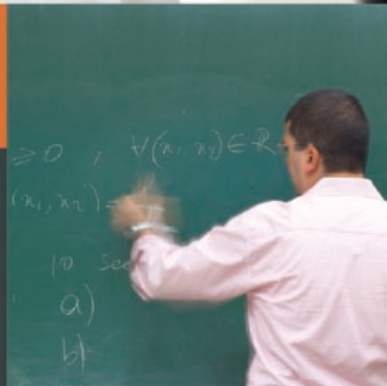


Annual Report 06/07

The Winning Advantage



Networks of
Centres of
Excellence

The Networks of Centres of Excellence

Annual Report 2006-07

The Winning Advantage

We live in a great country. Rich in natural, energy and human resources, Canada has achieved one of the highest standards of living in the world, according to the United Nations' Human Development Index.

Despite the seismic shifts brought about by globalization, our country has emerged as an important player in the world economy. Canada has one of the strongest economies in the G7 nations. We rank 1st in the G7 and second in the Organisation for Economic Co-operation and Development in expenditures on R&D in the higher education sector. Canada has much to celebrate.

However, we cannot afford to rest on our laurels. In a world in which economies are evolving, climates are changing, security is threatened, and health care systems are under increasing pressure, Canada needs to maximize the use of all of its resources to preserve its prosperity and maintain its pride of place on the world stage.

The Networks of Centres of Excellence (NCE) Program is a unique approach to pooling the research resources of academia, government and industry to improve Canadians' quality of life and make our economy stronger.

The Networks take an entrepreneurial approach to translating the new knowledge they generate in the natural, social and health sciences into making Canada a stronger, healthier and more prosperous country. The work they do gives Canada the advantage it needs—the scientific advantage—to thrive in a rapidly changing world.

NCE Mission

To mobilize Canada's research talent in the academic, private and public sectors and apply it to the task of developing the economy and improving the quality of life of Canadians.

The NCE Program invests in national research networks that:

- stimulate leading-edge research in areas critical to economic and social development;
- develop and retain world-class researchers in areas essential to Canada's productivity;
- create nationwide multidisciplinary and multisectoral research partnerships; and
- accelerate the exchange of research results within the Networks and the use of these results by organizations who can harness them for economic and social development.

The Networks

The NCE Program builds bonds between researchers and partners from the academic, private, public and non-profit sectors. By working together cooperatively, experts in a variety of fields give Canada the scientific advantage needed to rise to the challenges of the 21st Century

In 2006-07, the NCE Program comprised 16 networks working in four key areas of strategic importance:

Networks funded in fiscal year 2006-07

Information and communication technologies

- Canadian Institute for Photonic Innovations (CIPI)
- Geomatics for Informed Decisions (GEOIDE) Network
- Mathematics of Information Technology and Complex Systems (MITACS)

Engineering and manufacturing

- Advanced Foods and Materials Network (AFMNet)
- AUTO21 Network of Centre of Excellence
- Intelligent Sensing for Innovative Structures (ISIS Canada)

Environment and natural resources

- ArcticNet
- Canadian Water Network (CWN)
- Sustainable Forest Management (SFM) Network

Health and life sciences

- Allergy, Genes and Environment Network (AllerGen)
- Canadian Arthritis Network (CAN)
- Canadian Genetic Diseases Network (CGDN)*
- Canadian Language and Literacy Research Network (CLLRNet)
- Canadian Stroke Network (CSN)
- PrioNet Canada
- Stem Cell Network (SCN)

New Initiative NCEs

In addition to these 16 networks, the program supported five New Initiative NCEs, launched in 2005 for a four-year funding cycle:

- Canadian Design Research Network (CDRN)
- Canadian Obesity Network (CON)
- Emerging Dynamic Global Economies (EDGE) Network
- National Initiative for the Care of the Elderly (NICE)
- Promoting Relationships and Eliminating Violence Network (PREVNet)

*Funding cycle ended March 31, 2007.



THE WINNING ADVANTAGE.....	1	THE NETWORKS.....	31
MESSAGE FROM THE CHAIR.....	4	Networks at a glance	31
THE NCE PROGRAM	6	Advanced Food and Materials Network	32
Building the knowledge, people and entrepreneurial advantage	6	Allergy, Genes and Environment Network.....	34
The international advantage	8	ArcitcNet.....	36
NCE young innovators	10	Auto 21 Network of Centres of Excellence.....	38
The advantage of highly qualified personnel	12	Canadian Arthritis Network	39
A legacy of success	14	Canadian Institute for Photonic Innovations.....	41
Recognizing our advantage.....	15	Canadian Language and Literacy Research Network	43
How the NCE is governed.....	17	Canadian Stroke Network.....	44
THE YEAR'S HIGHLIGHTS	18	Canadian Water Network.....	46
How we built the scientific advantage	18	Geomatics for Informed Decisions.....	48
NCEs in the news	19	Intelligent Sensing for Innovative Structures.....	50
The advantage of partnerships: an overview	20	Mathematics of Information Technology and Advanced Systems	52
The advantage of partnerships: industry	22	PrioNet Canada	54
The advantage of knowledge translation	24	Stem Cell Network	56
The funding life cycle.....	27	Sustainable Forest Management Network.....	58
2006 NCE Annual Meeting	28	NCE New Initiatives	60
BENEFITS	29	PARTICIPATING UNIVERSITIES ...	62
Research delivering advantages to Canadians	29	Building advantages across the country	62
		British Columbia	63
		Alberta.....	64
		Saskatchewan	64
		Manitoba	64
		Ontario.....	65
		Quebec.....	66
		New Brunswick	67
		Nova Scotia	67
		Prince Edward Island.....	68
		Newfoundland and Labrador	68



Networks of
Centres of
Excellence

Message From The Chair



Welcome to the 2006-07 *Networks of Centres of Excellence (NCE) Annual Report*. This year's theme is "gaining the advantage," signifying the extra edge that the application and commercialization of excellent research gives Canada.

It has been, in so many ways, an exciting year. Not only was it marked by the impressive achievements of the individual Networks, but also by the ringing endorsement of the NCE Program from the Government of Canada. *Budget 2007* lauded the NCE Program for fostering "partnerships between research institutions, government and industry" and committed more than \$200 million to expand the program by creating new Centres of Excellence in Commercialization and Research and new Business-led NCEs. The budget also provided us with the means to create a national industrial research and

development (R&D) internship, modeled on the highly successful program established by the Mathematics of Information Technology and Complex Systems (MITACS) Network.

It is heartening to see that this government recognizes the NCE Program as a vital contributor to its "Advantage Canada" economic plan and a key player in driving science and technology (S&T) development. Our strengths in this area were also praised in a 2006 report by the Council of Canadian Academies, based on an on-line survey of 1,500 elite scientists and research administrators. Almost three-quarters of the respondents said the NCE Program is an asset for Canada's S&T efforts.

The year also saw the program extend its reach globally. We launched the International Partnership Initiative (IPI) to provide our networks with additional support to develop and enhance linkages with the best centres of excellence around the world. Over two years, \$7 million in grants is being awarded to help networks raise Canada's



profile on the world stage, provide a richer training environment for highly qualified personnel (HQP); stimulate and reinforce partnerships with foreign organizations; and enhance the sharing and dissemination of knowledge, resources and technology.

We also took time to honour our investigators whose brilliant ideas, diligence and dedication to knowledge translation are having positive impacts on Canadian life and Canada's economy. The inaugural Network Chairs' Award was given to Dr. Christian Messier of the Sustainable Forest Management (SFM) Network for his outstanding work in marrying ecological concerns with sustainable and profitable forestry practices.

And we made headlines. As the pages of this report illustrate, the NCEs were heralded in publications as local as the *Nunavut News* and as international as *Time Magazine*. From regional television stations to CNN, broadcasters covered the leading-edge scientific research the individual networks are conducting.

The year 2006-07 was as productive as it was exciting. We were successful in advancing Canada's scientific advantage in several ways:

- The NCE Program leveraged partnership cash and in-kind investments of **\$59 million**, including **\$22 million** in private-sector contributions.
- **830** companies, **333** provincial and federal government departments and agencies, **43** hospitals, **207** universities, and **584** organizations from Canada and around the world partnered in NCE activities.
- More than **6,600** researchers and HQP took part in NCE projects.
- NCE scientists filed **110** patents and published **4,309** papers in refereed journals.
- In total, **20** licences were granted or were under negotiation, while **4** spinoff companies were born.

The NCE Program gives Canada the advantages needed to improve life for its citizens and enhance its economy. It is an initiative of Industry Canada in partnership with the three federal granting agencies—the Natural Sciences and Engineering Research Council of Canada (NSERC), the Canadian Institutes of Health Research (CIHR), and the Social Sciences and Humanities Research Council of Canada (SSHRC).

I would like to take this opportunity to thank Dr. Alan Bernstein, who, having transformed the CIHR into a highly respected international model of health research, recently stepped down from his role as President. His help and guidance have been invaluable.

The NCE Program could not exist without the generous support we receive from Canada's universities, businesses, not-for-profit organizations and other levels of government. As ever, we are truly grateful for their cooperation an ongoing partnership

Dr. Suzanne Fortier

Chair, NCE Steering Committee



Networks of
Centres of
Excellence

The NCE Program

Building the knowledge, people and entrepreneurial advantage

From ideas to innovations

Canadian researchers have a proud history of groundbreaking discoveries. From the development of the long-life alkaline battery to the invention of the zipper, Canadian research—and the application of that research—has kept our country in the forefront of global innovation.

Now more than ever, there is a need to move excellent Canadian research into the marketplace, where it can solve the riddles of devastating diseases, rebuild aging infrastructure or help us come to grips with climate change.

In November 2006, the Government of Canada launched its new economic plan, “Advantage Canada.” The strategy is built on the premise that turning ideas into innovations will help Canada rise to the environmental, health and social challenges of the 21st century, while improving technological capacity and economic competitiveness.

The government reaffirmed its commitment to the NCE Program in *Budget 2007*. The budget announced a \$195-million investment over two years to create new Centres of Excellence in Commercialization and Research, as well as a \$46-million, four-year initiative to create up to five new Networks proposed and led by the private sector.

As part of the process of establishing these two new initiatives, the NCE Secretariat set up a Private Sector Advisory Board (PSAB). Made up of established leaders from the business community, the PSAB will help evaluate applications to these two programs and make recommendations to the NCE Steering Committee.

Budget 2007 also provided \$8.6 million over two years to establish a new Industrial R&D Internship Program patterned after the highly successful Mathematics of Information Technology and Complex Systems (MITACS) model.



“Science and technology are essential to the everyday lives of Canadians. They are crucial to building a prosperous economy and promoting a better quality of life across the country.”

**The Honourable
James M. Flaherty,**
Minister of Finance

The funds will be used to partner graduate students and post-doctoral fellows with Canadian companies that want help in using applied research to meet their innovation needs.

The Government of Canada set out the framework for its plan in the spring of 2007 with the publication of the strategy document, *Mobilizing Science and Technology to Canada's Advantage*. The focus is on building and enhancing three distinct Canadian advantages: the **entrepreneurial advantage**, the **knowledge advantage** and the **people advantage**.

Since 1989, the NCE Program has been turning ideas into innovations for the benefit of Canadians. This has only increased as the technological boom and the ramping-up of global competition intensified the need to:

- attract, train and retain highly qualified personnel;
- enable those people to generate new ideas; and
- engage academic, industry and public sector partners in translating those ideas into products, processes and policies that make Canada stronger.

The NCE Program is helping Canada gain the advantage it needs to protect the environment, improve the health of its citizens, make our country safer, and better manage our natural and energy resources. The NCE accomplishes that goal by building cross-country networks that link leading researchers, by encouraging a multidisciplinary approach to problem-solving and by partnering with the private and public sectors to transform great ideas into outstanding innovations.

Each of the networks in the NCE Program takes on, as a core activity, the recruitment and training of the next generation of researchers and specialists who will move society forward. Network research projects are evaluated on their capacity to incorporate training into achieving results. In this way, the NCE is building the *people advantage* into Canadian scientific and technological development.

In setting excellence as the standard for all projects undertaken under the NCE banner, the program is helping create a *knowledge advantage* that is positioning Canada to emerge as a global leader in the application of scientific advances.

And by partnering with industry to translate knowledge into better goods and services, the NCE Program is providing an *entrepreneurial advantage* that other countries have openly admired and emulated.

As this report shows, the NCE Program enhanced Canada's scientific advantage significantly throughout 2006-07 by mobilizing the best minds in academia and the private and public sectors to streamline the flow of ideas into innovations that improve quality of life and increase prosperity.



The NCE Program

The international advantage

"BSE hit Canada like a sledgehammer when the first home-grown case was discovered in May 2003. The direct impact on the Canadian economy was more than \$6 billion and the effect on individual farmers has been catastrophic. PrioNet can deliver value through our new international partnership initiative to make sure this never happens again."

Dr. Neil Cashman,
Scientific Director of
PrioNet Canada

"Canada is in a position to take not a but the major role in the allergy/asthma field internationally for years to come because of this."

Dr. Judah Denburg,
Scientific Director of AllerGen

We are all connected

In the 21st century, no country can afford to be isolated. Connectivity is the key to maintaining and improving the scientific advantage needed to succeed.

For almost two decades, the goal of the NCE Program has been to mobilize Canadian research talent in the academic, private and public sectors. Primarily, that has meant connecting experts in different fields from across Canada so they can work together. But in an increasingly globalized environment, Canada needs to be plugged-in internationally, sharing our advances with other countries and incorporating their innovations into our knowledge base. As an example, we only need to look to the North and the pressing challenge of climate change.

NCE IPI Selection Committee:

Grant Thomas (Chair) – Precarn Inc.

Tammy Bray – Oregon State University

John Clement – iCo Therapeutics Inc.

Richard D. Collin – International Centre for Collective Efficiency

Cathy Garner – Manchester: Knowledge Capital

Scott MacKnight – OCL Group

Tiago Santos Pereira – University of Coimbra

Ian Smith – École Polytechnique Fédérale de Lausanne (EPFL)

"Canada cannot get an accurate sense of the circumpolar-scale of changes happening in the Arctic by limiting ourselves to studying just the Canadian Arctic," says Dr. Louis Fortier, Scientific Director of ArcticNet. "Whether it's the Canadians, Americans or others, we all need an Arctic synthesis of what's going on. By focusing on only the Canadian Arctic, we miss half the picture."

In response to the growing demand for more international collaboration, the NCE launched the International Partnerships Initiative (IPI) in the summer of 2006 with a call for proposals from the Networks. With \$7 million available to Networks over two years, the IPI was designed to:

- raise Canada's profile on the world stage and ensure that Canada is part of international leading-edge initiatives;
- provide a richer training environment to develop highly qualified personnel with skills and awareness critical to Canadian productivity, economic growth, public policy and quality of life;
- stimulate or reinforce partnerships with foreign organizations to develop large coordinated and concerted efforts leading to economic and social impact; and
- enhance the sharing and dissemination of knowledge, resources and technology to Canada.

A selection committee reviewed the IPI applications and made funding recommendations to the NCE Steering Committee. The successful networks were awarded IPI grants in March 2007. Canada's International Development Research Centre (IDRC) has also contributed funds for projects involving developing nations.



"When the SARS epidemic hit Canada in 2003, MITACS reacted by partnering with Canada's public health agencies and universities to form the Canadian mathematical epidemiology team. If there had been an international network in place, we could have moved quickly to start sharing data between countries. Having access to the best scientists around the world means being prepared as issues and challenges arise."

Dr. Arvind Gupta,
Scientific Director of
MITACS

"The international partnership program represents tremendous possibilities to study best practices and approaches in other countries and to gain answers to questions such as how to reduce wait times in Canada."

Jonathan Riley,
Managing Director of CAN.

