PROMOTING INNOVATION & COMMERCIALIZATION IN RURAL BC

APPENDICES

MARCH 2003

Ference Weicker & Company

Management Consultants

APPENDIX I

PIC PROJECT ADVISORY COMMITTEE

APPENDIX I: PIC PROJECT ADVISORY COMMITTEE

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Western Economic Diversification

Tammy Schultz, Program Development Officer
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Dawn Miller, Chair
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APPENDIX II

LIST OF DOCUMENTS REVIEWED

APPENDIX II: PARTIAL LIST OF DOCUMENTS REVIEWED

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APPENDIX III

OVERVIEW OF THE REGIONAL INNOVATION SUPPORT SYSTEM

APPENDIX III: OVERVIEW OF THE REGIONAL INNOVATION SUPPORT SYSTEM

This appendix provides an overview of the regional innovation support system. The components of the regional S&T support system can be divided into a number of categories including:

- Research institutes and organizations;
- Sources of funding for R&D;
- Technology transfer organizations and facilitators;
- Education and training;
- Sources of business capital; and
- Other support for commercialization.

A list of leading organizations, programs, and other resources active in each of these categories is provided in the table below:

TABLE III.1

PARTIAL LISTING OF THE ORGANIZATIONS, PROGRAMS, AND OTHER RESOURCES FORMING THE REGIONAL INNOVATION SUPPORT SYSTEM

Component	Examples of Leading Players
Research Institutes and Organizations	■ Pacific Biological Research Station ■ Summerland Research Station ■ Four smaller Federal Government facilities ■ Three Provincial Government facilities ■ University of Northern British Columbia ■ College and university-college research centres
Sources of Funding for R&D	■ Industrial Research Assistance Program ■ NSERC ■ Canadian Foundation of Innovation ■ Revenue Canada SRED ■ Advanced Systems Institute
Technology Transfer Organizations and Facilitators	■ Seven Regional Councils ■ Four Technology Access Centres ■ Eight Industrial Technology Advisors ■ Eight industry associations ■ One UILO
Education and Training	■ One University ■ Four University-Colleges ■ Six Colleges ■ 1 Institute ■ Private educators and trainers
Sources of Business Capital	■ 34 Community Futures Development Corporations ■ 9 BDC offices ■ Woman's Enterprise Centre (Kelowna) ■ Regional Programs and Funds ■ Chartered Banks and Credit Unions
Other Support for Commercialization	■ Economic Development Agencies ■ Business Incubators

A summary of each of the components is provided in the following paragraphs.

A. RESEARCH INSTITUTES AND ORGANIZATIONS

1. Introduction

Research and development is defined as the creative work undertaken on a systematic basis to increase the stock of scientific and technical knowledge and to use that knowledge in new applications. As such, expenditures on R&D are broadly considered to be a key indicator of the effort devoted to creative activity in science and technology.

Gross Expenditures on Research and Development (GERD) is a statistical term used by OECD Member countries to indicate the total intramural expenditures on research and development in a given territory during a given time period. It includes all the R&D activity undertaken within the territory (ie. BC or Canada), whether it is funded locally or from outside the region. It does not include R&D funded by local firms but undertaken outside of the territory.

In 1999, most of the research and development occurring in British Columbia was performed by business (using 57% of the funding) and higher education (universities, colleges and institutes using 30% of the funding) as indicated below.

Table III.2

GROSS EXPENDITURES ON NATURAL SCIENCE RESEARCH AND DEVELOPMENT IN BRITISH COLUMBIA BY PERFORMING SECTOR

Year	Performing Sector (Millions of $)						Total
	Federal Govt	Provincial Govt	Provincial Res. Org.	Business	Higher Education	Private Non-profit	
1988	86	14	4	268	156	5	533
1989	87	18	4	295	167	7	578
1990	95	20	8	367	219	6	715
1991	96	24	5	348	242	6	721
1992	86	23	0	427	260	7	803
1993	88	26	0	471	254	6	845
1994	103	28	0	591	266	7	995
1995	80	21	0	602	281	6	990
1996	77	25	0	547	274	6	929
1997	82	27	0	573	283	5	970
1998	85	24	0	602	300	5	1,016
1999	106	26	0	645	339	6	1,122

Source: Statistics Canada, "Estimates of Canadian research and development expenditures (GERD), Canada, 1990 to 2001, and by province 1990 to 1999," Science, Innovation and Electronic Information Division, working papers.

Similarly, most workers engaged in research and development in BC are employed by the private sector or by the higher education sector. Together, the two sectors accounted for 90% of the workforce as indicated below.

Table III.3

DISTRIBUTION OF R&D WORKFORCE BY PERFORMING SECTOR, 1999

Sector	FTEs*	% of Total
Business enterprise	5,960	51.4%
Higher education	4,480	38.7%
Federal Government	690	6.0%
Provincial Government	300	2.6%
Private non-profit	30	0.3%
Total	**11,590**	**100.0%**

*Rounded to the nearest 10. Business enterprise refers to all commercially oriented enterprises (privately or publicly owned), industrial research institutes and trade associations.

The vast majority of research facilities in British Columbia are located in the Lower Mainland. The following sections will describe the regionally based facilities and those in the high population urban areas. The chart below summaries the distribution and operators of the major research facilities in BC.

Table III.4

LOCATION AND NUMBER OF MAJOR RESEARCH FACILITIES IN BC

Agency	Number of Research Centres/Institutes/Facilities		
	Region	Non-Region	Total
Federal	6	13	19
Provincial	3	3	6
College	2	0	2
University	2	56	58
Private or partnerships	2	16	18
Total	15	88	103

2. Regional Based R&D Facilities

The regional facilities include two relatively large federally funded research facilities (the Pacific Biological Research Station of Fisheries and Oceans Canada in Nanaimo and the Summerland Research Station of Agriculture and Agrifood Canada), four smaller Federal Government facilities that are branch locations of larger facilities, three Provincial Government facilities that study forestry and agriculture, two centres that are

located at the University of Northern British Columbia, and two research centres at regional colleges. We have attempted to contact each of these organizations to obtain a summary of the research focus, budget and staffing levels. The data we were able to obtain is summarized in the following table.

TABLE III.5

OVERVIEW OF FOCUS, BUDGET AND STAFFING LEVELS AT REGIONAL RESEARCH INSTITUTES AND ORGANIZATIONS

Research Centre	Research Focus	Budget	Staff Levels
Pacific Biological Research Station	Fisheries and oceans	$20 million	200
Bamfield Marine Station	Fisheries and oceans	$2.4 million operating -research budget varies	16
Whitelake Dominion Radio Astrophysical Observatory	Astrophysics	$2.5 million	50
Cultus Lake Salmon Research Laboratory	Salmon management	$500,000 operating $400,000 research	15
Kamloops Range Research Unit	Cattle, crops and pest and disease	$1million operating $1 million research	25
Summerland Research Station	Horticulture, food science, biotechnology	$10 million $2.5 million industry shared cost program	85
Aggasiz Research Station	Crops, pest management, soils and poultry	$5 million	45
UNBC: I. K. Barber Enhanced Forestry Lab	Forestry	n/a	2
UNBC: Two Research Forests	Forestry	n/a	n/a
Selkirk College GIS Research Centre	GIS	$500,000	In development
Malaspina UC Centre for Shellfish Research	Shellfish	$1.5 million	1
Natural Resources Canada: Forestry Service	Forestry	$1.2 million in regions annually	varies by project
Kalamalka Lake Research Station	Forestry	$90,000 operating research varies	14
Abbotsford Animal Health Centre	Animal health	$327,000 operating	24
Cowichan Lake Research Station	Forestry	$150,000 operating	10

Source: Interviews with the Research Centres

The University of Northern BC has a research budget of about $5 million annually, of which 75% to 85% is undertaken in Central and Northern BC. According to Statistics Canada, higher education institutions in BC performed $339 million in natural science R&D in 1999. The University of British Columbia, itself, received $259.6 million in sponsored research funding in 2001-02 in support of over 4,400 research projects. A representative of UBC estimated that about 235 projects totalling $10.6 million in funding had a specific regional aspect.

The creation of UNBC has had and will continue to have a major impact on the research and development resources of the northern regions of BC. UNBC faculty undertake research in a wide variety of disciplines. Two main research areas relating to S&T include High Performance Computing and Forestry (including two research forests).

A research and development park is being developed on the Prince George Campus. The development is being designed to foster synergy and creativity among businesses, faculty, and students, with tenancy in the Park open to public and private enterprises focussed on knowledge-based activities. The labs currently operational at UNBC include the High Performance Computing Lab, a GIS and Remote Sensing Lab, an Enhanced Forestry Lab and a General Equipment Lab.

The section below describes the research centres that are located outside of Victoria and the Lower Mainland.

a. Pacific Biological Research Station (PBS)

Located in Nanaimo, PBS is the main facility for the Science Branch of the Department of Fisheries and Oceans Canada in the Pacific Region. Research areas include Stock Assessment, Aquaculture, Marine Environment and Habitat Science, and Ocean Science and Productivity priorities. Fisheries management, through the Operations Branch, is also conducted here. The station has a full time staff of 200 and annual budget of approximately $20 million.

b. Bamfield Marine Station

This station was established to fill a need for a permanent base for marine-oriented field operations on the west coast. The station supports a year-round research program involving the station's staff, faculty members from universities and scientists from government and private research laboratories. There are also university courses available in the summertime for graduates and undergraduates. The station has 16 full time staff plus a number of visiting professors at any given time. The major source of funding for the station is from a consortium of 5 Universities in Western Canada, NSERC and NRC.

c. Whitelake Dominion Radio Astrophysical Observatory

This facility is part of the Herzberg Institute of Astrophysics. Its main function is as a research facility, however, it does host related seminars and is attempting to increase its connections with local industry.

d. Cultus Lake Salmon Research Laboratory

This is a Department of Fisheries and Oceans research facility that focuses on salmon management issues.

e. Northwest Maritime Institute

This is a not-for-profit society in Prince Rupert that hopes to promote economic diversification of the coastal communities. Its main activity currently is the use of a barge for training and monitoring programs related to salmon farming.

f. Kamloops Range Research Unit

This facility is a substation site of the Agriculture and Agri-food Canada's Lethbridge Research Centre. The Kamloops site has 57 ha of irrigated land, 470 ha of forested range land and several thousand hectares of provincial rangeland. Areas of research include beef production, crop production, and integrated pest and disease management.

g. Summerland Research Station

This facility is part of the Pacific Agri-food Research Centre (PARC). It is a 320 ha site located in Summerland. It has modern laboratory facilities with food research pilot plant and greenhouses. (The other part of PARC is located in Agassiz). The Summerland facility staff conduct research in horticulture and environment, food science and biotechnology.

h. Aggasiz Research Station (PARC)

This station has three field sites in the Fraser valley with a total of 326 ha. This station conducts research in intensive crop culture, integrated pest management, soils and poultry nutrition.

i. Selkirk College: GIS Research Centre

The college has been awarded $500,000 form the Canada Foundation for Innovation to establish a GIS Research Centre. Intended opening date is Fall 2002.

j. Malaspina University College: Centre For Shellfish Research

The college has obtained $1.5 million from the Canadian Foundation for Innovation. A director has been hired and negotiations continue for matching funding from the province

k. Columbia Mountains Institute of Applied Ecology

The Columbia Mountains Institute of Applied Ecology (CMI) is a non-profit society established to promote, facilitate and support co-operative interdisciplinary research focussed on the Columbia River Basin of southeastern British Columbia. The CMI seeks to facilitate collaboration among researchers, conduct research, and communicate knowledge on the Columbia Mountain ecosystems to the public, educators and decision-makers. A volunteer Board of Directors manages the Institute. CMI's membership is comprised of government agencies, community agencies, academic institutions, private businesses and members of the public.

l. Natural Resources Canada: Forestry Service

The Forestry Services of NRC spend approximately $1.2 million annually on regionally based forestry research projects. (Exclusive of their equipment and salary costs.) The service often does collaborative projects with regional institutions. Some of their partners have included UNBC, College of New Caledonia, Selkirk College, Nicola Valley Institute of Technology and the University College of the Cariboo.

m. Kalamalka Lake Research Station: BC Forest Service

The Kalamalka Research Station is located 3 km south of Vernon on Highway 97. The station is now the headquarters for the interior tree improvement and gene conservation programs, specifically working with species such as interior spruce, lodgepole pine, interior Douglas-fir, western larch and white pine. The staff provide technical expertise and services in propagation, seed handling, tree breeding, as well as the maintenance of the gene archive plantations.

n. Abbotsford Animal Health Centre

The centre is located in a mixed-use laboratory and office complex for the BC Ministry of Agriculture Fisheries and Food. The facility houses a staff of 130. The Animal Health Centre (AHC) is a full-service veterinary diagnostic laboratory, funded by the B.C. Ministry of Agriculture and Food. The Centre's mandate is to diagnose, monitor, and assist in controlling and preventing animal disease in British Columbia. It provides a full range of fee-for-service diagnostic testing, including Pathology, Bacteriology, Virology, and Toxicology. In addition, laboratory staff is frequently involved in the development of new diagnostic tests and the initiation of investigative projects to address emerging disease problems in production animals, poultry, and fish.

o. Cowichan Lake Research Station: BC Forest Service

This is a centre for coastal tree improvement and gene conservation programs. There are active research programs being conducted for Douglas-fir, yellow-cedar, red cedar, western hemlock, and Sitka spruce. The staff provides technical expertise and services in propagation and seed handling as well as maintenance of the gene archives for the coastal region.

