

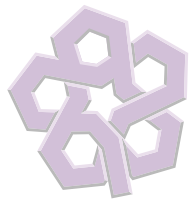


Networks of Centres of Excellence

Enhancing Productivity through Research
ANNUAL REPORT 1998-1999

Canada

NCE's Partners



INDUSTRY

British Columbia

A.E. Concrete Precast Products Ltd. (ISIS)
Ballard Power Systems Inc. (MITACS)
BC Hydro (IRIS, MITACS)
BC Tel (MITACS)
BC Tel Network Provisioning (MITACS)
BioStress Research (CBDN)
CAE Newnes Ltd. (IRIS)
Canadian Airlines International (MITACS)
Canadian Inovatech Inc. (CBDN)
Credo Interactive Inc. (IRIS)
Delfi Medical (IRIS)
DYWIDAG Systems International (ISIS)
Facet Decision Systems Inc. (GEOIDE)
FinancialCAD Corp. (MITACS)
Glenayre Electronics Ltd. (MICRONET)
Helix BioPharma Corp. (CBDN, PENCE)
Hewlett-Packard Canada Ltd. (CITR)
Hong Kong Bank of Canada (CGDN)
ID Biomedical (CGDN)
In Computro (MITACS)
INEX Pharmaceuticals Corp. (CGDN)
Ingenix (PENCE)
Innovation & Development Corp. (CBDN)
International Submarine Engineering (IRIS)
Kinetek (MITACS)
Kinetic Sciences Inc. (IRIS)
Knowledge Junction (IRIS)
Landmark Truss & Lumber Inc. (IRIS)
MacDonald Dettwiler and Associates Ltd. (GEOIDE, IRIS, MICRONET)
MAL Manufacturing Automation Laboratories (IRIS)
MDSI (MITACS)
Medical News Network Inc. (IRIS)
Mercator Systems Ltd. (GEOIDE)
Micrologix Biotech Inc. (CBDN, PENCE)
Microtek Intl. Ltd. (CBDN)
MicroXpress Biotech Inc. (CBDN)
NeuroVir Inc. (CGDN)
Newness Machine Ltd. (IRIS)
NLK Consultants (Wood-Pulps)
Pacific Papers Inc. (Wood-Pulps)
Padre Resources (MITACS)
PMC-Sierra Inc. (MICRONET)
Points West (ISIS)
Powerex Corp. (MITACS)
Powertech Labs Inc. (IRIS, MITACS)
Precision Biochemicals Inc. (MITACS)
Precision MicroDynamics Inc. (IRIS)
QLT Inc. (PENCE)
Quatronix (MITACS)
Rainmaker Digital Pictures Group (IRIS)
Rogers Cablesystems Ltd. (TeleLearning)
RSI Technologies Ltd. (IRIS)
Simons Consulting Group (IRIS)
SoundLogic (MITACS)
StemCell Technologies Inc. (MITACS)
StressGen Biotechnologies Inc. (CBDN, CGDN)

Networks of Centres of Excellence

350 Albert Street

Ottawa, Ontario K1A 1H5

Telephone: (613) 996-6010

Facsimile: (613) 992-7356

E-mail: info@nce.gc.ca

Website: www.nce.gc.ca

© Minister of Public Works and
Government Services Canada 2000

ISBN: 0-662-64215-5

Cat. No.: NS1-14 1999



Printed on recycled paper

ABBREVIATIONS OF NETWORKS' NAMES USED IN THIS REPORT

CAN	Canadian Arthritis Network
CBDN	Canadian Bacterial Diseases Network
CGDN	Canadian Genetic Diseases Network
CITR	Canadian Institute for Telecommunications Research
GEOIDE	Geomatics for Informed Decisions Network
HealNet	Health Evidence Application and Linkage Network
IRIS	Institute for Robotics and Intelligent Systems
ISIS	Intelligent Systems for Innovative Structures
Micronet	Microelectronic Devices, Circuits and Systems
MITACS	Mathematics of Information Technology and Complex Systems Network
PENCE	Protein Engineering Network of Centres of Excellence
SFM	Sustainable Forest Management Network
TeleLearning-NCE	TeleLearning Network of Centres of Excellence
Wood-Pulps	Mechanical Wood-Pulps Network

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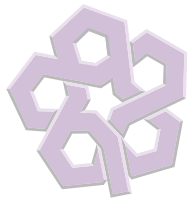
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INDUSTRY (continued from inside front cover)

Terra Surveys Ltd (GEOIDE, MICRONET)
Terragen Diversity Inc. (CBDN)
Western Clinical Devices Inc. (IRIS)
Xenon Bioresearch Inc. (CGDN)

Alberta

Advanis (MITACS)
Ainsworth Lumber (SFM)
Alberta Microelectronic Corporation (MICRONET)
Alberta Milk Producers (CBDN)
Alberta Peptide Institute (PENCE)
Alberta-Pacific Forest Industries Ltd. (SFM)
AltaRex (PENCE)
ANC Timber Products (SFM)
BioMechanigg Research Inc. (IRIS)
Biomira Inc. (CBDN, PENCE)
BioTools (PENCE)
Canadian Forest Products (SFM)
CANATEC Consultants Ltd. (GEOIDE)
CH2M Gore & Storrie Limited (ISIS)
COACH, Canada's Health Informatics Association (HEAL/Net)
Con-Force Structures Limited (ISIS)
CV Technologies (CBDN)
Cytovax Biotechnologies Inc. (CBDN, PENCE)
Daishowa-Marubeni International Ltd. (SFM)
DRE Suffield (PENCE)
Harding Instruments (IRIS)
Harris Canada Inc. (MICRONET)
Harris Canada Inc., NovAtel Division (CITR)
Healthcare Computing & Communications Canada (HEAL/Net)
High Level Forest Products (SFM)
Husky Oil (GEOIDE)
IBM Canada Ltd. (HEAL/Net)
InfoWard Inc. (HEAL/Net)
Intelligene (PENCE)
Intermap Technologies (GEOIDE)
International Downhole Equipment Ltd. (MICRONET)
ITRES Research Ltd. (GEOIDE), (MITACS)
Killam Foundation (PENCE)
Lakeland Peat Moss Ltd. (SFM)
Millar Western Industries (SFM)
Northstar Energy Corporation (GEOIDE)
OptEM Engineering Inc. (MICRONET)
Optimum Instruments Inc. (ISIS)
Petro Canada (Oil and Gas) (GEOIDE)
Premier Horticulture (SFM)
RADSS Technologies (IRIS)
Royal Sweet Technologies (PENCE)
Sierra Systems Consultants Inc. (HEAL/Net)
SPECO Engineering (ISIS)
Stantec Inc. (ISIS)
SUNGRO Horticulture Canada Ltd. (SFM)
Syn crude Canada Ltd. (IRIS)
SynPhar Labs Inc. (CBDN)
SYNSORB Biotech Inc. (CBDN)
TransAlta Energy Marketing Corp. (MITACS)

A Message from the Chair

Since its beginning in 1989, the NCE program has had one clear objective: to assemble the necessary critical masses of intellectual resources to enable Canadian university researchers to solve important problems at the leading edge of science and technology, and to put the new knowledge into practice. This is done through partnerships among universities, industry, and government that connect excellent research with industrial know-how and investment capacity, and with public policy. With this objective, the NCE program works toward the twin goals of Canada's prosperity and improving the well-being and quality of life of Canadians.

Today, as we look back on 10 years of growth and experience, we can take great satisfaction in seeing that the NCE program is proving very successful in meeting its objective and achieving its goals. Along the way, it has also gained broad recognition and respect as a very important Canadian innovation in the organization of research.

In the 1999 budget, the Government of Canada announced that it would increase funding for the NCE program by \$30 million per year. The 63 percent growth in the NCE budget will make it possible to create more networks and will have a positive impact on Canada's ability to develop and retain

outstanding researchers in areas critical to economic growth, public policy, and quality of life.

This increase in funding sent two powerful messages. It confirmed the permanent and integral role of the NCE program in Canada's Science and Technology Strategy. Second, by augmenting the budget of this permanent program so significantly, the Government of Canada demonstrated its confidence in the NCE's potential to contribute to Canada—tomorrow and beyond.

In practical terms, the increased funding means that we will be able to add perhaps as many as eight new NCEs to the 14 that already exist. More networks mean more research in important problems areas, more discoveries made, more innovations produced. More networks mean more young researchers trained in leading-edge research on issues of major significance. And more networks also mean more contacts among those who create new knowledge by research and those who use new knowledge productively in the economy and in society.

The NCEs are nation-building institutions. They are national networks of universities, companies, and government agencies, generally stretching across the country and involving several governments. They create a national critical mass of intellectual capacity,

and they also enhance local capabilities in Canada's regions. They bring together hundreds of people from several sectors and many disciplines in a common purpose, and they help them to work toward their common goals.

And the NCEs have proved the importance of partnership. The NCEs really do accomplish much more than the sum of what the partners might have done individually. The centres of excellence joined in the network complement and strengthen each other's research. The partners from all sectors together develop a research strategy that fills in the big picture and directs their common efforts to important objectives. The companies that support the networks with money, equipment, facilities, and expertise derive their benefits in pre-competitive research, in having a window on discovery and early-stage development in the universities, and, often most importantly, in having access to people trained in the areas of their future business.

As we highlight the merits of partnership, I must acknowledge the contributions of all those at the centre who have been partners in making the NCE program itself a success. They have shown leadership and supported the NCEs in many different ways over the past year, and without their participation the program would not be the success that it is today. I wish to express my gratitude and appreciation to the Honourable John Manley, Minister of Industry; the Honourable Allan Rock, Minister of Health; the Honourable Ron Duhamel, Secretary of State for Science, Research and Development, as well as to the three granting councils: the Social Sciences and

Humanities Research Council (SSHRC), the Medical Research Council (MRC), and the Natural Sciences and Engineering Research Council (NSERC). I also wish to add my personal thanks to the staff of the NCE program, whose tireless dedication and constant commitment to research excellence have been very large factors in the success of the program.

The NCE program is especially grateful to the members of the Selection Committee and the various expert panels that evaluated the individual applications for the expertise, energy, and integrity they brought to the process. They all served as volunteers, making an enormously valuable contribution to Canada's research community, and they deserve our most sincere gratitude for their efforts. I hope, also, that the rare opportunity they have had to see so much of Canada's best research talent and new ideas on display has been of value to them. The members of the Selection Committee, of course, enjoyed an additional reward—the knowledge that their recommended selection of new Networks of Centres of Excellence has been implemented. Finally, let me thank all of the researchers in Canadian universities and hospitals who took the time to prepare an application to the NCE program. They are very busy, hard-working people, who must often do their work with inadequate resources, but still manage to find new partners, develop a strategy, create an organization, and then prepare a long and detailed document. That was a lot of additional work, and I appreciate how much effort it required. Those applicants who were funded will find their reward in the new research accomplishments that are now within their reach.

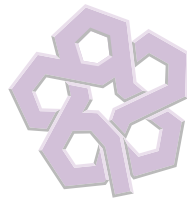


Photo: Couvrette Photography - Ottawa

And I hope that those applicants who were not funded will also find a reward—an irreversible enrichment of their research projects as a result of the strategic thinking and new relationships that went into the preparation of their applications.

The evolution of the NCE program from an experiment to a pillar of Canada's S&T strategy in 10 years is a triumph. But the job is not finished, and it probably never will be. There is always so much to learn.