By reaching out to other countries for collaboration, the NCE Program is helping to build strategic partnerships to address issues of importance for Canada, further develop our domestic research community, and strengthen our scientific advantage. Already, the IPI funding has been put to good use with the following:

The Allergy, Genes and Environment Network (AllerGen), which received \$828,000 in IPI funding and \$262,000 from IDRC, has secured significant support from partners in Belgium, France, El Salvador, Sweden, Switzerland and India toward identifying new treatments and potential cures for allergic disease.

ArcticNet, which received \$815,000, is leading an initiative involving research networks from Russia, Norway, France and the United States that will provide the most comprehensive picture yet of the impact of climate change on the Arctic. It will lead to the creation of a "network of Arctic research Networks," allowing scientists to share technical expertise and data on a rapidly transforming region that has become too complex for solitary study.

The Canadian Arthritis Network (CAN) is using its \$700,000 IPI grant to strengthen linkages with world-leading arthritis institutes in the United States, England, Switzerland and Japan. CAN's goal is to discover new ways to reduce wait times for joint replacement surgery and tackle other pressing health care issues. This is the largest partnering program in the world for arthritis research and training.

Mathematics of Information Technology and Complex Systems (MITACS) is leveraging its global leadership in industrial mathematics to create an international network of elite scientists with a knack for using mathematical modeling to track the spread of a deadly pandemic or identify public infrastructure that is vulnerable to attack. MITACS, which received \$900,000 in IPI funding, is building a partnership called the International Initiative in Mathematical Modeling of

Complex Systems—with \$2.2 million in funding through contributions and in-kind support from its international partners, the Government of British Columbia, Canadian businesses and industry, and \$209,000 from the IDRC.

The National Initiative for the Care of the Elderly (NICE) is establishing an international network of scientists and practitioners specializing in geriatrics and gerontology. NICE, which received a \$160,000 IPI grant and \$240,000 from the IDRC, has recruited partners from Israel, South Africa, Hong Kong, India, Switzerland, Germany, Australia, Scotland and England.

PrioNet is using its \$1 million of IPI funding to work closely with NeuroPrion in Europe and the National Prion Disease Pathology Surveillance Center in the United States to strengthen first-line defences for preventing, diagnosing, treating, and hopefully eradicating prion diseases such as bovine spongiform encephalopathy (BSE, or mad cow disease) in cattle, Creutzfeldt-Jakob disease (CJD) in humans, and chronic wasting disease in elk, deer, moose and caribou.

The Stem Cell Network (SCN), along with strengthening the global bonds it has built through its leadership role in creating the International Consortium of Stem Cell Networks (ICSCN), is targeting about one-third of its \$995,000 IPI grant to promote professional development of Canadian trainees. Initiatives include an annual ICSCN Trainee Symposium for 20 to 24 postdoctoral fellows, as well as opportunities for students from Canada and other countries to attend training courses hosted by various ICSCN members.



The NCE Program

The NCE's young innovators

"The passion behind all my scientific endeavours is to continue to travel and explore the frontiers where science meets industry, a passion that, in recent years, has been greatly helped with support from the NCE and AFMNet."

Dr. Brett Poulis,
2006 Young Innovator
Award recipient

Different fields, same goal

How do we build a better future for Canada?

The NCE Program believes that the path to a better future is paved with superior research, effectively applied. That is why the NCE supports and honours talented young people from the natural science, social science, engineering and health fields who are already using their leadership and skills to generate health, environmental, societal and economic benefits.

The Young Innovator Awards Program was established by the NCE in 2004 to celebrate outstanding work by scientists who, while still in the early days of their careers, are already making waves. Award recipients are selected by a panel of judges on the basis of the overall excellence, leadership and vision of the nominee.

The 2006 winners, Drs. Marlene Bagatto and Brett Poulis, come from very different fields. The former is an audiologist working with young children, the latter a biologist specializing in old trees. Both are applying world-class research to real-life challenges.

Dr. Marlene Bagatto

The earlier a child can begin developing and acquiring new skills, the better chance he or she has at mastering them.

The reverse is also true, of course. Often, young children with hearing disabilities are unable to use verbal and other audio cues to piece together the first steps toward speaking. Because tiny tots are difficult to assess and fit with hearing aids, children with hearing disabilities often get a late start on learning how to talk.

"The critical time for learning speech and language is between birth and two years old," says Dr. Bagatto. "Our targets are to have the infant's hearing assessment done by three months and the hearing aid in place by six months."

Dr. Bagatto, whose work at the National Centre for Audiology (NCA) at the University of Western Ontario has been supported by the Canadian Language and Literacy Research Network since 2001, developed a set of normative data for infants' ears and their ability to perceive sound. These data, called the Real-Ear-to-Coupler Difference (RECD) are now a part of many clinicians' software-based testing algorithms.

Dr. Bagatto has also developed a new type of probe to measure reliable RECD data. These advances are helping clinicians assess hearing disabilities earlier than ever, giving children a better chance to build their language skills.

Dr. Brett Poulis

What is the connection between age-old evergreens and good health?

To Dr. Brett Poulis, a former forest firefighter turned forest scientist, it's a matter of applying breakthroughs in one field toward advances in another.

"My research in the plant world has been on the ability of the plant to defend itself against pathogens," Dr. Poulis told the *Victoria Times-Colonist* upon winning his NCE Young Innovator Award. "It was always in the back of my mind that this can be applied to human health."



Dr. Poulis was seeking an answer to an old mystery: How do Douglas firs and other conifers, which can live for centuries, manage to protect themselves from microbial infection? He and his collaborators found that the trees secrete antimicrobial substances that trap germs, fighting off infection.

Dr. Poulis wanted to see how this knowledge might be applied to improve human health by developing innovative medical products such as antibiotics and topical antibacterial and antifungal creams.

With help from the Advanced Food and Materials Network (AFMNet)'s Research to Business Program and the university's technology transfer office, Dr. Poulis and his partners founded FloraPure BioSciences Inc., a biotech company committed to developing commercially viable processes for producing and purifying the antimicrobial compounds.



The NCE Program

The advantage of highly qualified personnel

"My MITACS internship provided me with valuable tools necessary to perform much more sophisticated simulations of drug processes in the body than were previously possible. It also enabled me to probe my thesis topic in greater depth... Not only did this internship expand the scope of my PhD research, it presented me with new tools and a collaboration that will provide me with many opportunities for the future.

Rebecca Marsh,
MITACS intern,
University of Alberta

A continual infusion of fresh ideas

Dr. Allen Eaves, President of StemCell Technologies Inc., understands the need for industries involved in leading-edge science to have access to fresh, new ideas generated by highly qualified personnel (HQP). This makes the NCE Program particularly important to his thriving British Columbia based company.

When 25 young researchers gathered in Vancouver in the fall of 2006 for four days of lectures and lab sessions organized by the Stem Cell Network (SCN), Dr. Eaves' company was keen to partner with the NCE to support the event.

"StemCell Technologies sees students and postdocs trained within SCN-member labs as a great source of future talent for the company," notes Dr. Eaves.

Because of the NCE Program, Canada's universities, governments and private sector employers can tap into a rich resource of young, talented researchers. By involving trainees in all aspects of their endeavours and encouraging them to hone their skills and build their careers in Canada, the networks nurture the next generation of researchers who can give the country the advantage it needs to compete head-to-head internationally. Here are three examples of how this is being done:

The Allergy, Genes and Environment Network (AllerGen) held its first Annual Trainee Symposium, "Advancing Professional Excellence," in the spring of 2006, and provided 39 trainees with professional development activities. The results were overwhelmingly positive: in a post-conference survey, 91.6 per cent of the trainees rated their experience as good or excellent.

2007 saw the launch of the PrioNet Student and Young Professional Association (SYPA) to promote collaboration and networking between students, postdoctoral fellows, technicians, research assistants, and research associates working on prion research and related sciences in Canada.

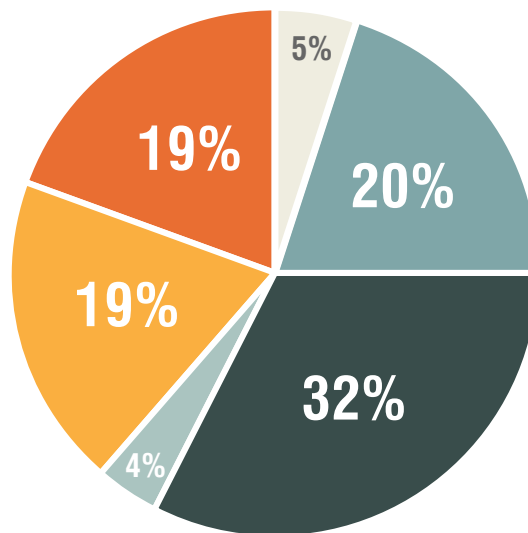
Geomatics for Informed Decisions Network (GEOIDE) hosted a Summer School program in Calgary for 55 trainees from Canada and abroad. GEOIDE invited ArcticNet graduate student Lisa Loseto to talk about the how the two Networks' research overlaps.

Highly qualified personnel bring new ideas, novel approaches and enthusiasm to solving problems. In 2006-07, the NCE Program supported **2,428** research staff (research associates and technicians) and research trainees (postdoctoral fellows, graduate and undergraduate students). Another **2,574** were involved in NCE project work while being supported by other funding sources.



Fiscal Year 2006-07

POST-NETWORK EMPLOYMENT BY SECTOR



- University 32%
- Industry 20%
- Outside Canada 19%
- Unemployed/unknown 19%
- Other 4%
- Government 5%



The NCE Program

A legacy of success

"The CGDN sets the gold standard for an interactive research programme in human genetics, for collaborative graduate and postgraduate training in genetics and for implementing process for the transfer of research and biotechnology to the private sector."

**International Review
Panel, 2001**

The Canadian Genetic Diseases Network

How do you measure success?

By any criterion, the Canadian Genetic Diseases Network (CGDN) surpassed its early promise to encourage leading-edge research into human genetic disease and create strategic partnerships to commercialize discoveries.

Having completed 14 years of full NCE funding and two years of Research Management Funding, the CGDN stands as a model of how successful a network can be.

Through its efforts, Canadian scientists have led the way in identifying or locating genes linked to dozens of diseases. The CGDN's team of investigators is responsible for more genetic discoveries than any other organization in the world.

Several leading biotech firms—including Xenon, Aspreva and Aegea—can trace their roots to the CGDN and its labs. These companies provide hundreds of high-skill jobs and have attracted hundreds of millions of dollars in investments.

Many world-class research facilities—including the Centre of Molecular Medicine and Therapeutics in Vancouver, the Centre for Applied Genomics in Toronto, and the Apoptosis Research Centre in Ottawa—exist because of the CGDN's encouragement and support.

Canada has a cross-country collection of centres of expertise in DNA sequence analysis, genotyping and familial disease analysis and other areas of genetic investigation because of the CGDN's efforts in organizing their creation and encouraging the inter-laboratory cooperation required for their success.

The CGDN has provided a Canadian solution to the worldwide shortage of bioinformaticians—scientists who have taken biology into the digital world—by initiating a globally respected bioinformatics certificate program that has evolved into an industry-sponsored, self-supporting entity.

Perhaps most importantly, the CGDN has been the driving force behind a major culture shift among genetic scientists. It brought an end to the old model in which individual researchers, working largely in isolation, competed against each other for research grants and places in peer-reviewed publications.

"The Network was the key catalyst in the transformation of a culture of isolation into a culture of cooperation," says Dr. Michael Hayden, the Network's long-time scientific director and now its CEO. "There was a shift in perspective in the sense that your colleagues' success, wherever they were in the country, became your success. We shifted from looking into our own labs to recognition that you were part of a country. It was a national effort in team-building. We built teams across this country to take on the world."

The CGDN also changed scientists' attitudes about reaching out to industry to develop their discoveries.

"A clear relationship was established between research and health and wealth creation," says Dr. Hayden. "Suddenly, there was an opportunity to think about how you could take research findings and translate them and transform them into products and services for patients. It was a profound change."

As the CGDN, one of the original 15 NCEs, manages its transition to self-sustainability, it will be building upon a brilliant legacy.



The NCE Program

Recognizing our advantage

The NCE Program earned considerable recognition in 2006-07, from having the Government of Canada hold up the Mathematics of Information Technology and Complex Systems (MITACS) internship program as a model for successfully engaging the country's best young minds with industry, to being cited as key player in the country's science and technology (S&T) development.

The NCE Program is proud to receive such recognition, largely because it helps shine a brighter light on the networks' managers, scientists and investigators who are doing so much to improve life for so many Canadians.

The state of science and technology in Canada

Since its beginnings almost 20 years ago, the NCE Program has brought scientists from a number of different backgrounds and perspectives to work together towards common goals. This past year, those efforts were acknowledged in the largest and most comprehensive S&T survey ever conducted in Canada.

The on-line survey of 1,500 elite scientists and research administrators from academia, government and industry forms the basis of the September 2006 report, *The State of Science and Technology in Canada*, released by the Council of Canadian Academies. This report was prepared at the request of the Government of Canada to explore the country's strengths in S&T and to provide context for the policy considerations.

The NCE ranked second in its support for commercialization, thanks to the partnerships it has nurtured with outside organizations and for its support in creating spinoff companies.

The survey also included a summary of international reports on S&T that indicated the NCE Program's collaborations and networking efforts also have gained international recognition.

New NCE Chairs' Award honours investigators who make an impact

The NCE Program believes that outstanding work deserves national recognition.

Network investigators, who through their diligence and determination develop better ways of doing things, serve as an inspiration to others to try harder, go further and achieve more.

That is why, in 2006, the NCE Program inaugurated the NCE Chairs' Award. This annual award will recognize brilliant researchers who, with the support of their networks, have contributed to achieving NCE goals of mobilizing the excellence of Canada's research talent in the academic, public and private sectors, and achieved economic and social benefits for Canadians.

The honour comes with a tax-free \$15,000 award made possible through the generous contributions of the NCE Program's industrial partners, in gratitude for the significant value they derive from their ongoing collaborations with the Networks' researchers.



"It's gratifying to see that the NCE is making such an important contribution to Canadian S&T and the translation of this research into benefits for Canadian society and our economy."

Jean-Claude Gavrel,

Director of the NCE Program
Directorate

Seeing the forest for the trees

Dr. Christian Messier, the inaugural winner of the NCE Chairs' Award, didn't always see the big picture.

"As an ecologist, I was a bit arrogant in thinking that if I improve the ecological knowledge, people will change their practices. I was totally wrong," says Dr. Messier, a Sustainable Forest Management (SFM) Network investigator with the Centre for Forestry Studies at the Université du Québec à Montréal.

"The SFM Network helped me to realize that you need the social and economic elements to bring about real change in forest management. Governments and local communities aren't going to adopt your ideas if it means closing factories and losing jobs."

Seeing things in the larger context, Dr. Messier has developed a bold new approach to forest management, based on five-decades-old knowledge, that is gaining ground as way of addressing the looming timber shortage while better protecting Canada's forests and the plants and animals they shelter.

Called "functional zoning," it is also known as the TRIAD concept. The idea, according to SFM, is to divide the landscape into three zones: biodiversity and wildlife habitat reserves which exclude timber harvesting; intensive timber management areas; and extensive management areas which are managed for multiple uses.

To gauge how to use each zone most efficiently, Dr. Messier conducted a mix of laboratory and field experiments in Canada, Finland, France and Panama, using computer simulation tools to analyze data and to predict the growth patterns of native tree species.

Industry has embraced the idea and entered into partnerships with the SFM Network, because the approach could allow them to reap larger timber yields while obtaining environmental certifications—such as Forest Stewardship Council (FSC) Certification—that are so valuable in marketing their products internationally.