3. Urban Based Research Centres

The vast majority of government, academic and private research facilities are located in the Lower Mainland and lower Vancouver Island. These are listed below by sponsoring organization. The majority of facilities are operated by the Federal Government and the four Universities. The Universities have developed specialized research strengths. UBC has the most areas of focus with major research efforts in the areas of biotechnology, forestry, geological/mining, fisheries and natural resource management, and health. UVIC specializes in environmental and ocean sciences. SFU is focussing on micromachining and information technology and shares advanced materials research with UBC.

a. Federal Government

- Centre for Plant Health, Canadian Food Inspection Agency:
- Centre for Genetics and Biotechnology for Aquaculture, DFO West Vancouver laboratory
- Environment Canada Research Facilities
- Esquimalt Defence Research Detachment
- Institute of Ocean Sciences, Fisheries and Oceans Canada:
- National Research Council Innovation Centre
- National Research Council Integrated Manufacturing Technologies Institute
- National Research Council Centre for Surface Transportation Technology, Vancouver
- National Research Council Herzberg Institute of Astrophysics, Victoria
- National Research Council Fuel Cells Canada
- Canadian Forest Service: Pacific Forestry Centre
- Natural Resources Canada Pacific Geoscience Centre

- Forest Biotechnology Centre
- Canadian Astronomy Data Centre
- Geological Survey of Canada Pacific

b. Provincial Government

- BC Forest Service, Research Branch;
- Ministry of Water Land and Air Protection: Environmental monitoring
- BC Forest Service Research Branch Laboratory (North Road - Victoria)
- BC Hydro: Powertech Labs inc.

c. University of BC

- BC Cancer Agency: The Terry Fox Laboratory
- TRIUMF (6 associate Universities)
- Biomedical Research Centre
- Centre For Integrated Computer Systems Research
- Media and Graphics Interdisciplinary Centre (MAGIC)
- Advanced Materials and Process Engineering Laboratory
- Centre for Metallurgical Process Engineering
- Centre for Nutrition Research in Fetal, Infant and Child Development
- Research Institute for Children's and Women's Health
- Biotechnology Laboratory
- Centre for Biological Microscopy and Imaging
- Centre for Environmental Research in Minerals, Metals and Materials
- Centre for Isotopic Geochemical Research
- Environmental Biotechnology Facility
- Fisheries Ecosystems Research Laboratory
- Fisheries Oceanography Research Lab
- Geophysical Disaster Computational Fluid Dynamics Centre
- ICAPTURE Centre (Imaging, cell analysis and phenotying)
- Institute for Computing and Cognitive Systems
- Canadian Genetic Disease Network (National Centre of Excellence)
- Pulp and Paper Centre: Pulp and Paper Research Institute of Canada (PAPRICAN)
- Sustainable Development Research Institute
- Centre for Advanced Wood Processing (Partnership with PAPRICAN)
- Multicentre Emergency Medicine Research Netowrk (with Vancouver Hospitals)
- UBC Network (High bandwidth research networking)
- Centre for Health Services and Policy Research
- Centre for Integrated Genomics (with BC Cancer Agency)
- Centre for Molecular Medicine and Therapeutics
- Children's Hospital of BC
- Centre for Educational Technology
- Institute of Applied Mathematics
- Sustainable Forest Management Research Group
- Institute of Health Promotion Research
- Multimedia Ethnographic Laboratory (MERLin)
- Westwater Research Unit

d. University of Victoria

- Centre for Earth and Ocean Research
- Oceans Physics Group
- Oceans Processes Group
- Laboratory for Automation, Communication and Information Systems Research
- Centre for Advanced Materials and Related Technology (CAMTEC)
- Centre for Environmental Health
- Centre for Forest Biology
- Institute for Integrated Energy Systems
- Laboratory for Parallel and Intelligent Systems
- Centre for Circulatory and Respiratory Health
- Applied Electromagnetics Group
- Astronomy Group
- Canadian Institute for Climate Studies
- Canadian Institute for Telecommunications Research
- Climate Modeling Group
- Digital Signal Processing Group
- NSERC Industrial Research Chair in RF Engineering
- Parallel, Networking and Distributed Applications Research Group
- Space and Subsea Robotics Laboratory
- Spatial Science Research Laboratory
- Rigi (software)

e. Simon Fraser University

- Centre for Systems Science
- Centre for Earth and Ocean Research
- Centre for Experimental and Constructive Mathematics
- Centre for Policy Research on Science and Technology (CPROST)
- Compound Semiconductor Device Laboratory (CSDL)
- Cooperative Resource Management Institute
- Exemplary Centre for Interactive Technologies in Education
- Institute for Micromachine and Microfabrication Research
- Intelligent Robotics Manufacturing Systems Laboratory
- TeleLearning Network (National Centre of Excellence)
- Pacific Centre for Advanced Materials and Microstructures (with UBC)
- Pacific Institute for Mathematical Studies (Associated with National Centre of Excellence)
- Underwater Research Laboratory
- Institute of Nutrition, Metabolism and Diabetes
- The Time Centre: Harbour Centre
- Behavioural Ecology Research Group
- Centre for Human Independence Engineering
- Centre for Pest Management
- Chemical Ecology Research Group
- Institute for Applied Algorithms & Optimization Research
- Logic and Functional Programming Group
- Dr. Frank Allison Linville Institute in Sensory Research
- Gerontology Research Centre

f. Royal Roads

- Centre of Economic Development and Applied Research

g. Private and Partnership Organizations

- BC Research and Innovation Complex: BC Research Inc.
- Forest Engineering Research Institute of Canada (FERIC)
- Forintek Canada Corporation - Western Division
- Powertech Labs Inc.
- Medical Device Development Centre (Vancouver General Hospital, UBC, SFU, BCIT and others)
- Pulmonary Research Laboratory (St. Paul's Hospital)
- Neil Squire Foundation
- Ocean Engineering Centre
- Forbes Medi-Tech Inc.
- North Pacific Marine Mammal Species-at-Risk Research Centre
- Rick Hansen Foundation
- WestMOST Consortium (software technology-UBC, SFU and U of A)
- Westlink Innovation Network
- BC Cancer Research Centre (also Genome Sequence Centre)
- BC Centre for Disease Control
- BC Centre for Excellence in HIV/AIDS (ST. Paul's Hospital)
- Genome BC

B. SOURCES OF FUNDING FOR R&D

1. Introduction

In 1999, the leading sources of funding for research and development activity occurring in British Columbia were business (accounting for 48% of the funding), the Federal Government (20%), foreign sources (10%), and higher education (universities, colleges and institutes accounted for 14%). Recent increases in provincial research and development expenditures are attributed primarily to an increase in foreign and business funding; direct Federal Government funding in BC, until recently, has declined significantly as indicated below.

TABLE III.6

GROSS EXPENDITURES ON NATURAL SCIENCE RESEARCH AND DEVELOPMENT IN BRITISH COLUMBIA BY SOURCE OF FUNDING

Year	Source of Funding ($ millions)						Total
	Federal Govt	Provincial Govt	Business	Higher Education	Private Non-profit	Foreign	
1988	199	31	213	58	15	17	533
1989	191	40	244	59	19	25	578
1990	232	51	289	92	18	33	715
1991	250	52	259	99	18	43	721
1992	239	49	336	107	23	49	803
1993	238	54	378	96	24	55	845
1994	257	56	465	108	24	85	995
1995	219	45	482	122	28	94	990
1996	192	57	395	120	29	136	929
1997	189	61	466	129	23	102	970
1998	187	52	521	142	24	90	1,016
1999	224	54	543	159	26	116	1,122

Source: Statistics Canada, "Estimates of Canadian research and development expenditures (GERD), Canada, 1990 to 2001, and by province 1990 to 1999," Science, Innovation and Electronic Information Division, working papers.

As part of this study, we contacted representatives of various government funding programs to develop a profile of the funding provided to the regions. This is a difficult process because many of the agencies do not track expenditures by region and some report figures on an annual basis while others report on a cumulative basis. A summary of available data on the leading sources of funding is provided in the table below.

TABLE III.7

LEADING FUNDING SOURCES FOR REGIONAL R&D

Program	Funding Information
NSERC	The major funder of research at educational institutions in Canada, NSERC has provided about $750,000 per year to the region institutions (which represents about 2% of the funding NSERC provides in BC annually)

Program	Funding Information
Canadian Foundation of Innovation	The major source of funding for infrastructure for R&D in educational institutions in Canada, CFI has provided about $5 million in funding to UNBC and university-colleges in the regions (which represents only about 2% of the funding CFI has provided to BC).
Industrial Research Assistance Program	Funds small scale industrial research, market assessments for technology products, delivers an internship program and helps companies to acquire foreign technology. In 2001-02, IRAP distributed $13.9 million in funding of which $2.5 million (18%) was provided to regional clients.
Revenue Canada SRED	SRED program that offers tax credits of up to 35% to companies for research and development expenses. We have not been able to obtain data on the value of tax credits issued in rural BC. Approximately 1,400 companies in BC claim SRED annually of which 10% to 15% are believed to be based in the regions.
BC SRED	The BC government offers an additional 10% tax credit to qualifying corporations for their research and development expenses.
Advanced Systems Institute (ASI)	ASI assists professionals and students who do research or develop products in advanced systems disciplines. Approximately 19% of ASI's budget (or about $200,000 annually) has been awarded to regional projects.
Agriculture Canada Matching Investment Initiative	Supports cost shared agriculture based R&D undertaken with Agriculture Canada. Approximately 85% of the $15 million in funding has been provided for regional projects.
DFO Aquaculture Collaborative R&D Program (ACRDP)	ACRDP is an industry-driven program designed to increase the level of collaborative research and development activity between the aquaculture industry and DFO. Over two years, $1.8 million was provided to 13 projects each of which had some regional application.
Technology Partnership Canada	A special operating agency of Industry Canada, TPC provides repayable contribution investments in leading-edge technology projects in eligible sectors. $10.7 million has been awarded for regional projects (less than 5% of the BC total), of which $8.9 million was for one project.

Source: Interviews with representatives of the funding programs

While the Ministry of Competition, Science and Enterprise remains a significant source of funding for the Technology Transfer Centres and Regional Councils, Provincial Government funding for programs such as Tech BC, MART and TAP has been eliminated. Under Tech BC, approximately 25% of the projects that received funding were based in the regions and these projects accounted for 18% of the of $11.3 million in R&D funding awarded between 1998 and 2000.

The Forintek Technology Transfer program, which was designed to address the technical needs of secondary wood processors in BC, has also been cancelled. Technical experts in Vancouver, Kamloops and Prince George delivered the program. Approximately two-thirds of the companies (442 of 667) that received visits under the program were based in the regions.

As indicated below, very few of the organizations that provide funding for R&D in the regions have a permanent physical presence (i.e. office) in the region or, in some cases, even in BC.

TABLE III.8

SOURCES OF FUNDING FOR R&D IN BC

Funding Source/Programs		BC Presence	Regional Presence
Federal Government			
	Industrial Research Assistance Program	yes	yes
	Technology Partnerships Canada	yes	no
	Canadian Foundation for Innovation	no	no
	BC Investment Agriculture Foundation	yes	no
	Agriculture and Agri-food Canada Matching Investment Initiative	yes	no
	National Science and Engineering Research Council	no	no
	Revenue Canada SRED	yes	no
	Canadian Institutes of Health Research	yes	no
	CANARIE	yes	no
	Canadian Centre for Remote Sensing	no	no
	Canadian Health Services Research Foundation	no	no
	Genome Canada (Genome BC)	yes	no
Provincial Government			
	Advanced Systems Institute	yes	no
	BC Knowledge Development Fund	yes	no
	Ministry of Competition Science and Enterprise	yes	yes
	Forintek Technology Transfer Program (cancelled)	yes	yes
Independent			
	Michael Smith Foundation for Health Research	yes	no

2. Regionally Based R&D Funding Program

There is only one R&D funding agency that has representatives “on the ground” in the regions of BC. That is the National Research Council network of Industry Technology Advisors (ITAs).

The National Research Council operates a network of Industry Technology Advisors across Canada. These ITA’s deliver the Industrial Research Assistance Program that funds small scale industrial research. The main program areas include the following.

a. Technology Partnership Inflow Program (TIPP)

TIPP has a domestic and international component and is designed to assist Canadian SMEs to access Canadian or foreign technology and help develop R&D partnerships.

b. Science and Collaborative Research Internships

A firms that is has or is initiating a collaborative research program with an NRC institute are able to hire a recent graduate for six months to help develop the company's technology (Funded by HRDC.)

c. Science and Technology Internship Program with SMEs

Firms have an opportunity to hire a recent graduate for six months and use their skills to help develop the company's technology. (Funded by HRDC)

d. Innovation Insights and Technology Visits Programs

This program exposes senior executives to the latest manufacturing technologies and innovation methods at lead-edge companies through company visits and networking events.

e. Advisory Services

ITA's support their clients through every aspect of the innovation process by matching clients with expertise, information and resources. The ITA network is a resource in itself as most are scientists and engineers with extensive business experience and expertise in technology sectors.

f. Strategic Alliances

NRC has established the Strategic Alliances office to assist SMEs in developing international collaborations. Access is provided to:

- ❑ International expertise;
- ❑ technologies;
- ❑ strategic technology alliances;
- ❑ joint activities

f. Pre-commercialization Assistance

In partnership with Industry Canada NRC is delivering a program of repayable contributions to further a company's innovative process. Eligible project costs cannot exceed $1.5 million and the SME must have 500 or few employees. Eligible activities include:

- ❑ scale-up activities;
- ❑ engineering to meet user requirement and usability;
- ❑ manufacturing engineering;
- ❑ pilot facilities-product or process testing; and
- ❑ other trials designed to determine and/or improve the technology's performance.

g. Financial Assistance for R&D Activities

IRAP provides cost shared financing of SME research projects. Support is available for projects up to $350,000. Funding is available for up to 50% of eligible project costs.

As indicated below, in 2001-02, IRAP distributed $13.9 million in funding in BC of which $2.5 million (18%) was provided to regional clients.

