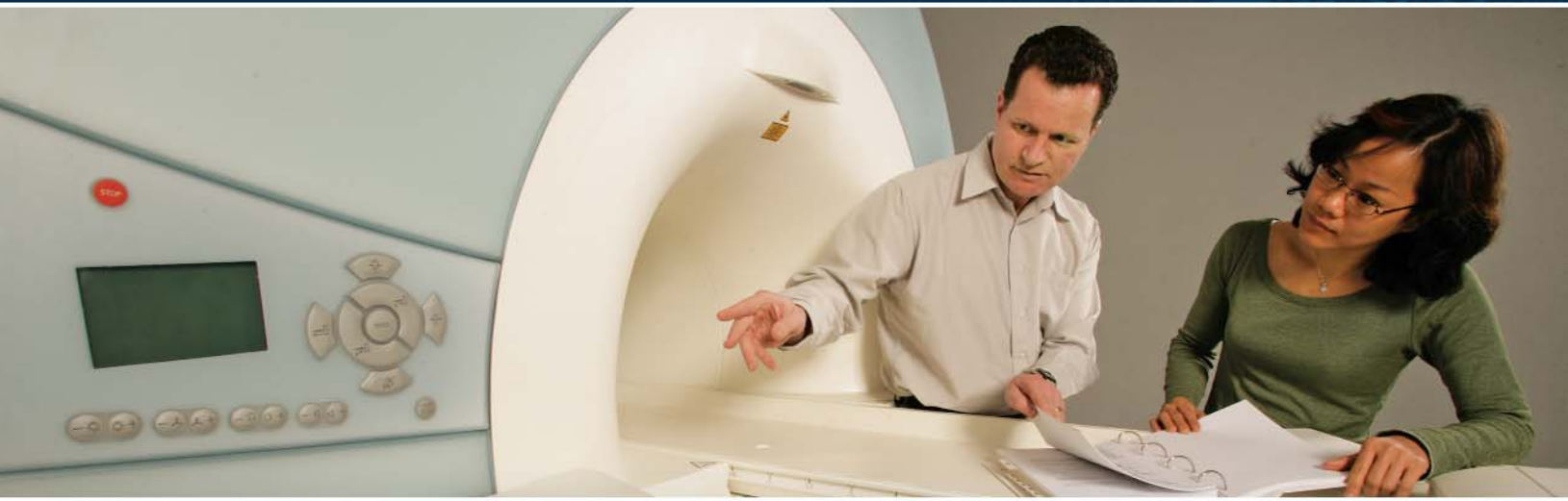




## NRC Technology Cluster

# INITIATIVES



Clusters are creating results in terms of strengthening Canadian and local economies and becoming magnets for international talent. [PAGE 2](#)

Regina

**Maintaining  
community lifelines**

[PAGE 10](#)

Winnipeg

**Innovations  
that save lives**

[PAGE 12](#)

Charlottetown

**Welcome to  
PEI's "oil sands"**

[PAGE 22](#)



The Government of Canada's science and technology strategy, *Mobilizing Science and Technology to Canada's Advantage*, recognizes research, innovation and the commercialization of new products, services and processes as critically important to Canada's economic growth and quality of life.

The National Research Council (NRC) is a major contributor to helping Canada gain an entrepreneurial advantage, knowledge advantage and people advantage — all three of which can come together to create products, services and technologies that will benefit Canadians and help Canada compete in today's aggressive global marketplace.

NRC is Canada's leading resource for science and technology (S&T) development and commercialization. Since its creation in 1916, NRC has consistently generated advantages for Canada by identifying Canada's science- and technology-based opportunities and taking action. NRC has continually adapted its research and development, industry support and commercialization services, programs and networks to meet national needs and priorities.

NRC works closely with industry, government and academia to increase the competitiveness of Canadian industry through S&T. It mobilizes the public and private sectors to invest in new S&T initiatives and research facilities and to strengthen technology clusters across Canada. NRC is helping small and medium-sized enterprises adopt new technologies, develop new products and services, and become more competitive in today's markets.

NATIONAL RESEARCH COUNCIL CANADA

Also available in electronic format (HTML and PDF)  
at: <http://www.nrc-cnrc.gc.ca>

© Her Majesty in Right of Canada, 2008  
Catalogue Number: NR16-87/2008E-PDF  
ISBN 978-0-662-48290-1





## TABLE OF CONTENTS

Technology Clustering .....	2
NRC Technology Cluster Initiatives .....	3
<b>Vancouver</b> — Fuel Cell and Hydrogen Technologies .....	4
<b>Edmonton</b> — Nanotechnology .....	6
<b>Saskatoon</b> — Plants for Health and Wellness .....	8
<b>Regina</b> — Sustainable Infrastructure .....	10
<b>Winnipeg</b> — Biomedical Technologies .....	12
<b>Ottawa</b> — Photonics .....	14
<b>Saguenay Region</b> — Aluminium Transformation .....	16
<b>Fredericton &amp; Moncton</b> — Information Technology and e-Business .....	18
<b>Halifax</b> — Life Sciences .....	20
<b>Charlottetown</b> — Nutrisciences and Health .....	22
<b>St. John's</b> — Ocean Technology .....	24
<b>NRC-IRAP</b> — A Critical Component of the Government of Canada's Science and Technology Strategy .....	26
<b>NRC-CISTI</b> — Building Canada's Knowledge Advantage .....	28
Contact Information .....	30

# CLUSTERING

Creating globally competitive technology clusters — concentrations of technology-intensive firms focused on specific sectors — is one of the best strategies for fostering economic growth. Clusters bring people, knowledge and entrepreneurial drive together to turn science and technology developments into innovations that solve problems and create opportunities for Canada and the world.

To make Canada a global leader in key fields of technology, NRC has worked closely since 2000 with stakeholders in communities and regions across Canada — building on decades of science at work for Canadians. NRC's resulting 11 technology cluster initiatives integrate industry, government and university resources through new partnership models that create the technological and entrepreneurial advantage for Canadian businesses to innovate and compete in the global marketplace. They create the climate in which people come together to turn ideas into innovations that can provide solutions to the country's environment, health, productivity and other challenges.

The benefits of the cluster approach are being reinforced under the Government of Canada's science and technology strategy, *Mobilizing Science and Technology to Canada's Advantage*. In early 2008, the Government of Canada announced \$118 million over three years in new funding for six of NRC's 11 technology cluster initiatives. That support is enabling NRC to build on the success to date in fostering Canada's entrepreneurial advantage, knowledge advantage and people advantage for global leadership in science and technology.

The additional funding for Canada's technology clusters clearly recognizes the importance to NRC of reaching out to small and medium-sized science- and technology-driven enterprises that are looking for partners to share risks and investment, allowing them to take full advantage of opportunities that could make them international players.

The progress being made by the technology cluster initiatives demonstrates the role that NRC increasingly plays as a catalyst for innovation. Through a mix of programs, services and expertise that are being focused within each cluster, NRC has the tools and experience to help build linkages among stakeholders and to provide targeted support where it will be most effective and relevant.

The commitment to NRC's technology cluster initiatives is generating impacts. Partners in communities are identifying

their science and technology strengths, deciding how best to increase them, and then implementing strategies for success. Researchers in those technology clusters are gaining access to new facilities and support, making those communities magnets for talent. Science- and technology-driven businesses that already exist in those clusters have enhanced support and networks as well as improved access to people, programs and services. New companies are forming in cluster communities with NRC support for both their technology development and other key aspects critical to their maturing into thriving, profitable businesses. These immediate impacts will only increase over the long term, as the growing investments in highly qualified people, research excellence and business growth create even more benefits for Canada.

**“The National Research Council of Canada’s Technology Clusters Initiative is encouraging research partnerships between federal, provincial and municipal governments, industry, and the higher-education sector. This initiative is accelerating the commercialization of new technologies produced by small and medium-sized firms. It is also building regional S&T capacity in key sectors and industries across Canada.”**

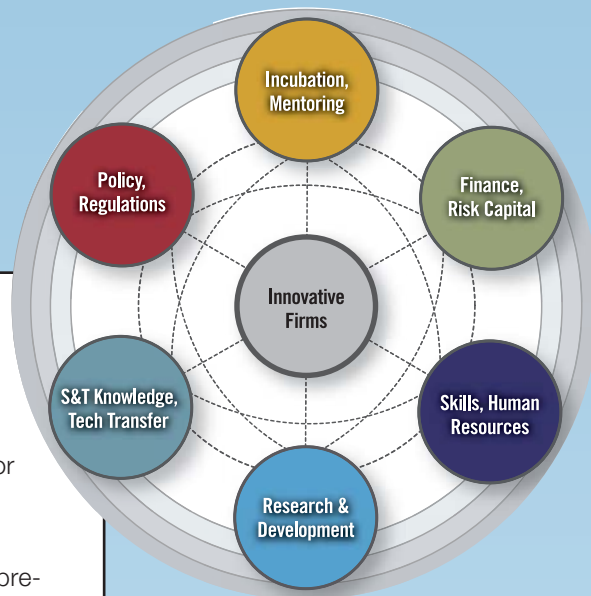
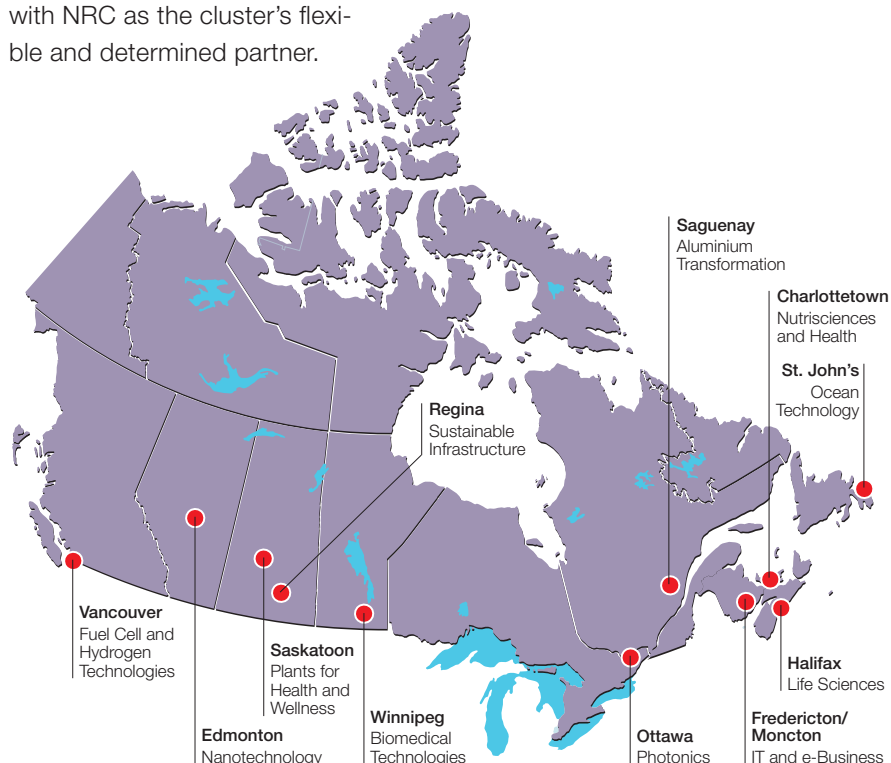
GOVERNMENT OF CANADA: *MOBILIZING SCIENCE AND TECHNOLOGY TO CANADA'S ADVANTAGE* (2007)

# INITIATIVES

## Global reach — local touch

NRC plays a pivotal role in building a competitive advantage for Canada, based on science and technology strengths in communities across the country. NRC's contribution to fostering clusters has made it a catalyst for technological progress and economic growth in every region of Canada.

NRC's successful clustering model encourages and supports local entrepreneurial and people advantages, while leveraging the knowledge advantages of NRC — capitalizing on its national and international resources, science and technology capabilities, networks and partnerships. This proven approach supports each cluster, based on its unique needs, opportunities and challenges, with NRC as the cluster's flexible and determined partner.



## DELIVERING RESULTS

Clusters are creating results in terms of strengthening Canadian and local economies and becoming magnets for international talent. They are benefiting from community partnerships that look forward with confidence, based on building local scientific and innovation capacity and a competitive business environment. They are creating climates in which what begins as a small number of partners can grow into a critical mass of skilled people, capital and entrepreneurial drive, with impacts in the lives of people around the globe.



## GREAT PEOPLE, GREAT MINDS

Recognized globally for cutting-edge research and innovation, the National Research Council helps Canada create a world-class, knowledge-based economy. NRC is home to nearly 4,000 creative and skilled people held in highest regard by their colleagues and collaborators worldwide. NRC employees have earned international acclaim for excellence and for winning innovations — their honours include a Nobel Prize, an Academy Award, and helping Canada capture Olympic gold.