Thomas A. Brzustowski, P. Eng., Ph.D.
Chair, NCE Steering Committee
President, NSERC



INDUSTRY *(continued from page 2)*

Tyler Research Corp. (PENCE)
 Weldwood of Canada Ltd. (SFM)
 Weyerhaeuser Canada Ltd. (SFM)

Saskatchewan

Cameco Corporation (IRIS)
 Moore Chamberlin and Associates (HEALNet)
 SaskTel (IRIS)

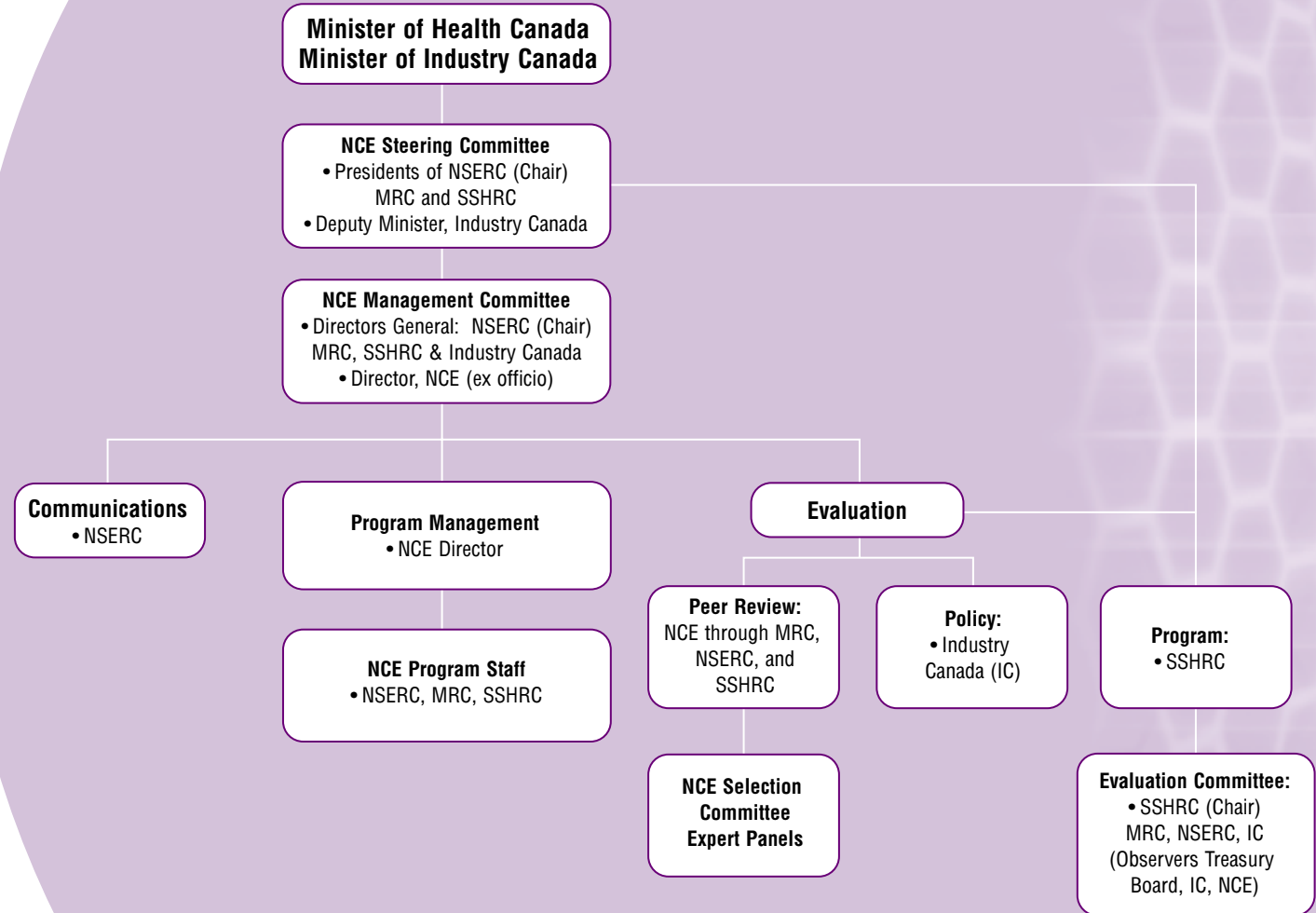
Manitoba

Applied Bioligands Corp. (CBDN)
 Cirlog Corporation (MICRONET)
 Concrete Restoration Services (ISIS)
 Department of Defense (CBDN)
 Dillon Engineering Consulting (ISIS)
 Faroex Ltd. (ISIS)
 IDERS Inc. (MICRONET)
 InfoMagnetics Technologies Corp. (MICRONET)
 Lafarge Canada Inc. (ISIS)
 Louisanna Pacific Canada Ltd. (SFM)
 Manitoba Hydro (ISIS)
 McLean Anderson (ISIS)
 Nelson River Construction (ISIS)
 Quantic Laboratories Inc. (MICRONET)
 Vector Construction Group (ISIS)
 Wardrop Engineering (ISIS)

Ontario

A.U.G. Signals Ltd. (GEOIDE)
 Abacom Tech (IRIS)
 Affymetrix (CGDN)
 Algorithmics Inc. (MITACS)
 Allelix Biopharmaceuticals (CGDN, PENCE)
 ApoptoGen Inc. (CGDN)
 Applied BioSystems (PENCE)
 Aquatic Sciences Inc. (IRIS)
 Aromat Canada (IRIS)
 Astra Pharma Inc. (CBDN)
 AT&T Canada (TeleLearning)
 ATI Technologies Inc. (MICRONET)
 Atlantis Scientific Inc. (GEOIDE)
 Bank of Montreal (TeleLearning)
 Bank of Nova Scotia (MITACS)
 Base4 Bioinformatics Inc. (CGDN)
 Bayer Inc. (CBDN, HEALNet, PENCE)
 Bayer Biological Products (PENCE)
 Canadian Red Cross Society (CBDN, PENCE)
 Beckman Instruments Inc. (PENCE)
 Bell Canada (HEALNet, TeleLearning)
 Bell Mobility Cellular Inc. (CITR)
 Blake, Cassels & Graydon (PENCE)
 Cadabra (MICRONET)
 Cambridge Isotopes (PENCE)
 Canadian Imperial Bank of Commerce (HEALNet)
 Canadian Medical Discoveries Fund Inc. (CGDN)
 Canadian Red Cross Society (CBDN, PENCE)
 Canadian Union of Public Employees (TeleLearning)
 Certicom Corp. (MITACS)

Administrative Structure of the NCE Program



14 Networks of Centres of Excellence

HEALTH AND BIOTECHNOLOGY

Canadian Arthritis Network (CAN) (1998-2005)

NCE Award in 1998-99:	\$3.2 million
Network researchers:	105
Highly Qualified Personnel:	N/A*
Universities:	21
Industries:	9
Government departments/agencies and others:	22

www.arthritis.ca/can

Canadian Bacterial Diseases Network (CBDN) (1989-2005)

NCE Award in 1998-99:	\$3.8 million
Network researchers:	58
Highly Qualified Personnel:	249
Universities:	16
Industries:	64
Government departments/agencies and others:	75

www.cbdn.ca

Canadian Genetic Diseases Network (CGDN) (1989-2005)

NCE Award in 1998-99:	\$4.5 million
Network researchers:	50
Highly Qualified Personnel:	441
Universities:	11
Industries:	35
Government departments/agencies and others:	54

www.cgd.generes.ca

Protein Engineering Network of Centres of Excellence (PENCE) (1989-2005)

NCE Award in 1998-99:	\$5.2 million
Network researchers:	50
Highly Qualified Personnel:	122
Universities:	12
Industries:	53
Government departments/agencies and others:	26

www.pence.ualberta.ca

HEALNet—Health Evidence Application and Linkage Network (1995-2002)

NCE Award in 1998-99:	\$2.4 million
Network researchers:	64
Highly Qualified Personnel:	132
Universities:	20
Industries:	31
Government departments/agencies and others:	58

www.healnet.mcmaster.ca/ncel

INFORMATION TECHNOLOGY

Canadian Institute for Telecommunications Research (CITR) (1989-2002)

NCE Award in 1998-99:	\$3.2 million
Network researchers:	55
Highly Qualified Personnel:	234
Universities:	17
Industries:	16
Government departments/agencies and others:	2

www.citr.ece.mcgill.ca

Geomatics for Informed Decisions Network (GEOIDE) (1998-2005)

NCE Award in 1998-99:	\$2.6 million
Network researchers:	97
Highly Qualified Personnel:	N/A*
Universities:	27
Industries:	29
Government departments/agencies and others:	24

www.geoide.ulaval.ca

Institute for Robotics and Intelligent Systems (IRIS) (1989-2005)

NCE Award in 1998-99:	\$4.6 million
Network researchers:	113
Highly Qualified Personnel:	249
Universities:	21
Industries:	47
Government departments/agencies and others:	16

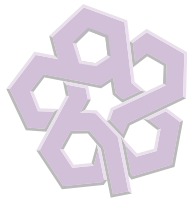
www.precarn.ca

Mathematics of Information Technology and Complex Systems (MITACS) (1998-2005)

NCE Award in 1998-99:	\$3.2 million
Network researchers:	188
Highly Qualified Personnel:	N/A*
Universities:	26
Industries:	53
Government departments/agencies and others:	16

www.mitacs.math.ca/

* N/A: Not Applicable, the network has started its operation at the end of the fiscal year.



INDUSTRY *(continued from page 4)*

Chipworks Inc. (MICRONET)
Clearnet Communications Inc. (CITR)
Cogency Technology Inc. (MICRONET)
COGNOS (MITACS)
Com Dev Ltd. (CITR)
Computing Devices Canada (CGDN)
Corporate Health Consultants: The EAP Specialists (HEALNet)
Dairy Farmers of Ontario (CBDN)
DALSA Inc. (MICRONET)
Dextran Products Ltd. (CBDN)
DIPIX Technologies Inc. (IRIS)
Dufferin Construction Company (ISIS)
Dynacon Enterprises Limited (IRIS)
Electro Photonics Corp. (ISIS)
Ellipsis (CGDN)
Ellipsis Biotherapeutics Corp. (MITACS)
Energenius (MITACS)
Engineering Services Inc. (IRIS)
EPC Corp. (ISIS)
ESRI Canada (GEOIDE)
Flintech Inc. (GEOIDE)
Forefront Graphics Corp. (MICRONET)
GasTOPS Ltd. (IRIS)
General Motors of Canada Ltd. (IRIS, HEALNet, MITACS)
Generation 5 (MITACS)
Gennum Corporation (MICRONET)
Glaxo Wellcome Inc. (CBDN, HEALNet, PENCE)
GlycoDesign Inc. (PENCE)
Halsall (ISIS)
Hatch Associates Ltd. (IRIS)
Hay Management Consultants Ltd. (HEALNet)
Hemosol Inc. (PENCE)
Hewlett Packard Canada Ltd. (HEALNet)
Hymarc Ltd. (IRIS)
IBM Canada Ltd. (CITR, MITACS, TeleLearning)
IBM Centre for Advanced Studies (IRIS)
INCO Limited (IRIS)
logen (PENCE)
ITS Electronics Inc. (MICRONET)
Kemira Chemicals (Wood-Pulps)
Kodak Canada Inc. (TeleLearning)
Kriegler, R., Private Consultant (ISIS)
LogicVision Canada Inc. (MICRONET)
Longwoods Publishing Corporation - Hospital Quarterly (HEALNet)
Maclean-Hunter Publishing Ltd. (GEOIDE, HEALNet)
Manulife Financial (HEALNet)
MDS Health Group (CGDN)
MDS Inc. (HEALNet)
MDS-SCIEX (CBDN, CGDN)
Mentor Graphics Canada Ltd. (MICRONET)
Microsoft Canada Ltd. (TeleLearning)
Milestone Media Corp. (CGDN)
Mitel Corporation (CITR)
Mitel Semiconductor (MICRONET)
Molecular Simulations Inc. (PENCE)
MOSAID Technologies Inc. (MICRONET)
Nanowave Technologies Inc. (MICRONET)

Success Stories

Canadian Bacterial Diseases Network

Food for Thoughts

Back to nature. Pure and natural. Green. Organic. As more and more Canadians become keenly aware of the chemicals, fertilizers, and antibiotics used to produce the food they eat, these words are taking on a startling new importance. To many, the issue has even become a matter of life and death. The Canadian Bacterial Diseases Network has seen the problem first-hand and is urging the entire food-producing industry to do something about it: go organic.

As a direct reaction to the overwhelming use of pesticides, artificial preservatives, fertilizers, and antibiotics used to produce the food we eat, the CBDN is spearheading the movement in Canada's food industry to produce food organically. This has meant some heavy-duty negotiating with representatives from Canada's beef, poultry, dairy, and fresh-produce industries. The goal? To cut down on chemical and antibiotic use and promote a healthier food supply—all in an effort to eliminate the allergies, sensitivities, and chemical and hormone reactions that many Canadians experience daily.