TABLE III.9

NRC IRAP PROGRAM CONTRIBUTIONS TO THE REGIONS, 2001-2002

Region	IRAP Contributions	Pre-Commercial-ization Program	Youth Internships	Total	%of Total
REGIONS OUTSIDE OF URBAN CENTRES					
Mid-Island	$63,965	$155,270	$8,465	$227,700	1.6%
North Island	$144,897	$165,000	$9,660	$319,557	2.3%
Fraser Valley	$383,487	$60,322		$443,809	3.2%
Cariboo	$222,653	$1,438		$224,091	1.6%
Okanagan	$749,681		$34,160	$783,841	5.6%
East Kootenay	$28,419		$16,360	$44,779	0.3%
West Kootenay	$66,113		$6,408	$72,521	0.5%
Peace River	$11,043			$11,043	0.1%
New Caledonia	$178,813		$41,387	$220,200	1.6%
North West	$51,978		$60,322	$112,300	0.8%
Total Regions	**$1,901,049**	**$382,030**	**$176,762**	**$2,459,841**	**17.7%**
URBAN CENTRES					
Victoria	$528,866	$809,169	$76,532	$1,414,567	10.2%
Vancouver	$7,539,256	$2,111,568	$390,798	$10,041,622	72.2%
Total Urban	**$8,068,122**	**$2,920,737**	**$467,330**	**$11,456,189**	**82.3%**
Grand Total	**$9,969,171**	**$3,302,767**	**$644,092**	**$13,916,030**	**100.0%**

In the interior of BC, the ITA's are responsible for large geographic areas. The regional ITA's are headquartered in Prince George (2), Kelowna (2), Nanaimo, Summerland, Nelson, and Abbotsford. NRC is considering at least one more ITA for the Interior. In addition, there are plans to engage agents in more remote centres to represent the ITA. These agents would work one day a week preparing suitable appointments for the ITA's visit.

3. Provincially Based R&D Funding Agencies

a. Science Council of BC (SCBC)

SCBC had been the main R&D funding agency in BC until recent government cutbacks and restrictions to business subsidies eliminated most of its programs. The council formerly offered assistance to companies performing R&D and operated a student subsidy hiring program. These programs have been suspended.

b. BC Advanced Systems Institute (ASI)

ASI assists professionals and students who do research or develop products in advanced systems disciplines. This is done through a number of different program areas including networking, industrial fellowships, product and prototype development funding, and research fellowships. ASI's budget in 2001-2002 was $2.5 million.

c. Michael Smith Foundation for Health Research

The Foundation provides funding programs to advance clinical, biomedical, health services and health population health research.

d. Ministry of Competition, Science and Enterprise: Science, Technology and Telecommunications Division

This is the agency in the Provincial Government that funds any provincial S&T initiatives. In the regions, the division supports the regional councils and the technology access centres. Other areas supported include the UILO's, ASI, Science Council, Centres of Excellence, the Cancer Agency, and Genomics.

e. British Columbia Knowledge Development Fund

This is a $217 million fund which allows public post secondary institutions, teaching hospitals and affiliated non-profit research agencies to invest in research infrastructure. The funding is provided over a nine year period that started in 1998/99.

f. Forintek Value-added Technology Transfer Program

The Forintek Technology Transfer program was designed to address the technical needs of secondary wood processors in BC. Technical experts in Vancouver, Kamloops and Prince George delivered the program. Services provided included the following:

- in-plant technical support and problem solving;
- solutions to reduce manufacturing costs and increased productivity;
- independent expert advice on expansion plans and technology;
- solve specific gluing, drying or matching problems;
- increase product quality and value; and
- cost-shared projects to reduce costs or increase product value.

This program was funded by FRBC and is now cancelled.

g. BC Scientific Research and Experimental Development Tax Credit

As of August 1999 the BC government is offering a 10% tax credit to qualifying corporations for their research and development expenses. This is in additional to the federal SRED tax credit. Revenue Canada administers both programs.

4. Nationally Based R&D Funding Agencies

There are a number of federally delivered programs that support R&D, which are headquartered in eastern Canada. Some have offices in Vancouver.

a. Industry Canada: Technology Partnership Canada (TPC)

TPC is a special operating agency of Industry Canada. It provides repayable contribution investments in leading-edge technology projects in eligible sectors. Eligible sectors are:

- aerospace and defence;
- environmental technologies; and
- enabling technologies (biotechnology, selected information technologies, advanced materials processes and applications and advanced manufacturing and processing technologies).

The objectives of the program are to increase economic growth, create jobs and wealth and support sustainable development. TPC also encourages the development of small and medium-sized enterprises in all regions of Canada. TPC will support industrial research, pre-competitive development and related studies. The program will pay 1/3 of project costs.

A new initiative to support shipbuilding and marine industries has just been announced. TPC is a technology investment fund that supports research, development and innovation in environmental technologies, enabling technologies and aerospace and defence.

b. Canadian Foundation for Innovation

CFI is a crown corporation established in 1997 to invest in research infrastructure projects. The goal of the organization is to strengthen the capability of Canadian universities, colleges, research hospitals, and other not-for-profit institutions to carry out world-class research and technology development. CFI supports research excellence and strengthens research training at Canadian institutions. A staff of 30 manage a $4 billion fund. CFI uses five different fund categories with different eligibility requirements and conditions. The five funds are:

- Innovation Fund;
- New Opportunities Fund;
- International Fund;
- Infrastructure Operating Fund; and
- Canada Research Chairs Infrastructure Fund.

The figures in the table below indicating the average sponsored research per year for regional colleges was generated by a 2000 survey of Canadian colleges by the CFI. The figures for the regional university colleges are rising as they become more aggressive in their search for research funding. These figures also do not include contract research performed by faculty or research undertaken as a subcontractor on a project funded at another institution. The University College of

the Cariboo and Okanagan University College are also eligible for NSERC funding for research chairs.

TABLE III.10

ANNUAL FUNDING FOR REGIONAL COLLEGE SCIENCE BASED RESEARCH

College	Canada Foundation for Innovation		Total Sponsored Research Average per year
	Eligible	1999-2001	
New Caledonia	no		
Rockies	no		$50,000
Malaspina	yes	$1,775,744	$613,915
Nicola Valley	no		
North Island	yes		
Northern Lights	no		
Northwest	no		
Okanagan	yes	$676,568	$460,523
Selkirk	yes	$471,756	$157,252
Cariboo	yes		$498,000
Fraser Valley	yes		$444,155
Total		$2,924,068	$2,223,845

Source: Canadian Foundation for Innovation Survey

c. National Science and Engineering Research Council (NSERC)

NSERC is a federal organization that funds university based research through grants to professors and scholarships to their students. Basic research is funded 100% while other arrangements are made for applied research and projects with industry partners. NSERC awards scholarships and research grants through peer-reviewed competition. The total budget for the agency is $538 million. The types of grants are divided into research, equipment, other and ship-time funds. The total amount of research funds awarded in BC from 1999 to 2001 totalled more than $1.5 million. NSERC is the main Canadian funding agency for university based research. NSERC supports a number of research projects that involve university and industry partnerships. It also supports the creation of Industrial Research Chairs. Of its total budget of approximately $450 million, NSERC allocates 61% to research grants, 18% to targeted research, 17% to scholarships and international work, and 4% to administration.

As illustrated in the table below the regions received about 1.7% of the funding awarded by NSERC in BC in 2000-2001.

TABLE III.11

NSERC GRANTS AND SCHOLARSHIPS IN BRITISH COLUMBIA 2000-2001

Institution	Number	Amount	%
Okanagan University College	6	$92,781	0.2%
Simon Fraser University	226	$7,952,291	18.1%
Technical University of BC	5	$79,115	0.2%
TRIUMF	28	$6,792,528	15.5%
University College of the Cariboo	5	$80,681	0.2%
University of BC	565	$21,605,604	49.1%
University of Northern BC	32	$575,888	1.3%
University of Victoria	181	$6,786,673	15.4%
Total	1048	$43,965,561	100.0%

Source: NSERC

d. Agriculture and Agri-Food Canada

- **Canadian Adaptation and Rural Development Fund: BC Investment Agriculture Foundation**. The BC Investment Agriculture Foundation provides funding for innovative projects designed to facilitate the growth and competitiveness of the BC agri-food industry. The fund has six areas of priority including value added-processing and science and technology.

- **Matching Investment Initiative.** The Matching Investment Initiative increases collaborative research activity between the private sector and Agriculture and Agri-Food Canada. Under the Matching Investment Initiative, the Department can match, up to a one-for-one basis, industry R&D contributions for collaborative research projects. The program is intended to stretch industry's research dollar and, at the same time, help ensure that the Department's research priorities accurately reflect the sector's real needs.

e. Revenue Canada: Scientific Research and Experimental Development Program

A Revenue Canada program that offers tax credits of up to 35% to companies for research and development expenses. The program is open to any size of business in any sector. It is the largest single source of Federal Government support for industrial research and development activity.

f. CANARIE

CANARIE is a not-for-profit corporation supported by its members, project partners and the Federal Government. It supports a variety of initiatives to develop innovative applications and technologies for advanced broadband networks. CANARIE supports projects that conform to principles of open systems and interoperability.

g. Canadian Institutes of Health Research (CIHR)

This is the major federal agency for health based research. It is a virtual institute with 13 virtual member centres across the country. Funding is directed to the following areas:

- Industry partnership programs;
- Intellectual Property Management Networked Training Initiative;
- Proof of Principle Initiative;
- Research Funding Programs; and
- Salary Support and Training Programs.

h. Canadian Health Services Research Foundation (CHSRF)

The foundation sponsors research of high quality and application of research findings to the management of health services.

i. Canada Centre for Remote Sensing

This centre provides various technical and financial support programs.

j. Genome Canada/BC

Genome Canada is a consortium of public and private sector funders and stakeholders that coordinates and assists with funding for genome research. It is dedicated to developing and implementing a national strategy in genomics research for the benefit of all Canadians. Genome Canada has a budget of $300 million to establish five Genome Centres. Genone BC is one of these centres.

k. Networks of Centres of Excellence

The universities receive substantial funding through the Networks of Centres of Excellence. The Networks of Centres of Excellence is a Government of Canada program which promotes Canadian fundamental and long-term applied research in the natural and medical sciences and engineering. The purpose of the program is to encourage scientists and engineers from across Canada to work together in strategic research areas considered vital to the country's growth in science and technology. For each of the 15 Centres of Excellence, one university from across Canada has been designated the lead institution. The University of British Columbia is the lead for three centres and the University of Victoria is the lead for one centre. The University of British Columbia is active in 12 centres, the University of Victoria is active in 6 centres, and Simon Fraser University is active in 4 centres.

5. Western Economic Diversification (WD)

WD also plays a key role in supporting innovation activities in Western Canada. WD's innovation strategy contributes directly to its mandate "to promote economic development and diversification in Western Canada". To achieve the strategic outcome of strengthening the western Canadian innovation system, WD supports projects and activities that will:

- improve knowledge infrastructure and capacity;
- enhance technology commercialization;
- assist rural communities in their transition to become more innovative; and

- enhance the coordination and alignment of innovation priorities between the various government, industry, community and academic players.

During the fiscal year ending March 31, 2001, 44% of WD's Grant and Contribution approvals were directed to innovation priorities. Examples of the targets of investments made by WD included:

- The New Media Centre (NewMIC), based in Vancouver, is a collaboration between industry, academia and government that focuses on the research, development and commercialization of new media technologies and applications. Members and affiliates from industry and academia jointly conduct pre-competitive new media research. Research at NewMIC is positioned to impact commercialization within an 18 to 36 months horizon. The research program is organized into the five focus areas including eLearning, Immersive and Collaborative Environments, New Media Experience Roadmap, Rich Media Entertainment, and Wireless and Broadband Technologies.

- Fuel Cells Canada, headquartered in Vancouver, is a national industry association that provides services and support to Canadian corporations, educational institutions and business alliances promoting, developing, demonstrating, and deploying fuel cell and related products and services in Canada.

- WestLink is an innovative not-for-profit organization formed to facilitate communication, collaboration, training, and technology bundling and commercialization through a range of programs and services. WestLink's Membership consists of 23 Western Canadian Universities, colleges, and research institutes. WestLink is supported by Western Economic Diversification and the Natural Sciences and Engineering Research Council. WestLink's supporting partners are its Members, Economic Development Edmonton, the Whole Family Fund - Edmonton Community Foundation, Medical Discovery Management Corporation, & the Rand Edgar Capital Corporation. WestLink's programs and services include:

    - Networking & Communication Opportunities;
    - Meetings, networking events, and communications forums;
    - Sharing of information (reference materials and statistics) and best practices;
    - Public web site and Member web site with discussion groups;
    - Building Technology Transfer Skills and Awareness;
    - Seminars and workshops for researchers, technology transfer staff, industry, and public;
    - The WestLink Technology Commercialization Internship Program;
    - Contract services;
    - Developing internal capacities, inventions and synergies for small-sized members; and
    - Develops collaborative opportunities.

WD offers the First Jobs in Science and Technology program, under which companies, association and business networks can receive funding to hire up to three recent science and engineering graduates. Projects can involve:

- acquiring new technology;
- identifying or implementing appropriate technologies;
- developing an implementation plan;
- operation or modifying technology;
- training staff to use new technology; and

- development of a new technology.

In addition, Technology Assessment Services are offered through a joint effort of WD and the Canadian Innovation Centre. WD Client Service Officers will meet with inventors, entrepreneurs and business owners who operate (or are about to operate) a business in Western Canada. This step includes discussing eligibility and assessment needs and recommend whether a full assessment should proceed. WD contributes to the cost of the Technology Assessment Service. The Canadian Innovation Centre also contributes to the cost of the Technology Assessment Service and provides its expertise to clients deemed eligible by WD Client Service Officers

Western Diversification also offers a series of specialized capital programs for small and medium-sized businesses in association with financial institutions. These are further discussed later in this appendix.

C. TECHNOLOGY TRANSFER ORGANIZATIONS AND FACILITATORS

1. Introduction

Basic research does not yield results which are ready for the marketplace. Further activities such as applied research, prototype development and product testing must typically be undertaken before a new product or process is ready for commercialization. The progression from basic research to the development of new products and processes is far from automatic; indeed, scientific advancements are a fundamental part but not a sufficient cause of technological change.