## COMMITTED LEADERSHIP

Innovative companies often develop around a government research institution or a university that attracts highly skilled researchers. However, successful clusters need more. They need staying power, often taking decades to mature. They must be community-driven and focused — with the support of effective networks and committed local champions.

NRC has distinguished itself as an effective leader in cluster development. It provides not only R&D expertise, but also the leadership, information and linkages that innovators need to generate ideas and then move their research from the lab to the marketplace. Its diverse strengths mean that NRC makes a range of contributions, tailored to individual community strengths and needs.



# VANCOUVER FUEL CELL AND HYDROGEN TECHNOLOGIES



Responding to the world's energy and environmental challenges is a priority in the Government of Canada's Science and Technology Strategy. Developing and commercializing fuel cell and hydrogen energy technologies in the Vancouver region is a core element to that response. The Vancouver region is already home to the world's most sophisticated grouping of companies and organizations focused on fuel cell and hydrogen technologies. By 2017, when experts say the global industry could be worth well over \$1 trillion annually, NRC's early strategic investments will have primed the Vancouver cluster to seize a significant market share.

## STRATEGICALLY POSITIONED PLAYERS



While pockets of fuel cell research exist in other locations across Canada, Vancouver remains the national hub

for ground-breaking R&D, accounting for nearly 70 percent of the roughly 1,500 Canadian jobs in the field.

This concentration of activity coincides with an aggressive development strategy launched by NRC in 1998. It eventually sparked:

- construction of a state-of-the-art NRC fuel cell research facility and the

attraction of talent to build a hydrogen and fuel cell knowledge advantage

- creation of a national association, now called Hydrogen & Fuel Cells Canada, to accelerate this sector in Canada and foster private sector development
- development of the National Program on Fuel Cells and Hydrogen, a research initiative that taps the best minds at six of NRC's research facilities across Canada

## PARTNERING TO COMMERCIALIZE RESEARCH

NRC's focus is to secure Canada's leading-edge competitive edge in hydrogen and fuel cell R&D and



commercialization. To reach this goal, NRC supported Canada's Fuel Cell Commercialization Roadmap, a federal government initiative that assembled 40 stakeholders to identify opportunities in fuel cell R&D and map a strategy for technology commercialization. The number of organizations partnered with NRC to bring pioneering technologies to market doubled over five years, bringing the total to 19 industrial collaborations, 14 university partnerships and eight international projects.

NRC has also strengthened its relationships with three local universities to help develop and attract talent for local industry, establish hydrogen and fuel cell consortiums, and leverage resources.

## DEMONSTRATING FUEL CELL POTENTIAL

To nurture the Vancouver fuel cell and hydrogen cluster, overcome barriers and establish a knowledge advantage through fuel cell R&D talent, NRC uses demonstration projects such as:

- a hydrogen vehicle refuelling station and storage tower
- photovoltaic panels that transform solar energy into hydrogen to power fuel cells
- a five-kilowatt solid-oxide fuel cell generator for building heat and power

## BLAZING A TRAIL

British Columbia's Hydrogen Highway™ — led by Hydrogen & Fuel Cells Canada and Natural Resources Canada's Canadian Transportation Fuel Cell Alliance — is an integral component of NRC's cluster strategy. Envisioned as a key attraction at the 2010 Winter Olympic and Paralympic Games, the Highway will extend from Vancouver's airport to Whistler. A new NRC research facility will be one of seven centres along the highway, providing hydrogen refuelling infrastructure as well as transportation, micro and stationary fuel cell demonstrations.



## UNIQUE OPPORTUNITY FOR SMEs

As part of its strategic investment in fuel cell research, NRC operates a cutting-edge, public testing facility that is unique in North America and an example of Canadian science and technology at work. The Hydrogen Environmental Chamber can simulate the climatic extremes from polar to tropical environments — enabling small and medium-sized enterprises (SMEs) to test fuel cell ideas and prepare innovations for international markets, complementing those private sector investments in research and development.

## RESPONDING TO INDUSTRY NEEDS

To meet the evolving needs of Vancouver's fuel cell cluster, NRC relocated its research operations in 2006 to a new, \$19 million facility on the grounds of the University of British Columbia. NRC focuses on three key research areas at this facility:

- proton-exchange membrane fuel cell technologies
- solid-oxide fuel cell technologies
- new materials development to advance hydrogen generation, compression and purification technologies

## Cluster Facts at a Glance

- The global fuel cell market is projected to be worth US\$2.6 trillion by 2021.
- In 2005, Canadian fuel cell companies generated revenues of \$134 million.
- Vancouver is home to nearly 70 percent of the roughly 1,500 Canadian jobs in the hydrogen and fuel cell industry.
- Cluster R&D expenditures were \$218 million in 2005.

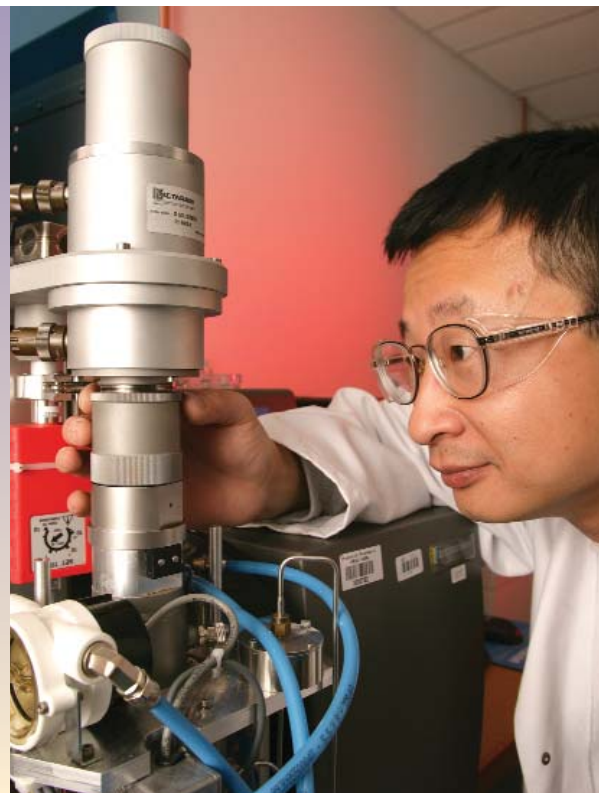
## NRC'S CLUSTER PARTNERS

- Hydrogen & Fuel Cells Canada
- Simon Fraser University
- University of British Columbia
- University of Victoria
- Government of British Columbia
- Western Economic Diversification Canada
- Natural Resources Canada
- Industry Canada
- Environment Canada
- National Defence Canada
- International Trade Canada
- Transport Canada



## MILESTONES in Cluster Progress

- 1998** NRC sparks cluster formation with task force
- 1999** NRC establishes a fuel cell lab at its Vancouver Innovation Centre
- 2000** NRC helps establish what would become Hydrogen & Fuel Cells Canada, a national industry association
- 2003** NRC and Western Economic Diversification announce \$1.5 million for Hydrogen Technology Environmental Chamber, unique in North America
- 2003** NRC drives the launch of a Canadian Fuel Cell Commercialization Roadmap, a multistakeholder initiative
- 2004** Hydrogen Highway™ unveiled
- 2004** Government of Canada announces \$15 million in funding to create the NRC Institute for Fuel Cell Innovation (NRC-IFCI)
- 2006** NRC-IFCI officially opens
- 2008** Government of Canada announces \$13.6 million reinvestment in NRC's fuel cell and hydrogen technologies cluster initiative





# EDMONTON NANOTECHNOLOGY



Nanotechnology applies the science of controlling tiny pieces of matter — atoms and molecules — to produce revolutionary products and processes. Although still in its infancy, nanotechnology has the potential to alter the way we make everything from transistors to skyscrapers. Aware that the worldwide market for nano-goods and services could reach US\$1.5 trillion annually by 2015, the Government of Canada recognizes the competitive advantage to be gained by positioning Canada as a nanotechnology leader. As they seek out opportunities, industry and universities are looking to NRC to gain access to its R&D expertise in this field and its unique role as a catalyst for partnerships and innovation.

## **TINY PARTICLES, COLOSSAL GOALS**

NRC's bold decision to work with partners to establish a state-of-the-art \$120 million nanotechnology research facility in Edmonton was taken to secure Canada's position at the vanguard of nanotechnology research worldwide. This new lab is already a hub for Edmonton's rapidly expanding "small tech" cluster. Established in 2001 as a partnership among NRC, the University of Alberta, and the governments of Canada and Alberta, the National Institute for Nanotechnology (NINT) can house 30 principal investigators who can collaborate with more than 100 university scientists and 120 researchers and staff.

## **ESTABLISHING A CLUSTER CHAMPION**

The Edmonton cluster consists of more than two dozen commercial organizations with recognized expertise in specialized nano-scale areas. Its interests are represented by NanoMEMS Edmonton, a vibrant cluster champion committed to building regional R&D capacity in "small tech" and increasing its impact through public-private partnerships around the world. NanoMEMS Edmonton is dedicated to fostering the development and growth of micro- and nano-based commercial enterprises across the Edmonton region.

## **UNITING KEY PLAYERS**

NRC has a proven track record of bringing technology organizations together to focus on common research and commercialization strategies. In 2002, NRC initiated a cluster development roundtable to forge links between key community stakeholders in the cluster. To help develop the community's vision and strategic direction, NRC representatives sit on the steering committee of NanoMEMS Edmonton, the advisory board of the Microsystems Technology Research Institute, and the board of directors of CMC Microsystems — all major players that foster growth and company creation around commercially promising technologies, in line with the Government of Canada commitment to increased private sector innovation and commercialization.





## BUILDING RESEARCH CAPACITY



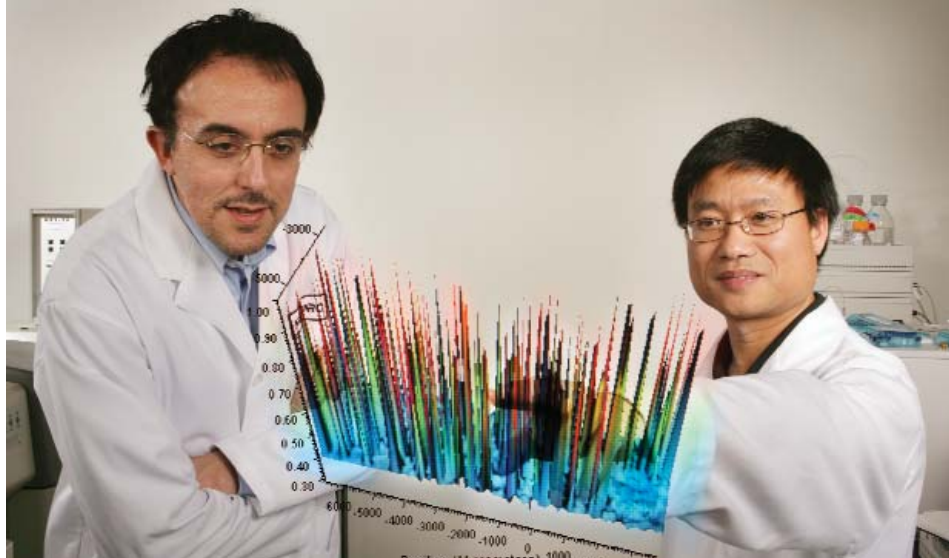
NRC and the University of Alberta are committed to making Edmonton a magnet for talent by recruiting top-flight

nano-scale researchers from across Canada and around the world. For example, NINT's unique staffing structure — principal research staff may split their time between teaching at the university and heading research groups — has already attracted leading nanotechnology researchers to the cluster. Today there are researchers from more than 30 countries working at NINT. This approach is helping to build an even stronger knowledge advantage for Canada.

