

NRC · CNRC

From Discovery to Innovation...

VALUE FOR CANADA
growth

Taking Technology to Market



National Research
Council Canada

Conseil national
de recherches Canada

Canada 

NRC VISION

Recognized globally for research and innovation, NRC is a leader in the development of an innovative, knowledge-based economy for Canada through science and technology.

This Vision is founded on five strategic pillars:

Outstanding People – Outstanding Employer

Recognition as a leading research organization distinguished by creativity and innovation

Excellence and Leadership in R&D

Integration of public and private strengths to create new opportunities and meet national challenges for Canada

Technology Clusters

Development of the innovative capacity and socio-economic potential of Canada's communities

Value for Canada

Commitment to the creation of new technology-based enterprises, technology transfer and knowledge dissemination to industry

Global Reach

Access to world-class science facilities, as well as global research and information networks. Stimulation of enhanced international opportunities for Canadian firms and technologies.

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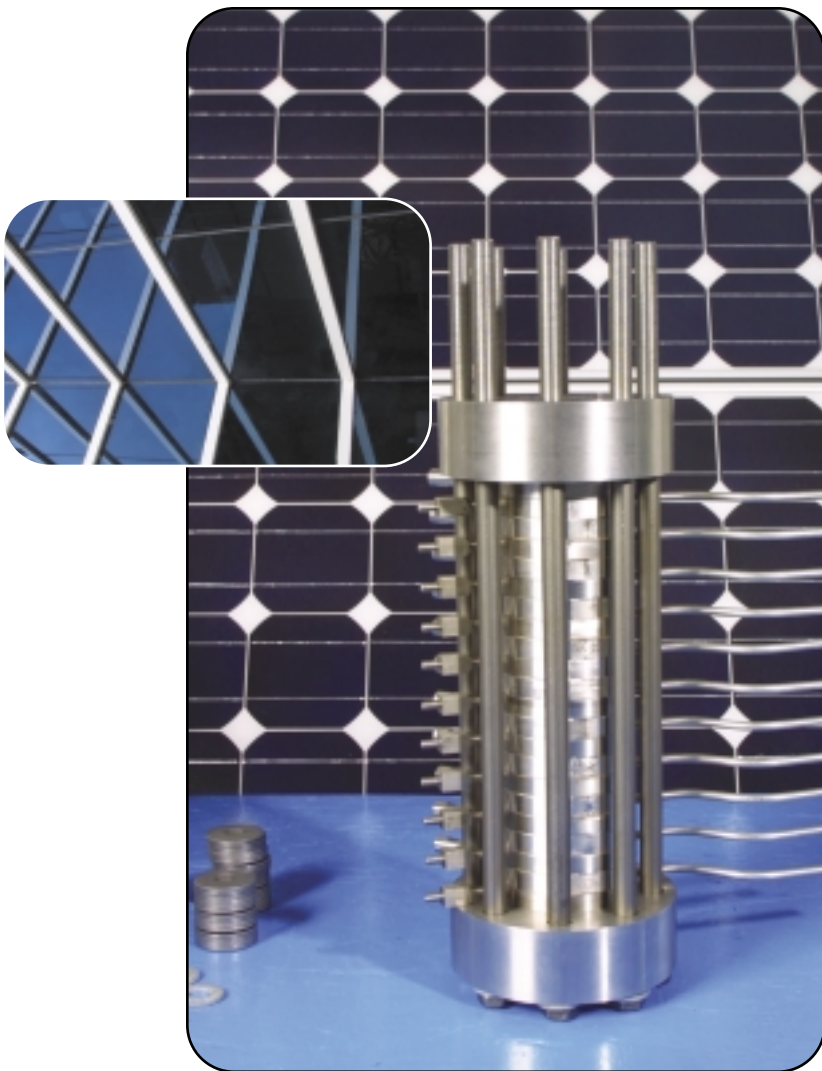
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Cover photo: View of thin-film deposition process using evaporation. Thin films can be as little as a few molecules in thickness, and are deposited on a glass, ceramic or semiconductor substrates. Thin films have numerous uses including telecommunication filters, optoelectronic devices, displays, lithography and anticounterfeiting. One of the most visible results of thin film technology can be found in the optical security device found on Canadian currency, which was originally conceived and created at NRC's Institute for Microstructural Sciences.

Taking Technology to Market



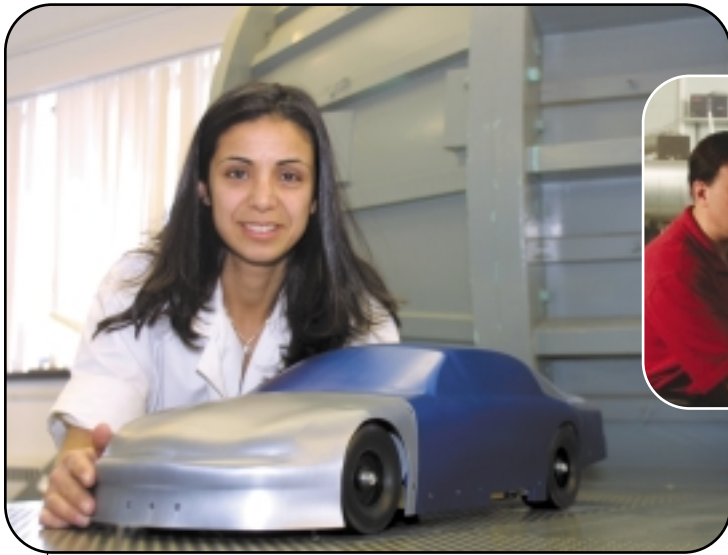
Electrochemical hydrogen compressor

The Path to Value

As an agency of the Government of Canada, NRC delivers economic and social value by putting science and engineering discoveries to work for Canada and helping increase the innovation capacity of small and medium-sized firms. The path to value varies, but the stakes are always the same: improving the nation's research and ability to innovate is crucial to Canada's economic growth and an increased quality of life for all Canadians.

