \$3.5 billion and employment was 29,000. ■



High-tech clusters