## NINT INNOVATION CENTRE

Dedicated to providing laboratory and office space for commercial activity, the NINT Innovation Centre serves technology start-ups and established companies that would benefit from locating close to NRC and University of Alberta facilities and expertise. Its revolving door policy allows 15 companies at a time to occupy space and collaborate with researchers in "Canada's flagship nanotechnology institute." It also offers services in three main areas:

- providing laboratory and office space
- arranging for access to technical expertise through materials characterization services, facilities



## Cluster Facts at a Glance

- Edmonton boasts the most technologically advanced nanotechnology research facility in Canada.
- The worldwide market for nano-goods and services could reach US\$1.5 trillion a year by 2015.
- Between them, NRC and the University of Alberta have 55 research teams, comprised of more than 400 researchers, post-docs, technical officers and graduate students, working in the field of nanotechnology.
- A nanometre is one billionth of a metre, or 1/80,000 the diameter of a human hair.

access, contract research and strategic research collaborations

- linking to services designed to assist technology entrepreneurs in business planning, financing and strategy

**"The National Institute for Nanotechnology is the most important building in Edmonton."**

STEPHEN MANDEL, MAYOR, CITY OF EDMONTON

## NRC'S CLUSTER PARTNERS

- University of Alberta
- Government of Alberta
- NanoMEMS Edmonton
- Edmonton Economic Development Corporation
- Western Economic Diversification Canada

## CUTTING-EDGE FACILITIES

Of the original \$120 million invested by NRC, the University of Alberta and the Government of Alberta, about one-third was spent to construct a research facility that features some of the quietest laboratory space in Canada. NINT offers lab space with ultra-low vibration and minimal acoustic noise or electromagnetic interference. These are conditions critical to conducting nano-scale research — and attracting world-class scientists as research collaborators. The six-storey, 20,000-square metre facility has specialty labs for chemical and biochemical synthesis and analysis of atomic-scale structures. More than \$40 million worth of state-of-the-art scientific equipment, including a transmission electron microscope equipped with a cold-field emission gun, has also been installed.





# SASKATOON PLANTS FOR HEALTH AND WELLNESS



Saskatoon is among the world's most dynamic locations for the innovation and commercialization of bio-based sciences. NRC's agricultural biotechnology cluster has evolved from a small industrial community to a major global player providing more than 1,100 local jobs; it's a world-leading example of how visionary thinking and careful planning can turn federally funded research into marketable products backed by significant private sector investment in research, development and commercialization. The cluster is a globally recognized contributor to science and technology for health and wellness.

## POWERFUL CATALYST

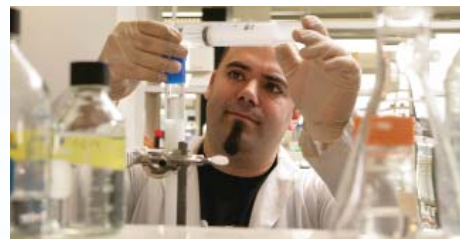
NRC has been a catalyst for competitive advantage and developing a technology cluster in Saskatoon since 1983, when it revamped its research facility, encouraging plant biotechnology partners to use it as a hub for the emerging cluster. The NRC Plant Biotechnology Institute (NRC-PBI) offers companies a full range of services including access to laboratory space and leading-edge genomics equipment. The facility's industry partnership program incubates businesses during their critical early years, and offers access to technology and business expertise.

## A STRONG AND GROWING CLUSTER

Home to more than 60 companies engaged in ground-breaking agricultural biotechnology R&D — 30 percent of Canada's activity in the field — the Saskatoon plants for health and wellness cluster is leveraging its unique technology and commercialization experience to diversify into rapidly expanding markets such as functional foods, nutraceuticals and plant-made pharmaceuticals. The cluster ranks as one of the most competitive cities in the world for food processing operations. Annual revenues from the cluster total nearly \$1 billion.

## CONNECTING VITAL PLAYERS

As the nucleus for Saskatoon's cluster activities, NRC has linked key partners around critical common goals. For example, along with partners Agriculture and Agri-Food Canada, the University of Saskatchewan, Protein Oilseed Starch Corp. and AgWest Bio Inc., NRC has mapped out a vision framework for the cluster to diversify into natural health products. Consistent with the direction set out in the Government of Canada's Science and Technology Strategy, NRC leverages its \$10 million annual budget by attracting \$30 million of investments from its private and public partners. While stakeholders across the cluster collaborate and develop ground-breaking products,





“Since its inception in 1983, NRC’s plant biotechnology research facility has been critical to the success of the bio-economy cluster in Saskatchewan, and instrumental in the development and commercialization of innovative technologies.”

DR. ASHLEY O’SULLIVAN, PRESIDENT AND CEO, AG-WEST BIO INC.

processes and marketing strategies, the University of Saskatchewan continues to generate a constant flow of skilled people — expanding the people advantage this cluster already enjoys.

### EXCELLENCE IN COMMERCIALIZATION

- NRC’s pioneering efforts decades ago led to the invention of canola — and NRC is still working with partners, such as through its strategic alliance with Dow AgroSciences Canada, worth \$10 million to NRC.
- NRC’s industry partnership facility in Saskatoon is home to Saponin Inc., a new company supported by \$2.2 million in venture capital financing to commercialize NRC-developed technology, involving saponins from Prairie Carnation™, for possible human and veterinary health care and other uses.
- NRC has a collaborative research agreement with Prairie Plant Systems to investigate plants as novel platforms for the production of pharmaceuticals.

### SUPPORTING INDUSTRY NEEDS

To support the cluster’s diversification priorities, and to increase Saskatoon’s and Canada’s share of a global biotechnology market estimated at more than US\$49 billion, NRC’s research facility has realigned its programs to focus on three key industry priorities:

- production of bio-products from plants
- production of compounds from plants that have human health benefits
- genomics research to enhance the performance and market diversity of Canadian crops

### NRC’S CLUSTER PARTNERS

- Agriculture and Agri-Food Canada
- Ag-West Bio Inc.
- Dow AgroSciences Canada
- Saskatchewan Ministry of Enterprise and Innovation
- Saskatchewan Research Council
- University of Saskatchewan
- Western Economic Diversification Canada
- Wellness West (and its partners)



### Cluster Facts at a Glance

- The cluster accounts for 30 percent of Canada’s ag-biotech industry — 60 companies with annual sales of close to \$1 billion.
- 30 companies in the nutraceutical and functional food sectors generate annual revenues of nearly \$60 million.
- The cluster accounted for \$120 million in genomics investments between 2001 and 2007.
- 1,100 people work in the cluster, including 400 research and technology professionals.
- The cluster is focused on capturing more of a global nutraceutical market already worth \$172 million.
- NRC’s industry partnership facility houses six tenants and provides lab space to non-tenants as well.

- Western Canadian Functional Food Network
- Saskatchewan Agriculture and Food
- Western Canadian functional food and natural health products small and medium-sized enterprises



## MILESTONES in Cluster Progress

- 1983** NRC lab commits to foster excellence in plant biotechnology R&D
- 2002** The Government of Canada commits \$10 million for NRC to support the plants for health and wellness cluster in Saskatoon
- 2003** NRC’s \$15.4 million industry partnership facility opens
- 2004** Ag-biotech, nutraceutical and bio-product cluster groups amalgamate
- 2005** NRC partners with Bioriginal to complete a technology landscape assessment for producing plant oils with specific health benefits
- 2006** NRC opens the BioAccess Commercialization Centre
- 2006** NAPGEN natural products research consortium created to develop genomic tools for plants with health benefits, linking 28 university and research organizations across Canada
- 2008** Government of Canada announces \$5 million reinvestment in NRC’s plants for health and wellness cluster initiative

# REGINA SUSTAINABLE INFRASTRUCTURE



Vital services such as systems for drinking water, stormwater and waste water, together with roads and bridges, are lifelines in Canada and all countries. The upkeep of that infrastructure is a major challenge. For example, 80 percent of the estimated \$12 to \$15 billion that Canadian municipalities spend annually on public infrastructure goes to system repairs and renewals.

Partners in Regina's sustainable infrastructure cluster are focused on new ways to maintain and develop these community lifelines. With its public and private sector networks, NRC is drawing on its expertise in working with stakeholders to develop and transfer technologies and methodologies that address critical infrastructure needs and create business opportunities, by creating a Canadian advantage centred in Regina. NRC is helping to meet the Government of Canada commitment to environmental science and technologies that make a difference in the lives of Canadians.

## A "LIVING LABORATORY"

NRC and its partners have identified Regina and its surrounding region as an excellent "living laboratory" to explore and test innovations, due to such

factors as the region's climate, soil conditions and geography. The lessons learned from pilot projects in Regina and elsewhere in Saskatchewan are enabling the acceleration of new technologies and solutions into best practices that can generate commercialization opportunities across Canada and internationally.

Sustainable infrastructure is: "the design, construction, planning and maintenance of infrastructure that meets the needs of the present without compromising the ability of future generations to meet their own needs." Ensuring sustainability requires addressing the environmental, economic and social dimensions of municipal infrastructure in a holistic manner or with a systems approach.



## PARTNERING FOR SUCCESS

NRC, the City of Regina, the University of Regina, Western Economic Diversification Canada and the Government of Saskatchewan have created "Communities of Tomorrow." This community-based organization is facilitating collaboration between firms and researchers to develop innovative sustainable infrastructure solutions for global markets.

## TRANSFERRING RESEARCH TO COMMUNITIES

Since 2003, NRC has worked with partners on many projects reflecting Canada's commitments to excellence in environmental and infrastructure priorities. It has helped identify industry needs and emerging problems to spur the growth of technology-based companies and a competitive advantage for Regina, Saskatchewan, and Canada.



# MILESTONES in Cluster Progress

- 2002** NRC meets with local stakeholders to define NRC's role in building a sustainable infrastructure technology cluster in Regina
- 2003** NRC hosts innovation roundtable
- 2003** The Government of Canada commits \$10 million for NRC to spearhead a sustainable infrastructure cluster in Regina
- 2004** The NRC Centre for Sustainable Infrastructure Research (NRC-CSIR) opens for business
- 2004** NRC, the City of Regina, the University of Regina, Western Economic Diversification Canada and the Government of Saskatchewan create the non-profit cluster organization Communities of Tomorrow
- 2006** Equipment for water quality research and infrastructure condition data acquisition is deployed at City of Regina field sites
- 2006** NRC staff reaches 18 researchers, students and visiting workers
- 2007** NRC leads a dozen strategic projects with cluster partners
- 2007** A project examining failure mechanisms of Regina water mains achieves results. Two projects with industry, utility company and municipal government participants are funded as a result
- 2008** A system for full scale testing of water quality interaction with water distribution pipe materials is designed, constructed and commissioned

“NRC has an extremely important research support role to play in Regina. That role involves assisting consulting engineers in finding practical solutions that arise out of complex problems encountered in engineering practice. NRC's lab has a unique and valuable research niche to fulfil by addressing these problems.”

DR. HUNG VU, P.ENG., GOLDBER ASSOCIATES LTD.

- Drinking water distribution pipes are susceptible to microbial fouling, corrosion and breakage, which can result in water loss, damage to other infrastructure, and potential water contamination. NRC researchers are assessing how and why these problems occur, and are developing tools to help municipal managers make informed decisions on pipe repair and renewal plans.
- NRC has projects addressing sustainable stormwater management, remote online water quality monitoring of drinking water systems, and interactions between

water mains and the quality of the water they carry. NRC researchers are also developing new, non-destructive tools to evaluate pipes and other infrastructure.

## ESTABLISHING A RESEARCH HUB

The NRC Centre for Sustainable Infrastructure Research (NRC-CSIR) has become a magnet for talent in this field of global importance. It provides access to specialized laboratory equipment and space. Its Regina research team has established expertise in technologies for infrastructure evaluation and condition assessment, decision support



## Cluster Facts at a Glance

- More than 50 percent of North America's 65,000 km of water transmission pipes are older than 60 years.
- The expansion of cities, the rehabilitation of aging systems, and environmental sustainability are driving major infrastructure investments around the world.
- The global environmental market is expected to reach US\$1 trillion by 2010, with the largest component being water supply, and water and wastewater treatment.
- The Civil Infrastructure Systems Technology Road Map, developed in a countrywide consultation with leadership by NRC and three other national bodies, identified new technologies and improved asset management practices as key to ensuring the sustained prosperity of Canadian communities.
- The more than 60 firms in the Regina cluster and over 250 firms across Saskatchewan are in two major industry sectors: construction industries related to infrastructure and environmental technologies.

systems for sustainable municipal infrastructure, and water quality and public infrastructure security. NRC's presence in Regina gives competitive advantages to Saskatchewan businesses that are active in the fields of public and municipal infrastructure.

## NRC'S CLUSTER PARTNERS

- City of Regina
- University of Regina
- Western Economic Diversification Canada
- Saskatchewan Ministry of Enterprise and Innovation
- Communities of Tomorrow

# WINNIPEG BIOMEDICAL TECHNOLOGIES



Winnipeg's biomedical technologies cluster is recognized for its thriving concentration of medical devices and life sciences industries. The 100 health-related companies and organizations in Manitoba's life sciences cluster generate sales of more than \$400 million a year — and growing annually — and employ 4,200 people. They are generating a competitive advantage for Winnipeg, based on people, knowledge and entrepreneurial strengths.

## IMPRESSIVE GROWTH

Growth of the cluster has been steady since 1992, when the NRC Institute for Biodiagnostics (NRC-IBD) was created in a bid to advance Winnipeg's R&D capacity in medical devices and life sciences technology. The facility began with 25 NRC employees who conducted \$2 million worth of research annually. Since then, NRC's commitment to biomedical research has driven an impressive surge in R&D capacity. Currently, 200 researchers, staff, affiliated collaborators and students are engaged in about \$15 million worth of R&D and technology transfer.