In all its programs and activities, NRC takes an aggressive, entrepreneurial approach to stimulate the innovation that Canada and Canadian firms need to succeed in the global knowledge economy. The approach is designed to gain the most benefit and leverage from the knowledge and technologies NRC generates. It ensures that NRC can work effectively to meet industry needs and match the capabilities of firms taking technologies to the market. From collaborative R&D to licensing, the creation of new enterprises,

growth



Wind tunnel test model



and industrial research assistance and support, NRC supports wealth creation through research and innovation.

Key indicators of true value creation for Canada include: creation of new technology-based companies; successful technology transfer; collaborations and partnerships between industry, government and universities that leverage valuable resources and generate new economic opportunities; the attraction and development of highly qualified people; R&D support for innovative small and medium-sized Canadian firms; and, of course, exciting new scientific discoveries that help generate innovative new products and services. In the past year, NRC made significant contributions to Canada on all of these fronts.

Supporting National Priorities for Innovation

NRC is a major catalyst for innovation in Canada. A priority recommendation from the National Summit on Innovation and Learning focused on improving the ability to commercialize leading-edge R&D. In response, NRC led the Building Canada's Capacity for Commercialization Workshop, held

NRC: Innovation Snapshot 2002–2003

Discoveries

- 193 patent applications
- 66 patents issued

Technologies Transferred to the Marketplace

- 48 licenses signed
- Licensing revenue – \$7.3 million
- 304 active license agreements

Research Partnerships

- 464 collaborations with industry
- 236 collaborations with universities
- 320 collaborations with other public organizations

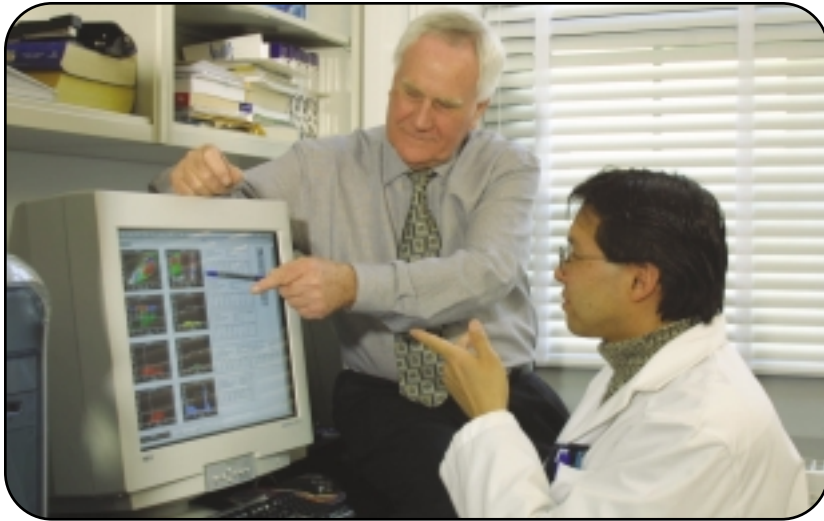
New Companies Created*

- OptoWorks Inc.
- Hefti Inc.
- LNL Optenia

** 10 companies in spin-off pipeline*

SME Support

- Customized advice, information and referrals to 12,000 firms
- \$95 million in contributions to innovative firms through NRC-IRAP
- Information services through NRC Canada Institute for Scientific and Technical Information
- 95 companies incubating at NRC
- 4 New IPFs completed, 5 under construction, 2 in planning stage



in March 2003. Some 35 innovation leaders from across Canada attended the workshop chaired by the President of NRC and the Chairman of Tundra Semiconductor Corp.

Participants helped identify the key attributes of an effective commercialization system for Canada and the actions and initiatives required to improve commercialization, such as improved intellectual property processes, financial incentives and improved entrepreneurial and managerial commercialization skills. As a result of the workshop, several major initiatives have appeared.

- ▶ The reactivated Prime Minister's Advisory Council on Science and Technology (ACST) has identified commercialization as priority issue for the coming year and has created three working groups to address the issues raised in the report.

- ▶ The Conference Board of Canada has used the results of the report as the starting point for the development of the Fifth Annual Innovation Report and National Conference to be held in November 2003.

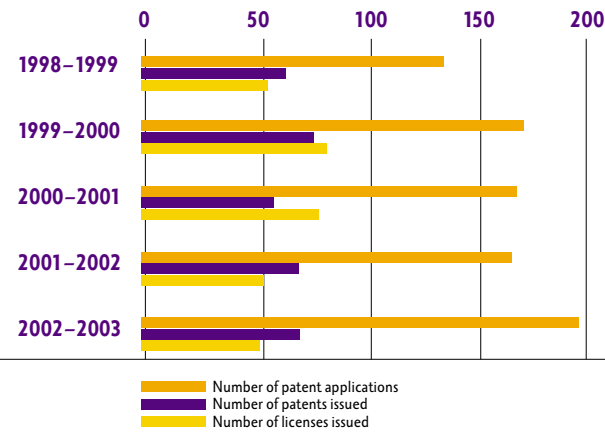
Intellectual Property

The importance of new knowledge has grown dramatically in the past decade. Original discoveries, know-how, software and new technologies – protected by patent or copyright – are the foundations for new products, process innovations and commercialization

A Reputation for Results

NRC delivers results for Canada. The successful licensing of an NRC-developed vaccine for Meningitis C is helping save the lives of millions of infants worldwide. NRC research into bio-remediation of contaminated soils offers hope for numerous abandoned and unusable industrial sites across the country. Successful management of such intellectual property, through patenting, licensing and the creation of new companies has produced major economic benefits such as the creation of thousands of new jobs and the introduction of innovative new products in the global marketplace. Two national programs, the NRC Industrial Research Assistance Program and the NRC Canada Institute for Scientific and Technical Information, provide essential services to innovative Canadian companies and to knowledge users around the world.