Dr. Messier is now working with governments, industry, native groups, conservationists and recreational users in a demonstration project involving a one-million hectare forest in central Quebec. The five-year SFM Network project, which begins in 2008, will help determine if his approach could become the standard for sustainable forest management, making Canada a world leader in protecting forests while invigorating the industry.

Dr. Messier, who plans to use the tax-free \$15,000 that comes with the award to hold a contest among high school students to promote the environmental value of trees, credits the NCE Program with leading him to investigate the application of an approach that balances industry, environmental and social concerns.

"The NCE's focus on interdisciplinary research has forced me—and I say 'forced' because I wouldn't have done it otherwise—to work with social scientists and economists, as well as hydrologists, engineers, foresters and many different groups."



The NCE Program

How the NCE is governed

Programmed for excellence

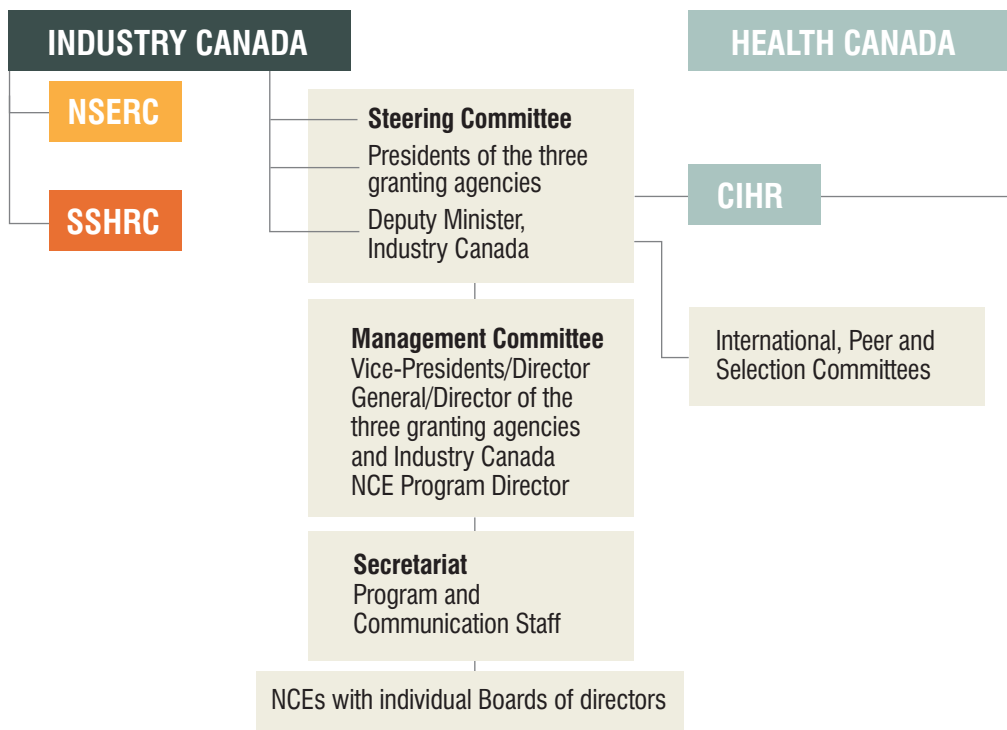
Launched in 1989, the Networks of Centres of Excellence (NCE) was made a permanent program of the Government of Canada in 1997; a commitment that was reaffirmed in the most recent federal budget when an additional \$11 million was allocated for research networks.

The NCE Program is jointly administered and funded by Canada's three federal granting agencies—the Canadian Institutes of Health Research (CIHR), the Natural Sciences and Engineering Research Council of Canada (NSERC)

and the Social Sciences and Humanities Research Council of Canada (SSHRC)—in partnership with Industry Canada.

A steering committee, comprising the presidents of the three granting agencies and the Deputy Minister of Industry Canada, manages the program. It is assisted by the NCE Management Committee, made up of the granting agencies' program vice-presidents, the Director General of Industry Canada's Innovation Policy Branch, the Director of NSERC's Policy and International Relations Division, and the NCE Program Director.

GOVERNANCE STRUCTURE





Networks of
Centres of
Excellence

The Year's Highlights

How we built the scientific advantage

Across the continuum of investigation

From developing a healthy alternative to trans fats, to helping the automotive industry save \$100 million with aluminum cast components, alloys and processes, the NCE Program did much in 2006-07 to build Canada's scientific advantage.

Whether discovering a new ocean-dwelling micro-organism, developing new techniques to identify arsenic compounds in groundwater, or explaining new thinking around the psychology of bullying in our schools, NCE investigators were active across the continuum of research activities in the natural, health and social sciences.

Areas of investigation and knowledge translation included global economics, the obesity epidemic and stem cell science. NCE investigators advanced the understanding of how the brain copes with stroke, how prion diseases like Bovine Spongiform Encephalopathy (BSE) spread, and how young children learn to read. Their work is helping build better bridges, keep our forests flourishing, and help Northerners deal with climate change and culture shifts.

By any standard, 2006-07 represents an impressive body of work by some of the best researchers in the world.



The Year's Highlights

NCEs in the news

While the individual networks in the NCE Program have outreach programs to further Canadians' understanding of science and the potential impacts and advantages it can bring to their lives, they do not seek publicity for publicity's sake. Given the leading-edge nature of their work, however, their expertise is frequently sought by the media.

In 2006-07, thousands of newspaper and magazine stories, as well as radio and television news reports, featured information supplied by NCE researchers. Their insights, accomplishments and discoveries were written about in the *Nunavut News* and the *New York Times*. Their comments were broadcast on local CBC programs and across CNN News. Their work was celebrated in the pages of *Time Magazine's* international edition and in small town newspapers. Here is a very small sampling of various Networks' presence in the press and broadcast media in 2006-07.

- **The Globe and Mail** reported on the work of **AUTO21's Dr. Jerry Sokolowski**. Technology developed by Dr. Sokolowski, his staff and students at the **University of Windsor** has improved aluminum cast components, alloys and processes, saving manufacturers about \$100 million. It is also helping to establish Windsor as the aluminum casting capital of the automotive industry.
- The media report that scientists at the **University of British Columbia, led by Advanced Foods and Materials Network (AFMNet) researcher Dr. Robert Hancock**, are developing infection-fighting therapies based on peptides—small proteins found naturally in every species that kill bacteria and regulate the immune system. Dr. Hancock, a professor of microbiology and immunology, is testing peptides against so-called superbug infections.
- **NBC News** reported on a study published in *Arthritis and Rheumatism* that shows being physically active outside of work may protect against work-related repetitive strain injury. **Canadian Arthritis Network (CAN) trainee Dr. Charles Ratzlaff** was the lead researcher for this study.
- **Les Affaires** interviewed **Canadian Institute for Photonic Innovations (CIPI) President Robert Corriveau** for a feature on knowledge transfer, citing CIPI as a proactive organization that encourages know-how and photonic technology transfer.
- The **Ottawa Citizen** profiled **Canadian Stroke Network (CSN) Scientific Director Dr. Antoine Hakim**, named winner of the **American Stroke Association's Thomas Willis Award**, an honour given to one researcher each year for outstanding lifetime achievement.
- **National Geographic**, the **Vancouver Sun** and other publications report on **ArcticNet investigator Dr. Connie Lovejoy's** role on an international team of researchers that discovered a tiny new life form in the ocean. The discovery was published in the journal *Science*.
- The **New York Times**, **Los Angeles Times**, **CNN News**, **The Washington Post**, and other media in the United States, quote **ArcticNet Scientific Director Louis Fortier** and **investigator Dr. Warwick Vincent** about a massive sheet of ice that broke clear from the coast of Ellesmere Island.
- The **Calgary Herald** interviewed **National Initiative for the Care of the Elderly (NICE) Network Manager Dr. Peter Donahue** about the Network's goals and objectives in improving care for Canada's seniors.



"My research has focused on the development of new aluminum casting technologies. Through this work we have saved Canadian manufacturers approximately \$100 million."

Dr. Jerry Sokolowski,
AUTO21 researcher and
University of Windsor
professor

*(Quoted in The Globe
and Mail in March 2007,
commenting on AUTO21's
contribution to the
development of lighter,
more efficient aluminum
automobile engines.)*

- **L'Actualité** highlighted research by **ArcticNet** investigators about understanding climate change issues.
- In a front-page story, **The Toronto Star** reports that a study led by **Stem Cell Network (SCN)** investigator **Dr. John Dick** of the **University Health Network**, represents a major step forward in discovering how cancers start. Dr. Dick's study, published in the journal *Nature*, indicates that only a small proportion of cells drive the formation of tumours associated with colon cancer.
- In a **Discovery Channel's Daily Planet** program focusing on preventative measures for natural disasters, **Intelligent Sensing for Innovative Structures (ISIS) Canada Project Leader Dr. Shamim Sheik** and two of his **University of Toronto** students show how concrete wrapped in glass or carbon fibres can withstand severe blasts from terrorist attacks or earthquakes.
- **CanWest News Service** reported on a study co-authored by **Dr. Vic Adamowicz**, a **University of Alberta** professor and research leader with **Sustainable Forest Management (SFM) Network**, showing that smoke from forest fires poses a significant health risk.
- The **National Post** reports on how a **Mathematics of Information Technology and Complex Systems (MITACS)** team's research into infectious diseases—including West Nile virus, bird flu, pandemic influenza and SARS—illustrates how mathematical modelling can provide a scientific framework to support the control and management of outbreaks.
- The **Edmonton Journal** and other Canadian newspapers report on the findings from a survey, conducted by **Promoting Relationships and Eliminating Violence Network (PREVNet)** researcher **Dr. Zopito Marini of Brock University**, suggesting a link between the likelihood of being a victim of bullying and sexual history and attractiveness.
- **The Toronto Star** reports that an **Allergy, Genes and Environment Network (AllerGen)** study of 10,000 Canadian children—which will follow them from the time their mothers are pregnant, possibly through to adulthood—could provide crucial answers to the allergies and asthma epidemic. The study, the largest of its kind in the world, will draw on the expertise of more than 170 researchers at 23 universities across Canada.
- A **Time Magazine** feature on **ArcticNet** focused on the effects of global warming in the Arctic.

The Year's Highlights

The advantage of partnerships: an overview

The power of partnerships

During 2006-07, the NCE Program's **1,597** researchers and **5,019** highly qualified personnel were involved in research relationships with **830** companies, **333** provincial and federal government departments and

agencies, **43** hospitals, **207** universities, and **584** other organizations from across Canada and around the world.

Collectively, the Networks were able to generate outside cash and in-kind investments of **\$59 million**, including **\$22 million** from the private sector companies.

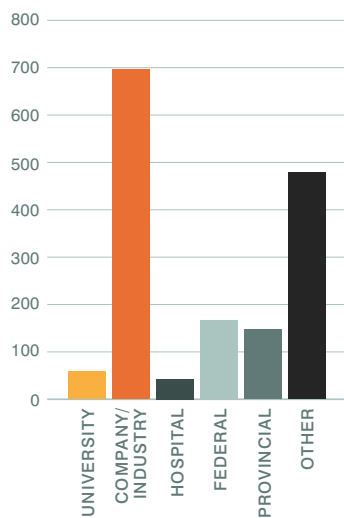


Fiscal Year 2006-07

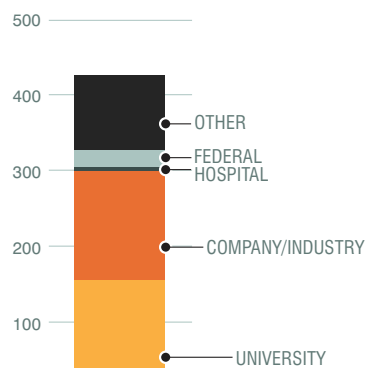
NCE PARTICIPATING ORGANIZATIONS

PROVINCE/TERRITORY	UNIVERSITY	COMPANY/ INDUSTRY	HOSPITAL	FEDERAL	PROVINCIAL	OTHER	TOTAL
NWT, Nunavut & Yukon	0	5	0	5	7	22	39
British Columbia	7	115	2	17	20	61	222
Alberta	3	72	2	7	20	46	150
Saskatchewan	2	11	0	5	6	4	28
Manitoba	2	17	0	5	15	19	58
Ontario	20	305	18	90	36	226	695
Quebec	15	128	12	24	22	70	271
New Brunswick	3	15	0	7	6	15	46
Nova Scotia	6	16	2	4	4	9	41
Prince Edward Island	1	1	0	1	2	1	6
Newfoundland & Labrador	1	6	0	6	5	7	25
Total Canadian	60	691	36	171	143	480	1,581
Total International	147	139	7	19	0	104	416
Grand Total	207	830	43	190	143	584	1,997

CANADIAN



INTERNATIONAL





The Year's Highlights

The advantage of partnerships: Industry

"The private sector has really started to believe in, and embrace, mathematical tools and methodologies. The proof is in the numbers.

MITACS has 134 industrial partners, both small and large companies, who have made significant investments in mathematical sciences research."

Dr. Arvind Gupta, CEO and Scientific Director of MITACS

How interns supplement capacity

As a global leader in information and communications technology, Alcatel-Lucent appreciates the advantage gained through partnership with the NCE Program.

"We had an idea for a project that required some pretty advanced mathematics—expertise that is in short supply in-house," says Peter Rabinovitch, Senior Research Scientist at Alcatel-Lucent Canada in Ottawa.

He called in the Mathematics of Information Technology and Complex Systems (MITACS) for help in addressing this challenge. The Network's interns are now assisting the telecommunications giant in developing new algorithms to boost network security and analyze Internet Protocol (IP) flow statistics.

Alcatel-Lucent is not alone. MITACS is partnered with five of Canada's top 10 research and development spenders, all of whom realize the Network's expertise in mathematical fields such as statistics, probability, algorithm development and simulation abilities can supplement their scientific capacity.

The MITACS internship program has, in fact, become the model for partnering graduate students and postdoctoral fellows with Canadian industries. The federal budget of March 2007 provides \$8.6 million over two years for the NCE Program to establish a new industrial R&D internship program patterned after what MITACS has accomplished to help Canadian businesses apply research to meet their innovation needs.

Partnerships with the NCE help some companies stay competitive; it aids others to launch new products. Magna Aftermarket Inc., one of Canada's largest manufacturers, introduced its new backless booster seat based on a groundbreaking study by AUTO21 researchers. Canadian Tire began selling the \$80 clek™ seat in 2006 and Magna plans to expand sales into the United States.



Fiscal Year 2006-07

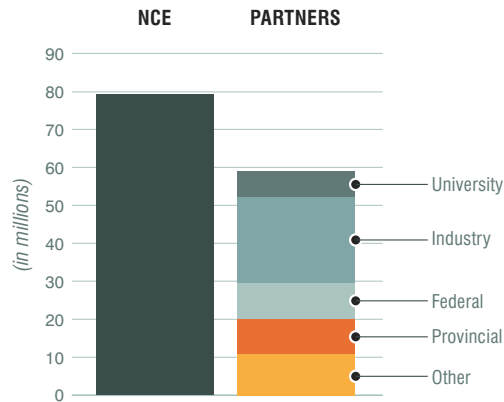
CONTRIBUTIONS TO THE NETWORKS OF CENTRES OF EXCELLENCE

SOURCE	CASH	IN KIND	TOTAL
NCE	\$ 79,500,000	\$ -	\$ 79,500,000
PARTNERS			
University	\$ 2,589,804	\$ 4,111,671	\$ 6,701,475
Industry	\$ 12,222,776	\$ 10,348,940	\$ 22,571,716
Federal	\$ 4,347,198	\$ 5,125,711	\$ 9,472,909
Provincial	\$ 7,744,749	\$ 1,710,924	\$ 9,455,673
Other	\$ 6,559,408	\$ 4,375,060	\$ 10,934,467
Partner's Total	\$ 33,463,935	\$ 25,672,306	\$ 59,136,241
Grand Total	\$ 112,963,935	\$ 25,672,306	\$ 138,636,241

Sources: NCE database; cash – org statement table

In kind – org in kind support contribution table.