NRC's revenues from collaborative research with private industry continue to grow substantially — an important measure of the organization's success

as a cluster catalyst, and the partnerships and excellence emerging with its support.

## SUCCESSFUL TECHNOLOGY TRANSFER

A core goal of the Government of Canada's Science and Technology Strategy is to increase private sector R&D activity in Canada. NRC's commitment to this goal is obvious in Winnipeg where its biodiagnostics researchers have transferred technologies, leading to the creation of nine spin-off companies and commercialization support entities — with an aggregate market value of over \$300 million.

IMRIS Inc. is the largest spin-off company, formed in 1998 to commercialize NRC-developed MRI systems. In 2007,

IMRIS successfully raised \$40 million in an initial public offering (IPO) on the Toronto Stock Exchange (TSX), one of the largest medical device IPOs in TSX history.

NRC scientists collaborate closely with medical researchers and clinicians to ensure rapid technology transfer from the lab to medical practice. The results are improved health-care facilities in Canadian communities and increased economic value for Canada, as new technologies become viable products in the global marketplace.

## COMMERCIALIZATION A PRIORITY

In October 2005, NRC stepped up its contribution to Winnipeg's growing technology cluster by opening the NRC Centre for Commercialization of Biomedical Technology (NRC-CCBT). The Centre is a model for public-private sector partnerships. It provides research facilities and innovation services for companies and technology organizations — helping them move pioneering biomedical innovations to market. It also links emerging medical imaging and medical





device companies to expertise around the globe. Its services include support for industrial research as well as access to science and technology information and competitive technical intelligence.

The Centre offers the critical services that young technology companies need to grow and thrive, such as business planning and marketing strategy support. Services are provided by a not-for-profit organization in partnership with NRC and the Manitoba government.

#### NEWS FROM THE LEADING EDGE

Launched in 2004, NRC's *Medical Technology Watch Canada* newsletter reaches more than 2,200 subscribers around the world by e-mail and others with its online version. It delivers timely, relevant information about the medical

technology industry in Canada. As a community-building vehicle, it provides Canadian companies, researchers and investors with unique insights on key research and innovation being done by Canadian R&D organizations and small and medium-sized enterprises.

#### TECHNICAL EXPERTISE

NRC's research collaborations with local, national and international companies in the biomedical sector are building local and Canadian competitive advantage. These companies seek NRC's expertise to solve R&D challenges. NRC's Winnipeg research facility employs highly trained personnel in fields such as physics, mathematics, medicine, chemistry, biology and engineering. They work together to bring multidisciplinary approaches to biomedical problem-solving, with impacts on products and services in use internationally.

**"This investment (in NRC-CCBT) demonstrates our ongoing efforts to make Manitoba a national centre for medical innovation."**

GARY DOER, PREMIER OF MANITOBA

#### Cluster Facts at a Glance

- Manitoba is home to more than 100 health-related companies with sales of more than \$400 million a year.
- Manitoba jobs in life sciences grew by 960 percent between 1989 and 2004.
- NRC has a \$30 million-a-year impact on the Winnipeg economy.
- Biodiagnostics companies spun-off from NRC are worth over \$300 million.

#### NRC'S CLUSTER PARTNERS

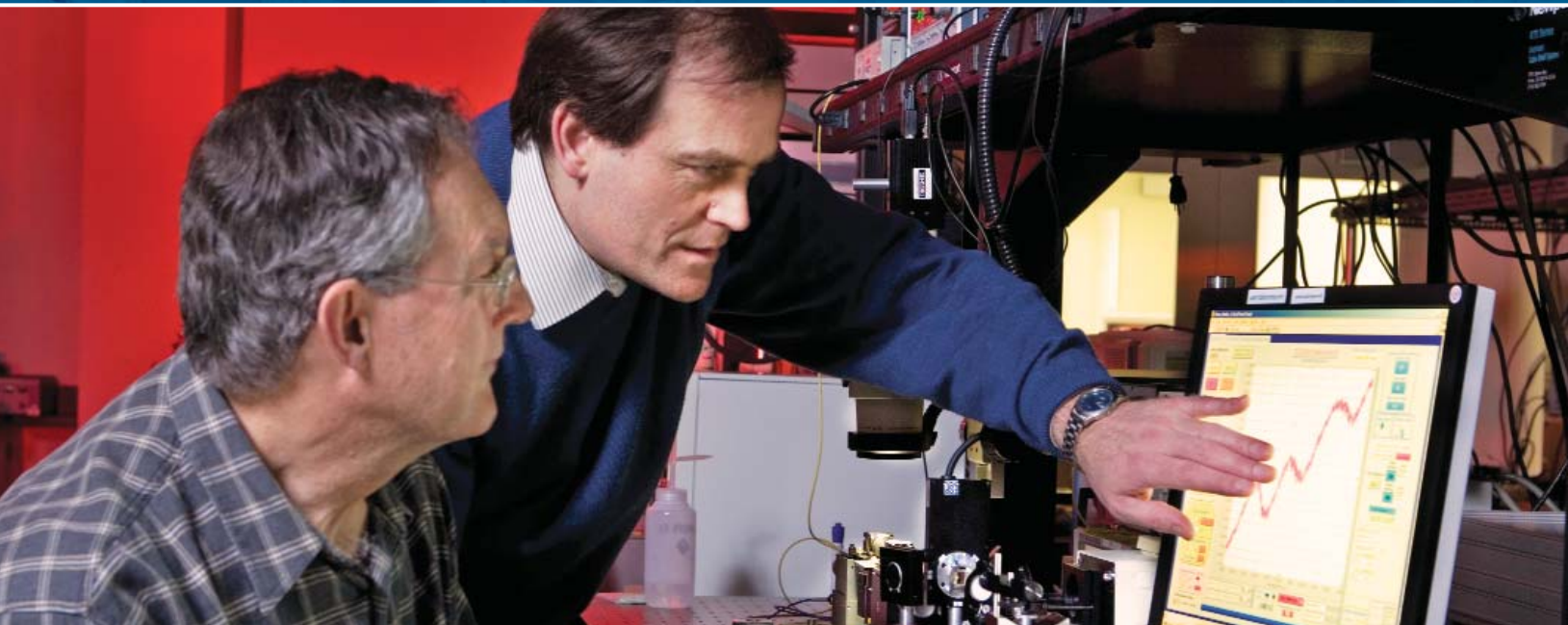
- University of Manitoba
- University of Winnipeg
- National Microbiology Laboratory and Canadian Science Centre for Human and Animal Health (Public Health Agency of Canada)
- St. Boniface General Hospital and Research Centre
- Health Sciences Centre/Children's Hospital
- Life Science Association of Manitoba
- Red River College of Applied Arts, Science and Technology
- Department of Science, Technology, Energy and Mines, Province of Manitoba
- IMRIS Inc.

## MILESTONES in Cluster Progress

- 1992** NRC opens a 25-person biodiagnostics R&D lab in Winnipeg
- 1998** NRC spins off IMRIS Inc., formed to commercialize MRI technology
- 2001** Collaborative biodiagnostics lab research income tops \$1 million
- 2003** Manitoba government commits \$2 million to NRC's \$10 million investment to create the NRC Centre for the Commercialization of Biomedical Technology (NRC-CCBT)
- 2004** Biomedical Commercialization Canada formed to provide incubation services to companies in NRC-CCBT
- 2004** NRC launches *Medical Technology Watch Canada* newsletter
- 2006** Biomedical Commercialization Canada welcomes initial clients
- 2007** NRC spins-off its seventh technology company
- 2008** Government of Canada announces \$5.7 million reinvestment in NRC's biomedical technologies cluster initiative



# OTTAWA PHOTONICS



Since the late 1980s, photonics has grown to be a key enabling technology in many scientific fields. To preserve Ottawa's reputation as a seat of pioneering photonics R&D, NRC is mobilizing industry and research organizations to seize the potential of photonics in such sectors as health, environment and energy — all of which are priorities for action in the Government of Canada's Science and Technology Strategy. The prospective markets are enormous, ranging from life sciences and manufacturing to security and solar power, and the opportunity to build a Canadian competitive advantage is immense.



## A WORLD-CLASS PHOTONICS FACILITY

With a tradition of collaboration for excellence in Ottawa's photonics cluster that goes back to the 1980s, NRC brought together local universities, R&D centres, government and industry in 2002 to create the NRC Canadian Photonics Fabrication Centre (NRC-

CPFC), which consists of a clean-room fabrication facility and a three-storey office wing. Operational since 2005, the Centre features pioneering technology and a leading-edge training facility to help Ottawa companies and research organizations maintain their position at the forefront of global photonics research. Companies gain a competitive edge through reductions in their time-to-market, and technology and investment risks.

To construct the Centre, NRC worked with the federal government, which contributed \$30 million; the Ontario government, which added \$13 million; and Carleton University,

which used \$3 million of the provincial funds to support the training of highly qualified personnel. During the planning for the Centre, NRC collaborated closely with Photonics Research Ontario — a division of the Ontario Centres for Excellence — and CMC Microsystems, which helped to attract a critical mass of companies, research organizations and universities. The Centre has served more than 20 clients in Canada and throughout the world, including several from Ottawa's innovative photonics cluster.

## UNITING MAJOR PLAYERS

NRC is often a catalyst in building relationships among potential partners and working with them to define and move forward on shared science and technology goals. It is also linking the enabling power of photonics to the R&D priorities of its other programs. For example, NRC has supported five photonics-related biotechnology projects, and a venture linking photonics and medical imaging R&D.





“The photonics industry is changing rapidly. We have arrived at a juncture where convergence with other technologies creates new opportunities if we can assemble the requisite collaborative, interdisciplinary teams. As a multidisciplinary organization with decades of understanding about collaboration and technology convergence, NRC is poised to shine, and will continue to make meaningful and lasting contributions to the Ottawa photonics cluster.”

RAY NOVOKOWSKI, PRESIDENT AND CEO, ECOVU ANALYTIC

more than 100 employees in Canada, the U.S. and U.K., SiGe generates over US\$50 million in revenue.

## BUILDING ON A FIRM FOUNDATION

Today, Ottawa has the most vibrant photonics cluster in Canada and is among the top five in the world for innovation. The community comprises close to 100 pioneering companies, various levels of government, and the best minds and research facilities at Ottawa’s universities. NRC has developed a bold strategic plan to build on existing expertise and lead the cluster forward.

## NRC’S CLUSTER PARTNERS

- Carleton University
- Government of Ontario
- Centre for Photonics, Ontario Centres of Excellence
- Agile All-Photonics Network
- Canadian Photonics Consortium
- Ottawa Centre for Research and Innovation
- Ottawa Photonics Research Alliance
- CMC Microsystems
- Canadian Association of Physicists
- International Photonics Commercialization Alliance
- Institut National d’Optique
- Ontario Photonics Consortium
- Ontario Photonics Technology Industry Cluster
- Canadian Institute for Photonics Innovation
- Ontario Photonics Industry Network

## MILESTONES in Cluster Progress

- 1998** NRC leads creation of Solid-State Optoelectronics Consortium
- 2001** NRC signs memorandum of understanding with Photonics Research Ontario
- 2002** \$43 million funding for the NRC Canadian Photonics Fabrication Centre (NRC-CPFC)
- 2005** NRC-CPFC opens its doors
- 2005** Ottawa photonics cluster stages first annual photonics commercialization symposium
- 2005** NRC creates the International Photonics Commercialization Alliance, showing leadership for photonics commercialization in Canada and the U.S.
- 06/07** NRC champions the Canadian photonics effort by creating the Canada Pavilion at the Photonics West Conference in Silicon Valley
- 2007** NRC supports Canadian Photonics Consortium’s effort for national photonics study
- 2007** Photonics trade mission to North Carolina
- 2008** Government of Canada announces \$22.3 million reinvestment in NRC’s photonics cluster initiative

NRC has been a dynamic player in the broader photonics industry, helping create the Agile All-Photonics Network. In Ottawa, it works closely with the Centre for Photonics Fabrication Research, which undertakes state-of-the-art research, education and training in photonics and optoelectronics for the design, fabrication and testing of novel photonic components and subsystems.