NRC Patents and Licenses



in the world’s marketplaces. It is essential that Intellectual Property (IP) be managed effectively by a knowledge organization such as NRC.

To create the most value for Canada, NRC chooses the best route to develop and exploit its new discoveries and knowledge resources. Over the past several years, NRC has established proven IP management tools and practices that guide the evaluation, protection, exploitation and transfer of technologies to receptor firms. In 2002-2003 NRC developed a new and aggressive IP management and commercialization strategy to ensure continued leadership in this area. Key attributes of the strategy include technology portfolio screening programs to better identify “high commercial potential value” technologies, and the re-allocation

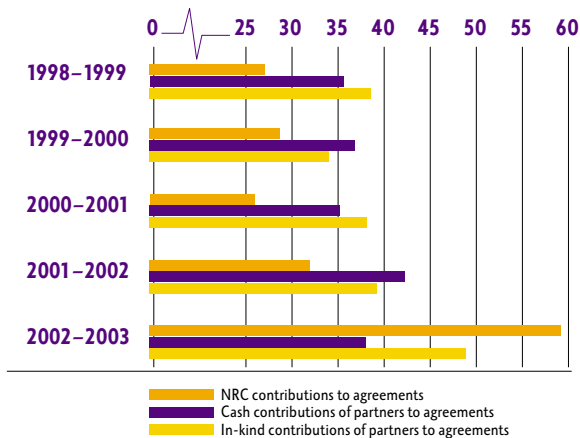
of IP protection resources towards market opportunity assessments and competitive patent intelligence.

Collaborations and Partnerships – A Reputation for Teamwork

Over the past five years, NRC partnerships with industry have doubled, those with public organizations have nearly tripled, and those with universities have grown five-fold. The value of agreements and collaborations amounted to some \$334 million in 2002-2003.

With its long-standing track record for excellence in R&D and new technology creation, NRC is an attractive partner for industrial and other partners. For NRC, the impact of these collaborations is enormous.

Contributions to NRC agreements* (\$ millions)



* Began counting international contributions to agreements in 2001-2002

Key NRC horizontal research initiatives have stimulated many rewarding new collaborations. NRC's Genomics and Health Initiative, for example, has helped solidify core competencies in areas such as DNA microarray and proteomics technologies. This, in turn, has attracted new partners from the public and private sectors in Canada and abroad. Other NRC initiatives involving fuel cells, nanotechnology, and sustainable development have produced similar results.

Each collaboration represents a unique opportunity both to share and tap into a partner's expertise. Often, results lead to other broader opportunities involving new players. Collaborations are also an effective form of technology transfer and, increasingly, have helped stimulate the creation of new ventures.

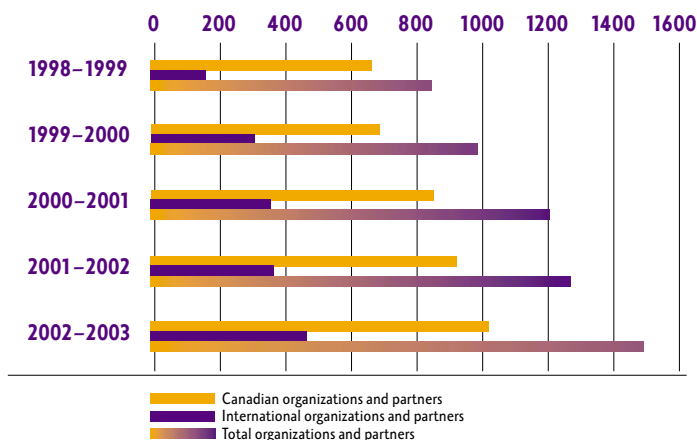
Collaborations also play an important role in NRC's community-based technology cluster

development efforts across Canada, helping bring communities together around a common vision for their economic growth and prosperity. They also ensure that the investments made by NRC are heavily leveraged on behalf of taxpayers.

NRC Expertise Helps Swiss Team Win America's Cup

The NRC Institute for Marine Dynamics (NRC-IMD), in partnership with OCEANIC Consulting, played a key role in the 2003 America's Cup, the most prestigious yacht race in the world. The team was contracted to undertake performance evaluation tests for two different race syndicates, the American Team, Oracle, and eventual race winner, the Swiss Team, Alinghi. The achievement caps a 10-year long involvement of NRC-IMD in three America's Cups and paves the way for an expanded client list.

NRC partnerships and agreements



“There is no doubt that the level of precision and repeatability achieved in your yacht testing far exceed what is achieved anywhere else in the world that I know of. You obtain variations on repeat testing, weeks, or perhaps even months, apart on the order of 0.5% in drag and 1% in lift. Variations elsewhere are two to four times as large.”

– Professor Jerome H. Milgram, Massachusetts Institute of Technology (MIT)