But the job is daunting and the stakes high. And it goes far beyond just soothing the allergies of a select few. When the World Health Organization sounded a warning identifying antimicrobial resistance as possibly the world's number one health problem, and the Canadian Medical Association warned that excessive use of antibiotics to prevent disease in livestock is contributing to the growth of antibiotic-resistant viruses that may have serious health consequences for *all* Canadians, the CBDN found itself armed with the ammunition it needs to make a difference.

To advance scientific knowledge and enhance Canada's economic competitiveness through networking, excellence in fundamental research on bacterial diseases and collaboration with industry—putting fundamental science to work.

14 Networks of Centres of Excellence *(continued)*

Micronet – Microelectronic Devices, Circuits and Systems (1989-2005)

NCE Award in 1998-99:	\$2.3 million
Network researchers:	74
Highly Qualified Personnel:	302
Universities:	19
Industries:	38
Government departments/agencies and others:	3

www.micronetrd.ca/

NATURAL RESOURCES

Mechanical Wood-Pulps Network (1989-2002)

NCE Award in 1998-99:	\$2 million
Network researchers:	46
Highly Qualified Personnel:	57
Universities:	15
Industries:	8
Government departments/agencies and others:	4

www.ppc.ubc.ca/wood-pulps

Sustainable Forest Management NCE (SFM) (1995-2002)

NCE Award in 1998-99:	\$3 million
Network researchers:	105
Highly Qualified Personnel:	291
Universities:	20
Industries:	17
Government departments/agencies and others:	3

www.biology.ualberta.ca/sfm

INFRASTRUCTURE

Intelligent Sensing for Innovative Structures (ISIS) (1995-2002)

NCE Award in 1998-99:	\$2.7 million
Network researchers:	52
Highly Qualified Personnel:	164
Universities:	12
Industries:	53
Government departments/agencies and others:	26

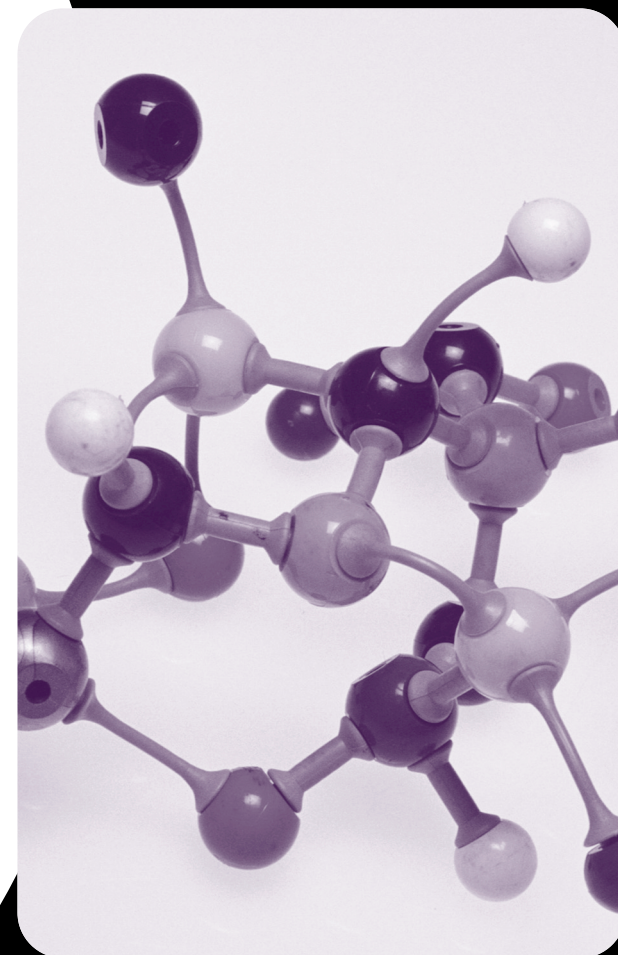
www.isiscanada.com

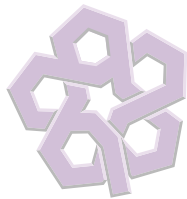
HUMAN RESOURCES

TeleLearning-NCE (1995-2002)

NCE Award in 1998-99:	\$3.7 million
Network researchers:	119
Highly Qualified Personnel:	316
Universities:	29
Industries:	14
Government departments/agencies and others:	10

www.telelearn.ca





INDUSTRY *(continued from page 6)*

Navitrak International Corporation (GEOIDE)
Newbridge Networks Corporation (CITR, HEAL/Net)
Nortel Networks Corp. (CITR, ISIS, MICRONET, MITACS, TeleLearning)
Northwood Geosciences Ltd. (GEOIDE)
Nuptek Systems (MITACS)
Object Technology International Inc. (MITACS)
Ontario Power Technologies (IRIS)
Oprel Technology Inc. (ISIS)
Osteopharm (PENCE)
PARTEQ R&D Innovations (CGDN)
Pasteur Mérieux Connaught Canada (CBDN, MITACS, PENCE)
PCI Enterprises (GEOIDE)
Pfizer (CBDN)
Philip A. Lapp Ltd. (GEOIDE)
PRECARN Associates Inc. (IRIS)
Pre-Con Inc. (ISIS)
Prentice Hall Canada Inc. (TeleLearning)
Price Waterhouse (HEAL/Net)
Resolution Pharmaceuticals (PENCE)
Searle (HEAL/Net)
Semiconductor Insights Inc. (MICRONET)
Sensor Technology Limited (IRIS)
Sika Canada Inc. (ISIS)
Silicon Valley North (HEAL/Net)
SiliconGraphics (TeleLearning)
Southam Inc. (HEAL/Net)
Spar Aerospace Limited (IRIS, MICRONET)
Stentor Resource Centre Inc. (CITR)
Texas Instruments Canada Ltd. (MICRONET)
TorStar (HEAL/Net)
Tundra Semiconductor Corporation (IRIS, MICRONET)
UCAN Fastening Products (ISIS)
UMDI (CBDN)
Uniroyal Chemical (CBDN)
University Medical Discoveries (CGDN)
Varian Canada Inc. (PENCE)
Vaughan Load Supporting Structures Inc. (ISIS)
Visible Genetics Inc. (CGDN)
Warner Lambert Canada (PENCE)
Waterloo Maple Inc. (MITACS)
Xerox Palo Alto (IRIS)
Xilinx Inc. (MICRONET)

Quebec

Abitibi-Consolidated (SFM, Wood-Pulps)
AD OPT Technologies (MITACS)
ADS Inc. (ISIS)
Alcan Aluminium Ltd. (CGDN)
Almerco Inc. (GEOIDE)
Aquila Mining Systems Ltd. (IRIS)
Astra Pharma Inc. (PENCE)
Banque Nationale du Canada (MITACS)
BCE Inc. (MITACS)
Bell Emergis (MITACS)
Bell Mobility (MITACS)

Success Stories

Canadian Genetic Diseases Network

Closer to a Cure

Ask any parent. What could be worse than having a sick child? Not much. But what if your child were sick and doctors couldn't tell you why?

That's been the nightmare for many parents of children with a severe form of epilepsy known as Lafora Disease (LD). Until recently, the disease remained mostly a mystery—the fundamental defect triggering the malfunction was unknown. Now, thanks to a major breakthrough by researchers with the Canadian Genetic Diseases Network, the gene that causes LD has been identified. And although the discovery itself doesn't yet mean a cure or treatment, it does provide a cellular key to determining the cause of the disease. And that unlocks the door to a world of possibilities.

An international research team, led by CGDN scientist Dr. Steve Scherer at Toronto's Hospital for Sick Children and the University of Toronto, has identified the

LD gene—which is responsible for the epilepsy that occurs during late childhood or early adolescence and is characterized by seizures and progressive neurological degeneration. Death usually occurs within a decade of the first symptoms.

The breakthrough came when researchers at one of the numerous CGDN-supported facilities across Canada discovered that the defective LD gene interferes with the brain's ability to metabolize and break down carbohydrates. This likely leads to the destruction of the brain's nerve cells.

Now that the gene has been identified, what's the next step? To discover the basic mechanisms that lead to the severe epilepsy and, ultimately, to develop diagnostic tools and therapies.

The Canadian Genetic Diseases Network is a nationwide institute committed to research excellence in human genetic disease, and to creating strategic partnerships to commercialize discoveries.

Peer Review Evaluation

The hundreds of national and international experts who work to evaluate the scientific merit of applications are the cornerstone of NCE program activities. They offer their time to the program without remuneration and work diligently and conscientiously to ensure that application evaluation remains at arm's length and adheres to the strictest standards.

NCE peer review is a rigorous and lengthy process that takes more than a year. First, a Selection Committee of extraordinary ability and breadth is appointed, all members of which contribute fully to the selection process. In the case of the 1998 competition, the process began with the evaluation of about 72 letters of intent according to the five published equally weighted selection criteria: excellence of the research program; highly qualified personnel; networking and partnerships; knowledge exchange and technology exploitation; and management of the network.

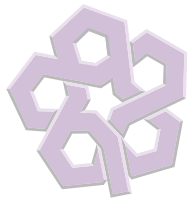
Then 11 groups of candidates were invited to submit full applications. During the fall, these applications were examined in depth by 11 expert panels in a review process that included meetings with the proponents and their partners. In January, the Selection Committee considered the reports of these expert panels together with the full application.

The reports of the expert panels proved extremely useful. They provided a detailed and objective assessment of the strengths and weaknesses of each application according to the five selection criteria. In addition, the Chairs of the 11 expert panels joined the Selection Committee by teleconference to answer questions that arose during the discussion of the applications.

The Selection Committee's discussions were extensive and challenging, and led to consensus on its recommendations. The Selection Committee transmitted a priority-ranked list of the new NCEs recommended for funding, along with a list of the recommended funding levels, to the NCE Steering Committee for final decision. The Selection Committee's report, which provided the rationale for the recommendations along with a summary analysis of each application recommended for funding, was then made public, and the list of new networks was transmitted to the Ministers of Industry and Health.

Without the expert panel report on each application and the NCE Selection Committee recommendations, the NCE program would not be as potent as it is. The value of their contribution is visible on a daily basis. Proof of that value lies in the quality of the research, and in the partnership and collaboration that are at the heart of each NCE. ■





INDUSTRY *(continued from page 8)*

BioChem Pharma Inc. (CGDN, MITACS, PENCE)
BioChem Therapeutics Inc. (CGDN, PENCE)
Bio-Mega Boehringer Ingelheim (CBDN, PENCE)
BioSignal (PENCE)
Bristol-Myers-Squibb (CBDN, CGDN)
Burroughs Wellcome (CGDN)
CAE Electronics Ltd. (IRIS)
Canadian Imperial Bank of Commerce (MITACS)
CERCA (PENCE)
CFL Structures Inc. (ISIS)
CM Tech (ISIS)
Composites Retrofit International (ISIS)
Construction Interlag (ISIS)
Cooperation Stone Consolidated (HEALNet)
Cryocath Technologies Inc. (MITACS)
CubeWerx Inc. (GEOIDE)
Dessau-Soprin (ISIS)
Developpement Purkinje Inc. (HEALNet)
EMS Technologies Canada Ltd. (CITR)
Entreprises Yvan Frappier (ISIS)
Genechem Technologies Venture Fund (CGDN)
General Datacom Ltd. (CITR)
Géomat International (GEOIDE)
GIRO Inc. (MITACS)
Global Geomatics (GEOIDE)
GOAL Electronics Inc. (MICRONET)
Handy Chemicals (ISIS)
Haptic Technologies Inc. (IRIS)
Harris Canada Inc. (Farinon Division) (CITR)
Hoechst Marion Roussel (HEALNet)
Hydro Québec (HEALNet, ISIS, MITACS)
Hydrosoft (MITACS)
IBEX Technologies Inc. (CGDN)
Institut de recherche d'Hydro Québec-IREQ (IRIS)
Intélec Géomatique Inc. (GEOIDE)
La Compagnie Minière Québec Cartier (IRIS)
L'Agence de traitement de l'information numérique de l'Outaouais (GEOIDE)
Lateral Logic Inc. (IRIS)
Lécuyer et Fils (ISIS)
Lockheed Martin Montreal (MITACS)
Matrox Graphics Inc. (MICRONET)
Merck Frosst Canada Inc. (CGDN, IRIS, MITACS, PENCE)
Microcell Labs (MICRONET, MITACS)
Microcell Telecommunications Inc. (CITR)
Miranda Technologies Inc. (MICRONET)
MPB Technologies Inc. (IRIS, MICRONET)
NATCAN (MITACS)
NHC Communications Inc. (MICRONET)
Novartis (PENCE)
Novasys Inc. (TeleLearning)
Nucor Hyper Technologies Inc. (GEOIDE)
OPAL-RT Technologies Inc. (IRIS)
Paprican (Wood-Pulps)
Pratt & Whitney Canada (IRIS)
Prestige Telecom (MITACS)
Pultrall Inc. (ISIS)
RGS Genome Inc. (CBDN, CGDN)
Rhône-Poulenc Rorer Canada (PENCE)

Success Stories

Canadian Institute for Telecommunications Research

E-commerce Ready

When you're sitting on top of a business that rang up \$100 billion in transactions last year and is expected to top \$4.5 trillion by 2003, who could blame you for getting a little e-xcited.