The requirements for applied research and development may be fulfilled by the same organization that completed the basic research. However, in practice, this rarely occurs. Those performing the basic research typically do not have the resources or the necessary understanding of industry applications and needs to undertake such activities. In addition, the culture of universities and government research organizations tends to place a much higher priority on basic research activities than on applied research and development. For example, contract research activities may not be considered in faculty evaluations or decisions regarding tenure. Furthermore, new products and processes often incorporate a number of enabling technologies and, as such, must draw upon a wide range of basic research and existing technologies.

As a result, there is usually a need to transfer the knowledge gained through the basic research to those who would undertake applied research and development. Awareness of basic research findings may be communicated through a variety of means such as the publication of research results, informational events, and conferences as well as through contracting the services of the researchers to industry. In some instances, industry may have been an integral part of the basic research program as a source of funding, as a participant in a cooperative research centre, or through a personnel exchange program.

To further facilitate the transfer of knowledge, many universities and research institutions have established industry liaison offices. The major function of these offices is to build links between the researchers and industry, particularly with respect to the commercialization of research discoveries and inventions. To transfer rights to such discoveries and inventions, the industry liaison offices may negotiate licensing agreements with companies who will, in turn, be responsible for achieving commercial applications. Through this process, universities such as Stanford and MIT generate more than $10 million annually in licensing revenue. The University of British Columbia generates approximately $500,000 annually in royalties.

In addition, some universities have established research parks, adjacent to the campus to encourage technology companies to locate next to the university. It is expected that the close proximity of industry and academia will encourage more frequent and more intense interaction between academic and industrial researchers as well as the sharing of facilities and the development of cooperative programs. Discovery Parks Incorporated operates a multi-tenant facility, adjacent to Simon Fraser University, which provides space

to incubate early stage companies. In addition, Discovery Parks controls lands adjacent to the B.C. Institute of Technology and the University of British Columbia.

However, even in places where research parks have been established, there is not necessarily a geographical connection between where the basic research was undertaken and where that knowledge is applied. For example, the results of basic research undertaken in British Columbia may be licensed to companies based outside of British Columbia. Conversely, much of the applied research occurring in British Columbia is founded upon basic research undertaken in other regions.

Applied research and development is usually implemented by industry, either directly or through contracting the services of research and development organizations. In some instances, the company undertaking the applied research may be a spinoff group which includes individuals who participated in the basic research upon which the applied research is founded. The development of spinoff companies is most likely to occur when an industry receptor (an existing company capable of exploiting the technology) is not available. As an alternative to setting up a spinoff company in a situations where the results of basic research may be significant but are not yet in a form ready for transfer, a university or government research organization may undertake applied research (perhaps in association with another research organization) to advance the technology to a stage where an industry receptor can be attracted.

There are a number of organizations in BC that participate in, facilitate and encourage applied research and commercialization of the results. These include industry associations, academic technology transfer offices, and small geographically based interest groups. The major players in this area are listed below.

TABLE III.12

TECHNOLOGY TRANSFER RELATED ORGANIZATIONS IN BC

Organizations	Regional	Major Centre	Total
Industry Associations	8	9	17
UILO/Tech Transfer Centre	1	4	5
Regional Technology Councils	7	0	7
Technology Access Centres	4	0	4

2. Regionally Based Technology Transfer Agencies

a. Regional Technology Councils

There are seven regional technology councils dedicated to promoting science and technology operating in the regions of BC. The councils do not provide direct services to business but rather take a strategic approach to improving the access of regional businesses to related services and programs. They also work to make local industry more aware of the need for innovation and of the methods of implementing technological change in their business. Some effort is also put into general public science awareness projects.

Operations are funded mainly by the Provincial Government though some councils have leveraged significant funds from other sources. Their annual budget is approximately $150,000. The councils determine strategies that suit their individual regions and no two councils function exactly alike. The councils are composed of a volunteer board and usually two staff, one professional and one

support/administrative. The councils have mandates that cover the college regions where they are located. The councils have their head offices in Prince George, Fort St. John, Kamloops, Kelowna, Nanaimo, Cranbrook and Nelson. There are no councils in the Fraser Valley, North Island or the Northwest region of the province.

b. Technology Access Centres

Four Technology Access Centres are operating in rural BC. They are the Innovation Resource Centre of Prince George, the Technology Transfer Centre in Nanaimo, the Okanagan University College Technology Access Centre in Kelowna, and the Advanced Technology Centre in Kamloops. These centres have developed their own missions and mandate to some degree; however, they generally have these main objectives in common:

- assisting businesses to access new and existing technology;
- assisting technology based startup companies;
- supplying related business counselling services;
- increasing regional R&D capacity; and
- linking businesses to local R&D capabilities.

In Prince George, the Innovation Resource Centre serves as both the region's Technology Access Centre and as the secretariate for the regional science council. The other three centres are separate entities from the regional councils and are closely associated with the local University College.

The University College of the Fraser Valley has recently established an Industry Liaison Office. Some of the things this office is designed to do include facilitating access to college staff expertise, helping with applied research, and assisting with technology transfer.

c. Canadian Institute of Market Intelligence (CIMI)

This organization is part of the Federal Government. Its staff work closely with the National Research Council ITA's. Clients of the ITA's can receive business counselling services, help with outlining needed market studies, referrals and market intelligence from the officials at CIMI. There are four staff of CIMI in Vancouver and one in Kelowna.

d. Vancouver Island Advanced Technology Centre (VIATEC)

VIATEC is an industry-driven venture with a mandate to promote the development of advanced-technology industry on Vancouver Island. The Centre is located in Victoria and is not usually considered to be a regional resource. However, the organization has an island-wide mandate and does have members outside of Victoria.

e. Columbia Mountain Open Network

This is an organization dedicated to providing affordable advanced telecommunications to all communities in the Columbia basin.

f. Technology Kamloops

Technology Kamloops is an initiative of the Kamloops mayor. A 12 member board has been formed. The group intends to attract high tech companies to the region, keep local college graduates in the area, start a technology business incubator and establish a venture capital fund.

g. Digital Valley

This is an organization of technology based businesses in Kamloops. The goal is to provide opportunities to network as well as voice industry issues and concerns.

h. South Okanagan Advanced Projects (SOAP)

This is a group organized by the Penticton Economic Development Committee to promote the development of high technology in the area. The group functions as a networking group and promote the area to other high tech companies.

i. NiTech

Nitech is an informal organization of technology services companies on the northern part of Vancouver Island. Its purpose is to promote local technology companies and provide a networking forum for these companies.

j. New Media Marketing Group

This is a partnership of new media professionals in the East Kootenay region. The group wants to share technical skills and resources and marketing expenses.

k. E-Biz Strategy

This is an initiative of the Economic Development Corporation of Williams Lake. The project was designed to educate local industry as to the advantages of implementing technology solutions. Technology diagnostic assessments of business operations are offered and matches made with local technology companies that can implement innovative business solutions.

l. High Tech Jobs Web Site

Two Regional Technology Councils have web webs that lists technology companies looking for personnel and individuals looking for employment in the high tech field. The Mid-Island Council and the Okanagan Council operate this service.

m. Revelstoke Telecommunications Committee

This group was one of the founders of the Columbia Mountain Open Network. This committee undertook the Revelstoke Fiber Optics Network Feasibility Study in the fall of 2000.

n. Okanagan Innovation Forum

This is an initiative of NRC and OUC in Kelowna to promote innovation and economic growth in the Okanagan region. The focus of the forum is to co-ordinate and support the development of a community plan to implement recommendations that came out of the inaugural Okanagan Innovation Roundtable last February.

3. Non-Regionally Based Technology Transfer Agencies and Related Agencies

a. University Industry Liaison Offices (UILO)

There are UILO offices at Simon Fraser University, University of Victoria (Innovation Development Corporation), and the University of British Columbia. These offices deal mostly with R&D developments at their educational institutions. The primary activity is partnering or matching researchers with companies and government organizations to conduct collaborative research. The offices also identify and assess university technologies, provide intellectual property advice, offer funding for prototype development, and identify industrial partners to commercialize university technologies.

b. Software Productivity Centre (SPC)

SPC supports the software development industry by offering process assessments to software development companies to improve productivity, quality effectiveness and global competitiveness. The centre does this through a customized combination of consulting, training and products.

c. New Media Innovation Centre (NewMIC)

This is a relatively new organization set up to promote the new media industry in BC. The initial focus of the innovation program is on research, product development, and incubation. The NewMIC Product Development Fund will provide investment funding for the development and commercialization of new-media products or processes.

d. BC Technology Industries Association (BCTIA)

The BC TIA is an industry funded association that provides its members with:

- Representation for the sector on many government advisory boards;
- Peer-to-peer networking opportunities;
- A forum for members to review industry issues, acquire new business knowledge and stay connected in a rapidly changing landscape; and
- Sponsorship for a number of research endeavours.

e. Biotech Alliance

The BC Biotech Alliance is a non-government, not-for-profit industry driven association. On behalf of its membership BC Biotech promotes the biotech capabilities of British Columbia firms and research organizations across all sectors including healthcare, forestry, aquaculture, agriculture, food and beverage and the environment.

f. Canadian Advanced Technology Alliance (CATA)

This is a national association of Technology companies. The association states that it is focussed on the provision of business services and government relations programs that conserve and leverage member resources. There is a CATA office in Vancouver.

g. Canadian Information Processing Society: BC (CIPS)

This is a national organization with an active BC chapter. It is a professional association focussed on promoting and maintaining the quality of the Information Processing Profession of Canada certification. There are members of this society in Kamloops and Prince George.

h. Applied Science Technologists and Technicians of BC (ASTTBC)

ASTTBC represents the professional interests of technologists and technicians in BC industry. Its objectives are to maintain, improve and increase the knowledge, ability and competence of technologist and technicians; regulate the standards of training and the practice of its members; and protect the interest of the public.

i. Premier's Technology Council

This is a 19 member industry group formed by the Provincial Government to provide advice to the Premier on all technology-related issues facing British Columbia and its citizens.

j. Canadian Technology Network

The National Research Council operates the Canadian Technology Network (CTN). The CTN provides access to a wide range of technology and related business assistance through connections to government labs and agencies, universities, colleges, industry associations, regional technology councils and technology transfer centres The system provides quick and personal access to expertise, advice and information on technology and related business challenges.

k. PATSCAN

PATSCAN is a patent and trademark fee based search service. PATSCAN has access to international patent data and offers services withing 48 hours. In BC the service is based at UBC.

l. BCIT Technology Centre

This is the applied research and technology transfer office of BCIT. Through the centre, BCIT undertakes contract applied research and development for industry in a wide range of technical fields.

m. Aerospace Industry Association of BC

This is an industry association that acts as a point of reference for the BC aerospace industry and promotes the development of the industry in the province. It considers itself a watchdog, advocate and facilitator for BC companies seeking Canadian and international business opportunities.

n. The BC Photonics Industry Association

This is a cross functional industry association representing all aspects of the photonics industry. The members include suppliers, manufacturers and users of lasers, sensors, lightwave communications, spectrometry, imaging tools, robot vision, infrared and visible sources and detectors.

o. Canadian Environment Industries - BC

This is the BC chapter of a national organization that promotes the environment industry. Among other functions it promotes research and training in disciplines and matters relevant to the environment industry.

p. Wireless Innovation Network Society of BC (WINBC)

WINBC is dedicated to fostering collaboration of early-state wireless companies in the province. The society tries to help the 100 wireless companies achieve their business objectives more quickly and cost effectively.

q. HiNet

HINET is a client-driven world wide web site providing a wide range of information and client support services to all sectors of the B.C. Health industry. The site was developed to meet the information and networking needs of the British Columbia health industry and it presents a window into the B.C. health sector and access to resources of interest to people within and outside of the province

r. Vancouver Enterprise Forum

The Vancouver Enterprise Forum is a not-for-profit BC society that was formed to education, motivate and support high tech companies in BC. This group holds monthly meetings at Science World in Vancouver that offer networking opportunities and relevant presentations.

s. Techvibes Vancouver

This is a networking organization for technology professionals. Through events and web services the organization help professionals generate sales leads, develop new contacts, recruit key employees and obtain other relevant industry information.

t. First Forward Network

This is a networking group for technology companies and investors. Meetings are held monthly in both Vancouver and Seattle. The meetings are for invited members of a chosen technology sector.

u. BCNET

This is an Internetworking society focussed on the development of advanced networks to further health education and research initiatives in BC. Together with CANARIE, BCNET is currently developing the BC ORAN (Optical Regional Advanced Network) to facilitate next-generation Internet architecture and service delivery. Partners is the project include BCIT, SFU, UBC, UNBC and UVIC.

v. British Columbia Inventors Society

This society acts as a venue for inventors to network with support sources. Monthly meetings are held in Vancouver.

w. British Columbia Internet Association (BCIA)

The BCIA is a non-profit society that represents the interest of the Internet industry in BC.

x. BC Ventures Society

This society provides education and training to entrepreneurs, gives financial assistance to entrepreneurs to help development business plans and operates a forum for entrepreneurs, executives, service providers and educators. In addition the society runs a competition sponsored by TELUS that takes participants through a four round process, idea, feasibility test, condensed venture plan and finale. The participants receive access to information sessions, seminars, online resources, related lines as well as discussion threads. The winner receives a package of goods and services worth $50,000.

D. EDUCATION AND TRAINING

1. Introduction

British Columbia's post secondary education system is a critical resource for the high tech sector. A network of universities, an institute of technology, colleges and private institutions train students in a variety of basic and applied science and technology areas. The opportunities for obtaining a science and technology related degree are still generally in the Lower Mainland and Victoria where the major universities are located. This has been changing to some degree as the number of graduates from UNBC is growing and the University Colleges are granting degrees. However, the number of S&T degrees granted in the regions is still low compared to the urban centres. The table below summarizes data on the number of UNBC science graduates and those from the urban based universities.

TABLE III.13

SCIENCE AND TECHNOLOGY DEGREES GRANTED BY BC UNIVERSITIES, 2000/2001

Degrees	UBC	SFU	UVIC	UNBC	RRU	Total
Applied Sciences	991	135	142	131	14	1,413
Health Sciences	688	118	230	17	0	1,053
Sciences	1,281	584	550	106	51	2,572
Total	2,960	837	922	254	65	5,038

As indicated, in 2000/01, the University of Northern BC awarded 254 degrees related to science and technology including 106 degrees in science, 17 degrees in health sciences, and 131 degrees in applied sciences.