* 2006-07 total contributions do not include CANVAC and CGDN, which explains a dip from previous years.





The Year's Highlights

The advantage of knowledge translation

"Most proposals to improve health care result in substantial costs to provide benefits to people. With \$8 billion in net savings, our model demonstrates that the benefits of a comprehensive stroke program far outweigh the costs. If we implement proven stroke therapies and practices across the country, the savings in lives and dollars will be significant."

Dr. Arvind Gupta,
CEO and Scientific Director
of MITACS

Putting science to work

Knowledge translation is the all-important link between discovery and development. It is the bridge between the lab and real life.

The NCE Program exists, in large part, to build that bridge. In 2006-07, the Networks' accomplishments in knowledge translation could be seen in the Canadian Stroke Network (CSN)'s initiative to encourage the implementation of best practices in stroke care at Canadian hospitals, a campaign that will save thousands of lives. They could be seen in the successful efforts of Intelligent Sensing for Innovative Structures (ISIS Canada) to have fibre-reinforced polymers included in the Canadian Highway Bridge Design Code. This will improve how new bridges are built and existing ones are repaired.

Each Network approaches knowledge translation in its own way, applying proven practices to address issues unique to its area of investigation. For example:

- The Advanced Foods and Materials Network (AFMNet) bridges the gap between invention and product through its Strategic Transition and Application of Research (STAR) Program.
- The Canadian Institute for Photonic Innovations (CIPI) has an Innovative Photonic Applications (IPA) Program that provides the funds needed to bring university research to commercial application.
- The Allergy, Genes and Environment Network (AllerGen) has funded an "intellectual property scan" to identify early-stage, break-through technologies that have commercial potential.

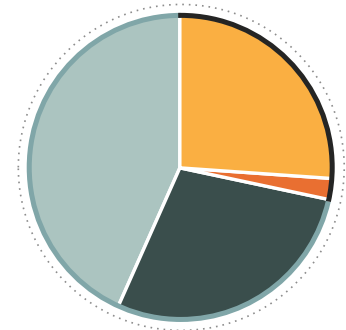
The networks' different programs share the same theme: use the advantage that multidisciplinary and multisectoral networking provides to turn ideas into innovations and discoveries into deliverables.



Fiscal Year 2006-07

REGIONAL DISTRIBUTION OF NCE UNIVERSITY AND NON-UNIVERSITY RESEARCHERS AND HQP* SUPPORTED BY NCE

PROVINCE/TERRITORY	NCE Researchers			HQP SUPPORTED BY NCE FUNDS	HQP SUPPORTED BY NON-NCE FUNDS	TOTAL HQP	TOTAL PERSONNEL
	UNIVERSITY	NON-UNIVERSITY	TOTAL RESEARCHERS				
NWT, Nunavut & Yukon	0	0	0	4	2	6	6
British Columbia	213	8	221	286	330	616	837
Alberta	184	0	184	324	355	678	862
Saskatchewan	32	0	32	30	29	59	91
Manitoba	43	0	43	104	36	140	183
Ontario	536	80	616	1,006	1,123	2,129	2,745
Québec	292	18	310	519	570	1,089	1,399
New Brunswick	53	0	53	52	49	101	154
Nova Scotia	70	1	71	66	59	125	196
Prince Edward Island	12	0	12	12	5	17	29
Newfoundland & Labrador	24	0	24	26	16	42	66
Total Canadian	1,459	107	1,566	2,428	2,574	5,001	6,567
Total International	13	18	31	0	18	18	49
Grand Total	1,472	125	1,597	2,428	2,592	5,019	6,616



- University 1,472
- Non-university 125
- HQP supported by NCE funds 1,597
- HQP supported by non-NCE funds 2,428
- Total researchers 2,592
- Total HQP 5,019
- Total personnel 6,616

* Highly Qualified Personnel: research staff such as research associates and technicians, and research trainees such as postdoctoral fellows, graduate students and summer students

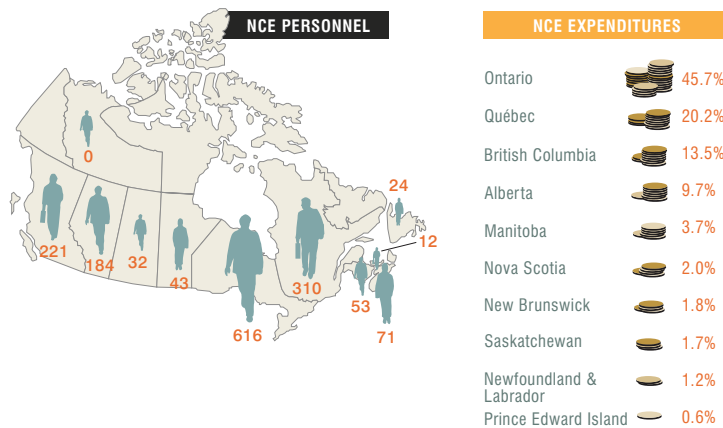


Fiscal Year 2006-07

REGIONAL DISTRIBUTION OF NCE PERSONNEL AND FUNDS

PROVINCE/TERRITORY	NCE Researchers		Highly Qualified Personnel*		NCE Expenditures	
	# TOTAL	PERCENTAGE	# TOTAL	PERCENTAGE	# TOTAL	PERCENTAGE
NWT, Nunavut & Yukon	0	0%	6	0%	\$0	0.0%
British Columbia	221	14%	616	12%	\$9,852,410	13.5%
Alberta	184	12%	678	14%	\$7,072,584	9.7%
Saskatchewan	32	2%	59	1%	\$1,235,761	1.7%
Manitoba	43	3%	140	3%	\$2,710,350	3.7%
Ontario	616	39%	2,129	42%	\$33,360,687	45.7%
Québec	310	19%	1,089	22%	\$14,742,090	20.2%
New Brunswick	53	3%	101	2%	\$1,325,915	1.8%
Nova Scotia	71	4%	125	2%	\$1,438,315	2.0%
Prince Edward Island	12	1%	17	0%	\$468,268	0.6%
Newfoundland & Labrador	24	2%	42	1%	\$861,204	1.2%
Total	1,566	98%	5,001	100%	\$73,067,584	100%
Total Foreign	31	2%	18	0%	\$0	0.0%
Grand Total	1,597	100%	5,019	100%	\$73,067,584	100%

* Highly Qualified Personnel means research staff such as research associates and technicians, and research trainees such as postdoctoral fellows, graduate students and summer students





The Year's Highlights

The funding life cycle

In order to ensure excellence, each network in the NCE Program is reviewed at regular intervals. Budgets and funding levels for new networks are set by the NCE Steering Committee and are based on recommendations by the NCE Selection Committee. Existing networks

undergo reviews at the mid-points of their seven-year terms to make sure they are meeting the NCE Program objectives. Networks leaving the program can apply for Research Management Funding (RMF) to help them transition into sustainability.

Fiscal Year 2006-07

CURRENT NETWORK ROADMAP

NETWORKS	FUNDING PERIOD	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
CGDN	1989-2007	RC														
ISIS	1995-2009	RC	RC	RMF												
SFM	1995-2009	RC	RC	RMF												
CAN	1998-2012	RC	RC	MT	RC	RC	RMF									
GEOIDE	1998-2012	RC	RC	MT	RC	RC	RMF									
MITACS	1998-2012	RC	RC	MT	RC	RC	RMF									
CANVAC	1999-2006	***														
CSN	1999-2013	RC	RC	RC	MT	RC	RC	RMF								
CIPI	1999-2012	RC	RC	MT	RC	RC	RC	RMF								
AUTO21	2000-2008	RC	RC	RC	RC	MT	RC	RC	RMF							
CLLRNet	2000-2008	RC	RC	RC	RC	MT	RC	RC	RMF							
CWN	2000-2008	RC	RC	RC	RC	MT	RC	RC	RMF							
SCN	2003-2008	RC	RC	RC	RC	MT	RC	RC	RMF							
AFMNet	2003-2010	MT	RC	RC	RC	RC	RC	RC	MT	RC	RC	RC	RC	RC	RC	RC
ArticNet	2003-2010	MT	RC	RC	RC	RC	RC	RC	MT	RC	RC	RC	RC	RC	RC	RC
AllerGen	2004-2011	MT	RC	RC	RC	RC	RC	RC	RC	MT	RC	RC	RC	RC	RC	RC
CDRN	2005-2009	MT	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
CON	2005-2009	MT	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
EDGE	2005-2009	MT	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
NICE	2005-2009	MT	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
PREVNet	2005-2009	MT	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
Prionet	2005-2012	MT	RC	RC	RC	RC	RC	RC	RC	MT	RC	RC	RC	RC	RC	RC

- RC** Competition for renewal of last funding cycle
- MT** Mid-term review
- 1st funding cycle
- 2nd funding cycle
- RMF Funding
- *** Transitional funding
- Remaining years of eligible funding based on successful mid-term review and/or competition for renewal of last funding cycle and/or RMF.



The Year's Highlights

2006 NCE Annual Meeting

Input from industry, charities stimulates ideas

In its December 2006 annual meeting in Ottawa, the NCE Program examined how to create more value for Canadians by mobilizing research excellence. It invited some of the best minds in industry, the not-for-profit sector and government to contribute their ideas.

One of the most fundamental elements of the NCE Program—enhancing Canadians' quality of life—was explored from a number of perspectives with insights shared by Sally Brown, CEO of the Heart and Stroke Foundation of Canada; and John Davidson, founder of Jesse's Journey (a charity that has raised millions of dollars to advance research into treatments for Duchenne muscular dystrophy).

The session on enhancing the Canadian economy heard from such key industry players as Perrin Beatty, then-President and CEO of the Association of Canadian Manufacturers and Exporters; and Steven Rodgers, former Vice-President Marketing and Business Development Asia Pacific of Magna International and current Chairman of the Automotive Parts Manufacturers Association.

Along with 21 poster presentations from the networks' trainees, the annual meeting also featured the Young Innovator Awards that went to Dr. Brett Poulis of the Advanced Foods and Materials Network (AFMNet) and Dr. Marlene Bagatto of the Canadian Language and Literacy Research Network, and the inaugural NCE Chairs' Award given to Dr. Christian Messier of Sustainable Forest Management (SFM) Network for his work in innovative timber and ecosystem management.

The winners were congratulated on their successes by the Honourable Maxime Bernier, the former Minister of Industry, now Minister of Foreign Affairs.



Networks of
Centres of
Excellence

Benefits

Research delivering advantages to Canadians

Benefits

By encouraging collaborative, multidisciplinary research that links university researchers with government, not-for-profit organizations and the private sector, the NCE Program has emerged as a key contributor to expanding Canada's scientific and technological capacity. Our approach to helping researchers develop the commercial potential of their discoveries pays dividends in far-reaching ways.

Benefits for Canadians

Canadians benefit from the NCE Program every day, from the increased safety of their water supply to the improved health care they receive. By helping companies operate more efficiently and stay competitive, the NCE gives Canadian consumers ready access to the latest innovations in technology—products and services that can improve their lives. And by giving governments the advice it needs to put effective policies in place, the NCE ensures that Canadians live in a fair and forward-thinking society.

Benefits for industry

Through its private-sector partnerships and its work in encouraging the creation of spinoff companies based on investigators' research, the NCE Program has been a boon to Canadian industry. The networks' annual meetings and conferences, for example, are often held in collaboration with industrial partners, facilitating a free flow of ideas between those generating new technological innovations and those who can put them to use. Such gatherings also connect trainees with prospective employers, so that industries understand they have a pool of highly qualified personnel to draw from to expand their efforts in developing new technology.



"It's not very often that you get to chat with a CEO of a company. The annual general meeting gives you that opportunity. Because it's open and informal, it's so easy for me to just walk up to anyone and inquire about future opportunities."

Poh Tan,

*PhD candidate Stem Cell
Network trainee*

Benefits for government

The NCE Program has helped Canada's three levels of government prepare policy based on the most up-to-date knowledge. Whether it involves adopting best practices in stroke care or finding the most environmentally friendly way of managing our forests, these partnerships help federal government departments, the provinces and territories, and other government agencies craft policies that enhance life for all Canadians. The NCE Program gives governments the advantage of being able to react to, and deal effectively with, the key concerns of today and tomorrow.

Benefits for research

The NCE Program has established a new way of doing science in Canada. The old model of individual researchers working independently is no longer effective. Instant communication and the rapid growth in information technology have made the exchange of ideas the new reality for moving science forward. Realizing that collaboration is crucial to scientific success, the NCE Program has built networks of knowledge exchange. By working together, scientists from across Canada and across a variety of scientific disciplines are pioneering a new way of thinking and conducting research that builds a Canadian advantage—and stands as a role model for other countries.

Managing outcomes

The NCEs must report on their activities and achievements in all areas, including excellence of research, the extent of their collaborations, the knowledge and technology transfer, and the personnel they have trained and retained. These data are collected and reported globally for the overall program in each annual report.



The Networks

Fiscal Year 2006-07

NETWORKS AT A GLANCE—2006-07

NETWORKS	FUNDING PERIOD	NCE AWARD	NETWORK RESEARCHERS*	HQP**	UNIVERSITIES***	INDUSTRIES***	GOVERNMENT DEPARTMENTS/AGENCIES AND OTHERS***	TOTAL ORGANIZATIONS***
AFMNet	2003-2008	\$ 5,559,000	96	77	33	35	29	97
AllerGen	2004-2009	\$ 5,272,000	44	60	25	39	53	117
AquaNet	1999-2006	\$ 0	105	n/a	23	6	6	35
ArcticNet	2003-2008	\$ 6,921,000	86	298	41	32	166	239
AUTO21	2000-2008	\$ 5,800,000	235	510	38	85	51	174
CAN	1998-2009	\$ 4,172,999	56	1061	36	69	79	184
CANVAC	1999-2007	\$ 3,999,490	37	n/a	8	n/a	n/a	8
CDRN	2005-2007	\$ 400,000	n/a	n/a	21	17	36	74
CGDN	1989-2007	\$ 250,000	n/a	n/a	9	6	14	29
CIPI	1999-2009	\$ 4,243,000	109	228	24	52	20	96
CLLRNet	2000-2008	\$ 3,550,000	73	107	37	14	59	110
CON	2005-2007	\$ 400,000	n/a	n/a	20	15	42	77
CSN	1999-2010	\$ 6,400,000	92	379	18	15	29	62
CWN	2000-2008	\$ 3,700,000	132	182	37	32	109	178
EDGE	2005-2007	\$ 400,000	n/a	n/a	9	11	37	57
GEOIDE	1998-2009	\$ 3,511,000	121	278	46	41	68	155
IRIS	1989-2006	\$ 0	n/a	42	33	135	29	197
ISIS	1995-2009	\$ 3,200,000	38	200	15	43	18	76
MITACS	1998-2009	\$ 5,846,000	191	857	47	172	114	333
NICE	2005-2008	\$ 487,512	n/a	n/a	16	1	16	33
PREVNet	2005-2007	\$ 400,000	n/a	n/a	20	5	41	66
PrioNet	2005-2009	\$ 5,434,000	30	76	14	10	24	48
SCN	2000-2008	\$ 5,453,999	73	357	24	44	60	128
SFM	1995-2009	\$ 4,100,000	79	307	37	40	74	151
TOTALS		\$79,500,000	1597	5019	631	919	1174	2724

- * Network researchers include Canadians and internationals
- * Two networks in first year of operation, yet to fund researchers
- ** HQP: research staff (research associates and technicians) and research trainees (postdoctoral fellows, graduate and undergraduate students)
- *** including Canadian and foreign organizations
- *** If an organization participates in multiple networks, it will be counted more than once.