What's all the excitement about? E-commerce, an explosive field that's allowing companies and individuals around the globe to conduct business at lightning-fast speed and with the utmost convenience. Here in Canada, there's no immunity to the excitement. But as more and more companies rush to take part in the e-commerce phenomenon, they're finding that to be successful takes a little more than a Web site, a product to sell, and a vision of dollar signs. They're finding that new and innovative technology, technical knowledge, R&D expertise, and highly skilled personnel are the key elements linking a business plan with reality. And that's why more and more companies—including business giants like IBM Canada and Montreal's SR Telecom—are turning to the Canadian Institute for Telecommunications Research for help.

As part of its mandate to advance e-commerce technologies and help Canadian companies keep pace with the rest of the world, CITR has been concentrating its efforts on developing fundamental enabling technologies for e-commerce applications such as architectures and systems, multimedia virtual catalogues, user interfaces, and intelligent agents. It's also looking at ways to allow systems to scale rapidly, provide a high quality of service, and ensure complete security for all users.

So far, CITR has been a big hit with Canadian companies. It already has quite a few achievements either under its belt or in the works, and is actively participating at conferences and symposiums all over the world. So remember its contribution the next time you log on to your favourite on-line shopping mall.

The mission of CITR is to enhance the competitiveness of the Canadian telecommunications and information technology industry by increasing the flow of people and ideas through its R&D activities.

Membership of the NCE Selection Committee

SEPTEMBER 17–18, 1998

Chair

Dr. William Cochrane
Director
MDS Capital Corp.
Calgary, Alberta

Members

Mr. Richard Fuchs
President
Futureworks Inc.
Torbay, Newfoundland

Dr. Yves Gingras
Professor
Département d'histoire
CIRST–Université du
Québec à Montréal
Montreal, Quebec

Dr. Martin Godbout
Vice-President
BioCapital
Montreal, Quebec

Dr. Jack Kraicer
Professor
Department of Physiology
University of Toronto
Toronto, Ontario

Dr. Ronald McCullough
President
Klasterk Inc.
Toronto, Ontario

Dr. Maurice Moloney
Professor
Department of Biological
Sciences
University of Calgary
Calgary, Alberta

Dr. Cameron Mustard
Associate Professor
Community Health
Sciences
Faculty of Medicine
University of Manitoba
Winnipeg, Manitoba

Dr. Donald Nicholson
Senior Director,
Biochemistry and
Molecular Biology
Merck-Frosst Centre for
Therapeutic Research
Kirkland, Quebec

Dr. Eva Rosinger
Deputy Director
Environment Directorate
Organisation for
Economic Co-operation
and Development
Paris, France

Dr. Martha E. Salcudean
Professor
Department of Mechanical
Engineering
University of British
Columbia
Vancouver, British
Columbia

Dr. David Sankoff
Professor
Centre de recherches
mathématiques
Université de Montréal
Montreal, Quebec

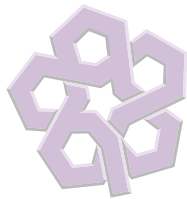
Dr. Bruce Smith
Chairman of the Council
Smith Institute for
Industrial Mathematics
and Systems Engineering
Surrey, England

Dr. Eva Turley
Senior Scientist
Division of Cardiovascular
Research
Hospital for Sick Children
Toronto, Ontario

Dr. Jacquelyn Thayer Scott
President & Vice-Chancellor
University College of
Cape Breton
Sydney, Nova Scotia

Dr. Michael Yeo
Ethicist, Research
Directorate
Canadian Medical
Association
Ottawa, Ontario





INDUSTRY *(continued from page 10)*

Roctest Ltd. (ISIS)
Schering Canada Inc. (CGDN)
Soesca (ISIS)
SoftMap Inc. (GEOIDE)
SR Telecom (CITR)
St. Laurent Paperboard Inc. (SFM)
T2C2 (CGDN)
Tecsult-Eduplus (TeleLearning)
Tektrend International Inc. (IRIS)
Tembec Inc. (Wood-Pulps)
Viasat Géo-Technologie Inc. (GEOIDE)

Maritimes

A/F Protein Inc. (PENCE)
Canpolar East Inc. (IRIS)
Coretec Inc. (GEOIDE)
Fraser Paper Inc. (SFM)
Geo-Resurces Inc (IRIS)
Innovacorp, Material Services Group (ISIS)
Maritime Tel & Tel (ISIS)
Math Resources Inc. (MITACS)
New North Media (HEALNet)
Vaughan Engineering Associates (ISIS)

International

Abbott Laboratories (US) (CBDN)
Abgenix (US) (CBDN)
Amgen (US) (PENCE)
Andritz Inc. (US) (Wood-Pulps)
Astra Research Inc. (US) (CBDN)
Bayer AG (Germ) (CBDN)
Bayer Animal Health (US) (CBDN)
Betz/Dearborn (US) (CBDN)
CalBiochem NovaChem (US) (PENCE)
CBD Technologies Inc. (US) (PENCE)
CBR Labs (US) (CBDN)
Cell Genesys (US) (PENCE)
Cephalon (US) (PENCE)
Cleveland Clinic (US) (PENCE)
Corixa Corporation (US) (CBDN)
Cytel Inc. (US) (CBDN)
Dupont Pharmaceuticals (US) (CBDN)
Dura (US) (CBDN)
Eli Lilly Company (US) (CBDN)
Elsevier Science (Neth) (HEALNet)
Forta Corporation (US) (ISIS)
Genzyme Corp. (US) (CGDN)
Hoechst Marion Roussel (US) (PENCE)
Hoffman La Roche Ltd. (Switz) (CBDN)
Hughes Bros. Inc. (US) (ISIS)
Hughes Network Systems (US) (MICRONET)
Human Genome Sciences (US) (PENCE)
ID Vaccine Corp. (US) (CBDN)
Intervet (US) (CBDN)
Invitrogen (US) (CBDN)
Isotec Inc. (US) (PENCE)
Japan Research & Development Corp. (Japan) (CGDN)
Kikkoman Corp. (Japan) (CBDN)

Success Stories

HEALNET

The Latest Healthcare Information at Your Fingertips

One of the most daunting problems facing healthcare professionals today is getting concise, current, and reliable information when and where they need it. With an estimated two million new medical research papers published every year, it would take a physician or nurse two to three hours a day to read all the new findings. That's valuable time that could be spent taking care of patients.

To help clinicians track down useful information without having to spend hours in the library, researchers with the Health Evidence Application and Linkage Network (HEALNet) are developing a number of tools that provide immediate desktop access to sound scientific information.

- One of these tools is the **Clinical Integrator (CLINT)**, a software package that is being commercialized by the HEALNet spin-off company InfoWard Inc. Using CLINT, healthcare practitioners can access the latest and most reliable scientific evidence—including patient information, test results, relevant Internet sites, and educational resources—right in the hospital ward or the emergency room.
- The **Evidence-Based Concept Map Project** is a one-year initiative to give HEALNet researchers a better understanding of how health informatics—the

Internet, computers, and information systems to manage healthcare information—can contribute to better decisions and a more effective healthcare system overall.

- **Autocontrol** is helping healthcare professionals to make wise healthcare decisions. The software system sifts through practice databases and identifies patterns of diagnostic test use and patient care. It also advises clinicians of the latest diagnostic tests as well as changes in clinical practice. Ultimately, Autocontrol improves a seemingly chaotic process by providing targeted information and reducing the costs of diagnostic testing.

With these HEALNet innovations, key informatics researchers in Canada will have a much bigger vision of what is involved in the basic concepts of evidence and decision making. And with improved decision making comes one important thing: better health for all Canadians.

HEALNet is a national network of researchers from the health, social, and applied sciences. The Network's mission is to enhance the health of Canadians through improved use of the most relevant research evidence in health decision making.

Three New NCEs

In a series of announcements, the NCE program welcomed the creation of three new Networks of Centres of Excellence following a national competition. Centred around a variety of disciplines, the new networks have a unique research niche and are well on their way to finding innovative ways to benefit a wide variety of Canadians.

Mathematics of Information Technology and Complex Systems (MITACS) Network

With a total federal investment of \$14.5 million over four years, the new MITACS network is making major contributions to the knowledge-based society by building relationships with industry to transfer mathematics-based knowledge from the university to the public and private sectors.

The MITACS network builds on the country's three major mathematics institutes: the Centre de recherches mathématiques in Montreal; the Fields Institute for the Mathematical Sciences in Toronto; and the Pacific Institute for the Mathematical Sciences in Vancouver.

The network has become a rallying point for Canadian participation in the key role that mathematics will play in the coming decades. Mathematical models of complex materials and of processes within biological cells that would

have been inconceivable a decade ago will soon revolutionize electronic design, medical therapies, and industrial manufacturing. Linked together as a network—with the talents of 188 researchers from 26 universities, partners from 53 companies and 16 other organizations, and \$1.5 million in partner contributions—these institutes will be better able to deal with the “revolution” and harness Canada's mathematical power for the 21st century.

Canadian Arthritis Network (CAN)

The launching of the new Canadian Arthritis Network marked the beginning of a unified network dedicated to searching for new therapies and possible cures for arthritis. A condition that affects one in five Canadian adults, arthritis is the most frequent cause of long-term disability and costs the Canadian economy an estimated \$18 billion each year.

With a federal investment of \$14.5 million over four years, CAN will link more than 100 researchers in 21 universities, numerous research hospitals, and 31 industries and government departments and agencies. Network participants aim to pool their knowledge and capitalize on discoveries by bringing them to industry and to market.

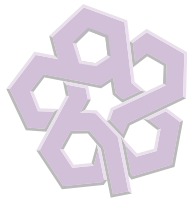
Geomatics for Informed Decisions (GEOIDE) Network

With a federal investment of close to \$12 million over four years, the GEOIDE network was established to further develop Canada's accomplishments in the field of geomatics. The network will address four major objectives:

- To better exploit Canadian geomatics infrastructure.
- To develop tools and technologies for decision making and information dissemination.
- To co-ordinate long-term fundamental research in multidisciplinary pan-Canadian teams.
- To broaden the range of applications based on geomatics technologies.

As part of a fast-expanding field that already supports an industry worth \$10 billion worldwide, the GEOIDE network will link all sectors involved with geomatics and facilitate the transfer of research results into marketable products in Canada.

The new network will connect 97 researchers from 27 universities with partners from 29 companies and 24 organizations, including a number of government agencies.