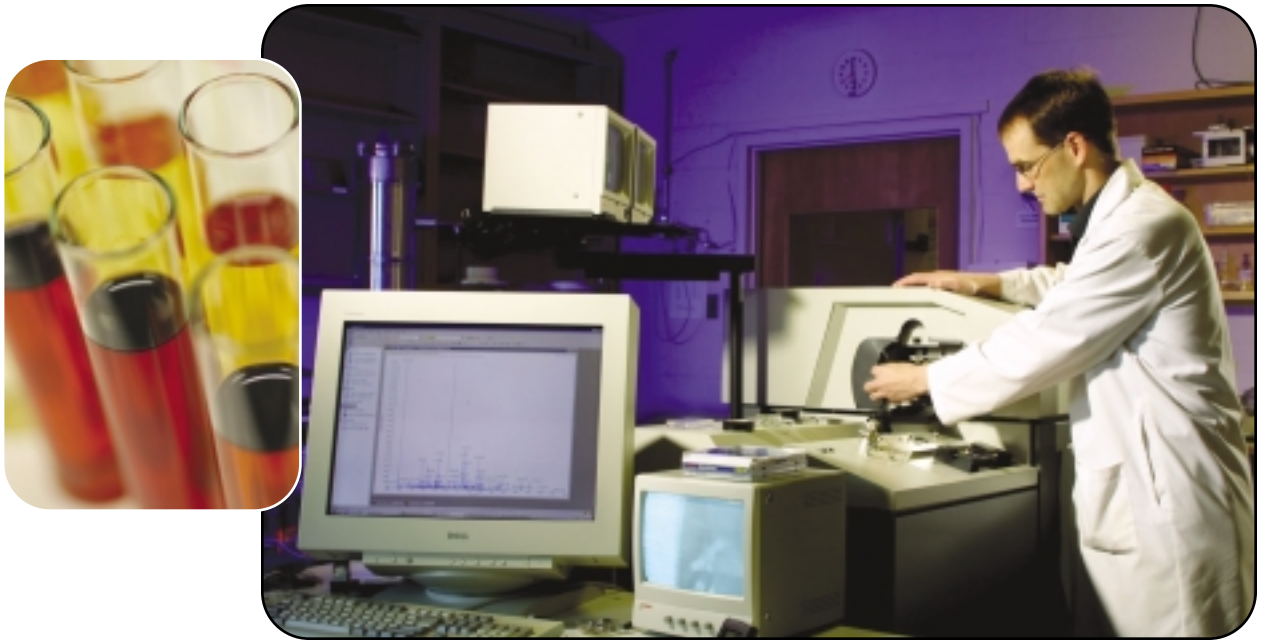
Special Interest in Very Small Materials

A total of 13 world-class companies recently joined with the NRC Industrial Materials Institute (NRC-IMI) to form a new Special Interest Group (SIG). This new R&D partnership is focused on the challenging and rapidly expanding field of polymer nanocomposites. Nanocomposites are plastic-based materials with remarkable properties, and are lighter, stronger and less permeable than conventional plastics. The new SIG is the first multi-partner R&D initiative for nanocomposites in Canada, and one of the first in the world. Known as PNC-Tech, the collaboration will invest \$300,000 a year in R&D focused on the development of these new nanocomposite materials.

New MDS Sciex Collaboration – Enhancing NRC’s Expertise in Proteomics

One of the most promising fields in biotechnology involves the study of proteins, known as proteomics. Proteins are required for the structure, function, and regulation of the body’s cells, tissues and organs and each protein has a unique function. A cell can make hundreds of thousand of proteins. NRC has extensive expertise in this emerging field, and a new collaboration with MDS Sciex will help expand this impact. Building





on 10 years of research collaboration, the NRC Institute for Marine Biosciences (NRC-IMB) signed an additional two-year, \$600,000 collaborative agreement with MDS Sciex. By combining NRC's extensive proteomics expertise with MDS Sciex's enhanced mass spectrometry technology, researchers will focus on developing techniques to map protein expression in quantitative terms.

New Collaboration with Canadian Institutes of Health Research

The Canadian Institutes of Health Research and NRC entered into a Memorandum of Understanding (MOU) in December 2002, laying the foundation for expanded cooperation and collaboration. Benefits of such a partnership include improving the health of Canadians and increased commercialization of health research for the benefit of Canada. Two specific initiatives

were also launched under the MOU: a new Joint Research Program, and a new Joint Commercialization Acceleration Program.

NRC Licensing Revenues
(\$ thousands)

1998-1999	1,661
1999-2000	1,106
2000-2001	4,987
2001-2002	3,840
2002-2003	7,354

Licensing: Moving Discoveries to the Marketplace

In moving its discoveries to the marketplace through the licensing of IP, NRC looks for industrial firms and other organizations with the best capacity to develop and exploit new technologies. License agreements are generally granted in return for up-front payments and/or royalties based on sales. Often, licensing agreements come out of collaborative research; in such cases the terms of the agreement reflect a client's contribution in developing the technology. A single technology may also be licensed to several clients for different fields of application. In all cases, licensing revenues flow back to NRC. NRC reinvests these revenues in its R&D programs to continue the cycle from discovery, to innovation, to market – creating economic gain for Canada.

In 2002–2003, NRC formalized 48 licensing agreements. License revenue climbed sharply to \$7.3 million, up from \$3.8 million for

2001–2002. Royalties from the Meningitis C vaccine, now approved for sale in Canada, accounted for a large portion of the licensing revenues. NRC had a number of successful research collaborations and licensing arrangements in 2002–2003, as the following examples demonstrate.

***FireFlex* – Foam Suppression for Greater Safety**

The NRC Institute for Research in Construction (NRC-IRC) licensed a unique new compressed-air foam fire suppression system to Montréal-based FireFlex Systems Inc. The system offers a valuable alternative to conventional foam suppression systems, creating superior quality foam with substantial injection velocity. These characteristics are particularly important in buildings with high ceilings, such as aircraft hangers, where the injected foam must penetrate fire plumes to reach the seat of the fire. The system also uses little water and offers easy cleanup.



FireFlex is currently adapting the technology for use with pre-existing piping systems and special nozzle technology.

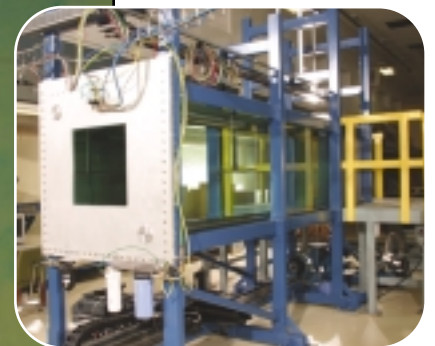
Aiolos Engineering Corporation – “Fly-on-the-Wall Technology”

The NRC Institute for Aerospace Research (NRC-IAR) signed a license agreement with Aiolos to market a new technology for testing Low Reynolds number flows associated with very small flight vehicles, called Micro Aerial Vehicles (MAVs). Conventional testing facilities cannot be used to obtain accurate aerodynamic data for such small vehicles. The company, based in Toronto, is a world leader in the design and construction of wind tunnels and related test facilities. MAVs are able to fly in confined spaces and acquire visual, acoustic and other information through on-board sensors. MAVs have market

applications for search and rescue, drug and contraband interdiction, accident damage assessment, and anti-terrorist surveillance.