In addition, there are over 4,500 full-time equivalent students enrolled in science and technology related programs at the regional colleges and university-colleges. This total represents about 35% of the 13,200 students enrolled in such programs in BC.

TABLE III.14

SCIENCE AND TECHNOLOGY ENROLLMENT IN REGIONAL AND URBAN INSTITUTIONS BY FTE, 2001/2002

Institution	Technical Programs	Academic Sciences	Related Degrees	Total
Regional Institutions				
University College of the Fraser Valley	381	130	233	744
Northwest Community College	58	50	-	108
Northern Lights College	25	32	-	57
Okanagan University College	373	135	424	932
Selkirk College	323	86	-	409
University College of the Cariboo	209	212	564	985
North Island College	160	79	-	239
Nicola Valley Institute of Technology	51	-	-	51
Malaspina University College	260	225	159	644
Rockies	35	45	-	80
New Caledonia	290	138	-	428
Total Regional FTE Enrollment	**2,165**	**1,132**	**1,380**	**4,677**
Major Centres				
BCIT	2,433	460	-	2,893
Camosun College	1,031	350	-	1,381
Capilano College	161	504	-	665
Douglas	978	296	-	1,274
Kwantlan University College	335	390	142	867
Langara College	623	744	-	1,367
Vancouver Community College	80	-	-	80
Total Urban FTE Enrollment	**5,641**	**2,744**	**142**	**8,527**
Total FTE Enrollment	**7,806**	**3,876**	**1,522**	**13,204**

Note: Apprenticeships, vocational, and entry level trades training not included.

The data was tabulated from enrollment figures provided to us by the Ministry of Advanced Education.

2. Regionally Based S&T Education

a. Regional Colleges

There are 9 regional colleges located in rural BC. Four of these are University/Colleges with the right to grant degrees. They are Malaspina University College (Nanaimo) Okanagan University College (Kelowna), University College of the Cariboo (Kamloops) and Fraser Valley University College (Abbotsford). The colleges offer a variety of science and technology based courses and programs. The most common are computer science orientated programs.

There are limited research activities being undertaken at these institutions. The University Colleges are more active in this area than the two-year colleges and they are making attempts to increase their research capacity. A number of these institutions are accessing federal academic research money from such agencies as the Canada Foundation for Innovation and NSERC.

Three of the University Colleges (Okanagan, Malaspina and Cariboo) house a Technology Access Centre. ITA's are located on three of the college campuses, Malaspina, Okanagan and Selkirk (Castlegar). The Fraser Valley University College has a Industry Liaison Office. There is also an institution located at Merritt called the Nicola Valley Institute of Technology. This is a First Nations facility offering a variety of training programs including natural resource technology.

b. University of Northern BC

UNBC is a fully accredited university with 3,500 students located in Prince George. The university has strong science and technology departments including computer science, environmental science and a college of science and management. Faculty undertake research in these fields and the University operates a University Industry Liaison Office to promote projects with local industry and the creation of technology based companies spun off from University research.

3. Provincially Based S&T Education

a. Universities

Urban based universities in BC include the University of Victoria, Royal Roads University in Victoria, the University of British Columbia in Vancouver, and Simon Fraser University in Burnaby. All three have strong science and technology teaching areas as was illustrated by Table III.13.

b. Colleges

Urban based colleges and institutions include the following:

- BC Institute of Technology (BCIT)
- Capilano College
- Douglas College
- Langara College
- Camosun College
- Kwantlan University College
- Vancouver Community College

4. S&T Related HR Funding

Funding for human resource development related to research and development is now almost exclusively supplied by the Federal Government. The programs that are available in this area are outlined below.

a. Canada Millennium Scholarship Foundation

This provides bursaries for students at post-secondary institutions.

b. Canada Research Chairs Program

This program is administered by the federal granting councils in partnership with the Canada Foundation for Innovation and Industry Canada.

c. Canadian Foundation for Innovation: New Opportunities Fund

The program provides infrastructure to support newly recruited academic personnel.

d. CIHR Funding Mechanism for the Support of Research Personnel: Industry Partnered Training Awards

The fund provides support for graduate studies or post-degree studies.

e. NSERC: Industrial Research Chairs Program

This program assists universities in building capacity for research in areas not yet covered by Canadian universities, but for which there is an important industrial need.

5. Related Programs and Organizations

a. Vitesse (Re-Skilling) Canada Inc.

This is an independent, not-for-profit organization created by the National Research Council, the University of Ottawa and Carleton University and the Ministry of Economic Development and Trade. The program "re-skills" knowledge workers into specialized, high-technology careers for industries facing skilled labour shortages. It includes co-op based training for photonics, bio-informatics, microelectronics and wireless communications. Vitesse offers workplace adjustment and enrichment programs for new and existing knowledge workers creating a training model built on the premise of a comprehensive skill continuum. In 2002, a program director was appointed for British Columbia with an office in Kelowna.

b. Society for Canadian Women in Science and Technology (SCWIST)

SCWIST is a national organization with a BC chapter located in Vancouver. The organization promotes equal opportunities for women in scientific, technological and engineering careers.

E. SOURCES OF BUSINESS CAPITAL

Leading sources of business capital in the regions include:

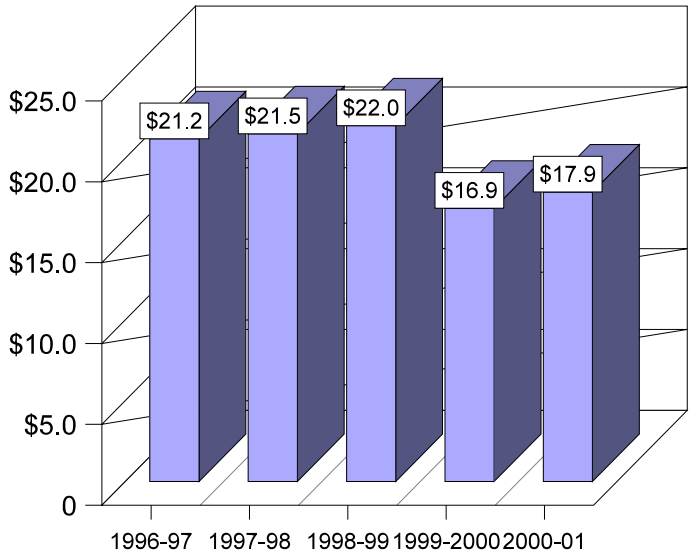
- Community Futures Development Corporations;
- Providers of Venture Capital;
- Angel Investors;
- The Business Development Bank of Canada;
- Western Diversification;
- The Women's Enterprise Initiative (WEI); and
- Loans from Chartered Banks and Credit Unions.

1. Community Futures Development Corporations (CFDCs)

Most CFDCs have been involved in delivering three loan programs: the General Loan Fund; the Entrepreneur with Disabilities Program (EDP); and the Western Youth Entrepreneur Program (WYEP). Under these programs, the CFDCs in BC have made 10,016 loans totalling $99.6 million over the past five years (1996-2001). The annual value of loans during this time period is illustrated below.

TABLE III.15

ANNUAL VALUE OF GENERAL, EDP, AND WYEP LOANS MADE BY CFDCs IN BC ($ millions)



In addition to the programs above, CFDCs in BC have also become involved in delivering a series of other loan programs. These are outlined in the table below

TABLE III.16

ADDITIONAL LOAN PROGRAMS DELIVERED BY CFDCs IN BRITISH COLUMBIA AS OF DECEMBER 31, 2001

Program	Leading Source of Funding	Number of Loans	Value (millions)
Fisheries Legacy Trust Loan Fund	WD	244	$11.2
Recreational Fishery Loan Program	WD	136	$6.1
Community Enterprise Investment Fund	ICBC	8	$3.0
Community Investment Loan Fund	Columbia Basin Trust	19	$3.0
Community Investment Loan Fund	WOF	50	$2.3
Forest Community Business Program[1]	FRBC	1,052	$14.1
Total		1,509	$39.7

When added to the loans approved under the regular loan programs, the $40 million in loans provided under these programs increases the amount of loans dispersed through Community Futures in BC by about 40% over the past five years.

2. Venture Capital

After several years of continual growth in the size and number of venture capital placements, the amount of venture capital invested in Canada declined in 2001 (and further declined year-over-year by 14% in the first quarter and 69% in the second quarter of 2002). The value of venture capital placements across Canada totalled $4.9 billion in 2001, which represents a decline of 27% from $6.6 billion in 2000 but was still higher than 1999 levels. Venture capital investment (all sectors) in BC declined from 120 financings totalling $540 million (8% of the Canadian total) in 2000 to 109 financings totalling $502 million (10% of the total) in 2001. From 1996 to 2001, an annual average of $307 million was invested in BC (which represents an annual average of $75 per capita as compared to the Canadian average of $85 per capita).

Resources available related to venture capital in BC include:

a. Provincial Government Venture Capital Programs

- **Equity Capital Program ("ECP").** The Equity Capital Program encourages investment in B.C. businesses by providing B.C. investors with a 30 percent refundable tax credit. The investment is made through a holding company, called a venture capital corporation (VCC). The VCC raises money from BC residents and then invests these funds in qualifying small businesses.

[1] Value of loans reflects FRBC contribution only.

- **Community Venture Capital Program ("CVCP").** The Community Venture Capital Program functions much like the Equity Capital Program - promoting new investments in BC businesses by providing investors with a refundable tax credit of 30 per cent.

  The difference is that for this program, the share capital is invested in small businesses outside of the provincial capital and Lower Mainland. This supports regional economic diversification. Investments are raised through community venture capital corporations. These corporations are encouraged to include members of the community in their management groups.

- **Green Venture Capital Program ("GVCP").** The Green Venture Capital Program is also an extension of the Equity Capital Program. It is aimed at raising capital for small businesses that are introducing technologies or services that restore, preserve or enhance the environment. This program helps green businesses raise new financing to start or expand their operation. Like the Equity Capital Program, the Green Venture Capital Program promotes new investments in B.C. businesses by providing investors with a refundable tax credit of 30 per cent.

b. Working Opportunity Fund

The Working Opportunity Fund (WOF) is the largest single venture capital fund in BC. BC's only labour sponsored fund, it was set up by the Provincial Government to encourage investment in BC industry. WOF is managed by a private investment company. Investors receive a 30% tax credit on all funds invested. The fund targets its investment to the areas of information technology, life sciences, advanced manufacturing, film and entertainment, tourism and the environment. The WOF invests equity capital in small and medium sized businesses in BC's emerging industries. The provincial government is currently reviewing the possibility of allowing additional labour sponsored funds to operate in BC.

c. VentureBC (Kelowna)

VentureBC operates as a venture capital firm that works with companies that have capital requirements of between $100,000 and $2 million. The organization screens potential investments for potential and helps prepare the companies chosen for introduction to investors and capital markets. The organization was originally set up by Industry Canada as one of 22 community demonstration projects as a community investment facilitation initiative. VentureBC receives 70 requests for investment annually of which 50% are related to a high tech company.

d. Community Venture Capital: Kamloops

In 2000/2001 a Kamloops Venture capital fund was established and $300,000 was given to VS Visual Statements Inc. of Kamloops, a company developing crime scene and accident management software. Technology Kamloops assisted eOptimize (a company developed by UCC graduates in Computer Science) to raise significant capital through an RTO on the CDNX . Technology Kamloops is currently working with ATC and Aquavent to raise early stage seed capital for commercialization. Further work is required in the community to establish a sustainable seed/venture capital fund to assist startup technology based companies.

e. Members of the Canadian Venture Capital Association

Members of the Canadian Venture Capital Association that are based in British Columbia include:

- Flynn Ventures, Victoria
- Futurefund Capital Corp, Vancouver
- Growthworks Capital Ltd., Vancouver
- HSBC Capital Inc, Vancouver
- Ventures West Management Inc., Vancouver
- Royal Bank Capital Partners, Vancouver
- BDC Venture Capital BDBC, Vancouver

Ventures West has joined with the Business Development Bank of Canada and Cascadia Pacific to form the Western Technology Seed Investment Fund. The WTSI is now a fully invested fund.

f. VanCity Capital Corporation

VanCity Capital Corporation specializes in providing unsecured working capital financing (subordinated debt) of up to $1 million to support a range of growth initiatives including: market development costs, management buy-outs, on-going R&D, inventory and/or specialized equipment acquisition.

g. Devon Ventures Corporation

Devon Ventures Corporation is a merchant bank focussed exclusively on early stage high technology companies. Their strategy is to build long-term value by investing capital into a relatively few undervalued companies and to actively participate in their development, so as to enhance their value and the liquidity of the investment.

h. Discovery Capital

Established in 1986, Discovery Capital is one of Canada's most experienced technology venture accelerators. Discovery Capital has worked with over 200 early-stage technology companies on an advisory, corporate finance, and/or investment basis, focussing primarily on the acceleration of B.C.-based technology ventures.

i. Smart Seed Fund

This is a specialized financing boutique service. They offer:

- Early stage technology fund;
- Hands on Management and Strategy to get you to the next level;
- Excellent relationships with VC Market to get additional capital;
- Gives young companies a network of channel partners; customers and strategic alliances; and
- Provide Corporate Finance and Business Development Services.

i. TSX Venture Exchange

The exchange specializes in public financing of early stage venture companies. In much the same way that CDNX facilitated the investment of capital in developing B.C.'s resource sector, CDNX is playing a major role in the technology sector. CDNX's new "Venture Capital Pool" program will act as a catalyst in bringing investors and companies together

j. T-Net Capital Connector

T-Net British Columbia is a portal web site for the night tech industry in BC. The Capital Connector is an on-line investment opportunity "routing" service. It delivers business plans and financing requirements of technology companies to qualified investors at its web site.