The Networks

Advanced Foods and Materials Network (AFMNet)

Heart-healthy treats: too good to be true?

AFMNet researcher develops healthy, solid fat for industry baking needs

We've all given in to the temptation. Standing in line at the grocery store checkout, we look at the chocolate and think: just this once won't hurt, will it? Besides, don't some studies say that chocolate is good for you? Before we know it, the clerk has scanned one through.

In moderation, sweets can be part of a balanced diet. And yes, chocolate can be good for you, especially dark chocolate, which some studies show contains anti-oxidants. However, a lot of popular snacks contain high amounts of trans fats and saturated fats, and these are harmful, even in small quantities.

To respond to consumer demand for healthier products, food companies worldwide are looking for ways to reduce or cut trans fats from many of their products. It's a challenge. Solid fats such as trans fats form a crystal structure at room temperature and provide the building blocks to create the texture, consistency and structural properties of baked products. Trans fats are also cheap to manufacture and increase the shelf-life of the final product.

Enter AFMNet researcher Alejandro Marangoni, professor in the Department of Food Science at the University of Guelph. He and his team have developed a new fat that can be used to make some of our favourite snacks. And it contains no trans fats and is low in saturated fat.

Marangoni recalls the day he watched candy bars containing the new fat come off a production line at a chocolate factory in Germany.

AFMNet Stars

With rapid technological advancement and increasing global competition, it is critical that new products and processes reach markets in a timely fashion. In February 2006, to help bridge the gap between invention and product, AFMNet created the Strategic Transition & Application of Research (STAR) Program to address the Knowledge and Technology Transfer priority. Marangoni's project is an AFMNet STAR project.

He worked in collaboration with Professor Stefan Idziak, from the Department of Physics at the University of Waterloo, and with graduates Sarah Langmaid, Brittany Huschka, and Carolyn Challacombe. Commercialization is led by Steve Bernet and Robert Plummer of Coagel Corporation.

The STAR Program focuses on emerging areas related to foods and bio-materials research. It supports proof-of-principle and knowledge-mobilization projects that are beneficial and relevant to the social and economic health of Canada. This rigorous program features industrially focused arm's-length review and rapid turnaround times. It is open to AFMNet and non-AFMNet researchers.



“Now that’s cool,” says Marangoni. “Trans fats are a public health concern and now we’ve come up with a healthier alternative.”

Marangoni knew that to be viable, his fat would need to have the same properties as conventional fats. So, beginning with standard canola and soybean oils, his challenge was to find a way to make these oils solid at room temperature. It turns out that part of the solution, emulsifiers, are already widely used in the food industry.

Emulsifiers are commonly used in food products to mix together two substances that wouldn’t otherwise combine. Marangoni used a particular emulsifier and learned how to combine and mix the vegetable oil, water, monoglycerides and fatty acids to form a gel that has the same properties as trans and saturated fats. Though its structure is very different, it works extremely well as a bakery shortening, making fabulously flaky pie crust and great tasting cookies.

However, Marangoni learned that a straight one-to-one substitution ratio doesn’t always work. He hired three recent graduates from the University of Guelph to experiment with the substance in typical baking applications to find substitution ratios that will achieve the same taste, texture and consistency of the more conventional sources of fat.

The shortening alternative can also make batter stickier and address a problem that’s hounded cookie bakers for years: chocolate chips that sometimes fall out or break off. The stickier batter helps hold the chocolate chips in. Producers can reduce the number of chips they use by 40 percent because fewer fall out on the assembly line.

“This has saved Canadian manufacturer Tasty Selections millions,” Marangoni notes.

The shortening alternative has bridged the gap between invention and commercial product. Some trans-fat-free treats are already available on A&P store shelves.

www.afmnet.ca



The Networks

Allergy, Genes and Environment Network (AllerGen)

AllerGen helping to solve allergy puzzle

Research sheds light on genes that make Canadians vulnerable to allergies and asthma

A research project by AllerGen investigators has yielded valuable information on the genetic piece of the complicated allergy and asthma “puzzle” — a puzzle involving the way genes and the environment interact to cause allergic and related immune diseases.

Validation of genetic associations in allergies and asthma in Canadian families is one of the studies funded in the first two years of AllerGen, the Allergy, Genes and Environment Network. The findings from this project support other important network research, with the ultimate aim of improving diagnosis, treatment and prevention of allergic disease.

Principal investigators Dr. Peter Paré from the University of British Columbia and Dr. Thomas Hudson, formerly of McGill University and now heading the Ontario Institute for Cancer Research, undertook the project within the context of an integrated research program focusing on gene-environment interactions. They wanted to learn more about specific genes and genetic variations that make people more susceptible to developing allergies and asthma, particularly in Canadian populations.

The need to decode the multiple genetic and environmental factors that determine who develops allergic disease is growing more urgent. The number of Canadians suffering from asthma, hay fever, eczema and food allergies has reached unprecedented levels. For example, 11.7% of Canadian children aged 12 to 19 have asthma, a number that has quadrupled in the past 20 years.

Scientists know some people are more susceptible to developing allergies and asthma because of their genetic makeup. But DNA alone is not destiny; the environment also plays a role. A person may have a genetic vulnerability but doesn't develop disease because they aren't exposed to risks in the environment such as pets, air pollution or maternal smoking. Someone else may be exposed to a risky environment but because of their genes, are protected from developing allergic diseases.

One key to unravelling these interactions is confirming which genes are involved. AllerGen researchers assessed major international studies that identified more than 100 genes with some association with allergy and asthma. They decided to examine 97 of them.

“We had two aims,” says Dr. Paré. “We wanted to validate or refute genes that had previously been associated with allergic disease, and we wanted to find out which of those 100 genes might be associated with allergy in Canadians.” Research has shown that in multiple-gene disorders, like allergic disease, different genes are involved in different population groups.

The power of AllerGen's networking structure prompted investigators to envision bringing together excellent Canadian population samples in a single project. Three earlier studies on allergy and asthma had involved collection of DNA: a family-based study in Chicoutimi, Quebec; a study of mothers and children from Winnipeg and Vancouver; and research with parents and their children from Manitoba. To add to the power of the research, they also collaborated with Australian researchers, using data from an Australian town that has been the subject of a population health study for 25 years.



“With all four samples combined, we had DNA from close to 6,000 people who had been studied for allergies and asthma,” he says. “We looked at all the previously recorded genes to see how many we could replicate.”

The complex analysis was done by two AllerGen members: Dr. Denise Daley, a genetic epidemiologist, and Dr. Mathieu Lemire a statistical geneticist, both rising stars in the field.

The investigators looked for gene associations in each of the population groups and those that occurred across all four cohorts. They found that 13 out of the 97 genes were associated with allergic disease in all four groups.

“It’s all about statistical power. These are important findings indicating these 13 specific genes have a strong effect on susceptibility.”

Dr. Paré says this could mean that the other 84 genes tested were either “false positives” or are not as important in affecting whether or not someone is susceptible to allergies and asthma.

These results provide important information that will be integrated into several other AllerGen research projects. This includes ongoing work by Dr. Scott Tebbutt to develop a rapid diagnostic test to determine if people have the genes that could cause asthma or allergy.

These new findings will also help researchers study how environmental triggers interact with these particular genes. A number of Year 3 and Year 4 projects in AllerGen will focus on environmental factors, including one that will determine if testing house dust can produce a measurement of exposure to traffic-related pollution, and another that will test the influence of maternal stress during pregnancy on development of allergic disease in children.

All of this research feeds into AllerGen’s development of a large national birth cohort study that plans to examine the causes and development of asthma and allergy from birth through early childhood. When funded, the national birth cohort study will follow 5,000 Canadian children through the first five years of their lives. By collecting data on multiple risk factors, both genetic and environmental, this study has the potential to address all aspects of diagnosis, treatment and policy for allergic/immune diseases.

“Ultimately, what will we do with all this information?” asks Dr. Paré. “We hope that eventually we will be able to predict susceptibility before disease occurs and modify the environment to prevent development and progression of disease. Finding out which genes are involved will also ultimately help us develop new therapies.”

www.allergen-nce.ca



The Networks

ArcitcNet

A ship for all seasons

“Floating lab” helps ArcitcNet connect with communities

Since its inauguration in August 2003, the Canadian research icebreaker *CCGS Amundsen* has been a major catalyst in re-energizing Canada’s Arctic research effort. The *Amundsen* has provided ArcticNet researchers, students and collaborators with three years of stable, unprecedented access to the marine and coastal Canadian Arctic. This has enabled ArcticNet to establish the long-term observational basis needed to address the broad, ecosystem-level questions raised by climate change.

On August 22, 2006, the *Amundsen* lifted anchor for its third ArcticNet expedition. Over the next 80 days, the ship would travel over 10,000 nautical miles (18,500 km) along some of the most beautiful and remote coastline in the world. The voyage involved over 90 researchers, students and other partners.

Thanks to funding from ArcitcNet partners, the ship left port fitted with a new dynamic positioning system—the only one of its kind in Canada. The new retractable azimuth thrusters can rotate in any direction, enhancing the *Amundsen’s* propulsion system and allowing the ship to reach and maintain extremely precise positions.

“The *Amundsen* has made Canada a world leader in the field of Arctic research,” says Dr. Phillipson, President and CEO of the Canada Foundation for Innovation and an observer-member of the NCE Steering Committee. “The multidisciplinary research made possible by the *Amundsen* allows Canada to develop effective strategies and policies surrounding critical issues such as climate change, Arctic ecology, and the health of our northern communities.”

Ocean properties, bathymetry, seabed geophysical characteristics, zooplankton abundance and fish distribution were

monitored continuously using onboard instrumentation. ArcticNet scientists redeployed oceanographic moorings and took samples at over 150 oceanographic stations.

For the first time, the CSL Heron hydrographic launch was routinely deployed from the *Amundsen* to conduct seabed geophysical mapping and habitat characterization of shallow, coastal waters. The two vessels were used as part of a new collaborative project between ArcticNet and Parks Canada to create the first nearly complete map of the uncharted waters of Oliver Sound in Sirmilik National Park, NU and of Nachvak fjord in the Torngat Mountains National Park, NL.

The project is designed to address Parks Canada’s ecological integrity monitoring program. The mapping will lead to the development of indicators and targets of ecological integrity and to design protocols for long-term monitoring of these fjord-based marine ecosystems.

The combined profiling capabilities of the vessels are also being used to expand our knowledge of depth readings and underwater hazards in the shallow channels of the Northwest Passage. This will help Canada prepare for the potential opening of the Passage to navigation and exploitation.

But the *Amundsen* isn’t just about collecting hard, cold data. The ship is also helping ArcticNet build closer connections with Arctic communities, supporting the network’s vision of “research for Northerners by Northerners.”



Qarmartalik School is a K-12 school located 880 km north of the Arctic Circle in Resolute Bay, NU. Through its outreach program, the school has developed partnerships with local organizations, universities, and national and international companies.

“These partnerships provide an opportunity to expose and educate our students to scientific research and discoveries, natural resources, and future means of employment in their community and beyond,” says Tracey MacMillan, the school’s outreach coordinator.

The school’s newest partnership is with ArcticNet. Network researchers have paid a series of visits to the school and made presentations to the students.

“Qarmartalik School has an educational philosophy based on the principles of Inuit Qaujimagatuqangit (societal values),” says MacMillan. “These values are respect and building relationships, teamwork and consensus, collaboration, inclusion, shared understanding, environmental stewardship, knowledge acquisition and service. These principles comprise the values, beliefs, traditions, and mores of the Inuit people. The formation of our partnership with ArcticNet supports these facets of Inuit Qaujimagatuqangit.”

During a meeting with MacMillan and Principal Brian Manning, Dr. Warwick Vincent from Université Laval and his team discussed how to include the students of Qarmartalik School in ArcticNet and the 2007 International Polar Year science programs. One of these ideas was to invite all the students from grades three to 12 and their teacher on board the *CCGS Amundsen* when it paid a visit to Resolute Bay during its 2006 fall expedition.

After boarding the ship, students received guided tours. ArcticNet scientists explained the science labs, research, and experiments.

“The students immensely enjoyed this experience and it greatly stimulated their interest in science,” says MacMillan.

That evening, Inuit Elders from the Resolute Bay community, who play an important role in the school’s education program, were welcomed aboard for dinner. They shared their knowledge and experience with the scientists and in return learned more about ArcticNet.

“At Qarmartalik School, we want to provide our students with a well-rounded education,” says MacMillan. “Exposure to researchers is a valuable experience and we look forward to ongoing exchanges.”

www.arcticnet.ca



The Networks

AUTO21 Network of Centre of Excellence

AUTO21 gives child car seat safety a boost

New seat "designed for kids, engineered for parents"

A groundbreaking study by AUTO21 researchers has helped one of Canada's largest manufacturers design a new backless booster seat for children.

Canadian Tire began selling the new \$80 clek™ seat in September 2006 in more than 400 stores across Canada. The manufacturer, Magna Aftermarket Inc., plans to expand sales into the United States market next year.

"Between 90 and 100 children in Canada never get to Grade 5 because they don't survive road crashes," says Dr. Anne Snowdon, the University of Windsor professor of nursing who led the AUTO21 project. "If we got every kid in Canada into the right car seat for their height and weight, the death rate of children in Canada would go down by 71 per cent."

Automobile accidents are the leading cause of death among North American children. Yet AUTO21's research found that more than 70 per cent of children between the ages of four and nine don't use booster seats already on the market. More than three-quarters of parents do not regularly use booster seats because they believe their children are too big, don't need one or are too old for one, according to an AUTO21-funded study.

Nearly 30 experts from academia, clinical medicine and government participated in the nation-wide study, along with dozens of graduate students. The team surveyed about 20,000 Ontario parents in the Windsor-Essex area on their knowledge and use of safety seats.

Moving children from baby seats directly into seat belts can have lethal consequences. A common injury is "jack-knifing", when the child's head and shoulders are violently

thrown forward. Another injury, "seatbelt syndrome" occurs when the lap belt pulls across the tender part of the child's abdomen, causing internal injuries

"The biggest problem parents face with booster seats is that many kids say they're uncomfortable and too babyish," says Christopher Lumley, Vice President of Magna Aftermarket in Concord, ON. "Through their work with parents and children, AUTO21 researchers were able to help our design team come up with a product that meets the safety criteria of parents and the interests of children. What makes this seat so special is the enthusiastic response from children. Not only are they no longer embarrassed to sit in their seat, they are rather excited about their cleks."

Ontario introduced legislation in September 2005 making it mandatory for anyone transporting children to ensure they are properly secured in the appropriate seat. Booster seats are required for children under the age of eight, weighing 18-36 kilograms (40-80 lbs) and standing less than 145 cm (4' 9") tall. Similar laws have come into effect in Quebec and Nova Scotia. Other provinces are expected to follow suit.

By designing a safer booster seat that is convenient for parents and appealing to children, AUTO21 researchers say dozens of young lives could be saved each year, and thousands of other children can be spared debilitating head, neck and spinal cord injuries.

"I doubt this would have been the first product Magna Aftermarket would have launched had it not been for AUTO21," says Mr. Lumley. "AUTO21 did a lot of our upfront work in terms of market research. Also, this product happened to come along as we were discussing a relationship with Canadian Tire so the timing was perfect. I hope we have an opportunity to work with AUTO21 again in the future."

www.auto21.ca



The Networks

Canadian Arthritis Network (CAN)

Sharing the wealth

A decade's worth of collaborative research on finding a cure for arthritis has seeded ideas, products, spin-off companies and a new mind-set about results.

To the outsider, which research model most accurately mimics osteoarthritis hardly seems the stuff of bitter debate. Yet when the Canadian Arthritis Network (CAN) invited over 160 leading Canadian and international scientists, industry representatives and patients to a ground-breaking conference on the subject, consensus proved elusive. However, delegates did leave armed with useful guidelines.