Dow AgroSciences – Technology to End “Outcrossing”

The NRC Plant Biotechnology Institute (NRC-PBI) licensed a new molecular recall technology to Dow AgroSciences Canada, helping address concerns of plant stock contamination from transgenic plants. The technology provides selective expression of a plant gene that causes cell death in transgenic plants upon expression. Future efforts surrounding molecular farming (using plants to produce biologically active compounds) will likely benefit from the same technology to ensure that plants with these properties do not spread beyond designated areas or contaminate neighbouring plants.



Low Reynolds Number facility

A graphic representation of NRC's future IPF at the NRC Institute for Marine Biosciences in Halifax. Construction began in early 2003 and will be ready for occupancy by spring 2004. The new facility will help support the growth of the Halifax Life Sciences and Aquaculture technology cluster.



Incubators/Co-Location

The growth of new science and technology-based firms is critical to economic growth for Canada and helping achieve national targets for R&D.

Creating value for Canada also involves helping new science and technology-based firms grow and prosper. Incubation not only accelerates the process of starting and growing such firms, but also helps them stay in business. According to a 1997 U.S. study on the impact of incubator investments, 87 percent of firms that were in incubators remained in business after the first three critical years of operation.

Over the past year, NRC's network of Industry Partnership Facilities (IPFs) continued to mature with new facilities opening in a number of communities across Canada. Most of NRC's research institutes have IPFs or other means to incubate new, small, technology-based firms. These IPFs act as magnets that attract innovative firms to NRC. By co-locating with

IPF Works for Caprion Pharmaceuticals Inc.

Caprion Pharmaceuticals Inc. began co-locating at the NRC Biotechnology Research Institute IPF in August of 1998 with just eight employees. Caprion graduated in only three years, with 43 employees and some US\$42.6 million in venture capital.

The company is involved in what some have called "the stuff of life" – isolating and charting the key proteins that are involved with – or are missing – in certain diseases. The key is to find out how those proteins can be deactivated or reprogrammed. Caprion, with 86 employees today, is operating in a 5,017 m² research facility in Montréal. The company has raised over \$100 million in financing and attracted international experts in cell biology, mass spectrometry and bioinformatics. But it has not forgotten the role NRC played in its start-up stage. Lloyd Segal, President and CEO, acknowledges the role of NRC in making the transition from the start-up phase, describing the IPF as "a unique space for any start-up biotechnology company," with excellent infrastructure and support. Beyond that he credits NRC with "playing a pivotal role in ensuring that there is a working network of mutually beneficial companies, people, researchers ... so that at every level Montréal becomes a centre of biotechnology"

“The reason Targeted Growth (TG) Canada Inc. is incubating at NRC-PBI is the outstanding understanding and assistance this group affords small research and development companies. NRC-PBI has afforded TG Canada assistance in business advice, exposure to state of the art equipment, as well as technical advice from world leaders in the research field TG Canada is investigating.” – Andrew Thomson, Business Development Officer, Targeted Growth Canada Inc.

One of NRC’s newest IPFs at the NRC Plant Biotechnology Institute in Saskatoon. The facility, opened in early 2003, is strengthening this region’s agricultural biotechnology cluster.



NRC, firms gain direct access to NRC’s specialized facilities, the expertise of its researchers, extensive national and international networks, and its technology intelligence and knowledge dissemination resources. A survey of IPF tenants carried out in 2002–2003 determined that over 80 percent of tenants were very satisfied with their access to facilities and close to 70 percent reported excellent access to researchers and research expertise.

In 2002–2003, 96 firms were incubating or co-located at NRC, a sharp increase from the 71 located at NRC in 2001–2002. The increase demonstrates the value of NRC’s IPF strategy.

New IPFs were completed in Saskatoon, Vancouver, and Victoria, while others were under construction in St. John’s, Halifax, Fredericton, Ottawa and Penticton. New IPFs are on the drawing board for Longueuil, Winnipeg, and Edmonton. In 2002–2003, IPF managers from across NRC met for a workshop to discuss best practices and formed an IPF network. The network held several follow-up workshops during 2002–2003.

New Company Creation

Often the fastest and most effective way to commercialize a new technology or product is to create a new Canadian company. Since 1995–1996, NRC technologies have led to the creation of 55 new companies in Canada. Taken together, these new companies account for approximately 495 highly skilled jobs and \$252 million in cumulative private investment. In 2002–2003, NRC spin-offs generated over \$21 million in revenue.

NRC started several new programs in 2002–2003 to help accelerate the scope and pace of its new company creation. NRC launched its first-ever NRC Business Case

Challenge, resulting in the identification of seven new business opportunities based on NRC technologies. Notably, many of these opportunities have attracted interest from outside investors. NRC also launched its Entrepreneurs-in-Residence Program to nurture better linkages between outside entrepreneurs and NRC researchers interested in commercializing their technologies.