INDUSTRY *(continued from page 12)*

Lancaster Company (US) (ISIS)
Marshall Industries Composites Inc. (US) (ISIS)
Martek Biosciences Corp. (US) (PENGE)
Master Builders Inc. (US) (ISIS)
MedImmune (US) (CBDN)
Merck KGaA (Germ) (CBDN)
Merck Sharp and Dohme Research Labs (US) (CBDN)
Millenium Pharmaceuticals (US) (CGDN)
Mitsubishi Chemical Corporation (Japan) (ISIS)
Mitsubishi Chemical America Inc. (US) (ISIS)
Nalco Chemical Company (US) (Wood-Pulps)
Neose Technologies, Inc. (US) (CBDN, PENGE)
Novo Nordisk Inc. (US) (PENGE)
Parke-Davis (US) (CBDN)
Pari (Germ) (CBDN)
PathoGenesis Inc. (US) (CBDN)
Pfizer Central Research (US) (CBDN)
Pharmacia & Upjohn (US) (CBDN)
Rhône-Poulenc-Rorer (France) (CBDN)
Sanders Lockheed Martin (US) (CITR)
Scripps Research Inst. (US) (PENGE)
Sequella (US) (CGDN)
SmithKline Beecham Clinical Labs (US) (CBDN)
SmithKline Beecham Pharmaceuticals (UK) (CBDN)
SmithKline Beecham Pharmaceuticals (US) (CBDN)
Sun Microsystems (US) (TeleLearning)
Synthetic Industries (US) (ISIS)
The Burnham Inst. (US) (CBDN)
Unimin Corp. (US) (ISIS)
Variagenics (US) (CGDN)
Wyeth-Ayerst (US) (CBDN)
Unnamed (UBC Spinoff Co.) (I) (CBDN)
Zoltec Corp. (US) (ISIS) ■

Success Stories

Institute for Robotics and Intelligent Systems (IRIS) *A Brave New World*

Ever been accused of being too smart for your own good? For the latest generation of high-tech intelligent systems, it's not an insult. Being too smart is what they do best. And that's good for everyone. Some of these systems have been developed in British Columbia by spin-off companies of the Institute for Robotics and Intelligent Systems (IRIS).

Intelligent Sound

A Canadian company, WaveMakers Research Inc., has developed WaveMakers Speaker Identification—a software tool that can identify individual speakers just by the sound of their voice. Using a new approach, the software can locate, identify, isolate, and track sound sources, even in noisy environments like a busy office. While other voice-recognition systems need to be trained to hear specific words, WaveMakers software “listens” to the voice or sound and can instantly identify speakers regardless of what they say.

What are the practical applications? Since it can track people as they move around a room, the software is great for teleconferencing. It's also useful for security purposes—to eliminate common, everyday sounds from the ones that pose a threat.

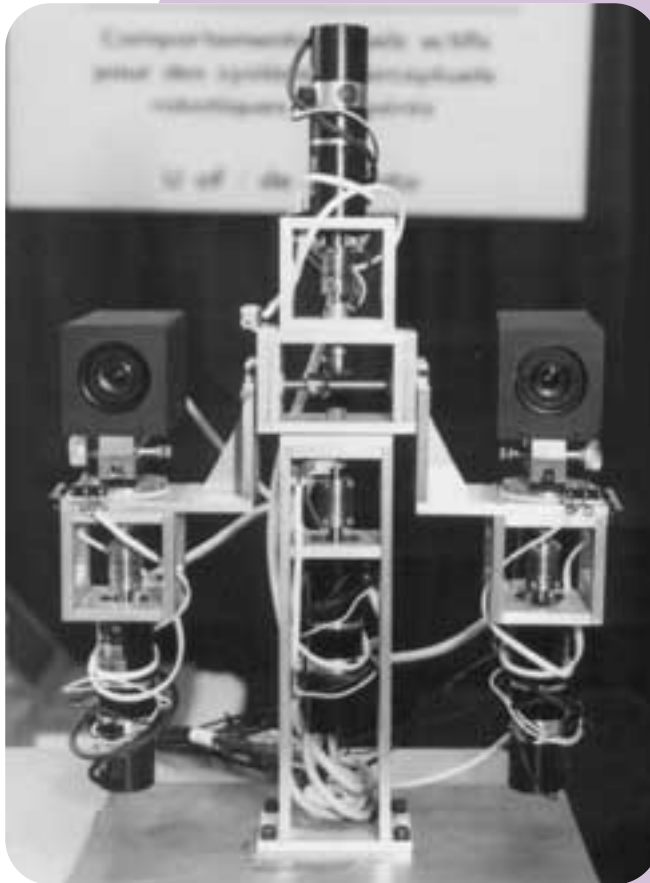


Photo: PRECARN Associates Inc.

continued on page 16

Renewal of Four Networks

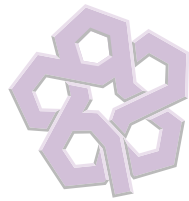
First established in 1995, four existing NCEs have shown they are on the right track. As a result, they are receiving a total of more than \$35 million in investment from the NCE program to promote and further develop their research and partnerships.

These four networks were reviewed in 1998 by panels of international experts. All their activities were placed under a microscope, and all showed they have earned their place in the NCE program. Following each panel's positive assessment, the networks' grants will be extended to 2002. These networks will continue to provide Canadians with a high return for their investment in terms of economic benefits and social gains.

- **The Health Evidence Application and Linkage Network** (HEALNet) is carrying out multidisciplinary research to improve the health and wealth of Canadians.
- **The Intelligent Sensing for Innovative Structures Network** (ISIS Canada) is developing Canadian civil engineering and construction capability to a world leadership position.

- **The Sustainable Forest Management Network** (SFM) is pursuing research aimed at managing the nation's forests while preserving their inherent ecological function and biodiversity.
- **The TeleLearning Network of Centres of Excellence** (TeleLearning) is focusing on new ways to use networked computer environments and tools for education and training.

These networks are training the next generation of scientists, and bringing researchers who generate new knowledge into close contact with those who use knowledge productively. They are key to preparing Canada for the knowledge-based society of the new millennium.



UNIVERSITIES

British Columbia

Simon Fraser University (CBDN, CITR, GEOIDE, IRIS, MICRONET, MITACS, PENCE, TeleLearning)

Technical University of British Columbia (TeleLearning)

University of British Columbia (CBDN, CGDN, CITR, GEOIDE, IRIS, ISIS, MICRONET, MITACS, PENCE, SFM, TeleLearning, Wood-Pulps)

University of Northern British Columbia (SFM)

University of Victoria (CBDN, CGDN, CITR, GEOIDE, HEALNet, IRIS, MICRONET, MITACS, PENCE, SFM, Wood-Pulps)

Alberta

Athabasca University (TeleLearning)

University of Alberta (CBDN, CGDN, CITR, HEALNet, IRIS, ISIS, MICRONET, MITACS, PENCE, SFM, TeleLearning, Wood-Pulps)

University of Calgary (CBDN, CGDN, GEOIDE, HEALNet, IRIS, MICRONET, MITACS, PENCE, SFM, TeleLearning)

Saskatchewan

University of Regina (IRIS, MICRONET, SFM)

University of Saskatchewan (CBDN, GEOIDE, HEALNet, IRIS, MITACS, SFM, TeleLearning)

Manitoba

University of Manitoba (CBDN, CGDN, CITR, HEALNet, IRIS, ISIS, MICRONET, MITACS, SFM)

University of Winnipeg (MITACS, TeleLearning)

Ontario

Brock University (TeleLearning)

Carleton University (CITR, GEOIDE, Wood-Pulps, MICRONET, MITACS, TeleLearning)

Lakehead University (SFM)

McMaster University (CBDN, CGDN, GEOIDE, HEALNet, IRIS, ISIS, Wood-Pulps, MICRONET, MITACS)

Queens University (CBDN, CITR, GEOIDE, IRIS, ISIS, Wood-Pulps, MITACS, PENCE, TeleLearning)

Royal Military College of Canada (ISIS)

Ryerson Polytechnic University (GEOIDE)

University of Guelph (CBDN, GEOIDE, MITACS, PENCE, TeleLearning)

University of Ottawa (CBDN, CGDN, CITR, IRIS, SFM, TeleLearning, Wood-Pulps)

University of Toronto (CGDN, CITR, GEOIDE, HEALNet, IRIS, ISIS, MICRONET, MITACS, PENCE, SFM, TeleLearning, Wood-Pulps)

University of Waterloo (CITR, HEALNet, IRIS, ISIS, MICRONET, MITACS, PENCE, SFM, TeleLearning)

University of Western Ontario (CBDN, CITR, GEOIDE, HEALNet, IRIS, MITACS, PENCE, TeleLearning, Wood-Pulps)

University of Windsor (MICRONET)

Wilfred Laurier University (GEOIDE, TeleLearning)

York University (GEOIDE, IRIS, MITACS, TeleLearning)

Success Stories

continued from page 14

Intelligent Tracking

Imagine a video camera that has eyes *and* a brain. Too far-fetched? A Vancouver company has come up with a way to combine the two elements in an innovative approach to video surveillance.

Point Grey Research Inc., a spin-off of the Laboratory for Computational Intelligence at the University of British Columbia, has designed the Triclops People Tracking System. The system uses three compact cameras connected to a computer to provide “intelligent” 3-D images. Triclops can detect the presence of a person, count the number of people passing by a specific

location, and determine their direction of travel by tracking their movements. With its ability to identify individuals and track unusual behaviour, Triclops is a big step up from traditional security systems.

Together, these two NCE spin-off companies are showing the kind of successful innovation that’s possible with “smart” partnerships between university researchers and the private sector.

The IRIS mission is to promote high-quality collaborative research in intelligent systems which is of strategic importance to Canadian industry and to strengthen the R&D interaction between universities and industry, thereby improving the competitiveness of Canadian firms.

Relevance of the NCE Program for Canadians and Canada

Since it was first formed in 1989, the NCE program has been the federal government's vehicle for linking researchers in different parts of Canada together to create national critical masses of research capacity to deal with complex and strategic problems. The program also reinforces the scientific capacity of Canada's regions—a prerequisite for the development of strong local economies. It builds on the excellence of research centres throughout the country, linking them to other major centres across Canada as part of an overall plan to improve the quality of life for Canadians. NCE research holds the promise of significant economic and social benefits in a number of sectors that are critical to Canada: forestry, agriculture, health, infrastructure, training, and informatics. There is demonstrable evidence of success. As with other federal research investments, the NCE program produces benefits far in excess of its cost.

Excellence of the Research Program

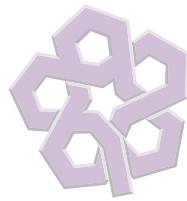
The NCE program contributes to Canada's ability to lead in areas of research with high economic or social impact as a result of its network approach. This approach builds on the excellence of the well-established research centres across Canada that have joined forces as part of the program. In the knowledge economy, Canada has to address new and emerging economic, social, and ethical issues. Only by using the NCE approach can important advances be made

in those areas. The NCE program acts as a pipeline between the universities' research capacities and the needs of industry, government, and the non-profit sector. NCE graduates and researchers carry innovative ideas and high-level skills along this pipeline. In this way, they fuel the development of new products, processes, enterprises, and jobs.

Highly Qualified Personnel

Training Canada's future scientists and engineers is an important role that NCEs play. The NCE program has made a significant contribution to Canada's ability to develop and retain outstanding researchers in research areas and technologies critical to Canadian productivity, economic growth, public policy, and quality of life. The program links young researchers with industry and business. As a result, on graduation they are "job ready" and have a high rate of success in finding employment. NCEs produce a stream of highly qualified graduates capable of moving immediately into industry, government, and the non-profit sector.