## COMMERCIALIZING RESEARCH

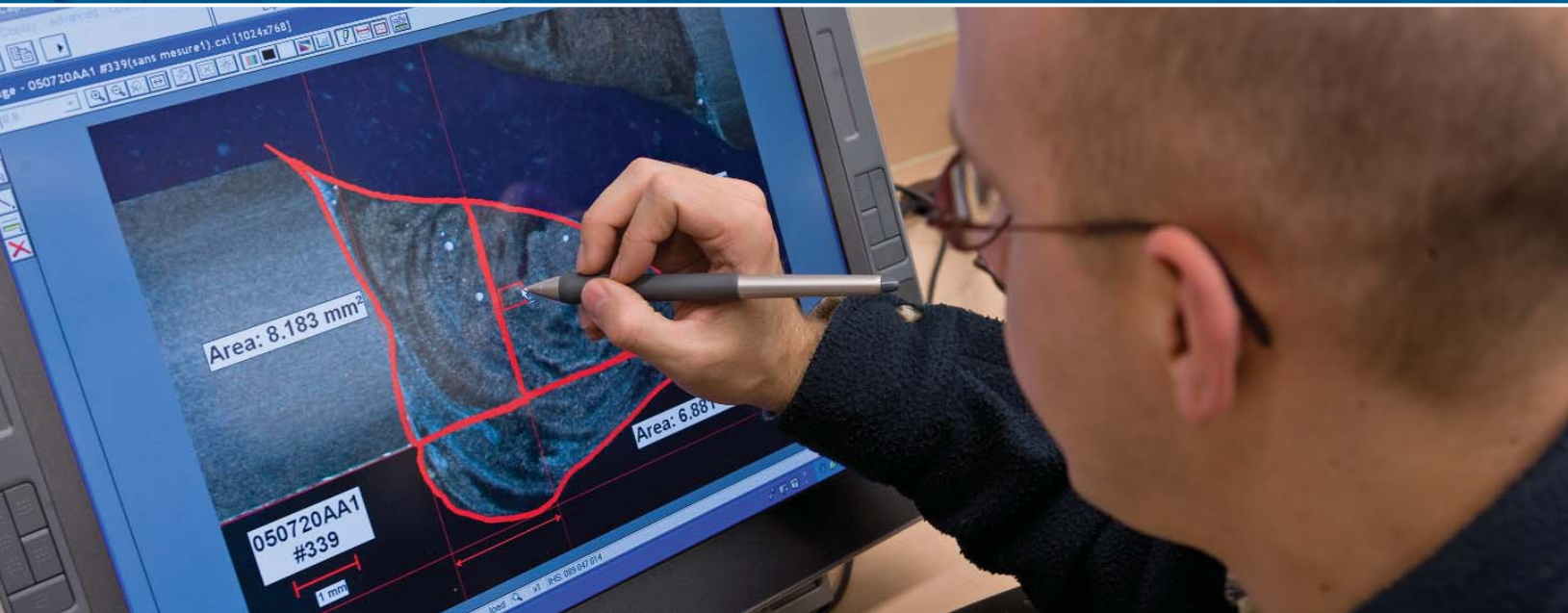
An NRC strategy to move cutting-edge research from federal labs to the marketplace and foster private sector R&D investments is typified by the journey of Dr. Derek Houghton, founder of SiGe Semiconductor. Dr. Houghton, a former NRC researcher, established SiGe using pioneering wireless processes developed at NRC. SiGe — now a world leader in wireless technology — incubated at NRC facilities in its crucial early years. With



## Cluster Facts at a Glance

- Ottawa’s photonics cluster comprises nearly 100 companies, various levels of government and local university laboratories.
- The cluster is Canada’s most vibrant in photonics and among the top five photonics clusters in the world.
- Photonics has evolved into an enabling technology with applications in a wide range of disciplines, including telecommunications, energy and solid-state lighting.

# SAGUENAY REGION ALUMINIUM TRANSFORMATION



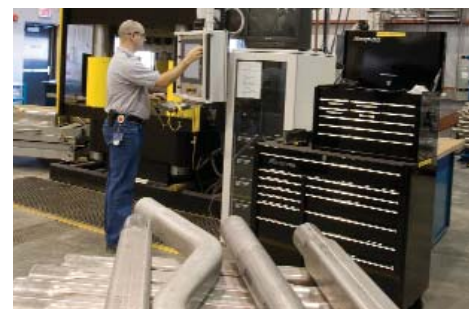
Canada is the world's second-largest exporter of primary aluminium and the Government of Canada has made all aspects of natural resources a science and technology priority. Progress on that priority is demonstrated by the strong presence of NRC in the "Aluminium Valley," Quebec's Saguenay region, where a vibrant technology cluster is moving beyond primary aluminium production to develop and export innovative value-added aluminium products. Well-established companies and new ones are investing in opportunities generated by science and technology — with NRC helping to accelerate that effort.

## INVESTING IN THE COMMUNITY

In the late 1990s, NRC targeted Saguenay as Canada's most promising investment site for pioneering aluminium transformation R&D. The reason: more than 90 percent of Canada's aluminium production is within 400 kilometres of that area. In 2002, NRC constructed its state-of-the-art research facility in Saguenay as a hub for the region's most enterprising researchers. NRC's R&D facility in Saguenay provides cluster stakeholders with wide-ranging support as they explore and then capitalize on profitable ways to transform aluminium into the durable, lightweight components that many industries want.

## BUILDING CRITICAL PARTNERSHIPS

A key element of the Government of Canada's Science and Technology Strategy is to foster more private sector investment in S&T. NRC has nurtured key partnerships with Saguenay aluminium transformation stakeholders that are already generating those kinds of added investments. These partnerships also play a critical role as NRC stimulates ground-breaking research, disseminates world-leading knowledge and helps to commercialize promising technologies.



## ATTRACTING TOP-FLIGHT TALENT

Located at the Université du Québec à Chicoutimi, NRC's \$57 million research facility is becoming a magnet for talent. The NRC Aluminium Technology Centre provides pioneering companies with technical support, expertise and lab facilities to develop value-added aluminium products and processes. It is a base for 60 NRC staff and 20 guest researchers.

## MAKING CARS LIGHTER

A commitment to greater energy efficiency, improved durability and better performance means the auto parts industry offers a massive market for aluminium transformation



technologies. Auto giants such as General Motors now seek out reliable, lightweight aluminium parts that can be up to 40 percent lighter than their steel counterparts — and look to Saguenay for innovations to help them reach their goals. As a result, the amount of aluminium used to manufacture cars has risen by more than 130 percent since 1998.

## TARGETING SUCCESS

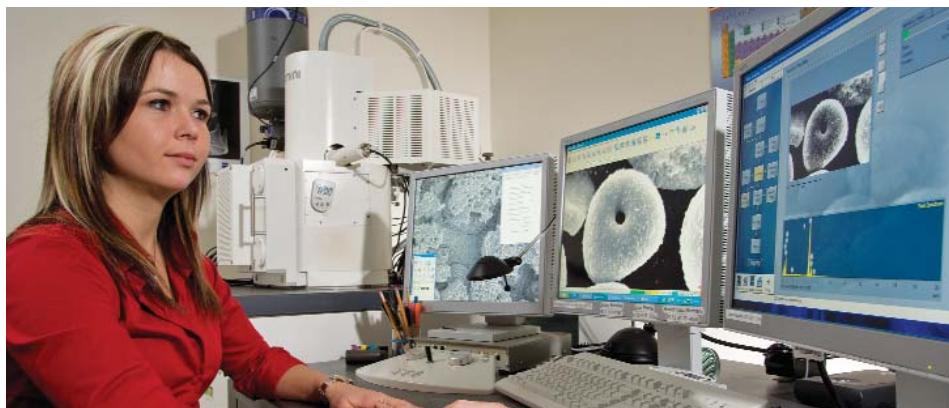
The Saguenay cluster is focused on the most achievable and potentially lucrative goals that will build the strongest competitive advantage for the region. NRC's strategic plan for this cluster targets two broad categories for special attention.

Advanced forming is one category. NRC supports researchers and emerging companies as they experiment with producing lightweight, usable parts from solid aluminium through innovative approaches to die-casting, hydroforming and other processes. The second category is joining (assembling) technologies. This involves NRC-supported research and development into laser and friction stir-welding, adhesive bonding and the mechanical assembly of aluminium parts.

NRC provides support in many ways for both categories. Advanced computer modeling and state-of-the-art instrumentation are giving the cluster the critical mass of knowledge, research and tools to support the development and commercialization of pioneering ideas.

## FOSTERING COLLABORATION

NRC has signed collaborative R&D partnerships with several local small and medium-sized enterprises (SMEs), and with industry giants such as Rio Tinto Alcan, General Motors and Novelis.



## Cluster Facts at a Glance

- Canada is the world's second-largest exporter of primary aluminium.
- Of all the aluminium produced in Canada:
  - Nearly 40 percent comes from within 35 kilometres of the city of Saguenay.
  - More than 70 percent comes from within 250 km.
  - More than 90 percent comes from within 400 km — all within Quebec.
- The Aluminium Valley is home to more than 70 SMEs working in aluminium.
- The cluster brings together more than 350 people involved in aluminium R&D.
- 7,000 jobs are directly linked to the aluminium business.

NRC has also negotiated collaborative agreements with Canadian universities to conduct ground-breaking aluminium transformation R&D. It has contracts with the University of Waterloo and the University of Toronto — with General Motors Canada as their industrial partner — and with Laval University and the Université du Québec à Chicoutimi.

## NRC'S CLUSTER PARTNERS

- Rio Tinto Alcan Inc.
- Alcoa Canada Primary Metals
- Aluminerie Alouette inc.
- Aluminium Association of Canada
- Centre québécois de recherche et de développement de l'aluminium
- Trans-Al Network Inc.
- REGAL Aluminium Research Centre
- Société de la Vallée de l'aluminium
- Université du Québec à Chicoutimi
- Canada Economic Development
- Government of Québec



## MILESTONES in Cluster Progress

- 2000** NRC develops Aluminium Industry Technology Roadmap
- 2001** NRC commits to building the NRC Aluminium Technology Centre (NRC-ATC) in the Saguenay region
- 2003** NRC-ATC opens its doors
- 2007** Canadian Aluminium Transformation Technology Roadmap launched
- 2008** Government of Canada announces \$27 million reinvestment in NRC's aluminium transformation cluster initiative

**“This NRC centre is a prime example of what can be accomplished when the region pulls together to work toward a common goal. It ensures the region of the kind of environment that is conducive to aluminium transformation.”**

MICHEL BELLEY, RECTOR, UNIVERSITÉ DU QUÉBEC À CHICOUTIMI

# FREDERICTON & MONCTON INFORMATION TECHNOLOGY AND e-BUSINESS



Since 2001, NRC has collaborated with New Brunswick companies and universities on ground-breaking research to develop innovative information technologies that address Canada's needs in health care, learning and the electronic marketplace. Using the state-of-the-art NRC Institute for Information Technology (NRC-IIT) e-Business facility as a central R&D hub, leading-edge firms in the region are turning federally funded research into products aimed at global markets and competitive advantages for Canada.

## **e-BUSINESS: DIVERSE APPLICATIONS AND DIVERSE OPPORTUNITIES**

Broadly defined, e-business involves carrying out economic, social and political activities using computers and communication networks such as the Internet. It enables much improved information sharing and the creation of new applications in sectors such as health care, learning, commercial transactions, culture and government. The creation of more Canadian innovations in health and related fields is consistent with broader Government of Canada goals for national investments in science and technology.

Building on the successes of the past seven years and supporting the provincial government's "Self-Sufficiency" agenda,

NRC's current research in New Brunswick focuses on the leading-edge fields of learning and collaborative technologies, as well as health and bioinformatics.

## **NRC AND ITS PARTNERS: CLEAR FOCUS ON RESULTS**

Since 2001, NRC has worked closely with the New Brunswick government and other cluster partners to build and implement an R&D agenda that responds to market opportunities and serves regional and national priorities. NRC makes its contribution by offering enterprising firms access to intellectual property, highly qualified personnel and specialized research infrastructure, and by working with all partners to build strong links between industry and researchers.

## **PROVIDING CRITICAL INFRASTRUCTURE**

NRC is investing \$48 million over five years in support of this cluster. Guided by the input of partners in local universities and businesses, the provincial government and the Atlantic Canada Opportunities Agency, NRC's investment is already improving the capacity of six labs in Fredericton and Moncton that give industry partners access to critical research infrastructure previously unavailable in New Brunswick.

NRC's industry partnership facility in Fredericton offers start-up companies up to three years of co-location with NRC and other small and medium-sized enterprises, as well as access to IT expertise, lab and network resources. This technology incubation support helps to foster the private sector commitment to science and technology that Canadians expect, while enhancing the competitive advantage of New Brunswick and Canada.



“Unlike most bureaucratic institutions, which are cursed with excessive paperwork and lengthy approval processes, NRC-IIT is nimble, fast and progressive.”