In 2002–2003, three new companies started up from NRC, with 10 more in the works awaiting formal “graduation.” The new ventures were:

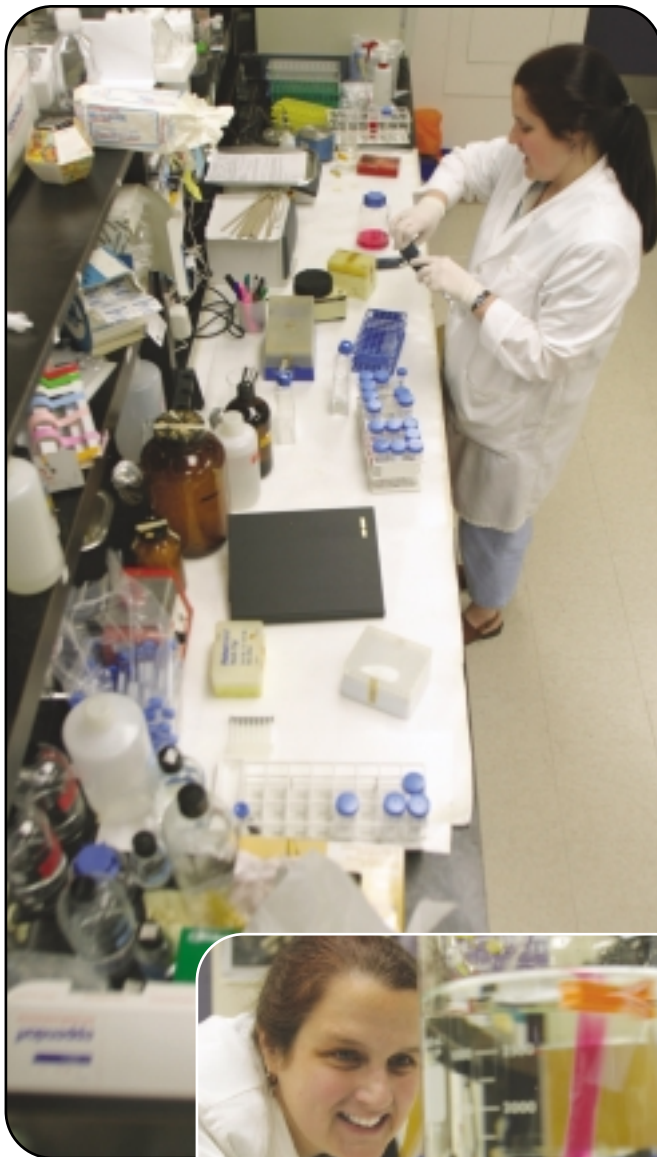
- ▶ *OptoWorks Inc.* – Screen-printing is one of the oldest methods of printing graphic and text images and, for the most part, has not changed substantially since its invention. Prints are still made from stencils, a complex process that involves numerous steps but which produces superior results. NRC has helped bring together two established Ottawa-based SMEs from very different backgrounds – Inkworks (screen printing) and Optotek (optoelectronics and display technologies) – to provide a new approach to this ancient art. OptoWorks Inc. utilizes modified, commercially



“The technical and business assistance provided by NRC has made it feasible to establish the new company and proceed with the unique application of technologies OptoWorks will offer. NRC involvement has allowed us to shape the technology into a more mature form than would have been the case if it were a venture between three industrial partners.”

– David Kennedy, President, Optotek

“With film three in the *Lord of the Rings* trilogy, Weta Digital is producing visual effects work that will have to withstand an even greater level of scrutiny than the first two episodes, and our collaboration with XYZ RGB.” – Matt Aitken, Digital Models Supervisor, Weta Digital



Zelos Therapeutics

New Spin-off Firms 1998–2003

	Total New Companies	Cumulative Spin-off Firms
1998–1999	10	31
1999–2000	9	40
2000–2001	9	49
2001–2002	3	52
2002–2003	3	55

available inkjet printers, in combination with patent-pending LED technology and proprietary emulsion chemistry. The process creates flexible and streamlined options for stencil production, allowing several forms of direct computer-to-screen printing. In addition, since the system uses inkjet technology, users can use the same solution to produce materials better suited to an inkjet approach.

- ▶ *Hefti Inc.* (High Energy Frequency Tesla Inc.) – Generation of, and protection from, non-nuclear electromagnetic pulses.
- ▶ *LNL Optenia Inc.* – Echelle grating technology used in fabrication of optical components.



Ionalytics



Some NRC spin-offs to watch

- ▶ **Ionalytics – A Clearer View of Drug Discovery:** Earlier this year, Ionalytics netted \$4.5 million in venture capital funding. And the company recently won an award for best new product at Pittcon 2003, a major laboratory science trade show. R&D into the ion separation technology that is the foundation of Ionalytics' business began in 1997 as a result of a collaboration between the NRC Institute for National Measurement Standards and MDS Sciex.
- ▶ **Zelos Therapeutics – Bone Regeneration Offers Hope:** Zelos announced \$14 million in new financing from Canadian and U.S. sources. Zelos is developing a drug called Ostabolin-CTM for the treatment of post-menopausal osteoporosis. Ostabolin-CTM is a Parathyroid Hormone (PTH) analog that holds promise of rebuilding and regenerating bones in the human body and is slated to enter clinical trials by the end of 2003.
- ▶ **XYZ RGB – Powering the Next Generation of Special Effects:** Arius3D, an NRC spin-off focused on 3D scanning technology, has itself launched a highly successful spin-off company. Ottawa-based XYZ RGB has made a substantial impact in applying this technology to the entertainment industry. The company helped create a number of the special effects in *The Matrix Reloaded*, producing 3D digital replicas of the actors which allowed stunts that were either too dangerous or physically impossible. To top this feat, XYZ RGB is now hard at work creating visual effects for the final movie in the *Lord of the Rings* trilogy. The 3D scanning technology was developed at the NRC Institute for Information Technology.