UNIVERSITIES *(continued from page 16)*

Quebec

Bishop's University (TeleLearning)
 Concordia University (CITR, IRIS, ISIS, Wood-Pulps, MICRONET, MITACS, TeleLearning)
 École des Hautes Études Commerciales (MITACS)
 École Polytechnique de Montréal (CITR, IRIS, Wood-Pulps, MICRONET, MITACS)
 McGill University (CBDN, CGDN, CITR, GEOIDE, HEALNet, IRIS, MICRONET, MITACS, PENCE, SFM, TeleLearning, Wood-Pulps)
 Télé-Université (TeleLearning)
 Université de Montréal (CGDN, GEOIDE, HEALNet, IRIS, MICRONET, MITACS, PENCE, SFM, TeleLearning)
 Université de Sherbrooke (CBDN, HEALNet, ISIS, MICRONET)
 Université du Québec à Chicoutimi (SFM, TeleLearning)
 Université du Québec à Hull (GEOIDE)
 Université du Québec à Montréal (CITR, GEOIDE, HEALNet, MITACS, SFM, TeleLearning)
 Université du Québec à Trois Rivières (MITACS, SFM, Wood-Pulps)
 Université Laval (CBDN, CITR, GEOIDE, HEALNet, IRIS, MITACS, SFM, TeleLearning)
 Institut national de recherche scientifique (INRS) (CITR, GEOIDE, MICRONET)

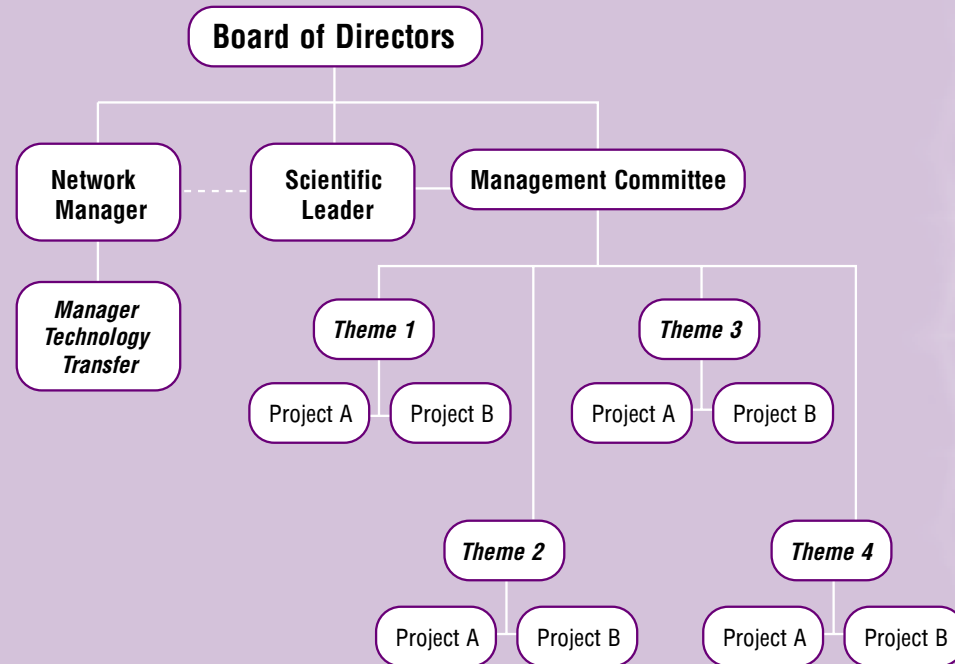
Maritimes

Dalhousie University (GEOIDE, HEALNet, ISIS, MICRONET, MITACS)
 Memorial University (IRIS, MITACS, TeleLearning)
 Mount Allison University (Wood-Pulps)
 Mount Saint Vincent University (TeleLearning)
 Université de Moncton (SFM)
 University of New Brunswick (GEOIDE, SFM, Wood-Pulps, TeleLearning)
 University Prince Edward Island (IRIS)

International

City University of New York (US) (GEOIDE)
 Columbia University (US) (HEALNet)
 Dartmouth University (US) (HEALNet)
 Université de Paris Sud (France) (GEOIDE)
 University of Chile (Chile) (CBDN)
 University of Newcastle (UK) (GEOIDE)
 University of Warwick (UK) (HEALNet)
 University of Wisconsin (US) (HEALNet) ■
 Yale University (US) (HEALNet) ■

A Typical NCE Organization Chart



Networking and Partnerships

This is an area where the NCE program excels. Developing effective research and technology links among academic institutions, federal and provincial agencies, and private sector participants adds up to big benefits for Canadians. Networks conduct pre-competitive or “discovery research”—research that benefits many organizations in a sector or cluster. Once a network’s research is sufficiently advanced, outside organizations can use its results as the basis for their own product and process development activities. Many companies can use the findings of an individual research program, thereby multiplying the impact and benefits of the original research. Companies realizing the benefits are proving willing to finance part of the costs of the discovery research phase, and most or all of the costs of the commercialization phase, in line with the balance between risk and reward.

Knowledge Exchange and Technology Exploitation

New products, processes, or services that can be commercialized by firms operating in Canada will strengthen the Canadian industrial base, enhance productivity, and contribute to long-term economic growth and social benefits. This process includes effective collaboration with the private and public sectors in technology, market development, and public policy development.

Management of a Complex Research Network

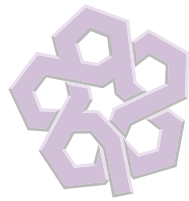
To manage such complex multidisciplinary and multi-institutional research programs, NCEs have adopted effective business practices. They each appoint a board of directors that reflects the interests and concerns of the public, private, and academic

sectors involved in the network, and that has overall responsibility for the management, direction, and financial accountability of the network. To ensure that stakeholders have input into the direction of the network, at least 50 per cent of the membership of the board of directors is from outside the university community, and the majority of those are from industry. Each network is led by a Program Leader, who is responsible for providing scientific leadership and direction to the network, as well as by a Network Manager with the appropriate background and expertise to direct the business management of the network. This adds up to a strong leadership team.

In addition, the management of the research program requires ongoing assessment of all the projects. This function is carried out by a research committee usually chaired by the Program Leader. The committee is made up of researchers from the network as well as representatives of industry and government user sectors, and reflects the multisectoral and multidisciplinary nature of the network research program. These best practices ensure that every effort is made to have the results of the network-funded research exploited in Canada for the benefit of Canadians. Canadians benefit from incremental economic activity, the development of new Canadian receptor companies, and the creation of high-quality jobs in Canada, as well as from the many research advances helping us all to enjoy happier, healthier lives.

A typical network organization chart appears opposite.

A total of 462 companies, more than 100 provincial and federal government departments and agencies, 18 hospitals, 58 universities, and more than 99 other organizations from Canada and abroad are involved in the NCE program. The active involvement of Canadian industry provides stimulating training environments and employment opportunities for students. In fact, about 90 per cent of network graduates are successful at finding jobs. In 1998-1999, the networks stimulated outside investments of over \$76 million, including more than \$44 million by the participating private sector companies. ■



GOVERNMENT DEPARTMENTS AND AGENCIES

British Columbia

Provincial Government

BC Government (CBDN)
BC Health Research Foundation (CBDN)
BC Innovation Agriculture Foundation (CBDN)
BC Ministry of Advanced Education, Training & Technology (HEALNet)
BC Ministry of Employment and Investment (CBDN)
BC Technology Development (CBDN)
British Columbia Science Council (PENCE)
Capital Health Region (HEALNet)
Ministry of Employment & Investment BC (IRIS)
Ministry of Transportation & Highways of BC (ISIS)
Pacific Biological Station (CBDN)
Province of British Columbia (CBDN, CGDN, IRIS, Mechanical Wood-Pulps, MITACS, PENCE)
Provincial Health Laboratory (CBDN)
Science Council of BC (CBDN)

Federal Government

Canadian Hydrographic Service (MICRONET)
Fisheries and Oceans Canada (CBDN)

Alberta

Provincial Government

Alberta Economic Development (CBDN)
Alberta Environmental Protection (SFM)
Alberta Heritage Foundation for Medical Research (CBDN, HEALNet, PENCE)
Alberta Peptide Institute (CBDN)
Alberta Research Council (PENCE)
Alberta Science and Research Authority (CBDN)
Alberta Science and Technology (CBDN)
Alberta Transportation and Utility (ISIS)
City of Calgary (ISIS)
City of Fort Saskatchewan (ISIS)
Province of Alberta (MITACS, PENCE)
Provincial Laboratory of Northern Alberta (CBDN)
Southern Alberta Inst. Of Technology (GEOIDE)
Workers' Compensation Board of Alberta (HEALNet)

Federal Government

Defence Research Establishment Suffield (CBDN)
Industrial Research Assistance Program (IRAP) (ISIS)

Saskatchewan

Provincial Government

Central Plains District Health Board (HEALNet)
Health Services Utilization & Research Commission (HEALNet)
Moose Jaw-Thunder Creek District Health Board (HEALNet)
Northwest District Health Board (HEALNet)
Pipestone District Health Board (HEALNet)
Saskatchewan Agriculture (CBDN)
Saskatchewan Health, District Support Branch (HEALNet)

Success Stories

ISIS

Smart Structures

Since it was formed in 1995, the Intelligent Sensing for Innovative Structures (ISIS) NCE has worked steadily to help develop smart and innovative ways to build, repair, and monitor structures. Now, with a number of new field applications, new and continuing industry partners, and a successful mid-term review under its belt, the network's position within the NCE program seems firmly cemented. ISIS is clearly showing the Canadian infrastructure industry what it's made of.

As enthusiasm for ISIS continues to grow and it collects award after award, more and more researchers, project leaders, and universities are becoming attracted to the network. The reason? ISIS seems to be in the right place at the right time—with the right technology and products. And what are the products causing all the commotion? State-of-the-art fibre-reinforced polymers used to repair and strengthen bridges and structures; and fibre Bragg grating sensors, a new and longer fibre optic sensor used to monitor how structures change over time.

These new products couldn't come at a better time for the Canadian infrastructure, and for bridges in particular. According to ISIS, over 40 per cent of the country's bridges were built more than 30 years ago and are in urgent need of replacement or rehabilitation. The Canadian Federation of Municipalities has identified over 200,000 bridges and structures as deficient. It estimates it will cost \$44 billion to make the necessary repairs.

However, once the repairs are done and everything's in place, that should take care of things for a while. ISIS estimates that its technology will reduce the cost of maintenance and help most structures last almost twice as long under the most corrosive and frigid climatic conditions.

ISIS Canada's mission is to advance civil engineering to a world leadership position through the development and application of fibre-reinforced polymers (FRP) and integrated intelligent fibre optic sensing technologies, for the benefit of all Canadians through innovative and intelligent infrastructure.

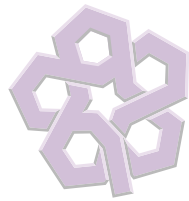
PATHS THROUGH WHICH NCE PROGRAM FUNDS FLOW TO THE NETWORKS

Funding Agency	Grants
NSERC	\$27,299,500
MRC	\$13,655,000
SSHRC	\$5,394,500
NCE Letters of Intent Awards	\$275,000
NCE Administration	\$1,476,000
Total	\$48,100,000

1998-1999 CONTRIBUTIONS TO THE NCE PROGRAM

Source	Cash	In-Kind	Total
NCE	\$46,624,000	\$0	\$46,624,000
Partners			
University	\$757,119	\$1,194,271	\$1,951,390
Industry	\$15,774,553	\$28,666,339	\$44,440,892
Federal	\$1,997,530	\$2,473,179	\$4,470,709
Provincial	\$6,216,600	\$855,034	\$7,071,634
Other	\$12,122,880	\$5,886,974	\$18,009,854
Partners' Total	\$36,868,682	\$39,075,797	\$75,944,479
Grand Total	\$83,492,682	\$39,075,797	\$122,568,479





GOVERNMENT DEPARTMENTS AND AGENCIES *(continued from page 20)*

Saskatoon District Health Board (HEALNet)
Southwest District Health Board (HEALNet)

Manitoba

Provincial Government

City of Winnipeg (ISIS)
Manitoba Health (HEALNet)
Manitoba Highways & Transportation (ISIS)
Province of Manitoba (IRIS, ISIS)
Province of Manitoba/Centre of Excellence (CBDN)
Province of Manitoba/Provincial Support for NCE (CBDN)
Workers Compensation Board of Manitoba (HEALNet)

Federal Government

Laboratory Centre for Disease Control (CBDN)

Ontario

Provincial Government

Cancer Care Ontario (HEALNet)
Halton-Peel District Health Council (HEALNet)
Institute for Clinical Evaluative Sciences (HEALNet)
Lethbridge Research Centre (CBDN)
Materials and Manufacturing Ontario (ISIS)
Ontario Graduate Scholarships (CBDN)
Ontario Ministry of Natural Resources (GEOIDE)

Federal Government

Atomic Energy of Canada Ltd. (IRIS, ISIS)
BIOTECANADA Human Resource Council (GGDN)
Canada Foundation for Innovation (CBDN, ISIS)
Canadian Food Inspection Agency (CBDN)
Canadian Forest Service (Mechanical Wood-Pulps)
Communications Research Centre (CITR)
Department of National Defence (GGDN, GEOIDE, IRIS)
Environment Canada (GEOIDE)
Department of Fisheries and Oceans (CBDN, GEOIDE)
Forestry Canada (Mechanical Wood-Pulps)
Health Canada (CBDN, HEALNet)
Human Resources Development Canada (TeleLearning)
Industry Canada (HEALNet, MITACS, TeleLearning)
Medical Research Council (CBDN, HEALNet, MITACS, PENCE)
National Animal Genome Research Program (NAGRP) (CBDN)
National Cancer Institute of Canada (NCIC) (CBDN)
National Research Council (CBDN, CITR, IRIS, ISIS, MICRONET, MITACS)
Natural Resources Canada (GEOIDE)
Natural Sciences and Engineering Research Council (CBDN, HEALNet)
Public Works and Government Services Canada (CBDN)
Transport Canada (GEOIDE)

Quebec

Provincial Government

Centre Antipoison du Québec (GEOIDE)
Centre de recherches pour la défense Valcartier (MITACS)

Success Stories

Mechanical Wood-Pulps NCE

Lending a Helping Hand to Students

Sometimes you get *out* what you put *in*. Never has that idea been more relevant than it was over the past year at the Mechanical Wood-Pulps Network. The Network, as part of its mandate, has always been devoted to providing a training ground for graduate students—in the belief that the industry would ultimately reap the rewards. However, the NCE recently added a new twist, demonstrating to the entire industry that, if students are the future, then that is where the Network has its eyes firmly fixed.