ATLANTIC BUSINESS MAGAZINE



This collaborative NRC approach is yielding impressive results. For example, Desire2Learn Inc. (D2L), a leader in providing innovative e-learning solutions to organizations around the world, opened its first satellite office in Moncton in 2007 due in large part to SynergiC3, a collaborative e-learning project between NRC, the Université de Moncton and D2L.

#### AWARD-WINNING INNOVATION

In the human body, a cell's genes exhibit different characteristics if they are diseased than if they are healthy. Certain combinations of these characteristics — called biomarkers — are

indicators of risk for various types of cancer. However, the presence of 30,000 human genes in any one tissue makes analysis difficult and costly.

NRC researchers and cancer specialists in New Brunswick created a technology to aid in faster, less expensive and more accurate biomarker discovery. The technology will lead to dramatic improvements in biomarker discovery that will translate into improved cancer detection and treatment regimes. With the Atlantic Cancer Research Institute, NRC has jointly filed for a patent on a biomarker for prostate cancer and has used the same method to identify colon cancer biomarkers, for which a patent is pending.

The Atlantic Innovation Fund is now providing \$2.9 million to help validate and commercialize this new technology. NRC researchers look forward to collaborating with a private sector partner to move their findings forward into the development of a practical diagnostic tool that can be used for health care results.

This breakthrough technology earned NRC the Gold Award of Excellence in the Innovation — Not for Profit category at the 2007 Canadian Information Productivity Awards.

#### NRC'S CLUSTER PARTNERS

- Atlantic Canada Opportunities Agency
- Government of New Brunswick
- University of New Brunswick (Fredericton and Saint John)
- Université de Moncton
- Atlantic Cancer Research Institute
- Cancer Populomix Institute
- Desire2Learn
- River Valley Health Authority



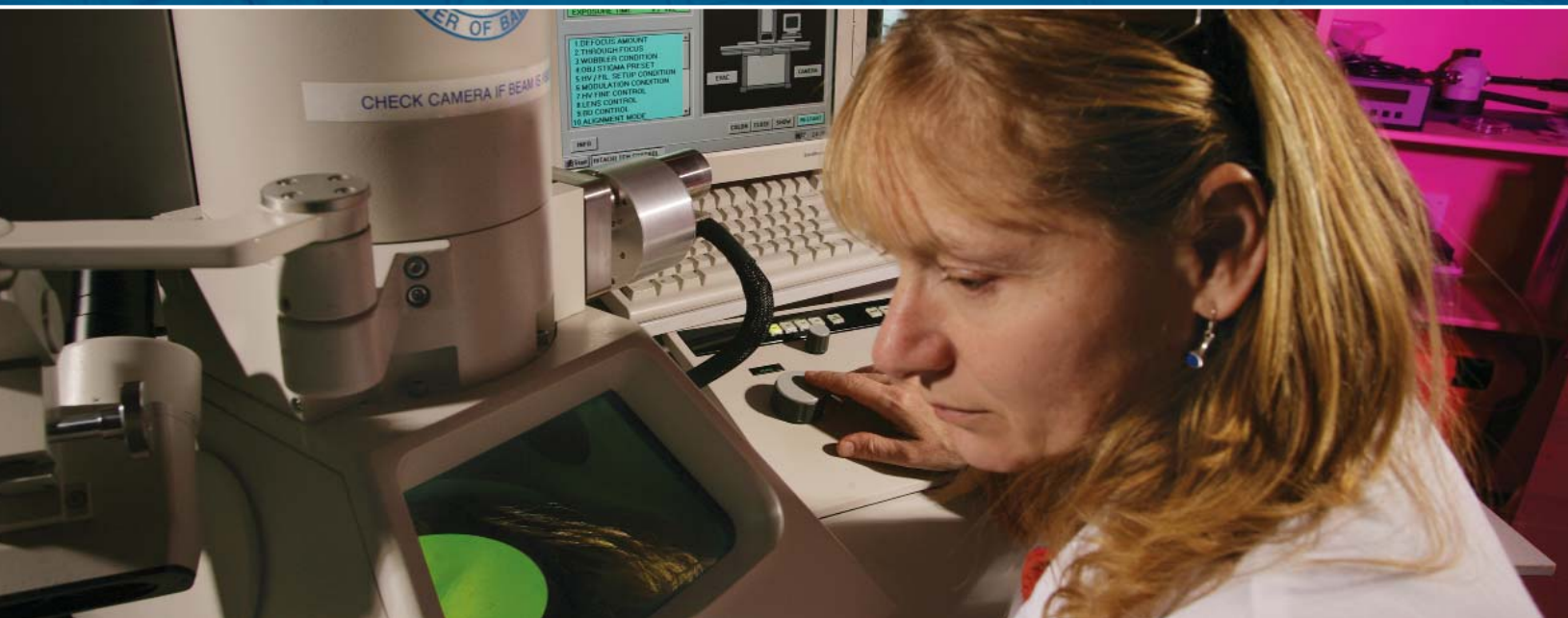
#### Cluster Facts at a Glance

- Canadian online sales recorded their fifth consecutive year of double-digit growth in 2006, as e-commerce gained momentum among Canadian retailers. Online sales by private firms surged 42 percent to \$46.5 billion.
- NRC has signed more than 92 formal collaborative agreements in New Brunswick, for a total project value of almost \$16 million.
- *Atlantic Business Magazine* has indicated that industry views NRC as a valuable partner in the information technology and e-business innovation sectors.
- NRC e-business staff increased from 14 in 2001 to 47 in 2008.

## MILESTONES in Cluster Progress

- 2000** NRC announces New Brunswick site for e-business cluster initiative
- 2001** NRC convenes Moncton roundtable to establish research agenda for New Brunswick initiative
- 2003** Official opening of NRC Fredericton labs
- 2004** \$11 million New Brunswick/Prince Edward Island research grid unveiled
- 2004** NRC officially opens its industry partnership facility in Fredericton
- 2007** NRC's RACOFI technology underlies Bell Canada's new independent music site, indiscover.net
- 2007** Desire2Learn announces opening of Moncton office
- 2007** NRC wins Gold Award of Excellence in Innovation at Canadian Information Productivity Awards

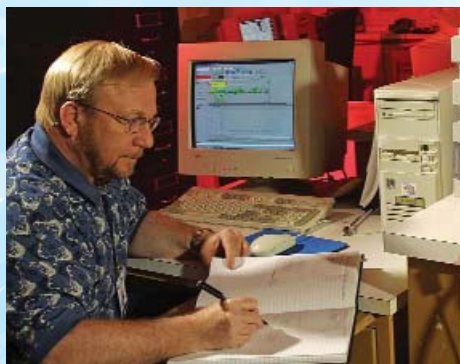
# HALIFAX LIFE SCIENCES



Nova Scotia, particularly Halifax, is developing a growing reputation for excellence in life sciences innovation. It is home to more than 50 companies that focus on life sciences R&D and technology, and this cluster benefits from research investments of more than \$110 million annually. NRC has a strong record of building links within this cluster by bringing together the industry's major players and encouraging ground-breaking collaborative R&D efforts.

## SPURRING INNOVATION

Vibrant life sciences companies are located throughout Nova Scotia, with almost three quarters located in Halifax. Through the Atlantic Initiative program, NRC will invest \$25 million between 2005 and 2010 to advance its life sciences-related infrastructure, foster cluster growth and support emerging companies.



The new Biomedical Magnetic Resonance Imaging Research Laboratory (BMRL) at the IWK Health Centre in Halifax provides researchers with a leading-edge facility, which is helping to deliver on commitments in the Government of Canada's Science and Technology Strategy. The BMRL is designed to develop technologies for non-invasive imaging that will provide a competitive edge for Canada's biotech sector — especially for the Atlantic provinces.

The BMRL is enabling research and innovation on epilepsy, Alzheimer's disease, cancer, arthritis and heart disease. NRC's investments in the facility also enable life sciences companies in the Halifax region to pursue R&D, technology transfer and commercialization opportunities, particularly for new drug development.

## GROWING SEEDS OF MARKETPLACE SUCCESS

A key NRC role in this cluster is to provide targeted supports to life science start-up companies as they seek to commercialize products and services. The NRC industry partnership facility in Halifax provides space for as many as 12 small and medium-sized enterprises. More than a research and business location, the industry partnership facility offers companies easy access to pioneering research and proximity to Genome Atlantic, which promotes leading-edge research and lucrative commercial opportunities in genomics.

## NRC'S CLUSTER PARTNERS

- Government of Nova Scotia
- Atlantic Canada Opportunities Agency
- Genome Atlantic
- Dalhousie University
- Capital District Health Authority
- IWK Health Centre
- InNOVAcorp
- BioNova
- Greater Halifax Partnership





### Cluster Facts at a Glance

- The Nova Scotia life sciences cluster includes 55 core companies that invest more than \$110 million annually.
- The annual global market for life sciences technologies is estimated at US\$1 trillion.
- NRC has committed \$25 million between 2005 and 2010 to carry out research and support activities within the cluster.
- Research enhancements and new facilities at NRC in Halifax are worth \$15 million.
- NRC has committed nearly \$8.5 million to its research programs and new equipment to build biomedical imaging capacity in Nova Scotia.
- More than 90 skilled professionals and dozens of guest researchers work at NRC in Halifax.

### CREATING BRAIN GAIN

NRC's involvement with the Nova Scotia neuroscience community has been a key contribution to Halifax's brain gain and the development of the Nova Scotia life sciences cluster. NRC has contributed its research and business expertise, along with advanced MRI systems. At the Queen Elizabeth Health Sciences

## MILESTONES in Cluster Progress

- 2000** Halifax roundtable
- 2002** NRC announces research presence at the Nova Scotia Brain Repair Centre and plans for the purchase of advanced MRI equipment
- 2002** NRC begins construction of facility for advanced MRI
- 2003** NRC officially commissions its 4.0 Tesla MRI
- 2004** NRC opens its industry partnership facility
- 2006** Construction begins on the new Biomedical MRI Research Laboratory
- 2007** "Virtual groundbreaking" for projected \$42 million Life Sciences Research Institute
- 2007** Implementation process for the new Biomolecular Magnetic Resonance Facility begins
- 2008** NRC opens new Biomedical MRI Research Laboratory

Centre, the Neuroimaging Research Laboratory (NRL) provides world-leading capacity to watch the brain in action. It has attracted top scientists who collaborate with local neuroscience researchers and clinicians. The result has been major advances to combat debilitating neurological disorders.

Building on the foundation of excellence in MRI research and infrastructure at the NRL, the new Biomedical MRI Research Lab at the IWK Health Centre positions Halifax among the leading magnetic resonance imaging centres in Canada. In the fall of 2008, NRC will officially open the new Biomolecular Magnetic Resonance Facility. This will provide state-of-the-art equipment to support large-scale research projects. It will be a new contribution to the leading-edge research infrastructure that emerging companies require to compete in a highly competitive global market.

### NEW FACILITIES FOR INNOVATIVE R&D

NRC is involved in the creation of the region's new Life Sciences Research Institute. This institute will help the Halifax cluster realize its goal of keeping Nova Scotia positioned as a globally competitive centre for life sciences R&D, and will provide a new home for the Nova Scotia Brain Repair Centre. When it opens in 2010, the \$42 million research facility will help start-up companies identify cutting-edge research opportunities and transform research into commercial enterprises. This state-of-the-art facility is projected to help attract more world-class medical specialists and researchers to the Halifax region, and give Atlantic Canadians much greater access to the latest medical advances.

**"With facilities like [the new Biomedical MRI Research Laboratory], we're able to attract and retain and develop and recruit the talent and ingenuity that our country and our region need. Thanks to the partnership of NRC and the IWK Health Care Centre, highly qualified people are attracted to and are choosing to stay and work here in Atlantic Canada and throughout the country."**

HON. PETER MACKAY, MINISTER OF DEFENCE AND MINISTER OF THE ATLANTIC CANADA OPPORTUNITIES AGENCY



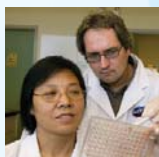
# CHARLOTTETOWN

# NUTRISCIENCES AND HEALTH



Health research and development is a priority in the Government of Canada's Science and Technology Strategy, and nutrition-related research is an important element within that priority — particularly with a global market for nutrition-related products valued at US\$226 billion annually and growing rapidly. NRC is working with partners in Prince Edward Island to tap market opportunities for human and animal nutrition and health-related products. NRC's approach draws on the immense potential of PEI's strengths in land and marine-based biosciences — a sector that has been called “the oil sands of PEI.”

## ESTABLISHING A RESEARCH HUB



A 2001 bioscience cluster development roadmap exercise helped to focus research investments and the

NRC allocation of \$20 million worth of world-leading staff, state-of-the-art equipment and innovative research projects. These investments have been leveraged with \$8 million from the Atlantic Canada Opportunities Agency (ACOA), \$3.5 million from the Government of Prince Edward Island, as well as a prime location provided by the University of

Prince Edward Island for the NRC Institute for Nutritisciences and Health (NRC-INH), which opened in 2006.