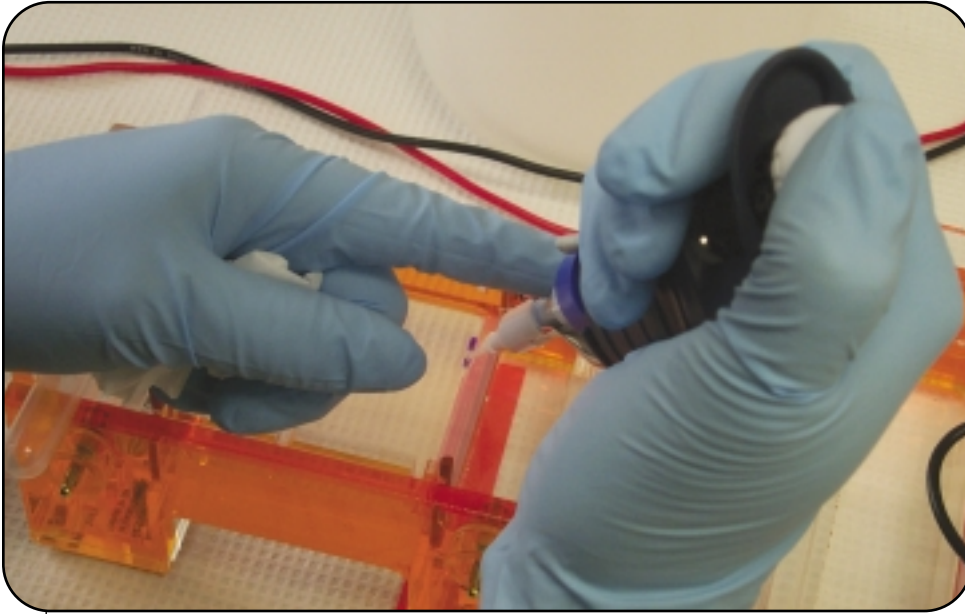
Helping Create a Skilled Workforce

NRC institutes and programs offer a number of training and outreach efforts to help meet Canada's need for a specialized workforce. Examples in 2002–2003 included a cross-Canada seminar series delivered by the NRC Institute for Research in Construction, metrology workshops and seminars delivered by the NRC Institute of National Measurement Standards and a new series of Lean Product and Process Design Workshops presented by the NRC Industrial Research Assistance Program.

- ▶ *IMRIS – Technology Reduces Repeat Surgeries:* Only 4,000 patients worldwide have benefited from intraoperative MRI. Of this total, close to 10 percent of procedures were done using the IMRIS system in place at the Calgary Foothills Medical Centre. With the system, surgeons are able to map the exact location of brain tumours and cut out all of the cancer. Immediately following surgery, the patient remains on the operating table while they are re-

checked with the IMRIS system to verify that all cancerous tissue has been removed. The technology has drastically reduced the incidence of repeat surgeries. IMRIS is a spin-off from the NRC Institute for Biodiagnostics.





Genesis Genomics, NRC-IRAP client

Building the Innovation Capacity of Canada's SMEs

Canada's nearly two million small and medium-sized enterprises (SMEs) are the key drivers of job and wealth creation in all sectors of the economy. Given their major impact on the economy, efforts to raise Canada's standing as a world leader in R&D and improve economic performance must take into account the vital role of SMEs. These firms have an ongoing need to access, develop and exploit new technologies and knowledge essential for their growth and prosperity. NRC continues to help stimulate wealth creation in Canada by helping address these needs.

NRC's primary vehicle for stimulating the innovation capabilities of SMEs is the NRC Industrial Research Assistance Program (NRC-IRAP). Regarded worldwide as one of the best programs of its kind, NRC-IRAP is a vital component of NRC's innovation strategy and a cornerstone of Canada's innovation system.

This program stimulates wealth creation through technological innovation by providing technology advice, assistance and services to SMEs to help them build their innovation capacity. NRC-IRAP brings together a diverse network of organizations, services and programs to help Canadian SMEs develop and exploit

NRC-IRAP Stimulates Economic Activity

A comprehensive program evaluation completed in 2002 determined that NRC-IRAP was a highly successful program that provides the Government of Canada with significant value for money. Between 1996 and 2001, NRC-IRAP clients created slightly more than 12,000 jobs and generated approximately \$4.2 billion so far in revenue that can be attributed to NRC-IRAP assistance.

“We have directly benefited from NRC both in financial support and technically, having gained from the expertise of representatives from NRC-IRAP, the NRC Biotechnology Research Institute whose researchers provided input on chemical additive issues geared towards maximizing process efficiency, and obviously, from the Mining Wear Materials team located at the NRC Institute for Fuel Cell Innovation. Their research significantly reduced our system-critical parts cost while extending the life of each valve from one day to two years plus, thus eliminating a fundamental barrier to the commercialization and market adoption of this environmental technology (secondary wastewater management). Without NRC’s support, there is no question in my mind, this process would have died.” – John Shaw, Managing Director and Chief Financial Officer Paradigm Environmental Technologies Inc.

technologies in the competitive, global, knowledge economy. Through expert technical and business advice, financial assistance, access to business information, contacts, and national and international networks, the program provides customized solutions to some 12,000 SMEs annually.

A network of 260 highly skilled Industrial Technology Advisors (ITAs) are key to the program’s success. Experts in their field, well connected to the community and to broader knowledge and research networks, ITAs deliver customized services to help SMEs develop and exploit their potential for innovation. Through contact with ITAs, clients are plugged into NRC’s extensive networks of knowledge, experience and

contacts from “around the corner and around the globe.”

NRC-IRAP partners with over 100 Network Member (NM) organizations at the regional level and has close to 1,000 public and private sector innovation service providers within its Canadian Technology Network (CTN) – all providing advice and assistance to SMEs.

NRC-IRAP – 2002–2003 Performance Highlights

In 2002–2003, NRC-IRAP’s total level of activity was \$147 million. It provided some 12,000 firms with customized information, advice and referral services. The program’s total financial contributions to firms was \$95 million, including \$28 million in



Paradigm Environmental Technologies, NRC-IRAP client

Imascope, NRC-IRAP client



Technology Partnerships Canada funding on behalf of Industry Canada and over \$4 million in Youth Initiatives on behalf of Human Resources Development Canada. The contributions went to 2,781 SMEs engaged in nearly 3,000 innovation capacity-building projects. NRC-IRAP has benefited greatly from the contributions of Canada's regional development agencies: Atlantic Canada Opportunities Agency, Canada Economic Development for Quebec Regions, Federal Economic Development Initiative for Northern Ontario and Western Economic Diversification.