Originally, the NCE's training concentrated on the purely technical side of the industry, with students working with investigators in each of the scientific programs. Last year, the NCE recognized the need for something more. That's when it took a unique step and launched its Job Skills program. Designed around the needs of students who are working in fields directly related to the pulp and paper industry, the program helps them improve their job and professional skills. Although the training goes back to basics and seems a little removed from the day-to-day demands and workings of the industry, the payoff has been big. So what's being offered?

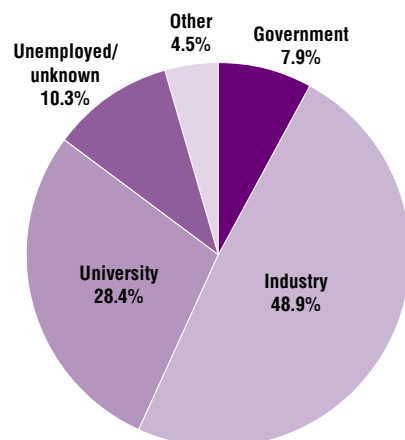
- In 1998–99, the program offered the graduate and post-doctoral students two Internet-based writing skills workshops. Students rapidly mastered the essentials of grammar and style, learning basic

English structure using examples from pulp and paper literature. Armed with new skills to express their ideas more clearly, the students demonstrate increased research productivity and motivation.

- The program provides training on how to find what every student wants: a job.
- Included is training on public speaking and how to make presentations to an audience.

The mission of the Mechanical Wood-Pulps NCE is to develop the technology and expertise that will enable Canadian-based manufacturers to market globally high-value products from mechanical pulp, or processes and equipment for their manufacture. The NCE accomplishes this through research focused on exploiting Canada's advantages in fibre quality, developing new equipment and process innovations for high-yield pulps, and enhanced training of highly qualified scientists and engineers.

POST NETWORK EMPLOYMENT BY SECTOR



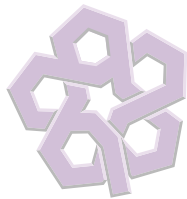
PATENTS, LICENCES AND SPIN-OFF COMPANIES

PATENTS	Number
Filed	102
Awarded	36
LICENCES	
Granted	44
Under negotiation	38
SPIN-OFF COMPANIES	8



NCE PARTICIPATING ORGANIZATIONS FOR 1998-1999

Province	Federal	Hospital	Industry	Other	Provincial	University	Total
British Columbia	2	2	66	10	14	5	99
Alberta	2	0	62	7	14	3	88
Saskatchewan	0	0	3	0	9	2	14
Manitoba	1	1	18	1	7	2	30
Ontario	21	7	144	37	7	15	231
Québec	2	7	85	19	20	15	148
New Brunswick	0	0	2	1	0	3	6
Nova Scotia	0	0	5	1	2	2	10
Newfoundland	0	0	4	2	0	1	7
Prince Edward Island	0	0	0	0	0	1	1
Total Canadian	28	17	389	78	73	49	634
Total Non-Canadian	3	1	73	21	0	9	107
Grand Total	31	18	462	99	73	58	741



GOVERNMENT DEPARTMENTS AND AGENCIES *(continued from page 22)*

Centre de Santé Publique de Québec (GEOIDE)
Centre géoscientifique de Québec (GEOIDE)
City of Sherbrooke (ISIS)
Comité de santé environnementale du Québec (GEOIDE)
Commission scolaire de la Seigneurie-des-Mille-Iles (HEALNet)
Direction de la santé publique de Montreal-Centre (HEALNet)
Direction de la santé publique, Régie Régionale de la Santé et des services sociaux (HEALNet)
Direction des structures Quebec (ISIS)
Formation de Chercheurs et l'Aide à la Recherche (Fonds FCAR) (CBDN, Mechanical Wood-Pulps, MITACS)
FRSQ (Fonds de recherche en Santé du Québec) (CBDN,CGDN)
Gouvernement du Québec (SFM)
Ministère de la santé et des services sociaux (HEALNet)
Ministère de l'environnement et de la faune du Québec (GEOIDE)
Ministère des Ressources naturelles du Québec (GEOIDE)
Ministère des Transports du Québec (ISIS)
Régie régionale de la santé et des services sociaux de Montréal Centre (HEALNet)
Régie régionale de l'Estrie (HEALNet)
Régie régionale de Montréal-Centre (HEALNet)

Federal Government

Biotechnology Research Institute, NRC (PENCE)
Canadian Space Agency (GEOIDE, IRIS)

Maritimes

Provincial Government

Harbour Authority of Hall's Harbour (ISIS)
Nova Scotia Innovation Corp. (ISIS)

International

Commission Européenne (US) (CBDN)
National Science Foundation (US) (CBDN)
Department of Defense (US) (CGDN) ■



Success Stories

Micronet

Taking the Right Track to Spin-off Success

What's in a name? For a new NCE-funded Canadian software company—it seems plenty.

It's been an exciting year for the appropriately named **Right Track CAD Corp.** As a provider of tools and services for the design of the newest generation of computer chips, the small Toronto company is making a big impact on the computer industry.

Founded in 1998 by Dr. Jonathan Rose, a professor of electrical and computer engineering at the University of Toronto, and three other Micronet-associated researchers, Right Track gets its name from the wires that connect things inside a computer chip—tracks—and the necessity of choosing the right track for the function of the chip. Now, after just a short time in business, with major contracts with two of the world's leading providers of programmable chips, and expected revenues of \$2 million in its first year, the company itself seems to be on the *right track*.

What's causing all the excitement? Right Track has developed a new type of programmable computer chip (programmable logic devices), which is unlike regular chips because it can be customized for a given task in a fraction of a second. Rather than individually program the millions of tiny “switches” inside a computer chip to make a connection, Right Track uses computer-aided design (CAD) tools to do the job.

In addition to creating jobs for a number of recent graduates and professionals in the electrical and computer engineering fields, Dr. Rose believes Right Track's good fortune sends a powerful message about the potential for success for this type of venture in Canada.

“There is absolutely nothing stopping us here in Canada from doing what they do in Silicon Valley,” says Dr. Rose. “If we have the will, I think we can go far with the resources we already have in this country.”

Micronet is a Canada-wide network of investigators from universities, industry, and government research organizations working co-operatively towards the development of the next generation of microelectronic systems. Micronet's mission is to mobilize Canada's research talent in the academic, private, and public sectors and apply it to strengthen the competitive ability of the Canadian micro-electronics and information technology industries.

REGIONAL DISTRIBUTION OF NCE RESEARCHERS AND HIGHLY QUALIFIED PERSONNEL* FOR 1998-99

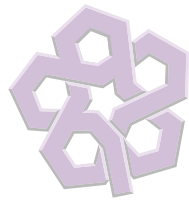
Province/ Territory	NCE Researchers		NCE supported HQP	NCE HQP supported by other sources	Total personnel
	University	Non-university			
Alberta	122	13	194	170	499
British-Columbia	202	8	244	281	735
Manitoba	19	11	24	37	91
New Brunswick	16	0	19	9	44
Newfoundland	10	1	2	16	29
Northwest Territories	0	0	0	1	1
Nova Scotia	9	0	8	4	21
Ontario	327	97	368	410	1,202
Prince Edward Island	2	0	3	0	5
Québec	269	52	320	384	1,025
Saskatchewan	16	2	26	37	81
Total	992	184	1,208	1,349	3,733

* HQP is highly qualified personnel (Research Associates+Postdoctoral Fellows+Graduate Students+Summer Students)

REGIONAL DISTRIBUTION OF NCE PERSONNEL AND NCE FUNDS FOR 1998-99

Province/Territory	NCE Researchers		Highly Qualified Personnel		Total NCE Expenditures by Province	
	# total	Percentage	# total	Percentage	\$ total	Percentage
Alberta	135	11.48%	364	14.24%	\$6,455,566	19.20%
British-Columbia	210	17.86%	525	20.53%	\$7,646,043	22.74%
Manitoba	30	2.55%	61	2.39%	\$1,173,023	3.49%
New Brunswick	16	1.36%	28	1.10%	\$173,945	0.52%
Newfoundland	11	0.94%	18	0.70%	\$80,590	0.24%
NWT	0	0%	1	0.04%	\$0	0%
Nova Scotia	9	0.77%	12	0.47%	\$268,604	0.80%
Ontario	424	36.05%	778	30.43%	\$10,500,774	31.24%
Prince Edward Island	2	0.17%	3	0.12%	\$6,998	0.02%
Québec	321	27.30%	704	27.53%	\$6,527,188	19.42%
Saskatchewan	18	1.53%	63	2.46%	\$785,143	2.34%
Total	1176	100%	2557	100%	\$33,617,8748 *	100%

* This table only shows actual reported expenditures by each participating institution for this period.



HOSPITALS

British Columbia

Children's & Women's Health Centre of British Columbia (CGDN)
St. Paul's Hospital (IRIS)

Manitoba

St. Boniface Hospital (CBDN)

Ontario

Children's Hospital of Eastern Ontario Research Institute (CGDN)
Hospital for Sick Children (CGDN, IRIS, MITACS, PENCE)
London Health Sciences Centre (CGDN)
Mount Sinai Hospital (CBDN, CGDN, PENCE)
Ontario Cancer Institute / Princess Margaret Hospital (MITACS, PENCE)
Ottawa General Hospital (CGDN, PENCE)
Women's College Hospital (CGDN)

Quebec

Centre Hospitalier Universitaire de Québec (CGDN)
Hôpital du Sacré-Coeur de Montréal (HEALNet)
Hôpital St-François d'Assise (CGDN)
Hôpital St-Justine (CGDN)
Montreal Children's Hospital (CGDN)
Montreal General Hospital (CGDN)
Shriners Hospital for Children (PENCE)

International

Hôpital National Saint-Maurice (France) (HEALNet) ■

Success Stories

The Sustainable Forest Management Network *When Tradition and Innovation Work Side by Side*

When science and technology move into traditional, established, and closely guarded domains, things can get difficult and the end result might be that somebody loses and somebody wins. Researchers with the Sustainable Forest Management Network are trying to change that. Along the way, they're working hard to respect old traditions, inspire confidence, and keep a forest in northern British Columbia healthy and vibrant for generations to come.

Dr. Winifred Kessler, an ecologist at the University of Northern British Columbia (UNBC), is leading a team of scientists working on a forest management project that is charting the future course for the Johnson Prince Research Forest in northern British Columbia. The forest is exceptional for its ecological diversity, medicinal plants, cultural sites, wildlife, and marketable Douglas fir. The team is using a computer-generated planning model called "Echo" to assist in looking hundreds of years into the future to see how the forest will evolve under the influence of management and natural processes.

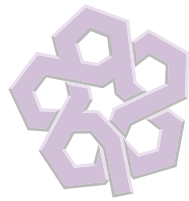
Sound challenging enough? For the SFM Network, the real challenge lies elsewhere. For countless generations, the forest has been the home of the Tl'azt'en First Nation people, who have a long history of traditional use within the forest and are intimately linked to it spiritually and physically. So, how do science and technology co-exist with tradition and spirituality? Quite nicely, thank you.

The Sustainable Forest Management Network, through strong partnerships and enhanced networking, is dedicated to the provision of integrated, multi-disciplinary research and training to ensure the sustainability of Canada's boreal forests. Such research and training are aimed at preserving the ecological functions and biodiversity inherent in Canada's forests. In addition, they are aimed at improving the nation's forest-based economy by developing new knowledge, new strategies, and new technologies for the management and conservation of this valuable renewable resource.