3. Angel Investors

The term "angel investor" is often used to describe an informal private investor. Angels invest their personal funds, expertise and experience in a business in exchange for an equity stake (usually minority) in the company. While little data is available on the aggregate amounts invested by angel investors, some reports have estimated that angles form the financing for about 90% of startups under $1 million. They differ from venture capitalists in that they are using their own money. Venture capitalists also tend to focus on high technology while angels tend to have more diverse interests. However as the technology industry matures and produces more high-tech millionaires there appears to be more angel investor funding available for high tech companies.

There is no shortage of angel investor funds in Canada. There is an angel investors network in Vancouver that holds forums to introduce emerging companies to private investors. On-line angel networks are becoming more common as well.(See www.agelinvestors.infopoint.com; www.mtpearl.nf.ca; VentureDirve.com; and eValhala.com) Another example of an angel investor forum is the Toronto Angel Investor Summit. This forum is a non-profit think tank and networking event that aims to improve the competitiveness of angel investors. As the Toronto event organizers have realized, "The challenge lies in readying SMEs to approach investors, and linking willing investors with able entrepreneurs."[2] Angels often complain about the shortage of good investments available. The challenge is to prepare entrepreneurs to approach angels, identify the angels and then link the two.

Recognizing this challenge the federal government (Industry Canada) initiated the Canada Community Investment Plan (CCIP) which supported 22 demonstration projects that developed investment facilitation services that would match entrepreneurs with angel investors. One of these projects involved the North, Central and South Okanagan area of BC. Venture BC (www.venturebc.com) screens companies for angel investors and helps prepare them for presentation to angel investors in the area.

The Vancouver Angel Technology Network (VANTEC) consists of experienced high technology CEO's or executives who meet monthly in Vancouver to hear two or three 15 minute business presentations by startup technology entrepreneurs. The objective is to make initial introductions with a view to having interested parties subsequently meet in private. Between 20 and 30 angels attend each meeting. VANTEC is an initiative of the Vancouver Enterprise Forum.

4. Business Development Bank

The Business Development Bank (BDC) is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There are BDC offices located in Kelowna, Terrace, Prince George, Fort St. John, Kamloops, Cranbrook, Nanaimo, Campbell River and Langley. The BDC would not provide us with data on the value of loans they have issued to businesses in rural BC. They have approximately $540 million in loans outstanding in BC.

[2] Angel's Touch!!! An Entrepreneurs Guide to Informal Investment, Industry Canada, 2001, p.2.

5. Western Economic Diversification (WED)

Western Diversification offers a series of specialized capital programs for small and medium-sized businesses in association with financial institutions. WD has provided about $60 million in financing into BC through the various components of the Loan Investment Fund Program. Because the components are delivered through various institutions, it is currently not possible to track the amount of funding that is going into the regions.

In addition to supporting the programs delivered through CFDCs, WD has also been the primary source of funding for:

- The Women's Enterprise Initiative, which administers a $5 million loan portfolio and is headquartered in Kelowna. The office provides:
  - ❑ business counselling;
  - ❑ business linking;
  - ❑ a financing program;
  - ❑ business development; and
  - ❑ information services.
- Francophone Economic Development Organizations which provide enhanced services to Francophones. These services include:
  - ❑ training;
  - ❑ business and community economic development;
  - ❑ access to capital;
  - ❑ information services;
  - ❑ marketing advice;
  - ❑ networking; and
  - ❑ mentoring.

  La Société de Développement Economique has its office in Vancouver.

6. Kootenay Product Development Fund

This is an investment-funding program, administered through the Kootenay Association for Science and Technology, that is intended to develop technology-based products and processes. The Provincial Government and the Columbia Basin Trust each made matching contributions to provide $500,000 for the fund. The fund is fully subscribed and is in the final stages of fund disbursement. It is unclear whether it will be renewed.

7. Aboriginal Business Canada (ABC)

ABC provides financial and other support to Aboriginal businesses throughout the country. One of its stated priority areas is innovation. This includes:

- increasing the number of knowledge-based firms;
- improving productivity and processes;
- introducing new products and processes;
- and creating advocacy activities such as conferences, workshops or studies that improve the overall climate for innovation in Aboriginal businesses.

ABC also supports a network of six Aboriginal Capital Corporations. These were initially capitalized by ABC but are owned and control by Aboriginal people. There are also eleven independent Aboriginal financial institutions in the province.

8. Chartered Banks and Credit Unions

British Columbia has 65 credit unions with 335 branches. The system serves 125 communities including 39 with no other financial outlets. The credit unions provide a full range of business and farm loans. As of 2000, there were 930 Chartered Bank branches in British Columbia.

F. OTHER SUPPORT FOR COMMERCIALIZATION

Commercialization refers to the stage where capabilities for manufacture and marketing are established to introduce a new technology or enhanced technology into the marketplace. By this stage, a prototype has typically been developed and both the technical and financial feasibility of the proposed product or process have been tested.

Commercialization may be undertaken by an existing company or through the creation of a start-up company. Government support may be available to both existing and new companies to offset the costs of investing in manufacturing capabilities, staff training and export market development. In addition, start-up companies may be assisted through a variety of mechanisms such as seed capital programs, small business incubators, and entrepreneurial development programs.

Some of the organizations that provide financial and other assistance with respect to the commercialization of new products and processes in BC include the following.

1. Economic Development Agencies

There are 38 economic development commissions operating in rural British Columbia. Many of these commissions are recognizing the place that science and technology can play in regional economic development and designing related initiates. Many have partnered with the regional technology councils to study the high technology sector in their area. The commissions in Salmon Arm, Nanaimo and Kelowna have recently completed these types of projects.

2. Community Futures Development Corporations (CFDCs)

There are 34 CFDC's operating in rural BC. The mandate of the corporations is community and business development. Each CFDC delivers a variety of services ranging from local strategic economic planning, technical and advisory services to businesses, loans to small and medium-sized businesses, self-employment assistance programs, and services targeted to youth and entrepreneurs with disabilities. These development groups are also participating in science and technology based initiatives, either on their own or in partnership with other elements of the S&T regional infrastructure.

3. Patent Services: Kelowna

There is a patent lawyer in Kelwona who is recognized and registered with the Canadian Patent Office, the US Patent Office and the World Intellectual Property Organization. This is the only patent lawyer in BC located outside of Vancouver and Victoria.

4. The Kiwanis Enterprise Centre

This centre, located in Dawson Creek operates as a business incubator and a source for information for entrepreneurs. The centre provides:

- The opportunity and the environment for students to innovate, plan and carry out a business venture;
- A facility where venture activities can be organized and in some cases be launched;
- Programs that encourage the entrepreneurial attitude and develop small business skills as well as training;
- Resources and inventories of business opportunities both domestic and international for access by the local community; and
- Facilities, capital, equipment, services and expertise to support the successful start-up and operation of a small business.

Specific services provided to developing entrepreneurs include:

- business consultations,
- mentorship opportunities,
- workshops,
- financial assistance information,
- a business resource library, and
- administrative and secretarial support services.

5. The Shuswap Business Development Centre: Salmon Arm

This facility is location in the Salmon Arm Industrial Park It provides entrepreneurs with facilities and resources needed in developing new businesses. The Shuswap Business Development Centre attempts to simplify the business startup process by providing professional office space and equipment to budding entrepreneurs at minimal cost.

The facility has three (3) 880 square foot commercial manufacturing bays, a 1200 square foot Food Processing Facility (Commercial Kitchen) and a 400 square foot training room/ boardroom. A full range of business support services are available.

This facility provides subsidized rental facilities for startup small businesses requiring office space, manufacturing bays or commercial kitchen space to conduct their business operations. The concept is that the new small business entrepreneurs requiring a manufacturing bay will apply to rent appropriate space at this new facility

6. Advanced Technology Centre: Incubator Without Walls: Kamloops

The Advance Technology Centre is located on the campus of the University College of the Cariboo in Kamloops. It is one of the four Technology Centres funded by the Ministry of Competition, Science and Enterprise. The Centre offers a number of services to entrepreneurs including incubation. Qualified companies have access to a full range of business, financial and technical services including business mentoring on a cost shared basis. The Business Incubator program provides technology based companies specialized services in business management, marketing, finance, technology and mentoring for up to 3 years to ensure viability.

7. Virtual Incubation Services: Innovation Resource Centre (IRC): Prince George

The IRC also supports technology companies with virtual incubation services. These services include:

- consultations with business analysts to identify areas requiring assistance;
- small group mentoring;
- a variety of training sessions; and
- use of meeting room and training room facilities.

8. WoodTEK Business Development Centre

WoodTEK is a business incubator for the value-added wood manufacturing industry located in Prince George. It is designed to support the existing value added industry and foster new business start-ups. The centre enjoys strong community support and excellent linkages to local industry and academic institutions.

9. Courtenay High Tech Business Incubator

This facility offers reduced rent and fibre optic connectivity to small technology start up companies. All 14 offices in the incubation centre are occupied.

10. Canadian Institute of Market Intelligence (CIMI)

This organization is part of the Federal Government. Its staff work closely with the National Research Council ITA's. Clients of the ITA's can receive business counselling services, help with outlining needed market studies, referrals and market intelligence from the officials at CIMI. There are four staff of CIMI in Vancouver and one in Kelowna.

11. Canada/BC Business Service Centre

This organization is based in Vancouver but through an excellent access strategy provides business information to the whole province. Topics include, starting a new business, entering new markets, management growth, accessing government programs, taxation and regulations.

12. Parksville Civic & Technology Centre

This centre is a project of the City of Parksville, Malaspina University College and the Qualicum School District. It is intended to provide shared administrative services in addition to leasing business space to the community's nascent information technology sector.

APPENDIX IV

SCIENCE AND TECHNOLOGY INFRASTRUCTURE BY COLLEGE REGION

APPENDIX IV: SCIENCE AND TECHNOLOGY INFRASTRUCTURE BY COLLEGE REGION

The following table summarizes the regional distribution of various resources including regional technology councils, tech centres, industrial technology advisors, business associations, research centres, universities and university-colleges, and business incubators.

TABLE IV.1

REGIONAL DISTRIBUTION OF THE S&T INFRASTRUCTURE

College Region	Tech Council	Tech Trans Centre	ITA	BDC	High Tech Bus. Assoc.	Research Institute/ Centre	University	High Tech Incubator (Resident)
Cariboo	yes	yes	no	yes	no	yes	U/C	yes
New Caledonia	yes	yes	yes(2)	yes	yes	no	yes	yes
Northern Lights	yes	no	no	yes	no	no	no	no
Okanagan	yes	yes	yes (2)	yes	yes	yes	U/C	no
Rockies	yes	no	no	no	no	no	no	yes
Selkirk	yes	no	yes	yes	no	no	no	no
Malaspina	yes	yes	yes	yes	no	yes	U/C	no
North Island	no	no	no	yes	yes	no	no	yes
North West	no	no	no	yes	no	no	no	no
Fraser Valley	no	no	yes	yes	yes	yes	U/C	no

The appendix provides an overview of the S&T resources based in each of the college regions.

A. NORTH WEST

1. Northwest Community College

a. Description

The Northwest Community College is a community college with two year programs that lead to diplomas or enable university transfer. It has six campuses and four community education sites within the college region. The main campus including student residents is located at Terrace.

b. Science and technology related education

The college has a Marine Department that offers courses for professional mariners and others interested in nautical studies. The other major education program in the marine field is the Coastal Integrated Resources Management program. This program is designed to prepare students for technology level position in the field of natural resources management and for university degree programs. Courses in this program include habitat restoration, oceanography, GIS technology, and geomorphology.

Other science and technology related programs at NWCC include:

- Applied Computer Technology;
- Business Technology;
- Nursing;
- Forest Ecosystem Technology; and
- A University preparation program that includes biology, physics, chemistry and math.

A number of Chemistry, Biology and Computer labs are available to students at the Terrace campus.

2. University of Northern British Columbia (UNBC)

UNBC offers an array of courses in Terrace, including part-time graduate programs, undergraduate courses sufficient to progress towards a BA general and the requirements for the Minor in Resource Recreation and Tourism through a mix of college courses, face-to-face UNBC courses, web courses and special summer institutes. Face to face and teleconference courses are offered each semester in Terrace including environmental studies. UNBC's web courses are accessible in Terrace.

3. First Nations Training and Education Centre: Prince Rupert

The Metlakatla Development Corporation delivers short term intensive training and education courses at this centre. The course mainly focus on business skills but does include technology related subjects such as GIS.

4. Northwest Marine Institute

This is a not-for-profit society in Prince Rupert that hopes to promote economic diversification of the coastal communities. It's main activity currently is the use of a barge for training and monitoring programs related to salmon farming. The board of this organization is very supportive of further science and technology related initiatives especially as they relate to the local marine industry.

5. Business Development Bank of Canada (BDC)

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Terrace.

B. NORTHERN LIGHTS (NORTH EAST BC)

1. The Science and Technology Association of the North (Sci-Tech North)

a. Description

Sci-Tech North is one of the regional technology councils supported by the Ministry of Competition, Science and Enterprise. It is an independent, non-profit society. The mandate of Sci-Tech North is to assist in the economic development and diversification of the Peace-Liard-Stikene region through the application and/or use of science and technology.

b. Current Initiatives

i. Sci-Tech North Grants

The council supports applications for funding for regional projects supporting:

- advanced technology industrial development;
- access and/or uptake of provincial programs;
- technology transfer and adoption; and
- science awareness and education.

ii. Northern High-Tech Development Grants

The council supports applications for funding for regional projects supporting:

- feasibility, planning or other studies to identify and develop northern high-tech clusters;
- growth initiatives, such as niche infrastructure;
- projects that will market local high-tech strengths;
- marketing and communication tools to expand investment and attract companies to the region; and
- coordination of high-tech forums or trade shows.

iii. Tech Talk

This a Rural Technology Forum that occurred in September, 2002.

iv. Renewable Energy Project

The council is researching the viability and cost benefit point in using wind and or solar energy in the Peace Region

v. Human Resources Work Groups

A series of workshops and projects to address the on going issue of recruitment and retention of skilled workers in the area

vi. Young Scientists Club

This is a club for ages 15 to 25 who are interested in science based workshops and field trips.

vii. North Peace Business and Innovation Centre

Sci-Tech North is now the operating tenant of this Business and Innovation Centre in Fort St. John.