The program played a proactive role in identifying and facilitating potential SME partnerships, networks and multi-stakeholder interactions at the local, regional, national and international levels. NRC-IRAP maintains a vital and growing network that includes more than 100 of Canada's leading public and private research and technology-based organizations. Organizations collaborate with NRC-IRAP to help SMEs through Technology Advisory Services, as well as other agreements for specific collaboration initiatives. These collaborations enhance client value-added services, strengthen national/local infrastructure, extend the program's reach, and bridge gaps in the program's capabilities by creating more innovation services for SMEs. In 2002–2003, total contributions to Network Member organizations amounted to \$23 million, and NRC-IRAP contributed close to \$4 million to CTN.

NRC-IRAP Responding to SME Competitive Technology Intelligence Needs

NRC-IRAP Technology Sector Groups are teams of Industrial Technology Advisors that provide a national perspective on specific technologies. Sector groups help ensure that clients get the most from NRC-IRAP services and information networks. To extend the impact of these groups, NRC-IRAP is introducing additional competitive intelligence services tailored to specific sectors.

As part of this initiative, the NRC-IRAP Aerospace Sector Group, in partnership with NRC-IAR, launched a pilot project in 2002 focusing on composites, a growing market in aerospace manufacturing with, as yet, a small number of Canadian companies. The goal is to help aerospace companies make more strategic decisions about the technologies they should focus on, as well as to provide academia and research organizations with input for their research programs. Other collaborators include the NRC Canada Institute for Scientific and Technical Information, NRC-IMI, Canada Technology Network, and Industry Canada. It is endorsed by the Aerospace Industries Association of Canada and includes participation by industry, academia and government members of the Canadian aerospace composites community.

NRC-IRAP – A New Strategic Plan for the Future

In 2002–2003, NRC-IRAP released its new strategic plan designed to provide more benefits to SMEs. The strategy is built on a number of key elements to strengthen the program while promoting new directions to increase innovation and growth:

- ▶ More assistance, advice and funding for high-risk/high-return R&D at earlier stages – to help small firms grow to medium-size, and medium-size firms grow to large firms
- ▶ Increased efforts to create international networks and partnerships – global reach for SMEs – to help them access foreign technologies, alliances and markets via missions, visits, joint ventures, partnerships and R&D collaborations
- ▶ Promotion of SME involvement in new and emerging community innovation and technology clusters – supporting SME participation, enhancing community infrastructure for clustering, and seeking international opportunities that promote development
- ▶ A national Competitive Technology Intelligence (CTI) capacity for NRC-IRAP – to help SMEs anticipate the future and make key technology decisions sooner – keys to their growth and the creation of new jobs
- ▶ Greater focus on commercializing publicly funded R&D – encouraging collaboration between research organizations and SMEs, promoting technology exploitation by SMEs, creating receptor capacities and creating tools, programs and fora for best practices, intelligence and information exchanges



NRC-IRAP mission to Russia

NRC's Canada Institute for Scientific and Technical Information (NRC-CISTI) – Vital Knowledge Infrastructure for Canada

As Canada's science library, largest scientific publisher and leading Scientific, Technical and Medical (STM) information dissemination resource, NRC-CISTI has assumed increased importance in the knowledge economy. NRC-CISTI maintains, publishes and provides access to the STM information essential to Canada's researchers. It provides access to Canadians through NRC Information Centres (NICs) across Canada as well as virtually via the Internet.

In 2002–2003, NRC-CISTI provided nearly one million documents worldwide, with some 59 percent to Canadians – 20 percent to industry, 50 percent to the academic community, 6 percent to the medical community, and 12 percent to public organizations. The NRC Research Press published close to 6,400 peer-reviewed submissions from authors in Canada and around the world in its 15 research journals.

NRC-CISTI is also adopting an integrated management approach for the development and delivery of its knowledge and information products and services. It continues to implement an innovative e-Business environment to provide access to and extend the reach of its information products and services. The resulting e-Infostructure is quickly changing the way NRC-CISTI manages and distributes STM information.

NRC Research Press

NRC Research Press publishes scientific and medical information of the highest quality, an accomplishment which earned the attention of the U.S.-based Chemical Abstracts Service (CAS). CAS, which tracks most-requested articles, formally recognized the NRC Research Press *Canadian Journal of Chemistry*. A paper published in the journal by Dr. Robert Franzen of Tampere University of Technology in Finland was among the most requested papers handled by CAS.

Designed to store and make accessible the world's e-Infostructure, this is an important building block for a future national digital STM information network.

NRC-CISTI has also been instrumental in the Federal Science eLibrary, an initiative of the Strategic Alliance of Federal Science and Technology Libraries (the libraries of six federal science departments) to deliver electronic STM research journals directly to the desktops of the 20,000 federal government scientists and researchers across Canada. The Federal Science eLibrary will increase the number of key STM electronic journals that are available to scientists at their desktops, realize economies in cost and information reach, and promote inter-disciplinary and inter-departmental collaborations.

In conjunction with NRC-IRAP, NRC-CISTI extended its outreach to SMEs and industry associations, and will offer new services such

as competitive intelligence, technology roadmapping and technology forecasting information services.

NRC-CISTI renewed its agreement with Nortel Networks to operate the Nortel Optical Knowledge Centre. Staffed by an NRC-CISTI information specialist, the centre provides Nortel staff with access to essential information resources. NRC-CISTI is looking at this unique operating arrangement as a model for services to other Canadian companies.

The program's support of NRC's community technology cluster agenda continued in 2002–2003, with initiatives underway

to open NICs in Atlantic Canada (New Brunswick and Prince Edward Island), at the National Institute for Nanotechnology in Edmonton and at the new NRC-IAR Aerospace Manufacturing Technology Centre in Montréal. Also in Montréal, NRC-CISTI set up a public access computer room for the use of companies located in the Industry Partnership Facility at the NRC Biotechnology Research Institute. A new NIC was also created to service researchers and partners in the new NRC Aluminium Technology Centre (NRC-ATC) in Ville Saguenay, Quebec. The NRC-ATC is an initiative of the NRC Industrial Materials Institute.