The facility accommodates up to 130 scientists, support and other staff. It provides technology incubation space that companies are using to develop and commercialize new products for human and animal health. NRC researchers are exploring the impact of nutraceuticals and bioactive ingredients on health conditions such as neurological disorders, obesity-related disorders, infection and immunity.

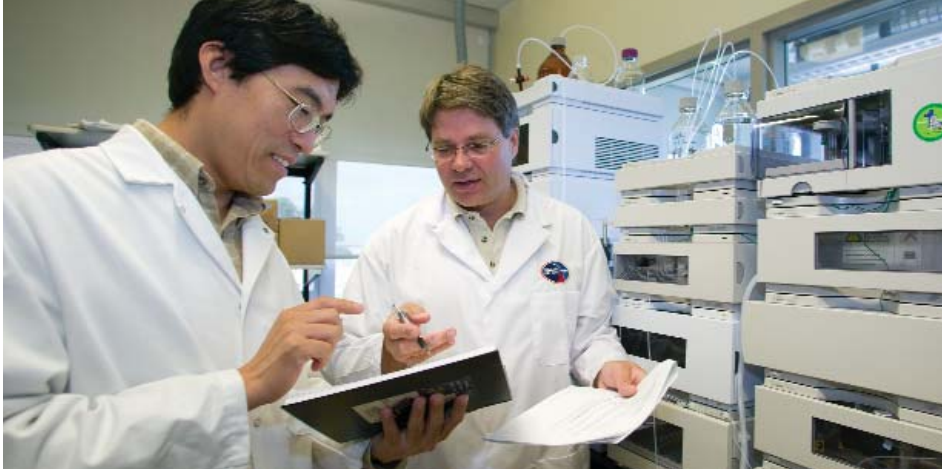
**Bioresources** are renewable, naturally occurring land- and marine-based resources. They are being used to create pharmaceuticals, nutraceuticals, and nutritional and dietary supplements for human and animal health applications.

**Bioactives** are molecules that can affect the body at a cellular level. They are key to creating many products that aim to improve human and animal health.

**Functional foods** are similar in appearance to, or may be, conventional foods consumed as part of a usual diet. They are marketed for their physiological benefits beyond basic nutritional functions and/or their potential to reduce the risk of chronic disease.

**Nutraceuticals** are products isolated or purified from natural sources and are sold in various forms.





## Cluster Facts at a Glance

- PEI is home to eight major research organizations and more than 25 bioscience companies.
- NRC's research facility in Charlottetown can house up to 130 research and support staff, and offers incubation space for emerging bioscience companies.
- The global functional and fortified food and beverage market is forecast to grow 35 percent from US\$96 billion to \$130 billion by 2011.
- Worldwide nutraceutical sales are forecast to exceed US\$60 billion by 2012.

Collaborative research projects, which may create new economic advantages for PEI and health benefits for the world, are addressing cardiovascular disease, Alzheimer's disease, diabetes, metabolic and neurological disorders, immune system diseases and ways to improve the body's acceptance of medical devices, such as pacemakers and artificial joints.

### A MAGNET FOR TALENT

Part of the NRC strategy to promote PEI as a global centre for biosciences R&D is to help build the province's knowledge advantage:

- NRC has attracted top talent to its research team, coordinating adjunct appointments for researchers with the University of Prince Edward Island.
- Building on existing links established by the NRC Industrial Research Assistance Program, relationships between researchers and bioscience cluster employers are being strengthened.
- NRC creates skilled employment for technical officers, graduate students, postdoctoral fellows and research support staff at its research facility in Charlottetown.
- NRC provides speakers, and hosts tours and meetings with associations and bioscience interest groups, and promotes the province internationally.

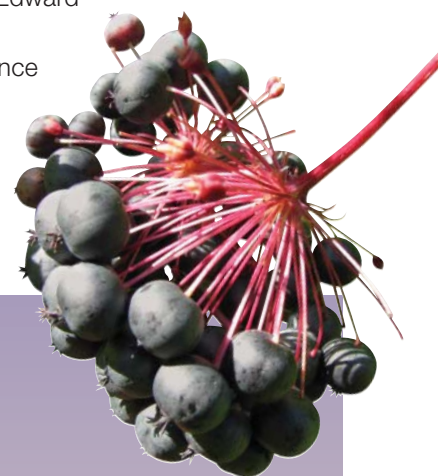
- NRC is a key member of the Prince Edward Island BioAlliance, a partnership of business, research and government agencies that have created the collaborative environment for business and research that is essential for maximizing the economic impact of science and technology.

## PROMOTING PEI

A 2003 NRC research forum showcased PEI as a major player in commercializing new nutritional science and health research. NRC elevated PEI's position in this burgeoning field by hosting "BioProspecting for Neuroprotectants," a 2007 international symposium on bioactives-based solutions for neurological disorders, held in Charlottetown. The event promoted the PEI bioscience cluster's capabilities. It attracted national and international speakers and participants at the forefront of nutrisciences and health research.

## NRC'S CLUSTER PARTNERS

- Atlantic Canada Opportunities Agency
- Province of Prince Edward Island
- University of Prince Edward Island
- Agriculture and Agri-Food Canada
- Prince Edward Island BioAlliance



## MILESTONES in Cluster Progress

- 2001** Biotechnology roadmapping exercise begins
- 2003** Federal and provincial governments announce \$31.5 million in funding for NRC's Charlottetown-based nutrisciences and health research facility
- 2003** NRC hosts Inaugural Research Forum in Charlottetown
- 2005** NRC joins newly established PEI BioAlliance
- 2006** Government, industry and academic researchers move into new NRC facility on the University of PEI campus
- 2006** NRC collaborates with three recipients of ACOA's Atlantic Innovation Fund, representing \$14.2 million in total new investment
- 2007** Bioscience firms commit to 76 percent of NRC's industry partnership facility "incubator space" in PEI
- 2007** Two international bioscience conferences are held in PEI: "Bioprospecting for Neuroprotectants" hosted by NRC, and "InnoVet — International Veterinary Business Conference" hosted by the PEI BioAlliance
- 2008** Five firms are awarded \$10.9 million for innovative bioscience projects, accounting for 76 percent of PEI's share in ACOA's Round V Atlantic Initiative Fund
- 2008** PEI hosts the International Conference on Biodiversity and Natural Products

# ST. JOHN'S OCEAN TECHNOLOGY



Oceans cover three-quarters of the Earth's surface. The global ocean technology market is growing rapidly to address the needs of sectors as diverse as offshore energy, fisheries, marine transportation and ocean sciences, worth an estimated \$1.75 trillion annually. NRC is playing many roles to help the St. John's ocean technology cluster quadruple in size over the next 10 years. Its expertise and facilities enable the cluster's 50 technology companies to develop and test new technologies for global markets — a critical contribution to achieving Government of Canada science and technology goals.

## UNITING KEY PLAYERS IN OCEAN TECHNOLOGY



The cluster has grown an average of 15 percent per year for the past five years. Behind much of that growth is

NRC-supported collaboration involving businesses, governments, community-led boards and industry groups, and Memorial University of Newfoundland. Since an NRC-initiated roundtable in 2001, partners have identified and

seized opportunities to build competitive advantage and enhance the economic impacts of the ocean technology cluster:

- The influential private sector ocean technology cluster development forum, OceansAdvance, is creating a 10-year ocean technology growth strategy.
- The cluster is linking with similar organizations in the U.S. and Europe to develop joint capabilities in the rapidly growing ocean observing sector.
- NRC's industry partnership facility — the Ocean Technology Enterprise Centre located at the NRC Institute for Ocean

Technology in St. John's — has become one of the most successful incubator facilities in the province. The facility transfers research from NRC labs to technology companies for commercialization and houses eight firms.

- The Government of Newfoundland and Labrador has identified the ocean technology industry as an important new economic sector for the province. It is projected that the ocean technology sector may surpass the fishery sector as the largest non-oil industry in the province within 10 years.
- The SmartBay technology demonstration project, funded through Canada's Ocean Action Plan, has supported an ocean observation system for traffic monitoring and localized operational weather prediction.

## COMMERCIALIZING RESEARCH

A central goal of the Government of Canada's Science and Technology Strategy is to boost the commercialization



“The ocean technology cluster in St. John's has made great strides in aligning industry, academia and government. In 2008, with support from government and implementation through OceansAdvance, we are undertaking a comprehensive growth strategy for the sector to meet the challenge of keeping ahead in a dynamic and highly competitive international market.”

JOE RYAN, STRATEGIC ADVISOR, R&D, RUTTER TECHNOLOGIES AND OCEANSADVANCE BOARD MEMBER



of Canadian R&D — a long-time NRC objective as well. In 2007-08, NRC had collaborative agreements with cluster stakeholders worth \$8.4 million over the lives of those agreements. NRC research is already translating into business opportunities through the creation of spin-off firms that are commercializing innovations in marine safety equipment, performance evaluation and marine simulation.

## WORLD LEADING CLUSTER

Although knowledge-intensive ocean technology companies are located throughout Newfoundland and Labrador, the approximately 50 ocean technology companies in St. John's make it an important Canadian ocean technology centre. NRC's continuing investment in the community helps ensure the impressive work to date will be a base for substantial future advances in R&D and the commercialization of federally funded research. NRC's work in ocean technology has been instrumental in helping the industry position St. John's as a centre of ocean excellence.

## OCEAN TECHNOLOGY SECTOR MAP

In 2006-07, NRC, the Government of Newfoundland and Labrador, and OceansAdvance led the creation of a graphical cluster map for the ocean

technology sector. The map concept was a direct outcome of an Israel-Newfoundland and Labrador ocean technology initiative in June 2006.

The map is a planning and marketing tool that demonstrates the tremendous growth and diversity of the ocean technology sector in Newfoundland and Labrador. It illustrates the composition, scope and depth, strengths and opportunities for growth of the ocean technology sector in the province. The map has been instrumental in crystallizing the makeup of the cluster and establishing areas of industry strength as a guide for the OceansAdvance foresight exercise.

## MILESTONES in Cluster Progress

- 2001** St. John's roundtable attracts 85 participants from industry, academia, various agencies and all levels of government
- 2002** NRC spearheads the creation of OceansAdvance, a public-private joint venture with a mission to make St. John's an international location of choice for ocean technology
- 2002** NRC organizes \$60 million Ocean Partners Investment Fund
- 2005** NRC's Ocean Technology Enterprise Centre graduates its first two companies
- 2006** OceansAdvance signs a memorandum of understanding with the Marine and Oceanographic Technology Network, a U.S. business development association
- 2007** OceansAdvance, NRC, and the Government of Newfoundland and Labrador release the first Ocean Technology Cluster Tech-knowledge Map
- 07-08** OceansAdvance undertakes a strategic foresight exercise

## Cluster Facts at a Glance

- Ocean-related economic activities comprise 25 percent of the Newfoundland and Labrador GDP. The ocean technology component of this figure is growing at 15 percent annually.
- Ocean industries contribute \$20 billion and 350,000 jobs to the Canadian economy annually.
- St. John's is home to approximately 50 ocean technology companies.
- The world market for ocean technologies is \$1.75 trillion and growing at a rate of 2.5 percent annually.
- 90 percent of world trade in goods travels by sea.
- Under the United Nations Law of the Sea Convention, Canada stands to gain undersea territory, equivalent in size to the three prairie provinces, with significant economic potential.

# A Critical Component of the Government of Canada's Science and Technology Strategy



Increased commercialization of science and technology innovations is a cornerstone of the Government of Canada's Science and Technology Strategy. That strategy recognizes the importance of the NRC Industrial Research Assistance Program (NRC-IRAP) as a key Government of Canada vehicle to help small and medium-sized enterprises (SMEs) develop new technologies that result in the commercialization of new products and processes.

NRC-IRAP helps Canadian small and medium-sized businesses access, develop, exploit and apply technologies to create new products, services and industrial processes. NRC-IRAP's 230 professionals give firms access to a unique national network of highly specialized technical and business experts in more than 100 communities across Canada.

NRC-IRAP's technology and business advisory network, coupled with the shared financial support it offers to innovative companies and organizations, strengthens Canada's innovation

system and ignites the growth of technology clusters across Canada.

### **CLOSING THE GAP FROM DISCOVERY TO COMMERCIALIZATION**

Just like no two clusters are alike, NRC-IRAP's role in cluster building differs with every SME client. NRC-IRAP is highly regarded by business leaders and innovation experts within Canada and around the world. It has a proven record of bringing government organizations and industry together — facilitating collaboration and helping to move ideas from the drawing board to the marketplace.