With no decision on the horizon, technology may help to speed the process. In addition to the resources already provided in a secure web environment dedicated to the conference, delegates will be able to continue their heated dialogue on-line via a discussion forum.

"The forum is a better mousetrap," says Stacey Johnson, CAN's Director of Communications. "Instead of emailing one person directly, it's a more interactive way of sharing information and getting feedback. Research doesn't happen in isolation any more. CAN hopes that if the delegates keep talking to each other, they'll eventually reach consensus. And we're happy to facilitate that effort."

The Canadian Rheumatology Research Consortium (an organization supported by CAN) and the Ontario Institute for Cancer Research are also sharing information in a whole new way by spearheading the formation of the Network of Networks (N²) to share clinical research best practices, tools and resources between organizations.

"N² will reduce the duplication that's inherent in research by creating high quality standardized standard operating procedures and training materials for all its members," says Johnson. "Because it represents more than 200 research sites, N² has the potential to become the unified voice of the clinical research community."

CAN is the first network of its kind to involve patients. Members of the Consumer Advisory Council sit on every CAN committee, collaborate on research projects and attend all conferences and workshops.

"It's easy for researchers to forget about patients when they're looking down a microscope," says Johnson. "But when consumers share their personal experiences at our annual conference, it's a stark reminder that arthritis is real and life-changing."

Members of the Council hold their own meetings and education days with other patients, and are involved with organizations that support arthritis research and advocacy.

"They are our eyes and ears," says Johnson. "They share our information, advocate for the cause and bring key knowledge back to us."

CAN has done a good job at targeting the scientific community. Now it's directing its attention to sharing the work with more Canadians.



Networks of Centres
of Excellence

Annual Report 06/07

CAN has produced a 16-page booklet called *Research Excellence at the Canadian Arthritis Network*. Written in plain language, it contains information on the kind of research that patients can relate to, including how fatigue during the day and poor sleep at night contribute to the pain of the disease; how patients can manage their disability and adapt their working environment during the day; new technology for repairing damaged cartilage; potential new drugs; and possible alternatives to hip surgery.

“The booklet isn’t an exhaustive summary of CAN’s work,” says Johnson. “We chose these topics because they showcase how relevant CAN’s research is to patients.”

To reach a maximum number of people, CAN partnered with The Arthritis Society to distribute the booklet, which has been translated into French and Chinese. It will eventually be available in clinics, hospitals and through organizations that support arthritis research.

“Knowledge transfer and exchange is about education and accountability,” says Johnson. “When we tally up our efforts — be it towards the scientific community or towards the patient — we’re really out there, sharing what we’ve got. That’s how a cure will be found.”

www.arthritisnetwork.ca



The Networks

Canadian Institute for Photonic Innovations (CIPI)

Capturing the LED limelight for Canada

Expanding partnerships between CIPI members demonstrate how incubating projects can pave the path to innovation

Although incubation is often a slow process, the Université de Sherbrooke's Dr. Vincent Aimez and Fox Group President and CEO Bernard O'Meara are proving that it can also fast-track product enhancement. Their collaboration on LED technology might well lead to capturing international pre-eminence in several emerging markets.

For the Canadian Institute for Photonic Innovations (CIPI), incubation means identifying and approaching Canadian companies that can work with CIPI researchers to adapt and exploit a university's discoveries to address manufacturing challenges or create products.

It was their complementary resources that attracted Dr. Aimez, Director of the Centre de recherche en nanofabrication et en nanocaractérisation (CRN²) and the Fox Group to each other.

The Fox Group is the only manufacturer of light-emitting diodes (LEDs) in Canada, and one of only a handful in North America. CRN² is also unique in Canada, partly thanks to research facilities that allow rapid prototyping of opto-electronic devices. The centre boasts more than \$15 M worth of equipment in a clean room environment supported by an internationally recognized research team.

Fox President and CEO Bernard O'Meara says he already knew that CRN² had excellent facilities for studying LED devices. Quebec's thriving research community was one reason the Fox Group chose Montreal as its Canadian home. So when Dr. Aimez approached the company with a collaboration proposal, O'Meara agreed.

That proposal grew from an opportunity that arose two years ago, when CRN² hosted a world expert in semiconductor materials characterization, Australia's Dr. Mathew Phillips, as a visiting researcher.

"Dr. Phillips was working with us on ways to improve LED base materials" recalls Dr. Aimez. "Since he knew that Canada's only LED manufacturer was nearby in Montreal, we invited Fox to provide him with some of their materials. We wanted not only to study them, but to evaluate them and even suggest ways to improve their fabrication processes."

This work was supported by a CIPI-TEN grant that provided research support for 12 months.

With such a good start to their relationship, Dr. Aimez felt it was time to submit a more ambitious collaborative proposal to CIPI's competitive Innovative Photonic Applications (IPA) program. IPA provides grants for bringing university research related to the exploitation of light to commercial application.



The collaborators' IPA proposal focused on the next logical step in LED development: moving from blue LED production to LEDs that exploited the portion of the light spectrum that is invisible to the naked eye: ultraviolet (UV) light.

With this new project, CRN² and the Fox Group are adding another Canadian industrial player to their collaborative team.

"The UV LED devices that the Fox Group is manufacturing in its Montreal facility are crucial for a wide range of potential applications in various industries, including medical, homeland security, biotech and water and air sterilization, as well as pollutant-free curing techniques," says Fox's Director of Sales and Marketing, Fayçal Beydoun.

The collaboration between these companies continues because Dr. Aimez's group brings Fox the ability to measure the purity of the required semiconductor materials that are the building blocks of UV LEDs, while the Fox Group offers CRN² the production and marketing capabilities to test these advances in the real world and measure their practicality through market feedback.

Together, CIPI's support, CRN²'s scientific acumen and Fox's ability to manufacture and market better UV LEDs may capture the international limelight for several significant "made in Canada" applications.

www.cipi.ulaval.ca



The Networks

Canadian Language and Literacy Research Network (CLLRNet)

Bringing research to a fridge door near you

New calendar helps parents improve children's literacy

There's no shortage of research literature on early literacy," says Dr. Mary Ann Evans, Professor of Clinical Psychology at the University of Guelph and a researcher with the Canadian Language and Literacy Network (CLLRNet). "The problem is in getting that research out to the public."

That's why, in September 2006, CLLRNet and Invest in Kids, a national not-for-profit, introduced a 16-month calendar that translates proven research findings into fun, practical activities parents and guardians can use in everyday play with children up to age five.

"Parents don't read scientific journals," says Scott Wells, Manager of Fund Development at CLLRNet. "What good is all this research if you're not translating it into an easy-to-understand tool that parents can use?"

Researchers agree that the earlier you address language and literacy, the greater impact you will have on a child's positive development later in school and in life. "This calendar helps parents give children that head start," adds Wells.

This is the second calendar of its type published by the Network. In 2004, it distributed more than 50,000 bilingual calendars to teachers and early childhood educators across Canada and internationally. The calendar featured weekly tips and techniques that encourage conversation and peer interaction among children. The project was so successful that CLLRNet's partner, the Hanen Centre, spun it off into its own calendar for 2006.

Good reviews from CLLRNet's first calendar prompted the partnership with Invest in Kids. Research findings were coupled with good practices to create a resource specifically for parents and guardians with infants, toddlers or preschoolers. Every idea, tip and activity in the Parent-Child Literacy Calendar is based on a large body of scientific knowledge that supports adoption of such practices. The calendar was designed in a large format so busy families can keep track of soccer games, school meetings and other activities.

For each month of the calendar, research findings were paired with activities based on Comfort, Play & Teach™ – Invest in Kids' research-based framework for positive parenting. These activities help lay a foundation little ones to learn to read, write and understand.

The calendar's activities encourage development in areas such as vocabulary, phonological awareness, letter-sound correspondence, creativity, self-confidence, and fine motor development. For example, certain activities help children learn the concept of rhymes. When they hear rhymes, children learn how letter sounds can be manipulated to form different words, an ability that is crucial for learning to read.

Can a simple calendar really have an impact on children's literacy? Dr. Liane Comeau, Manager, Research & Programs at Invest in Kids., believes it can.

"You're making it easy for parents by pointing to very concrete and specific things they can do without investing in a lot of resources," she says. "It doesn't necessarily change how parents do things but it makes them act in a more deliberate way to foster their child's development."

www.cllrnet.ca



The Networks

Canadian Stroke Network (CSN)

From the lab bench to the bedside

CSN best practices revolutionizing stroke prevention and care

What if we could prevent 160,000 strokes, avert disability in 60,000 Canadians, and save \$8 billion in health care costs over 20 years?

A recent Canadian Stroke Network economic analysis backs the idea that widespread access to organized stroke care could do just that.

The Canadian Stroke Network (CSN) has developed a core set of evidence-based best practices for stroke prevention, care, rehabilitation and reintegration.

“It is an essential first step on the road to improved stroke care,” says Dr. Stephen Phillips, the director of the Acute Stroke Program at Halifax’s Queen Elizabeth II Health Sciences Centre.

Physiotherapist Alison McDonald, of the Nova Scotia Rehabilitation Centre, and Dr. Phillips co-chaired the best practices working group that developed the blueprint for optimal care across the entire stroke continuum.

“By applying best practices, we can make a tremendous difference in the lives of people affected by stroke,” McDonald notes.

Over approximately 10 months, stroke experts from across Canada held workshops and conferences, vetted recommendations with international experts and consulted key partners to define the best-practice recommendations. The recommendations cover everything from blood pressure management to brain imaging to inpatient rehabilitation and beyond.

The Canadian Stroke Strategy

Canada has long been a powerhouse of stroke research. Our contributions include the earliest clinical trials showing the benefits of taking Aspirin, laboratory efforts focused on brain repair, and the recent development of a tool to screen patients for swallowing difficulties.

Canada’s networked community of stroke researchers delivers results that cover everything from prevention to care to recovery. But while results are exciting and innovative, the value of research rests with the people who use it.

“Our best research and evidence is not always being translated to patient care,” says Debra Lynkowski, Director of the Canadian Stroke Strategy until September 2007.

The Canadian Stroke Strategy, a joint initiative of the Canadian Stroke Network and Heart and Stroke Foundation of Canada, is working to reverse that trend. The CSS is developing a how-to guide for stroke prevention, treatment and recovery.



Until now, there were no Canadian guidelines for stroke care, says Phillips. “There have been guidelines from other jurisdictions, but there wasn’t really anything specific to the Canadian health system. We took the best and most appropriate guidelines and Canadianized them.”

The working group focused on 24 recommendations that recognize the reality of the Canadian health system and are adaptable to the needs of provinces, territories and local communities.

“One of the challenges was to have something general enough to be applicable across the whole country, yet specific enough to make it practical and useful,” says Phillips. “The intent is that these recommendations will be adopted and adapted at the provincial level, the regional health board level, and at individual hospitals

Debra Lynkowski was director of the Canadian Stroke Strategy during the development of the best practices.

“We tried to zone in on those best practices that had the highest level of evidence or that we knew were vital to transforming systems and driving system change,” she says. “We wanted to look at what would have the biggest impact on patient care.”

But it was not enough to develop the recommendations. The guidelines had to get into the hands of the people who can put them to use.

“We want every front-line clinician who deals with stroke to have this,” says Dr. Patrice Lindsay, a performance and standards specialist with CSN.

Canadian Best Practice Recommendations for Stroke Care, 2006, the document resulting from the working group’s efforts, has been published on the web, in print and on CD-ROM. More than 10,000 copies have been distributed to clinicians in each province and territory.

The recommendations, says Lindsay, give people a consistent starting place. “It’s an opportunity to put all evidence-based recommendations into one package, giving people guidance, consistency and a standardized approach.”

For Teri Green, a Calgary nurse, the guidelines fill possible gaps in care.

“This really gives us the information we need to make sure we provide quality care, and provide it consistently,” says Green. “Nurses now know what to look for with their patients, and how to stay on top of the rapidly changing situations.”

www.canadianstrokenetwork.ca



The Networks

Canadian Water Network (CWN)

Taking a closer look at arsenic

New map will pinpoint arsenic levels across Canada

More than 30% of Canadians get their drinking water from groundwater, which in some communities contains very low levels of arsenic. Canadian researchers are identifying where these communities are and the potential health risks to local residents.

There is no shortage of scientific evidence linking exposure to high levels of arsenic to serious health problems, and even death. Yet little is known of the risk to humans who are exposed over the long term to low levels of this notorious poison.

“It may seem like arsenic has been studied to death, but actually we know very little about how it causes various health problems,” says Dr. Chris Le, the lead researcher on a Canadian Water Network project that is breaking new ground internationally in arsenic research.

“Partly, it’s because we didn’t have proper analytical tools to measure the effects from low-level exposure, particularly the cancer effects, notably skin, bladder and lung cancers,” he says.

Dr. Le is working with university and government collaborators in Canada and the United States on a four-year project to quantify the health risks people face from exposure to low levels of arsenic, which occur naturally in the environment. Although most Canadians are only exposed to low concentrations, under 0.005 mg/L, it’s still not clear what level of arsenic is acceptable. The Canadian guideline for arsenic is 0.010 mg/L.

One of the first outcomes of the CWN project will be an “Arsenic Map of Canada,” showing levels of arsenic in drinking water across Canada as well as population statistics. The research team is working with all levels of government to compile current data on well water and surface water. Health Canada will be able to compare the map with epidemiological studies to determine if cancer rates are higher in areas with higher concentrations of arsenic.

“We know where arsenic is for the majority of people who are exposed,” says Dr. Le, who holds a Canada Research Chair in Bioanalytical Technology and Environmental Health in the Faculty of Medicine at the University of Alberta.

“We’re now in the process of looking at smaller communities and the people who use well water. It’s fewer people but there are far more water sources to examine. We’re writing a report for the Alberta government and are working on one for Ontario and Atlantic Canada,” he adds.

A detailed map showing arsenic levels in major metropolitan areas and some smaller regions will be available later in 2007. The map will help water utilities and governments take action to reduce arsenic exposure.

People who are exposed to arsenic as well as other carcinogens may be at an increased risk of getting cancer. The reasons may be two-fold. First, when arsenic is present, the cells can absorb more benzo(a)pyrene a carcinogenic chemical found in tobacco smoke that damages them further.



CWN researchers also discovered that arsenic can inhibit or interfere with the body's natural ability to repair DNA damage in human cells, putting a person at an increased risk of developing malignant cells.

"Both of these findings are quite significant," says Dr. Le. "Usually this type of research takes a long time and we're quite pleased that we've made such significant progress in just four years."

One reason we know so little about arsenic, particularly in low concentrations, is because the analytical tools haven't existed to properly study it. Dr. Le and his colleagues Dr. William Cullen at the University of British Columbia and Dr. Kenneth Reimer at Royal Military College have developed new techniques that combine chromatography with mass spectrometry to identify new arsenic compounds beyond the 20 that are already known.

These state-of-the-art techniques, which are now being used by researchers around the world, can detect trace levels of arsenic and provide insight into how arsenic binds to other molecules.

Different arsenic species have different chemical behaviours in water. The information on what arsenic species is present in a particular source water will help water utilities determine the best process for removing arsenic.

The research has already helped Canada's largest gold mine, GoldCorp Inc. in Red Lake, Ontario, to identify arsenic compounds in their refining waste. The company's environmental engineers were trained to ensure that the correct arsenic removal processes are being implemented before the water reaches the lake.

"There's a lot of interest in North America and around the world in this research," adds Dr. Le. "For the scientific community, it increases our understanding of the mechanisms of action associated with arsenic and human health. And for public health officials, the research could lead to more informed decisions related to arsenic guidelines and treatment."

www.cwn-rce.ca



The Networks

Geomatics for Informed Decisions (GEOIDE)

Is it getting hot in here?

GEOIDE uses 3D visualizations and spatial mapping to help communities understand the impact of climate change on their lives.