Since the beginning, the UNBC team has respected the Tl'azt'en First Nation and worked hard to involve them in the process of managing the forest and in planning its future. They did this by identifying the needs and values of the Tl'azt'en First Nation people and then factoring these needs and desires into the model for the forest. In the past, this hasn't always taken place.

The results of the consultation have allowed everyone to co-exist happily. For the Tl'azt'en First Nation, the project and approach have been positive and exciting. They see the project as a tool that is helping them empower their aboriginal rights and title to land and resources in their territory. As a result, everybody wins.





OTHER ORGANIZATIONS

British Columbia

B.C. Advanced Systems Institute (IRIS, TL-NCE)
Camosun College, Science Council (CBDN)
Coddling, Dr. Penny (PENCE)
National Institute of Disability Management (HEALNet)
Pacific Institute for the Mathematical Sciences (MITACS)
SCOET (TL-NCE)
United Food and Commercial Workers Union (HEALNet)
Vancouver Foundation (CBDN)
Ventures West Management Inc. (PENCE)

Alberta

Alberta Consultative Health Research Network (HEALNet)
Alberta Research Council (IRIS)
Beef Industry Development Fund (BIDF) (CBDN)
Canadian Masonry Research Institute (ISIS)
Foothills Medical Centre (GEOIDE)
Little Red River Cree Nation (SFM)
University Technologies International Inc. (CBDN)

Manitoba

ISIS Special Projects (ISIS)

Ontario

Canadian Cochrane Centre (HEALNet)
Canadian Council on Health Services Accreditation (HEALNet)
Canadian Cystic Fibrosis Foundation (CBDN)
Canadian Institute for Health Information (HEALNet)
Canadian Labour Congress (HEALNet)
Canadian Medical Association (HEALNet)
Canadian Policy Research Network Inc. (HEALNet)
Canadian Turkey Marketing Agency (CBDN)
CANARIE (HEALNet)
Cancer Care Ontario (MITACS)
Contact North (TL-NCE)
CRESTech (GEOIDE)
Fields Institute for Research in the Mathematical Sciences (MITACS)
Founder's Network (PENCE)
Geomatics Industry Association of Canada (GEOIDE)
Hamilton Regional Cancer Centre (HEALNet)
Humber College (TL-NCE)
Institute for Research in Construction (ISIS)
Institute for Work & Health (HEALNet)
Kaviar Information Technology (HEALNet)
Knowledge Connection Corp. (TL-NCE)
Loeb Institute (PENCE)
London Health Sciences Centre (HEALNet)
MDS Health Ventures Inc. (PENCE)
Multiorgan Transplant Program (CBDN)
National Cancer Institute of Canada (CBDN)
Ontario Science Centre (OSC) (IRIS)
Physicians' Services Incorporated Foundation (CBDN)
Poultry Industry Council (CBDN)
Private Donations (PENCE)
PRO (ISIS)
Province of Ontario, Centre of Excellence (ISIS)
Royal Military College of Canada (GEOIDE)

Success Stories

TeleLearning *Tomorrow's Mathematicians*

As part of a fresh new approach to high-tech learning, students at the Island Pacific School on Bowen Island in British Columbia are turning around an old adage: if you can't go to the mountain, let the mountain come to you.

In a reshaping of the traditional technology and approaches that have been used to teach children in classrooms for generations, the TeleLearning NCE has helped to introduce an innovative educational technology project at the school—part of a TeleLearning educational program that has 185 client community participants in 56 projects in schools, companies, public organizations, and colleges across the country. The PolyMath-IPS project is being co-ordinated by the Centre for Experimental and Constructive Mathematics at Simon Fraser University, and is teaching students advanced mathematics using the latest technology. This includes a variety of interconnected tools and resources—such as JavaBeans and the PolyNet system—that offer unprecedented levels of interactivity. And it's all being done at a distance. The project is shattering traditional notions about teaching and learning.

Rather than imposing a fixed approach to learning, this new environment allows students to rapidly construct their own materials and then explore mathematical ideas and concepts in an intuitive and engaged fashion. Nathalie Sinclair, a teacher and researcher at the school, is showing students how to take a critical look at the role technology plays in society and in their own education.

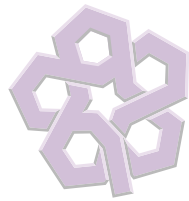
But it's not only *how* and *what* they're learning that are important. It's also the access they have to big-league tools and information. Island Pacific School students are now accessing the same tools that a research-level mathematician might use. The result? A sophisticated and collaborative learning environment that's producing successful results that closely mirror those found by a number of TeleLearning network studies. Students are acquiring essential skills they'll need in the 21st century,

The TeleLearning Network of Centres of Excellence was established in 1995 to support a leadership role for Canada in the worldwide development of telelearning—the use of networked computers and tools for education and training.

such as time management, self-monitoring and motivation, goal setting, problem solving, use of technology, and communications skills. Along the way, they've also experienced significant changes in their attitude about collaborative learning, peer tutoring, and responsibility for their own learning.

The PolyMath-IPS project would not be possible without the commitment and participation of a variety of community partners: BC Tel Advanced Communications, Imaginative Computer Solutions, and Zentra Computer Technologies have all participated in true network-like fashion and supplied hardware, software, and other services. As a result, the students are learning to apply the latest in education technology to mathematics, and are playing an active part in the user participatory design process that will shape the technology of tomorrow's classroom.





OTHER ORGANIZATIONS

(continued from page 28)

Samuel Lunenfeld Research Institute of Mount Sinai Hospital (MITACS)
Sunnybrook Health Science Centre (HEAL/Net)
The Change Foundation (HEAL/Net)
Theta Wave Technologies (HEAL/Net)

Quebec

ASSTSAS (l'Association pour la santé et la sécurité du travail, secteur affaires sociales) (HEAL/Net)
Canadian Bureau of International Education (ISIS)
CEFRIQ (TL-NCE)
Centre de développement de la géomatique (GEOIDE)
Centre de recherche informatique de Montréal (IRIS)
Centre de recherches mathématiques (MITACS)
Centre international de recherche en infographie (GEOIDE)
Centre Universitaire de santé de l'Estrie (HEAL/Net)
CMC (ISIS)
Collège des médecins du Québec (HEAL/Net)
Conseil de pharmacologie du Québec (HEAL/Net)
Conseil d'évaluation des technologies de la santé (HEAL/Net)
École des Hautes Études Commerciales (HEAL/Net)
FRSQ (Fonds de Recherche en Santé du Québec) (HEAL/Net)
Institut de cardiologie de Montréal (MITACS)
Institut de recherche en santé et en sécurité du travail du Québec (HEAL/Net)
Montreal General Hospital Research Institute (MITACS)
Société de gestion informatique (SOGIQUE) (GEOIDE)
Société de transport de la communauté urbaine de Québec (GEOIDE)

Maritimes

Canadian Centre for Cold Ocean Research (IRIS)
Canadian Centre for Marine Communication (IRIS)
Nova Universities Technology Inc. (ISIS)
TeleEducation (TL-NCE)

International

American Cystic Fibrosis Foundation (US) (CBDN)
Armauer Hansen Institute (US) (CGDN)
Burroughs Wellcome Fund (US) (CBDN)
Carnegie Mellon University (US) (IRIS)
École Nationale de Santé publique (France) (HEAL/Net)
European Space Agency (France) (IRIS)
Glaucoma Research Foundation (US) (CGDN)
Howard Hughes Medical Research Institute (US) (CGDN)
HPS Inc., Consultants (US) (HEAL/Net)
Huntington Disease Society of America (US) (CGDN)
Institute for Genomic Research (US) (CBDN)
Internal Research Fund (UK) (CBDN)
Japanese Society for Promotion of Science (Japan) (PENGE)
Korean Institute of Science & Technology (Korea) (PENGE)
Ministerio de Salud/Instituto de Salud (Chile) (CBDN)
Muscular Dystrophy Association (US) (CGDN)
National Cancer Institute (US) (CGDN)
National Institute of Health (US) (CBDN)
National Institute of Health (US) (CGDN)
Swiss National Science Foundation (Switz) (PENGE)
Wellcome Trust (UK) (CBDN) ■

Success Stories

A Biosensor Venture: Sensium Technologies Inc.

A progressive Canadian pharmaceutical company, Helix BioPharma Corp., is an excellent example of how industry can benefit from a collaboration with PENCE (Protein Engineering Network of Centres of Excellence). In 1997, Helix and PENCE embarked on a multi-partner R&D agreement to develop novel biosensor diagnostic technology to enhance Helix's product pipeline of diagnostics, therapeutics, and drug delivery systems. Biosensor technology is a method of detecting the existence of organisms or chemical compounds in human blood or in other substances by the use of a diagnostic chip. Initially the biosensor technology will be developed to target various research applications, followed by applications to detect drugs, hormones, and infectious organisms.

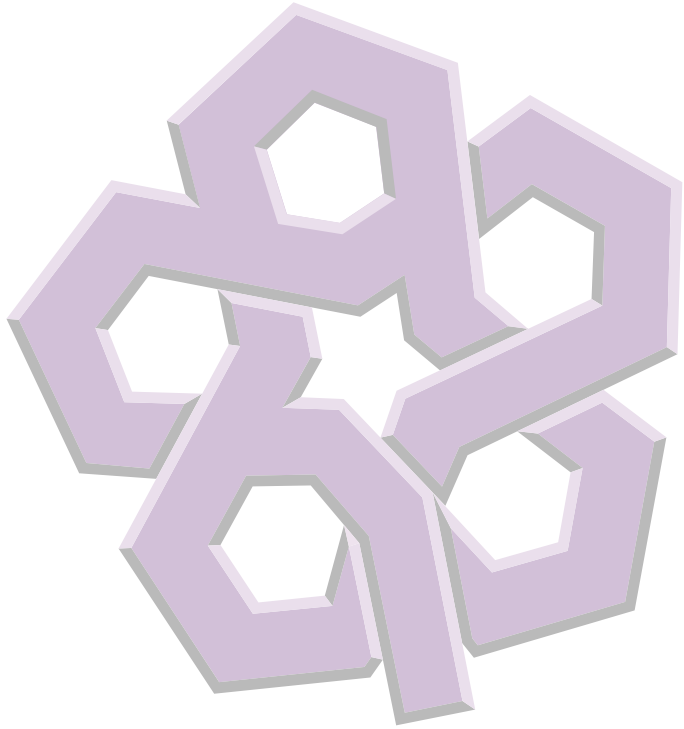
PENCE took on the research challenge and offered Helix a team of highly focused PENCE and non-PENCE researchers. The project involved collaboration, bundling viable technologies and expertise with PENCE, the University of Alberta, and McGill University to further develop the biosensor technology. Between 1994 and 1998, funding in this area totalled over \$1.6 million.

The success of the technology has led to a licence agreement, four U.S. patents, and two patents filed internationally. The cost of these patents has been covered by Helix under a licence agreement between PENCE and its member institutions. The collaboration has resulted in an additional combined investment from PENCE and Helix of over \$2 million.

The past year saw the formation of Sensium Technologies Inc., a wholly owned subsidiary of Helix BioPharma, to specifically focus investment and management on the commercialization of the biosensor technology. Investors have committed over \$1 million to assist the company in making Sensium autonomous and self-financing.

Currently, PENCE is actively working with Sensium to provide technical expertise and access to state-of-the-art technologies and equipment and has committed \$740,000 over two years to match Helix's expenditures towards development of a "biosmart" card.

The mission of PENCE Inc. is to foster scientific excellence by creating or identifying new and emerging technologies and innovative research ideas in the field of protein engineering that are globally competitive; to exploit the knowledge in the development of useful new protein products, new pharmaceutical therapeutics and biotechnological research tools; to support the training of highly qualified young scientists; to exploit discoveries and intellectual properties through active collaboration with industry, and to support existing businesses, as well as to create new businesses in Canada.



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- The Mechanical Wood-Pulps Network
- MICRONET – Microelectronic Devices, Circuits and Systems
- Protein Engineering Network of Centres of Excellence (PENCE Inc.)
- Sustainable Forest Management Network (SFM)
- TeleLearning-NCE

NOTE: On May 1, 1999 a new NCE was announced and a fact sheet is available about it:

- Canadian Institute for Photonic Innovations (CIPI)