### **NRC-IRAP'S ROLES IN BUILDING TECHNOLOGY CLUSTERS**

- Diagnosing emerging opportunities
- Proactively facilitating growth of cluster infrastructure
- Accelerating the flow of knowledge and technology to groups of firms
- Forging connections within cluster supply chains regionally, nationally and internationally
- Linking firms to clusters to ensure research relevance
- Providing industry and market intelligence
- Collaborating with other government and non-government organizations, programs and associations, to ensure industry succeeds in the commercialization of technology
- Strengthening regional innovation systems to improve Canada's productivity and competitiveness



“NRC-IRAP has been extremely useful for a number of emerging photonics companies — assisting them with R&D, product development and business expertise. Certainly, it is very highly spoken of among members of the photonics business community in Ottawa and elsewhere.”

MIKE SCOTT, CHAIR, OTTAWA PHOTONICS CLUSTER

## A FEW WAYS NRC-IRAP HAS TRANSFORMED TECHNOLOGY INTO BUSINESS

### Saskatoon

NRC-IRAP played a central role in the creation of the BioAccess Commercialization Centre in 2006. The Centre offers start-ups and SMEs programs, collaborative projects and a connection to NRC to provide: competitive intelligence support; regulatory advice and services; investor readiness assistance; access to NRC's research strengths and technology expertise; and path-to-market advice.

BioAccess has expanded its network by partnering with government representatives and the functional foods and natural health products industry as part of its mandate for *Helping Business Grow™*.

### Saguenay Region

NRC-IRAP has helped link several Saguenay clients to expertise at the NRC Aluminium Technology Centre in areas such as technologies for the specialized field of aluminium parts for high-performance bicycles, a key market for companies in this cluster. The Program is extensively involved with Quebec's Trans-Al Network, a group of more than 120 pioneering small and medium-sized enterprises.

### New Brunswick

Working throughout New Brunswick, more than a dozen e-business projects — ranging from electronic food service management tools to software that secures remote commerce and medical clinic practice management e-systems — receive NRC-IRAP support. To ensure companies successfully attract business opportunities flowing from the rest of Canada, NRC-IRAP is helping firms collaborate on proposals for national tenders — since group proposals are often more effective than individual ones.

### Charlottetown

NRC-IRAP has partnered with the PEI BioAlliance to establish a successful “virtual incubator” program that offers customized business advisory services to local bioresources companies. Emerging companies gain access to critical support for business model development, regulatory processes, exit strategy planning and business execution. Small businesses can be paired with established industrial partners or NRC and university-based research capabilities.

### Regina

NRC-IRAP is funding many projects involving Saskatchewan firms working in the construction and environmental sectors related to sustainable infrastructure innovations. These include:

- remediation equipment for contaminated soils
- assessing energy costs associated with various building materials
- production of bio-gas and fertilizers from organic waste
- water monitoring for mine waste management
- monitoring of bacteria in water



## NRC-IRAP Facts at a Glance

- Unique professional network consisting of 230 technical, business and innovation network advisors located throughout 100 communities across Canada
- More than 9,000 clients assisted annually
- Shared financial assistance to over 100 organizations that provide technology and business services
- Support to firms for international technology missions throughout North America, Asia and Europe

### Vancouver

NRC-IRAP has developed close relationships with the majority of the fuel cell firms in British Columbia, supporting early R&D and pre-commercialization of fuel cell products. From 2003 to 2005 alone, it funded 30 projects for a total contribution of \$1.5 million to 13 BC firms.

### Winnipeg

NRC-IRAP provided \$2.3 million in contributions to SMEs and the commercialization system in Manitoba during the 2006-2007 fiscal year alone, with 46 percent of that amount directed to biomedical firms and biomedical commercialization support.

“The key for any company is to share their needs with NRC-IRAP. NRC's people have the experience and contacts to really help a company move ahead.”

MARK PICARD, GENERAL MANAGER,  
INFRAREADY PRODUCTS LTD.

# Building Canada's Knowledge Advantage





“Over the years we have had an opportunity to deal with other technical and business libraries. The NRC-CISTI team has provided more relevant and timely technical and business information than other information providers. In part this comes from a willingness and ability to participate in some of the client meetings up front, but more often it is the open dialogue and understanding of the goals of competitive intelligence.”

MAVIS MCRAE, PRAIRIE CENTRE FOR BUSINESS INTELLIGENCE

### ACCESS TO TIMELY, PEER-REVIEWED INFORMATION IS ESSENTIAL TO CANADIAN RESEARCH

As the Government of Canada's Science and Technology Strategy points out, Canada's future success depends on enhancing its knowledge advantage. Canadians need to generate knowledge. They also have to capitalize more rapidly on the wealth of knowledge that is created around the world. NRC plays a central role in making it easier for Canadians to find and use the knowledge they need, at a time when more of it exists than ever before.

The NRC Canada Institute for Scientific and Technical Information (NRC-CISTI) — Canada's national science library — is one of the world's leading providers of information in science, technology, engineering and medicine. NRC Research Press publishes 16 international research journals, 15 client journals as well as books and conference proceedings.

NRC-CISTI, a gateway to global research publications, fills document orders for industry, universities, government and the public, transferring new knowledge rapidly to users from its extensive collection or from other libraries around the world.

NRC information centres across Canada provide Canada's innovation sector with market analysis, competitive technical intelligence and other information crucial to moving research from the lab into commercial applications.

### HELPING CANADA'S INNOVATION SECTOR TURN KNOWLEDGE INTO COMMERCIAL APPLICATIONS

NRC-CISTI's Competitive Technical Intelligence (CTI) program supports the innovation and commercialization efforts of NRC cluster initiatives across Canada. CTI can help researchers, business development officers and senior management make decisions about R&D investments that will contribute to increasing the economic strength of Canada.

NRC-CISTI information specialists and technical business analysts also offer CTI services to companies receiving support and mentoring from the NRC Industrial Research Assistance Program

### NRC-CISTI Information Services at a Glance

- Competitive technical intelligence
- Information research and analysis
- Patent landscape analysis
- Ground-breaking technical information
- Cutting-edge industry and market information
- Rapid delivery of up-to-date full text articles from online sources
- Referrals to industry experts or organizations

(NRC-IRAP). By providing decision makers in technology-based small businesses with the best analysis of technological trends, these firms are in a better position to maximize results and returns on their research and development investments.

NRC-CISTI offers strategic technical information analysis (STIA) to Canada's public R&D laboratories. STIA helps capitalize on the unique technical and commercial information that can be gathered from patents and specialized S&T and business information databases. It helps decision makers confirm the potential value of R&D projects and develop strategies that will translate knowledge into commercialized technology.



# NRC TECHNOLOGY CLUSTER INITIATIVES

## CONTACT INFORMATION

### **National Research Council Canada**

1200 Montreal Road  
Ottawa, ON K1A 0R6  
Tel: 613-993-9101  
Website: <http://www.nrc-cnrc.gc.ca>

### **NRC Industrial Research Assistance Program (NRC-IRAP)**

Tel: 1-877-994-4727  
E-mail: [publicinquiries.irap-pari@nrc-cnrc.gc.ca](mailto:publicinquiries.irap-pari@nrc-cnrc.gc.ca)  
Website: <http://irap-pari.nrc-cnrc.gc.ca>

### **NRC Institute for Scientific and Technical Information (NRC-CISTI)**

Tel: 1-800-668-1222  
E-mail: [info.cisti@nrc-cnrc.gc.ca](mailto:info.cisti@nrc-cnrc.gc.ca)  
Website: <http://cisti-icist.nrc-cnrc.gc.ca>

### **Vancouver**

#### **NRC Institute for Fuel Cell Innovation (NRC-IFCI)**

4250 Wesbrook Mall  
Vancouver, BC V6T 1W5  
Tel: 604-221-3000  
E-mail: [info.ifci-iipac@nrc-cnrc.gc.ca](mailto:info.ifci-iipac@nrc-cnrc.gc.ca)  
Website: <http://ifci-iipac.nrc-cnrc.gc.ca>

### **Edmonton**

#### **NRC National Institute for Nanotechnology (NINT)**

11421 Saskatchewan Drive  
Edmonton, AB T6G 2M9  
Tel: 780-641-1600  
E-mail: [nintinfo@nrc.gc.ca](mailto:nintinfo@nrc.gc.ca)  
Website: <http://nint-innt.nrc-cnrc.gc.ca>

### **Saskatoon**

#### **NRC Plant Biotechnology Institute (NRC-PBI)**

110 Gymnasium Place  
Saskatoon, SK S7N 0W9  
Tel: 306-975-5248  
E-mail: [PBI-Info@nrc-cnrc.gc.ca](mailto:PBI-Info@nrc-cnrc.gc.ca)  
Website: <http://pbi-ibp.nrc-cnrc.gc.ca>

### **Regina**

#### **NRC Centre for Sustainable Infrastructure Research (NRC-CSIR)**

Suite 301, 6 Research Drive  
Regina, SK S4S 7J7  
Tel: 306-780-3208  
E-mail: [csir-crid@nrc-cnrc.gc.ca](mailto:csir-crid@nrc-cnrc.gc.ca)  
Website: <http://irc.nrc-cnrc.gc.ca/csir>

#### **NRC Institute for Research in Construction (NRC-IRC)**

1200 Montreal Road  
Ottawa, ON K1A 0R6  
Tel: 613-993-2607  
E-mail: [Irc.Client-Services@nrc-cnrc.gc.ca](mailto:Irc.Client-Services@nrc-cnrc.gc.ca)  
Website: <http://irc.nrc-cnrc.gc.ca>

### **Winnipeg**

#### **NRC Institute for Biodiagnostics (NRC-IBD)**

435 Ellice Avenue  
Winnipeg, MB R3B 1Y6  
Tel: 204-983-7692  
E-mail: [ibd.research@nrc-cnrc.gc.ca](mailto:ibd.research@nrc-cnrc.gc.ca)  
Website: <http://ibd.nrc-cnrc.gc.ca>

#### **NRC Centre for the Commercialization of Biomedical Technology (NRC-CCBT)**

445 Ellice Avenue  
Winnipeg, MB R3B 3P5

### **Ottawa**

#### **NRC Institute for Microstructural Sciences (NRC-IMS)**

1200 Montreal Road  
Ottawa, ON K1A 0R6  
Website: <http://ims-ism.nrc-cnrc.gc.ca>

#### **NRC Canadian Photonics Fabrication Centre (NRC-CPFC)**

1200 Montreal Road  
Building M-50  
Ottawa, ON K1A 0R6  
Tel: 613-991-1143  
E-mail: [info@cpfc.ca](mailto:info@cpfc.ca)

### **Saguenay Region**

#### **NRC Aluminium Technology Centre (NRC-ATC)**

501 Université Blvd. E.  
Saguenay (Chicoutimi), QC G7H 8C3  
Tel: 418-545-5544  
E-mail: [jean-pierre.martin@nrc-cnrc.gc.ca](mailto:jean-pierre.martin@nrc-cnrc.gc.ca)  
Website: <http://imi.nrc-cnrc.gc.ca/CTA>

### **Fredericton & Moncton**

#### **NRC Institute for Information Technology (NRC-IIT)**

46 Dineen Drive  
Fredericton, NB E3B 9W4  
Tel: 506-444-0393  
E-mail: [lorna.brown@nrc-cnrc.gc.ca](mailto:lorna.brown@nrc-cnrc.gc.ca)  
Website: <http://iit-iti.nrc-cnrc.gc.ca/>

### **Halifax**

#### **NRC Institute for Marine Biosciences (NRC-IMB)**

1411 Oxford Street  
Halifax, NS B3H 3Z1  
Tel: 902-426-8332  
E-mail: [Communications.IMB@nrc-cnrc.gc.ca](mailto:Communications.IMB@nrc-cnrc.gc.ca)  
Website: <http://imb-ibm.nrc-cnrc.gc.ca>

### **Charlottetown**

#### **NRC Institute for Nutrisciences and Health (NRC-INH)**

550 University Avenue  
Charlottetown, PE C1A 4P3  
Tel: 902-566-7000  
E-mail: [inh@nrc-cnrc.gc.ca](mailto:inh@nrc-cnrc.gc.ca)  
Website: <http://inh-isns.nrc-cnrc.gc.ca>

### **St. John's**

#### **NRC Institute for Ocean Technology (NRC-IOT)**

P.O. Box 12093  
St. John's, NL A1B 3T5  
Tel: 709-772-4939  
E-mail: [derek.yetman@nrc-cnrc.gc.ca](mailto:derek.yetman@nrc-cnrc.gc.ca)  
Website: <http://iot-ito.nrc-cnrc.gc.ca>