For most Canadians, sweating in the middle of November isn't normal. But aside from a little unseasonable discomfort and the push to recycle more and drive less, climate change is still a fairly abstract concept for most of us. We all want to do our part for the environment. But it's hard to visualize how global climate change scenarios like melting polar ice caps, vanishing wildlife, and rising sea levels will affect us personally.

But what if you could actually see the effect these global scenarios might have on you and your community? What if you could look into the future and see how actions you take now could reduce their impact?

That's exactly what Professor Stephen Sheppard and Dr. Alison Shaw from the University of British Columbia set out to do. Through an innovative new research project, *Local Climate Change Visioning Project*, made possible through the GEOIDE Network, they are working with a team of experts to bridge the gap between global climate science and local community response.

Using geographic information systems (GIS) and 3D visualizations, they are generating realistic images that lay out four possible climate futures for local communities. These worlds project alternative carbon emissions scenarios, differences in climate change impacts, and the various responses a particular community can take to adapt to and mitigate global climate change.

Working together to help communities plan for the future

This study depended on a range of expertise and a mix of disciplines. All involved were brought together in an environment that required integrating their specialized skills to build up a cumulative picture of future conditions, something made possible through the GEOIDE Network.

"This is truly an innovative partnership model that really stretches people intellectually," notes Dr. Sheppard. "Everyone from computer specialists, to city planners, to climate change experts, to engineers from all levels of government was involved. Having this unique opportunity to network and collaborate across disciplines has been invaluable."

It's been a huge success. Calls are coming in from communities all over the continent, from Toronto to Seattle to the Arctic, all asking to see results.

"The interest and practical application of this research to communities across Canada is very encouraging," says Sheppard. "Now we hope we can spread out these highly qualified people to train others and be of service in many more communities."



Using climate projections and regional emission scenarios downscaled to a local level as a framework, these four worlds are visualized using computer simulation techniques with supporting maps, data, photographs and narratives. Together they create a compelling package of information that literally paints pictures of a community's future a powerful tool for municipal practitioners, politicians, and the local public.

"We wanted to experiment with taking global information and forcing it down to the local level to see if showing people what their communities could look like in the future under alternative scenarios would improve awareness," says Dr. Sheppard.

The research focuses on three communities in B.C.'s Lower Mainland. Each one represents a different climate challenge based on their geography: a coastal community facing rising sea levels, a mountain environment with reduced snow pack and terrain stability hazards, and an urban neighbourhood retrofitted for low-carbon lifestyles.

The first case study was done in the coastal community of Delta, B.C. Residents have always known that flooding is a huge risk to their community, but weren't sure what their options were to reduce the risk and lessen the impact when it happens. Raise seawalls? Remove a row of houses so you can build a berm? Lift up the houses? Retrofit and redesign these communities, or retreat from low-lying coastal areas?

Each option has its drawbacks. And changes like these often meet with significant local opposition because people may not understand what the benefit is to them. But showing Delta residents and government officials how each of these scenarios might manifest themselves in their community has really increased awareness of what the community can do to protect itself.

"One of the biggest benefits is that we can now show workable solutions for people who have to make hard decisions at the community level," says Dr. Sheppard.

Local behaviours and policies are often slow to change, but this study is having a galvanizing effect on community members. According to survey results, residents feel more motivated to act and want to see more policies to reduce local greenhouse gas emissions. Local government and residents know much more about actions they need to take today to protect their community tomorrow.

www.geoide.ulaval.ca



The Networks

Intelligent Sensing for Innovative Structures (ISIS Canada)

Building better bridges

New design codes rest on ISIS research

In 2006, the Canadian Standards Association (CSA) issued a revised edition of the Canadian Highway Bridge Design Code (CHBDC). For the first time, fibre reinforced polymers (FRPs) are now allowed to be used to strengthen and reinforce new or rehabilitated bridges and structures made of concrete or wood.

Getting FRPs incorporated into the bridge code has been a major focus for the Intelligent Sensing for Innovative Structures (ISIS) network. Working closely with the CSA, ISIS was instrumental in paving the way for the new provisions.

“Everything is based on work that had been done within the ISIS network,” says Dr. Kenneth Neale, Vice-President of ISIS. “We did a lot of the basic research that backs up the new stipulations.”

Of the dozen or so people who served on the CSA’s committee to evaluate the proposed inclusion, about half were ISIS members. The committee was chaired by ISIS Scientific Director Dr. Aftab Mufti.

“The code is considered to be the leading code for bridge design by engineers around the world,” adds Bala Tharmabala, vice-chair of the CHBDC technical committee.

FRPs, sometimes called fibre reinforced plastics, are polymers that are reinforced with glass or carbon fibres. Their inclusion in the code is nothing short of a paradigm shift in the way new bridges can be designed and built, and how old ones can be repaired. They mean stronger, longer-lasting structures that are able to withstand Canada’s climate and geologic extremes.

“These materials are very durable and suitable for the types of environments we have in Canada,” says Dr. Neale. “Especially in bridge structures, where a lot of de-icing salt is used.”

Strong structures, strong people

The ISIS network was created in 1995. Over the years, many hundreds of ISIS graduates helped develop and prove FRPs and are now using them in their work, whether they are researchers, consultants or engineers in the private and public sectors. Dr. Neale strongly believes in the tremendous benefits of this knowledge transfer.

“This would not have been possible without the large body of research done by ISIS, and post-graduate students played an important role in the basic research,” he says. “Having a network like this attracts the best students to do graduate work.”

That knowledge is translating into proven, effective technology that is preserving the safety and security and prolonging the life of our infrastructure.



De-icing salts wreak havoc on steel-reinforced structures. FRPs are corrosion resistant, making them ideal for Canada's harsh winters.

Originally conceived of to increase the seismic strength of buildings FRPs provide the ideal solution to many problems. In addition to their strength and ability to withstand the elements, they are also cost-effective. While the materials tend to be more expensive, they are very light and can be installed more easily than conventional materials. There are real savings in labour costs. And as FRPs are used more often and production volumes increase, the costs are coming down.

FRPs can preserve and prolong the life of our existing infrastructure. The life of bridges that were built 40 or 50 years ago and reaching the end of their lifecycle can be extended. New structures will last longer.

With the Canadian standards now entrenched, eyes are turning to the rest of the world.

"The International Standards Organization (ISO) is currently developing their standards," says Dr. Neale. "The Canadian Code will certainly have an impact on that. What we have been doing is contributing to the background knowledge in the technologies. This helps to accelerate the use of them worldwide."

www.isiscanada.com



The Networks

Mathematics of Information Technology and Advanced Systems (MITACS)

Making math cool in the business world

MITACS interns show top Canadian companies how mathematics can improve their bottom line.

Founded in 2003, the MITACS Internship Program connects organizations with some of Canada's most talented young scientists. These connections provide graduate students with the opportunity to apply their knowledge and training to actual business challenges. Meanwhile, partners get the change to try out new tools and technologies to address scientific issues vital to their organization's success.

The Mathematics of Information Technology and Advanced Systems Network promotes the use of sophisticated mathematical tools to help solve complex industrial and societal problems. In the three years since the internship program began, MITACS has placed over 250 master's students, Ph.D. candidates and post-doctoral fellows at companies, hospitals, financial institutions and other organizations across Canada. The network and the industry partner share the cost of funding an internship. This results in a \$15,000 research grant for the intern's supervisor, with a minimum of \$10,000 of the funds for the intern's stipend.

Canada's top companies are "doing the math"

A review of Canada's Top 100 Corporate Research and Development Spenders reveals that many have partnered with MITACS.

"The private sector has really started to believe in and embrace mathematical tools and methodologies," says Dr. Arvind Gupta, CEO and Scientific Director of MITACS.

"The proof is in the numbers."

MITACS has more than 130 industry partners, both small and large companies, who have made significant investments in mathematical sciences research.

MITACS' arrival on the landscape in 1999 created a new competitive opportunity that few companies realized existed—how advanced mathematics can lead to productivity and profits through increased efficiencies, cost savings and better pricing strategies.

As more traditional manufacturing jobs move to places like India and China, western countries are realizing that their greatest competitive advantage is in creating a strong knowledge-based economy. Dr. Gupta sees a strong role for mathematics in this new economy.

"We hadn't thought about this role for MITACS when we started, but in some ways, we've found the sweet spot of what society needs," he says. "There's been a huge boom in the type of things that MITACS can do for society. We've only begun to tap the number of partners who could benefit from our network."



One beneficiary has been Direct Energy, North America's largest competitive energy and services retailer.

During his four months at Direct Energy in 2005, Aaron Pratt, a Master's Degree student at the University of Calgary, designed a matrix which correlates all of Direct Energy's positions in gas and power across the locations where they do business in North America, across all time periods. This matrix is now used by Direct Energy's Canadian and U.S. divisions to help navigate energy markets. Both MITACS and Direct Energy reaped the benefits from the partnership.

"The value for industry to collaborate with academia is gaining access to the collective brainpower at the university," says Jeff Michnowski, Senior Vice-President and Chief Risk Officer for Direct Energy. "Academics approach problems from a different perspective than those of us in industry, bringing a new way of thinking about our business. It's also important for universities to get feedback from industry in terms of the types of skills companies are looking for and the challenges we are facing."

Under the MITACS Internship Program, graduate student researchers spend approximately 50% of their time over a four month-period at a company, undertaking research on a problem jointly identified by the business, MITACS and the students' supervising professors. The rest of the students' time is spent at the university, advancing their research under the guidance of their supervisors.

During his internship with Carmanah Technologies Corporation, a solar lighting and power system company in Victoria, B.C., Kiran Kumar used numerical stimulations and optimization techniques to help the company improve the brightness and uniformity of its solar-based transit and roadway signs.

"I had the opportunity to work with other engineers as well as the company's sales teams and hear from the front-line people what their customers were asking

for," says Kumar, studying for his M.Sc. in electrical engineering at the University of Victoria. "This helped to ensure that the products that we were developing addressed the needs of the marketplace."

Kumar's work was so valued that Carmanah offered him an extended contract to complete work on a new product.

The success of the MITACS internship program has been noticed in some very high places. In March 2007, when the federal government announced it was creating a new national Industrial R&D Internship program, it cited MITACS as the model.

www.mitacs.math.ca

Top 100 R&D Spenders Partner with MITACS

- 1 Nortel Networks
- 2 Bell Canada
- 6 IBM Canada Inc.
- 7 Alcan Inc.
- 9 Bombardier Aerospace
- 11 Alcatel Canada Inc.
- 15 Cognos Inc.
- 16 Telus Corp.
- 25 Hydro-Québec
- 29 Ballard Power Systems
- 92 Biomira

Source: *Canada's Top 100 Corporate R&D Spenders 2006*, RESEARCH Infosource Inc.



The Networks

PrioNet Canada

Where's the beef?

PrioNet Integrated Risk Management Framework is helping countries around the world fight mad cow disease

Mad cow disease, or bovine spongiform encephalopathy (BSE), can have critical consequences on food and health safety. In May 2003, a Canadian cow tested positive for BSE. Within hours, American borders closed to the export of Canadian cattle. Other countries soon followed. More than 1,000 animals were slaughtered and an estimated 5,000 jobs in Canada were lost. Borders reopened in 2005; however, Canada's economic loss was estimated at over \$6 billion.

At the time, Canada had a National Surveillance Program to watch for suspected cases of BSE in our country. The World Health Organization recommended that all countries implement feed bans. Canada banned certain products. But beyond that, little was being done. The 2003 crisis changed all that.

PrioNet Canada, one of the Networks of Centres of Excellence, was born out of the federal government's desire to minimize the threat of BSE, a prion disease. Prion diseases are fatal, transmissible diseases that involve the degeneration of brain tissue, and are found in both humans and animals.

Past attempts to address BSE as a human health, animal health, economic and social risk issue failed because of an incomplete approach to risk management. But thanks to a PrioNet research team led by Dr. Daniel Krewski, Professor and Director of the R. Samuel McLaughlin Centre for Population Health Risk Assessment at the University of Ottawa, Canada will soon have an integrated risk management framework for prion diseases that incorporates research, basic science, and social science into policy making.

Working Together to Control and Prevent BSE

Thanks to an extensive network of people and expertise, PrioNet Canada's Integrated Risk Management Framework for BSE has been able to incorporate data beyond standard scientific assessments of risk.

The team includes scientific members, students, and young professionals networking with academia, government, non-government organizations, and industry partners. Together they have been able to take a much broader look at the socio-economic impacts of prion diseases as well as public perception of prion disease risks to determine more effective approaches to risk management.

They evaluated the impact of psychological, social, and gender health determinants of Canadians. BSE-affected families were analyzed and lessons from regional and national experiences around the world were integrated into the policy framework. The goal is to deliver sound scientific advice that governments can use as a basis for future policies and regulations, and to develop risk mitigation strategies to address prion diseases.



“We wanted to move from the traditional ‘assess and manage’ framework that stems from reacting to BSE crises to an ‘anticipate and prevent’ strategy that prepares for managing potential BSE crises,” notes Dr. Krewski.

Risk management should have two components: a *retrospective* aspect, that is, a scientific assessment of risk factors based on knowledge gained from past experience; and a *prospective* aspect that uses this information to reduce risk, and manages options to realize this objective going forward. The crucial aspect is deciding *when* to invest in strategies to reduce consequences and *how much* to invest in any particular case.

“Based on the research, we believe that in specific circumstances, early investments in risk reduction strategies may have very large payoffs in terms of averted costs,” says Dr. Krewski.

Countries around the world are asking Canada to share its expertise. Costa Rica invited the PrioNet team to discuss their BSE risk management measures with that country’s government agencies and other stakeholders. A team of eight Canadian lecturers assembled by the Canadian International Development Agency (CIDA) included PrioNet investigators from the universities of British Columbia and Ottawa, and partners from the Public Health Agency of Canada, the Canadian Food Inspection Agency and the Canadian Cattlemen’s Association.

The course informed attendees about the risks and management techniques for their livestock herds so Costa Rica can avoid the financial and social repercussions of BSE. An exit survey, filled out by course participants, produced very high ratings.

“The idea is to take advantage of this experience to help us prepare at the national level before a possible situation like that which occurred in Canada happens, given their implications for public health and the economy in general,” stated one Costa Rican participant.

The next stop on the international stage? Edinburgh, Scotland, in September 2007, where PrioNet hosted a one-day workshop on prion disease risk management.

www.prionetcanada.ca



The Networks

Stem Cell Network

Stem Cell Network brings regenerative medicine to market

Most biotechnology companies never survive the “valley of death” between early stage research and a commercial product. Aggregate Therapeutics Inc. wants to be the exception.

The Stem Cell Network (SCN) has re-written the rule book for how to move promising new medical research out of the university lab and into the market. The network, which was founded in 2000, has launched a new company, Aggregate Therapeutics Inc. (ATI). The Ottawa-based company focuses on cellular therapies for the large regenerative medicine markets. ATI will work closely with investigators, universities and research hospitals to create a pipeline of made-in-Canada therapies that can be groomed for commercialization over the next three to 10 years.

With universities producing mostly early-stage medical research, and investors shying away from higher risk ventures, it was clear that a new type of public-private partnership was needed.

“We’ve spent over two years building a strong collaborative relationship between individual investigators, university technology transfer offices and the private sector,” says James Price, Vice President of ATI. “We’re now at the point where we have a company that is working closely with the academic community to evaluate technologies, protect their intellectual property, and help move them closer to market readiness.”

Usually, universities license new technologies to the private sector or spin off their own company. These two approaches that have produced far more failures than successes. With ATI, 37 researchers from 16 institutions are pooling their technologies and becoming shareholders in return for providing the company with unencumbered access to any existing or new intellectual property for five years.