2. Northern Lights College

a. Description

Northern Lights College is a community college with two year programs that lead to diplomas or enable university transfer. It has five campuses and three learning centres within the college -region. The main campus including student residents is located at Dawson Creek.

b. Science and technology programs

Science and technology related programs at NWCC include:

- Aircraft Maintenance Engineering;
- Power engineering and gas processing;
- Applied Business Technology;
- Nursing;
- Rotor technology; and
- A University preparation program that includes biology, physics, chemistry, computer programming and math.

3. Business Development Bank of Canada (BDC)

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Fort St. John.

C. NORTHERN INTERIOR

1. Innovation Resource Centre (IRC)

a. Description

This organization, located in Prince George, fulfills the dual role of providing support for the local regional technology council as well as functioning as a Technology Access Centre. Like the other regional councils it is an independent non-profit society funded mainly by the Ministry of Competition Science and Enterprise. The stated mandate of the IRC is to enhance the use and application of science and technology for the development of regional economies through public advocacy, activities, and direct assistance. The IRC is located in a store front where services are delivered directly to businesses. The centre is also involved in a great range of projects designed to promote S&T in the region.

b. Current Initiatives

i. Technology Centre Services

Services delivered under this category include:

- Information and referral;
- NRC liaison;
- Intellectual property and Business management seminars;

- Inventors kit;
- Technology business analysis;
- New Media Incubator;
- Venture Out Program (Youth Entrepreneur development);
- Technology Case Studies (on web site);
- Small group Networking;
- Professional development;
- E-business Special Interest Group;
- New Media & IT Conference;
- Job Shadowing;
- Scientists and Innovators in the Schools;
- Regional Economic Development Officers' Conferences; and
- Sponsorships and awards.

ii. Other Projects

Other projects undertaken by the IRC include:

- Regional Innovation Consultation to develop an innovation strategy for the city;
- IdeaWorks Post-Secondary Student Project Showcase;
- S&T graduate survey;
- Technology CEO's Round Table;
- High Tech Success story newsletter; and
- MBA Advisory Group.

iii. Fee for Service Projects

The centre offers a number services that are undertaken on a fee for service basis. These include:

- Spruce Credit Union Market Research;
- Facilitation of CNC CIS Department Strategic Planning;
- Training session for Public Library staff;
- Facilitation of 5 Year Plan Development - BC Hydro Peace-Williston Fish & Wildlife Compensation Program;
- Data Sharing Network: Smithers;
- Curriculum Development Project: Product Development; and
- Innovation Network Website.

2. University of Northern BC

a. Description

UNBC is a fully accredited university with 3500 students. The main campus is located in Prince George. There are four regional branch campuses

b. S&T Education Programs

The university has strong science and technology departments including computer science, environmental science and a college of science and management. Faculty undertake research in these fields and the University operates a University Industry Liaison Office to promote projects with local industry and the creation of technology based companies spun off from University research.

i. Undergraduate Programs

Specific undergraduate degree programs relating to science and technology include:

- Science, general;
- Biology;
- Biology/chemistry (joint major);
- Chemistry;
- Chemistry/computer science;
- Chemistry/mathematics;
- Chemistry/physics;
- Computer science;
- Computer science/mathematics;
- Computer science/physics;
- Environmental science;
- Environmental engineering;
- Mathematics;
- Mathematics/physics;
- Natural Resource Management (Forestry, Wildlife, Fisheries, Recreation);
- Nursing; and
- Physics.

ii. Graduate Programs

Graduate degree program areas relating to science and technology include

- Health Sciences;
- Mathematics, computer and physical science; and
- Natural Resources and Environmental Studies.

c. Research

UNBC faculty undertake research in a wide variety of disciplines. Two main research areas relating to S&T are High Performance Computing and Forestry (including two research forests).

A research and Development Park is being developed on the Prince George Campus. The development is being designed to foster synergy and creativity among businesses, faculty, and students, with tenancy in the Park open to public and private enterprises focussed on knowledge-based activities

d. Labs

The labs currently operational at UNBC include the following:

- High Performance Computing Lab;
- GIS and Remote Sensing Lab;
- Enhanced Forestry Lab; and
- General Equipment Lab.

These labs have equipment such as the following:

- scanning electron microscope;
- particle size analyzer;
- nuclear magnetic resonance spectrometer (magnet);
- NMR control cabinet;
- stable isotope ratio mass spectrometer;
- gas chromatograph mass spectrometer;
- high performance liquid chromatograph;
- a greenhouse; and
- inductively coupled plasma analyzer.

e. University Industry Liaison Office (UILO)

The objectives of the UILO are to:

- undertake liaison with industries and communities to facilitate and encourage collaborative research;
- assist in building UNBC's research capacity;
- increase knowledge with respect to intellectual property issues within the UNBC community;
- help secure intellectual property protection for the results of research; and
- to aid in the commercial development of results of research for the benefit of the researchers, the region, the province, Canada and the world.

3. College of New Caledonia

a. Description

The College of New Caledonia is a community college with two year programs that lead to diplomas or enable university transfer. It has five branch campuses within the college region. The main campus including student residents is located at Prince George .

b. S&T related education programs

These include the following:

- Applied Business Technology;
- Computer Science;
- Forest Resource Technology;
- Geographic Information Systems;
- Math;
- Nursing;
- Physics; and
- Wood Technology.

4. National Research Council: IRAP

The industrial research and assistance program (IRAP) is a program of the National Research Council that supports a national network of Industrial Technology Advisors (ITAs). The ITAs provide advisory and referral services and also administer a financial assistance program. Financial assistance is designed to enable small and medium sized companies to validate and develop innovative ideas.

There are two ITA's headquartered in Prince George. These ITA's provide IRAP services to the northern half of the province.

5. Business Development Bank of Canada (BDC)

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Prince George.

6. WoodTEK

WoodTEK is a business incubator for the value-added wood manufacturing industry located in Prince George. It is designed to support the existing value added industry and foster new business start-ups. The centre enjoys strong community support and excellent linkages to local industry and academic institutions.

7. Forintek Canada Corp.

Forintek is a national wood products research institute. The institute is dedicated to the technological advancement of the Canadian wood products industry through the creation and application of innovative concepts, processes, products and education. It's main offices are in Vancouver and Quebec City. It has a part time representative in Prince George. Forintek had been delivering a value-added wood technology transfer program in the regions through this representative and the Advanced Technology Centre at the University College of the Cariboo. This program was funded by Forest Renewal BC and is now cancelled.

D. CENTRAL INTERIOR

1. Interior Science Innovation Council (ISIC)

a. Description

ISIC is the regional technology council for the Central Interior of BC. This area is comprised of the Cariboo, Williams Lake, the Nicola Valley and the Cache Creek areas. It is an independent, non-profit society supported by the Ministry of Competition, Science and Enterprise. The council considers its role to be the following:

- fostering the development of partnerships to support S&T initiatives;
- providing initial project leadership for S&T initiatives; and
- providing direct financial and other assistance to initiatives.

b. Current Initiatives

i. **Biz BC** - This is an annual conference that is focussed on demonstration technology for small to medium sized businesses. Included is a free "Business Make-over" for participating companies.

ii. **Natural Denim Pine Marketing strategy** - This is a partnership with NRC and the Denim Pine Marketing Association to distribute information about Denim Pine products.

iii. **Biomass Electricity** - The project will determine the viability of biomass power for wood waste.

iv. **High Tech Strategy Development and Implementation**

v. **Regional Learning network in Gold Country**

vi. **Complexity Science** - This is to be a portable lab to be toured in the region

vii. **Linking Bonaparte Indian Band to Hat Creek by Fibre Extension**

viii. **Develop teaching video regarding video streaming and web casting**

ix. **Support for Williams Lake e-commerce businesses**

x. **Seniors High Tech Training Project**

2. Advanced Technology Centre (ATC)

The ATC is located on the campus of the University College of the Cariboo. It carries out research and development, manufacturing support, technology transfer applications operates a virtual incubator and links business and industry to UCC faculty and student expertise. Specifically it offers:

- consulting services for wood products manufacturing companies;
- business consulting services for technology-based companies;
- business incubation for start-up companies; and
- University-Industry liaison services.

3. Forintek Canada Corp.

Forintek is a national wood products research institute. The institute is dedicated to the technological advancement of the Canadian wood products industry through the creation and application of innovative concepts, processes, products and education. It's main offices are in Vancouver and Quebec City. Forintek had been delivering a value-added wood technology transfer program in the regions through a representative in Prince George and the Advanced Technology Centre at University College of the Cariboo. This program was funded by Forest Renewal BC and is now cancelled. The program provided expert technical services to companies manufacturing value-added wood products.

4. University College of the Cariboo

a. Description

UCC is both an undergraduate University and a College. As a 'university' it offers 40 different undergraduate degree options. As a 'college' it has 50 different Certificate and Diploma programs offering career and job-entry training. Many of the college programs are "laddered" into university degrees. The main campus is located in Kamloops with a regional campus at Williams Lake. There are another 10 regional centres that deliver UCC courses.

b. S&T related education programs

These programs include the following:

- Anaesthesia Technology;
- Animal Health Technology;
- Mathematics;
- Computer Automated Systems Technician;
- Computing Science;
- Computer Systems;
- Digital art and design;
- Engineering;
- Engineering design and drafting;
- Forestry;
- Pre- dentistry/medicine/pharmacy/rehabilitation sciences;
- Medical lab assistant;
- Nursing;
- Natural resource sciences;
- Health sciences;
- Biology;
- Animal biology;
- Ecology and environmental biology;
- Chemistry;
- Environmental chemistry;
- Environmental studies;
- Physics;
- Applied computing science;
- Computer Networks;
- Database Systems;
- Software engineering;
- Telecommunications technician;
- Animal health technology;
- Pre-veterinary medicine;
- Wood process technology; and
- Science education for BA students.

c. Other S&T activities

i. EUREKA

This is a non-profit, student-run organization that strives to increase the interest in science and engineering for elementary students, and to help teachers bring science into the regular classroom. The organization offers in-classroom workshops and summer camps.

ii. The Regional Technology Council

UCC is highly supportive of the Interior Science and Innovation Council. The ISIC staff are housed at UCC.

5. Nicola Valley Institute of Technology

This is an institution located at Merritt. It is a First Nations facility offering a variety of training programs including natural resource technology.

6. Business Development Bank of Canada (BDC)

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Kamloops.

7. Digital Valley

This is an organization of technology based businesses in Kamloops. The goal is to provide opportunities to network as well as to have a voice in industry issues and concerns.

8. Technology Kamloops

Technology Kamloops is an initiative of the Kamloops mayor. A 12 member board has been formed. The group intends to attract high tech companies to the region, keep local college graduates in the area, start a technology business incubator and establish a venture capital fund

9. Agriculture Canada Kamloops Range Research Unit

This facility is a substation site of the Agriculture and Agri-food Canada's Lethbridge Research Centre. The Kamloops site has 57 ha. of irrigated land, 470 ha. of forested range land and several thousand hectares of provincial rangeland. Areas of research include beef production, crop production, and integrated pest and disease management

E. OKANAGAN

1. Okanagan Science and Technology Council (OSTEC)

a. Description

OSTEC is an independent non-profit organization supported by the Ministry of Competition, Science and Enterprise. The organization's mission is "To foster the development of the region as a globally competitive centre of excellence in the research, development and application of science, technology and innovation. The strategic focus areas are as follows:

- economic/business development;
- human resource development;
- access to capital;
- promotion of the region and industry;
- telecommunications infrastructure;

- research and development; and
- OSTEC communications and marketing.

b. Current Initiatives

Listed below are some of the projects being pursued by OSTEC at this time:

- branding the Okanagan region as "The Silicon Vineyard";
- high tech job website;
- technology transfer forum;
- software training;
- composite materials seminar;
- technology skills inventory;
- access to capital seminar;
- television technology series;
- smart communities; and
- R&D networking events.

2. Okanagan University College (OUC)

a. Description

OUC is a University College with a range of diploma and degree programs. There are two campuses in Kelowna and campuses in Salmon Arm, Vernon and Penticton

b. S&T related education programs

These include the following:

- Computer Information Systems;
- Electronic Engineering Tech;
- Bachelor of Science;
- Biology
- Computing Science
- Chemistry
- Earth and Environmental Sciences
- Environmental Chemistry
- Freshwater Science
- Mathematics
- Physics
- Applied laboratory science (biotechnology, chemistry, physics/electronics or computer science/math)
- Nursing;
- Mechanical Engineering Tech;
- Water Quality Tech;
- Civil Engineering Tech;
- Commercial aviation; and
- Network and telecommunications Engineering Technology.

3. Technology Access Centre

The ATC is located on the campus of the Okanagan University College. It functions as a University Industry Liaison Office and provides a variety of consultative guidance and project management services, on contracted or fee for service basis. Its main objectives are:

- successful commercialization of technology;
- to increase research capacity development at OUC; and
- provide net economic development gains.

The centre assists with access to the following resources:

- funding for industry through various Science & Technology grants;
- funding for researchers through research grants;
- intellectual / technical resources; and
- facilities and equipment.

4. National Research Council: Industrial Research and Assistance Program (IRAP)

IRAP is a program of the National Research Council that supports a national network of Industrial Technology Advisors (ITAs). The ITAs provide advisory and referral services and also administer a financial assistance program. Financial assistance is designed to enable small and medium sized companies to validate and develop innovative ideas.

There are three ITA's headquartered in the Okanagan. Two are located at the OUC main campus in Kelowna and the other is at the Summerland Research Station. These ITA's serve the Okanagan and the Cariboo regions.

5. Business Development Bank of Canada (BDC)

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Kelowna.

6. Summerland Research Station

This facility is part of the Pacific Agri-food Research Centre (PARC). It is a 320 ha site located in Summerland. It has modern laboratory facilities with food research pilot plant and greenhouses. (The other part of PARC is located in Agassiz). The Summerland facility staff conduct research in Horticulture and Environment, Food Science and Biotechnology.