Under the agreements, ATI gets first shot at reviewing new technologies, licensing them and working with the researchers to further develop them. The approach is designed to pool the intellectual property output of Canada’s universities and research hospitals to create a critical mass on par with some of the largest universities in the United States. It could also become a model for commercializing other types of university research.

ATI got its start with about \$3 million in public funding from the NCE Program, the Natural Sciences and Engineering Research Council of Canada, the Canadian Institutes of Health Research, Western Economic Development and Canada Economic Development for Quebec Regions. That seed funding enabled the company to evaluate nearly 50 technologies from across the country and standardize intellectual property agreements across 16 institutions. ATI has since optioned or licensed eight of those technologies and is working closely with researchers to identify the best approach for moving them from early investigation and animal model testing to the clinical trial stage, when venture capitalists are more interested.



“There is a huge wealth of technology in Canada, but it’s very early stage, and not necessarily focused on being attractive for either development or venture funding,” explains Dr. Annemarie Moseley, ATI’s CEO. “The technologies we’ve chosen are still relatively early stage, but we’ve created a strategy that we believe we can take some of these things forward quite quickly,”

A medical doctor specializing in immunology and molecular genetics, Dr. Moseley has more than 20 years experience as a biotechnology executive. She has worked extensively with companies to develop and commercialize cell therapies for AIDS, cancer and bone defects, as well as a medical device for heart failure.

ATI’s success will depend on how well it can manage and exploit the pipeline of new discoveries constantly flowing from Canada’s universities and research hospitals. Since most of this research is still early-stage and of little or no interest to private investors, Dr. Moseley says ATI works with investigators to put “more meat on the bones.” This includes working with the technology transfer offices to secure provisional patents, and advising investigators on how their particular research can be transformed into a therapeutic, a diagnostic or product for regenerative medicine.

The company is in the process of raising between \$10-\$20 million in venture financing. It has already identified novel technologies based on multi-potential cells derived from skin, pancreas and retina, as well as genetically modified cells from bone marrow. ATI expects to launch its first product, a new medical device for regenerative medicine, within five years.

“Launching a device first as opposed to a therapeutic represents a far lower risk, compared to a therapeutic which can take ten years to get to market,” says Dr. Moseley. “With revenue from our first product, we will be able to fund a second tier product, probably a cellular product, which in turn would finance our longer-term third tier product focusing on cardiovascular and stroke. And once we get to that clinical trials stage, I think you’re going to see more investors taking notice.”

www.stemcellnetwork.ca



The Networks

Sustainable Forest Management Network (SFM)

Healthy forests, healthy economies, healthy communities

SFM research is changing how forests are managed across Canada

Since its launch in 1995, the Sustainable Forest Management Network (SFMNet) has been unique in how it conducts forest sector research: across sectors, cultures, regions and academic disciplines.

Through SFM, ecologists, biologists, economists, social scientists and forest managers from industry, Aboriginal and government partners work together for the wellbeing of Canada's forests from ecological, economic and social perspectives. An abundance of research results have means the Network can share the latest scientific information with its partners. Synthesis reports and research notes provide input for forest managers to improve their practices in formats that are accessible to non-specialist audiences.

While the Network produced a wide range of research reports during 2006-2007, three were particularly noteworthy:

Dr. Christian Messier (Université du Québec à Montréal) received the 2007 NCE Board Chair's Award for his innovative simulation models. These models have the potential to ensure the sustainable management of Canada's forests, putting Canada on track to develop the world's best forestry practices: socially acceptable, ecologically viable and profitable. Dr. Messier is promoting "functional zoning," an approach that has been known in theory for sometime but has never before been attempted in practice.

Under Dr. Messier's direction, a full trial on over a million hectares of land in central Quebec will see the landscape divided into three key zones. In the first zone, most of the landscape would be set aside for ecological forestry, allowing for limited timber harvesting in a way that protects biodiversity and habitats. In the second, less than 20% of the land would be zoned for intensive

Whither Canada's forests? Looking forward to 2050

Concerns about the state of Canada's forest ecosystems are being voiced with increasing frequency. Some say our forests are being compromised to the detriment of future generations. Is this true? Are we indeed exhausting our forest resources or is Canada's forest future bright?

"Rather than attempting to predict a largely unknowable future, we can develop and explore a range of plausible scenarios," says SFM Network Scientific Director Dr. Jim Fyles. "It's like preparing an evacuation plan for an office building. Where could the fires break out, and how should we respond in each case?"

The Network's Forest Futures project, which will run through 2007 until 2009, will examine four scenarios, national in scope, which describe contrasting futures for our forests and forest sector until the year 2050. Network researchers and collaborators will analyze the scenarios to gain insights into promising policies and practices that the Network's industry, government and Aboriginal partners might adopt to promote positive outcomes.



forestry, and fast-growing native and hybrid tree species would be planted and harvested much like an agricultural crop. Finally, in the third zone, 5% to 25% of the land would be protected and free of industrial activity

This trial has the potential to help companies produce up to 15 times more cubic metres of timber per hectare per year while remaining eligible to obtain the strictest environmental certifications, such as Forest Stewardship Council (FSC) Certification.

Dr. Shashi Kant (University of Toronto), winner of the Scientific Achievement Award of the International Union of Forest Research Organizations, Ontario's Premier Research Excellence Award, and, most recently, the 2007 Canadian Forestry Scientific Achievement Award, has completed an economic analysis that demonstrates that Ontario's stumpage system performs as well as U.S. pricing systems for standing timber.

"The government controlled stumpage pricing system, if designed and revised regularly to incorporate the dynamics of wood products markets, may prove better than the market system, specifically for sustainability of forests and communities," states Dr. Kant.

Based on his economic analysis, Kant determined that Ontario did not dump softwood lumber into the U.S. market during the extended period he used for the study.

Finally, Dr. Iain Davidson-Hunt (University of Manitoba), after more than a decade of research, has come to understand why the Pikangikum people located near Red Lake, Ontario, are so tied to the movement of caribou within their traditional territories.

The Pikangikum see great importance in caribou as an indicator of forest health, as an integral component of their relationships with the land, and as a source of subsistence. Because of this, they want to guide forest management and planning on their traditional lands to protect the caribou's winter feeding areas, spring migration routes, summer calving areas and fall rutting grounds while at the same time reaping the benefits of a sustainable forestry industry they would manage themselves.

www.sfmnetwork.ca



The Networks

NCE New Initiatives

New Initiative NCEs connect science and practice to tackle complex challenges

As they enter the 21st century, Canadians are facing a range of increasingly complex and pressing issues, including the obesity epidemic, the need to provide care for an aging population, and violence in our schools.

The NCE New Initiatives (NCE-NI) program was created with these and other challenges in mind. Excellent research exists in these areas but researchers from various disciplines aren't always aware of each other's work. The latest science may not be making its way into the hands of the policymakers and practitioners who can put it to use.

The NCE-NI program is changing this landscape by connecting science to practice in new ways. The program is not intended to fund research, but supports scientists and teams whose research costs are already covered by other sources. The objective is to encourage multidisciplinary networking among established researchers, and to support the building of new partnerships with industries, government and not-for-profit organizations.

In 2005-06, the NCE funded the first New Initiatives. They continue to pool their knowledge and to develop new channels for moving research into their user communities.

2006-07 NCE New Initiatives:

Canadian Design Research Network (CDRN)

Research can improve the design of everything from a small handheld device to an urban community. Good design also yields social, economic and environmental benefits, as in the case of a "green" building.

The Canadian Design Research Network (CDRN) brings together more than 100 researchers along with government and industry partners, to improve Canadian design through research, outreach and collaboration.

CDRN links experts from such areas as architecture, engineering, urban design, industrial design and computer science. Together, they're working to strengthen the Canada's industrial-design base and speed the transfer of the latest design research to the construction of buildings and the manufacturing of products.

www.cdrn.ca

Canadian Obesity Network (CON)

CON links more than 1,000 health professionals, researchers, policymakers, non-profits and companies focused on the prevention and treatment of obesity, a growing and major threat to the health and economic wellbeing of Canadians. An estimated 5.5 million adults and half a million children in Canada are obese, which puts them at risk for a host of chronic diseases, early disability and premature death.

By connecting scientists from a range of disciplines, the CON is building a comprehensive body of knowledge on the complex biological and environmental factors that contribute to obesity. The network is encouraging more students to specialize in obesity and is developing educational resources for health professionals. More than 20 industry partners are also engaged, exploring options for new nutritional formulations, drugs and advanced surgical techniques.

www.obesitynetwork.ca



Emerging Dynamic Global Economies Network (EDGE)

The rapid growth of the new economic powerhouses of China, India and Brazil is transforming the global economy and presenting both challenges and opportunities for Canada. EDGE, the Emerging Dynamic Global Economies Network, links more than 50 research institutions and think tanks from across Canada and internationally. They identify the key economic and social impacts of this change, and help develop public policies and business strategies.

Leading companies and key business associations are also part of EDGE. Plans include a communications campaign to encourage public debate on the issues, and creation of new training and exchange programs for students, business professionals and government officials.

www.edgenetwork.ca

National Initiative for Care of the Elderly (NICE)

Canada is ill-equipped to deal with its aging population, in part due to a critical shortage of trained professionals specialized in care of the elderly, and few students enrolling in these specialties. The National Initiative for Care of the Elderly (NICE) is addressing this societal challenge by linking more than 40 gerontology and geriatric researchers with doctors, nurses and social workers who treat and care for older Canadians.

The evidence shows that interdisciplinary teams provide high-quality care to the elderly, whose needs are complex and diverse. By linking the three main professional groups who care for older Canadians with researchers, NICE is working to make team-training a standard practice for elder care across Canada. NICE is also building foundations for new government policies for senior care.

www.nicenet.ca

Promoting Relationships and Eliminating Violence Network (PREVNet)

Bullying in schools is a growing problem in Canada. In a recent survey by the World Health Organization, Canada ranked 26th out of 35 countries on the measure of bullying. PREVNet, the Promoting Relationships and Eliminating Violence Network, is providing the groundwork for a national strategy on bullying, bringing together researchers, governments, schools and community organizations to promote safe and healthy relationships for Canadian children and youth.

Many programs have been developed to address bullying, but few are evidence-based or evaluated. PREVNet helps schools and communities adopt more scientific and proven approaches to combat bullying, victimization and aggression, through standardized training materials, assessment tools, intervention strategies and national policies.

www.prevnet.ca



Networks of
Centres of
Excellence

Participating Universities

Building advantages across the country

A win-win relationship

When the Sprott Centre for Stem Cell Research opened at the Ottawa Health Research Institute in November 2006, the *Ottawa Citizen* praised it as a “massive brain gain” that “brings the best to Ottawa.”

The Sprott Centre illustrates how the NCE Program helps Canadian universities achieve the advantage needed to grow stronger and attract better researchers. The bricks-and-mortar realization of the dream of Dr. Ronald Worton, former scientific director of the Stem Cell Network (SCN), the Sprott Centre’s stem cell and regenerative medicine researchers are professors at the University of Ottawa. The university’s Dr. Michael Rudnicki, Dr. Worton’s successor as science leader at the SCN, is also Director of the new Sprott Centre.

The relationship between the individual networks and the universities that host them is mutually beneficial. When a university’s professors become network investigators, they stimulate additional grants and funds for research by leveraging their NCE funding through partnerships with industry, government agencies and not-for-profit organizations such as charities. This “multiplier effect” gives an institution the additional resources required to do world-class work and attract globally respected experts to its faculty. Meanwhile, the school’s students benefit from the opportunity to become network trainees and elevate their educational experience by working in a multidisciplinary, multisectoral environment.



Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

British Columbia

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPI	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM
Malaspina University College			•																					
Royal Roads University																								•
Simon Fraser University	•	•	•	•	•			•		•	•	•		•		•	•		•		•			•
Thompson Rivers University			•																					•
University of British Columbia	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
University of Northern British Columbia				•	•											•			•					•
University of Victoria	•	•	•	•						•	•			•	•	•	•		•	•	•		•	•



Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Alberta

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM
University of Alberta	•	•		•	•	•	•	•	•	•	•	•	•	•		•	•	•	•		•	•	•	•
University of Calgary	•	•		•	•			•	•	•	•	•	•	•		•	•	•	•	•		•	•	•
University of Lethbridge	•										•		•	•					•				•	

Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Saskatchewan

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM
University of Regina			•		•									•			•		•	•				•
University of Saskatchewan	•	•	•		•	•	•			•	•	•	•	•			•	•	•	•		•	•	•

Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Manitoba

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM
University of Manitoba	•	•		•	•	•	•	•	•			•	•	•		•	•	•	•	•		•		•
University of Winnipeg				•							•					•			•		•			•



Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Ontario

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIP1	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM	
Brock University	•										•			•						•	•				
Carleton University				•	•			•		•	•			•		•	•	•			•				
Lakehead University	•				•												•							•	
Laurentian University																•									
McMaster University	•	•	•		•	•	•			•	•	•	•	•		•	•			•	•	•		•	
Nipissing University					•																				
Queen's University	•	•		•	•	•				•	•	•	•	•		•	•	•	•	•	•	•		•	
Royal Military College of Canada				•	•									•		•	•	•		•					
Ryerson Polytechnic University	•			•	•			•			•			•		•			•						•
Trent University				•	•						•			•											•
University College London						•																			
University of Guelph	•	•	•	•	•	•					•	•		•			•		•		•	•		•	
University of Ontario Institute of Technology	•				•														•						
University of Ottawa	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•
University of Toronto	•	•		•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•
University of Waterloo	•		•	•	•	•		•		•	•			•		•	•	•	•	•				•	•
University of Western Ontario	•	•		•	•	•				•	•	•				•	•		•		•	•	•	•	•
University of Windsor					•									•		•	•		•						
Wilfrid Laurier University		•	•								•			•		•			•						•
York University				•	•			•			•	•			•	•	•		•		•				



Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Quebec

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM	
Concordia University		•	•	•				•		•	•						•	•	•			•	•	•	
École de technologie supérieure								•		•						•									
École des Hautes Études Commerciales						•														•					
École Polytechnique de Montréal					•	•		•		•				•			•	•	•						
Institut national de la recherche scientifique		•	•		•					•				•		•									
McGill University	•	•		•	•	•		•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•
Université de Montréal	•	•	•	•	•	•	•	•			•		•	•		•	•		•		•		•		
Université de Sherbrooke	•	•			•	•				•		•	•	•		•	•	•	•	•		•			
Université du Québec à Chicoutimi		•																							•
Université du Québec à Montréal				•							•									•		•			•
Université du Québec à Rimouski			•	•							•					•								•	•
Université du Québec à Trois-Rivières				•	•											•	•		•						•
Université du Québec en Abitibi-Témiscamingue																•									•
Université du Québec en Outaouais																•									•
Université Laval	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•



Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

New Brunswick

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PENCE	PREVNet	PRIONET	SCN	SFM	
Mount Allison University			•											•					•							
Université de Moncton	•		•								•								•							•
University of New Brunswick	•	•	•	•	•						•	•		•		•			•	•						•

Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Nova Scotia

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM		
Acadia University											•			•					•							
Dalhousie University	•	•	•	•	•	•		•			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mount Saint Vincent University											•															
Nova Scotia Agricultural College														•												
Saint Mary's University																			•							
St. Francis Xavier University	•		•																							



Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Prince Edward Island

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM	
University of Prince Edward Island		•				•					•		•	•			•								

Fiscal Year 2006-07

PARTICIPATING UNIVERSITIES

Newfoundland and Labrador

	AFMNet	Allergen	AquaNet	ArcticNet	AUTO21	CAN	CANVAC	CDRN	CGDN	CIPi	CLLRNet	CON	CSN	CWN	EDGE	GEOIDE	IRIS	ISIS	MITACS	NICE	PREVNet	PRIONET	SCN	SFM
Memorial University of Newfoundland	•		•	•		•					•		•	•		•	•		•				•	•