The research station staff conduct research on:

- horticultural and field crop production and protection, including tree fruits, small fruits, greenhouse vegetables, special crops, and forages;
- advanced processing, utilization, and quality of plant products;
- the cellular and molecular biology of plant pathogens of significance to agricultural crops;
- soil resource conservation and land evaluation; and,
  poultry production.

The centre has a variety of equipment that relates to the following areas:

- Food processing pilot plant (plant products only);
- Food chemistry, food physics and food biochemistry;
- Food microbiology;
- Sensory evaluation;
- Food processing engineering;
- Sensory science;
- Postharvest physiology; and
- Functional foods and nutraceuticals

The centre undertakes collaborative research projects with industry, provides research services on a fee for service basis and can provide technical assistance. It does not lease equipment or facilities. The library is open to the public during regular office hours but material cannot be borrowed.

7. National Research Council: Herzberg Institute of Astrophysics: Dominion Radio Astrophysical Observatory

The Dominion Radio Astrophysical Observatory operates the seven-antenna Synthesis Telescope (ST), the 26-meter Telescope, and the 10-cm Solar Flux Monitor. It is a member of the Canadian Galactic Plane Survey a project to map 60 degrees of the Galactic plane at numerous wavelengths with a uniform sensitivity. Other projects at the DRAO site include the JCMT correlator, the space VLBI, the Large Adaptive Reflector, and the EVLA Correlator.

8. South Okanagan Advanced Projects (SOAP)

This is a group organized by the Penticton Economic Development Committee to promote the development of high technology in the area. The group functions as a networking group and promotes the area to other high tech companies.

9. Patent Services

There is a patent lawyer in Kelowna who is recognized and registered with the Canadian Patent Office, the US Patent Office and the World Intellectual Property Organization. This is the only patent lawyer in BC located outside of Vancouver and Victoria.

10. Canadian Institute of Market Intelligence (CIMI)

This organization is part of the federal government. It's staff work closely with the National Research Council ITA's. Clients of the ITA's can receive business counselling services, help with outlining needed market studies, referrals and market intelligence from the officials at CIMI. There are four staff of CIMI in Vancouver and one in Kelowna. MI

11. Columbia Mountains Institute of Applied Ecology

The Columbia Mountains Institute of Applied Ecology (CMI) is a non-profit society established to promote, facilitate and support cooperative interdisciplinary research centred on the Columbia River Basin of southeastern British Columbia. The CMI seeks to facilitate collaboration among researchers, conduct research, and communicate knowledge on the Columbia Mountain ecosystems to the public, educators and decision-makers. A volunteer Board of Directors manages the Institute. CMI's membership is comprised of

government agencies, community agencies, academic institutions, private businesses and members of the public.

12. Vitesse (Re-Skilling) Canada Inc.

This is an independent, not-for-profit organization created by the National Research Council, the University of Ottawa and Carleton University and the Ministry of Economic Development and Trade. The program "re-skills" knowledge workers into specialized, high-technology careers for industries facing skilled labour shortages. It includes co-op based training for photonics, bio-informatics, microelectronics and wireless communications. Vitesse offers workplace adjustment and enrichment programs for new and existing knowledge workers creating a training model built on the premise of a comprehensive skill continuum. In 2002 a program director was appointed for British Columbia with an office in Kelowna.

13. Okanagan Innovation Forum

This is an initiative of NRC and OUC in Kelowna to promote innovation and economic growth in the Okanagan region. The focus of the forum is to co-ordinate and support the development of a community plan to implement recommendations that came out of the inaugural Okanagan Innovation Roundtable last February.

14. VentureBC (Kelowna)

VentureBC operates as a venture capital firm that works with companies that have capital requirements of between $100,000 and $2 million. The organization screens potential investments and helps prepare the companies chosen for introduction to investors and capital markets. The organization was originally set up by Industry Canada as one of 22 community demonstration projects as a community investment facilitation initiative.

F. WEST KOOTENAY

1. Kootenay Association for Science & Technology (KAST)

a. Description

KAST is an independent non-profit society that works to foster a culture that values science, technology, innovation and entrepreneurship. It is governed by a volunteer Board of Directors drawn from every area of the region. KAST is working to achieve the following conditions in the West Kootenay region:

- economic growth and entrepreneurial opportunities;
- innovative R&D projects;
- S&T integrated into the education system;
- competition for attractive, well paid S&T employment opportunities;
- access to venture capital; and
- development of infrastructure to support S&T.

b. Current Initiatives

Listed below are some of the main projects recently completed or currently being undertaken by KAST:

- development of the Columbia Mountain Open Network;
- supporting establishment of Selkirk GIS Research Centre;
- Premier's Technology Council consultations;
- telecommunication's conference;
- support regional science fair and other awareness initiatives;
- New Media conference;
- By-Product Synergy Workshop
- established Technology Entrepreneurs Network;
- production of newsletter;
- administrative support to the Columbia Basin Trust; and
- technology sector strategy.

2. Selkirk College

a. Description

Selkirk College is a community college with two year programs that lead to diplomas or enable university transfer. It has eight campuses within the college region. The main campus is located at Castlegar.

b. S&T related education programs

These programs include

- integrated environmental planning technology;
- nursing;
- applied business technology;
- aviation;
- computer information systems;
- forestry technology;
- recreation fish and wildlife technology; and
- University transfer
  - physics
  - biological
  - chemistry

c. GIS Research Centre

The college has been awarded $500,000 form the Canad Foundation for Innovation to establish a GIS Research Centre. Intended opening date is Fall 2002.

3. National Research Council: ITA

IRAP is a program of the National Research Council that supports a national network of Industrial Technology Advisors (ITAs). The ITAs provide advisory and referral services and also administer a financial assistance program. Financial assistance is designed to enable small and medium sized companies to validate and develop innovative ideas. There is an ITA headquartered in Nelson who serves the east and west Kootenay areas.

4. Kootenay Product Development Fund (KPDF)

This is an investment-funding program, administered through the Kootenay Association for Science and Technology intended to develop technology-based products and processes. The provincial government and the Columbia Basin Trust provided matching contributions to provide $500,000 for the fund. The fund is in the final stages of fund disbursement. IT is unclear whether it will be renewed.

5. Columbia Mountain Open Network (CMON)

This is an organization dedicated to providing affordable advanced telecommunications to all communities in the Columbia basin.

6. Revelstoke Telecommunications Committee

This group was one of the founders of the Columbia Mountain Open Network. This committee undertook the Revelstoke Fibre Optics Network Feasibility Study in the fall of 2000.

G. EAST KOOTENAY

1. Science & Technology Association of the Rockies (STAR)

STAR is an independent non-profit society that works to foster a culture that values science, technology, innovation and entrepreneurship. It is governed by a volunteer Board of Directors drawn from every area of the region

2. College of the Rockies

a. Description

The College of the Rockies is a community college with two year programs that lead to diplomas or enable university transfer. It has five campuses within the college region. The main campus with over 1500 students is located at Cranbrook.

b. S&T related education programs

These program include:

- computing;
- nursing;
- horticulture technician;
- engineering technologies; and
- associate of science (biology, chemistry, mathematics, environmental studies).

3. Business Development Bank

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Cranbrook.

4. New Media Marketing Group

This is a partnership of new media professionals in the East Kootenay region. The group wanted to share technical skills and resources and marketing expenses.

H. FRASER VALLEY

1. University College of the Fraser Valley (UCFV)

a. Description

UCFV is a University College with a range of diploma and degree programs. The University College operates five campuses in the region with the main one at Abbotsford.

b. S&T related programs

These programs include:

- applied business technology;
- aviation;
- computer information systems;
- biology;
- chemistry;
- mathematics; and
- physics.

c. The Cascade Institute

The Cascade Institute facilitates the collection and distribution of information, offers a variety of educational opportunities, supports planning and mapping activities, and generally encourages appropriate research in various areas of sustainability.

d. Industry Liaison Office

This office is responsible for developing partnerships with the community in various industry sectors. Services include:

- access to faculty and staff expertise;
- partners for projects and initiatives;
- access to federal and provincial research funding;
- help with applied research;
- facilitation of industry-specific training;
- help with technology transfer;
- access to students for work terms or special projects;
- liaison with UCFV's ITA; and
- forums and career fairs.

2. Business Development Bank

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Langley.

3. Aggasiz research station

This station has three field sites in the Fraser valley with a total of 326 ha. This station conducts research in Intensive Crop Culture, Integrated Pest Management, Soils and Poultry Nutrition. The station is part of Pacific Agriculture Research Centre based in Summerland.

4. Cultus Lake Salmon Research Laboratory: DFO

Staff at this facility are part of the Freshwater Habitat Science Section of the Marine Environment and Habitat Science Division of DFO. Research is focussed on the freshwater portion of salmon life histories with an emphasis on sockeye salmon.

5. National Research Council ITA

IRAP is a program of the National Research Council that supports a national network of Industrial Technology Advisors (ITAs). The ITAs provide advisory and referral services and also administer a financial assistance program. Financial assistance is designed to enable small and medium sized companies to validate and develop innovative ideas. There is an ITA headquartered at the Fraser Valley University College in Abbotsford who serves the Fraser Valley area.

6. Fraser Valley Technology Network

This is a non-profit technology industry association representing technology companies in the Fraser Valley area. It is basically a networking organization that focuses on building and financing businesses. Members come from an area bounded by Surrey, Delta and Coquitlam in the west and Chilliwack and Hope in the east.

7. Abbotsford Animal Health Centre

The centre is located in a mixed-use laboratory and office complex for the BC Ministry of Agriculture Fisheries and Food. The facility houses a staff of 130. The Animal Health Centre (AHC) is a full-service veterinary diagnostic laboratory, funded by the B.C. Ministry of Agriculture and Food. The Centre's mandate is to diagnose, monitor, and assist in controlling and preventing animal disease in British Columbia. It provides a full range of fee-for-service diagnostic testing, including Pathology, Bacteriology, Virology, and Toxicology. In addition, laboratory staff is frequently involved in the development of new diagnostic tests and the initiation of investigative projects to address emerging disease problems in production animals, poultry, and fish.

1. MID VANCOUVER ISLAND

1. Mid-Island Science, Technology and Innovation Council (MISTIC)

a. Description

MISTIC is a not-for profit society with the following general goals:

- advance and promote technological development in a variety of sectors;

- promote and support community and economic development activities and partnerships with a focus on science, technology and innovation initiatives;
- support regional access to federal and provincial small business programs and initiatives; and
- promote technology transfer and adoption.

b. Current Projects

Some projects underway or recently completed include the following:

- Innovation Island Web site;
- access to capital seminar;
- hosting networking opportunities;
- award programs;
- breakfast lecture series;
- CEO club meetings;
- SRED program seminar; and
- career matching services.

2. Vancouver Island Advanced Technology Centre (VIATEC)

VIATEC is a not-for-profit, industry-driven venture. It actively promotes and enhances the development of the advanced-technology industry on Vancouver Island. The organization maintains a directory of advanced-technology companies as well as a collection of information for employers and career seekers. The organization is membership based and current membership is at 600. The head office is in Victoria.

3. Technology Transfer Centre

The mission of the Technology Centre at Malaspina College is to link the resources of the University-College with the region's industries for the purpose of developing technical expertise, generating collaborative research projects and increasing the application of technology at the business level.

Services of the Centre include the following:

- research services;
- intellectual property;
- outreach to industry;
- consulting services;
- assess viability of product development;
- employment matching services; and
- information management.

The Centre also provides linkages with industry sectors and information on potential new projects and funding.

4. Malaspina University College

a. Description

Malaspina University-College is a degree granting institution that offers a comprehensive range of certificate and diploma programs, as well as selected baccalaureate degrees. The main campus is at Nanaimo with three branch campuses in the region.

b. S&T related programs

These programs include:

- Applied business technology;
- Applications upgrade in microcomputers;
- Nursing;
- Computing science;
- Forestry resources technology;
- Horticulture technician;
- Fishing and aquaculture technology;
- Information technology and applied systems;
- Resource officer management technology;
- Biology; and
- Bachelor of Science transfer programs.

c. Centre For Shellfish Research

The college has obtained $1.5 million from the Canadian Foundation for Innovation to establish a shellfish research centre. A director has been hired and negotiations continue for matching funding from the province

5. National Research Council ITA

IRAP is a program of the National Research Council that supports a national network of Industrial Technology Advisors (ITAs). The ITAs provide advisory and referral services and also administer a financial assistance program. Financial assistance is designed to enable small and medium sized companies to validate and develop innovative ideas. There is an ITA headquartered at the college campus in Nanaimo.

6. Business Development Bank

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Nanaimo.

7. Pacific Biological Station

The Pacific Biological Station is the main facility for the Science Branch of the Department of Fisheries and Oceans Canada in the Pacific Region. Operating since 1908 the facility is involved in a variety of research activities. These include:

- stock assessment (50%);
- aquaculture (20%);
- marine environment and habitat science (5%);
- ocean science and productivity (5%); and
- fisheries management (20%).

There are 200 staff at the facility. The annual budget is $20 million. The majority of the funding comes from DFO but funding is also accessed from industry projects, the provincial government and other federal government departments.

9. Bamfield Marine Station

The station is owned and operated by a consortium of five western Canadian universities with support from the National Research Council. The universities involved are the University of Alberta, the University of British Columbia, the University of Calgary, Simon Fraser University and the University of Victoria. The station provides year round research facilities and technical assistance to scientists from these 5 universities as well as other visiting scientists. The facility offers courses for undergraduate and graduate students in marine sciences and runs a public education program.

The facility offers 13 university courses with approximately 170 students and a public education program that accommodates an average of 4000 school children and adults annually. There are 16 full time and 9 part time faculty and up to 90 visiting scientists at various times. Core support for the station is a $300,000 grant from NSERC. Almost $200,000 is earned in user fees and visiting researchers bring their own grant monies

10. Parksville Civic & Technology Centre

This centre is a project of the City of Parksville, Malaspina University College and the Qualicum School District. It is intended to provide shared administrative services in addition to leasing business space to the community's nascent information technology sector.

J. NORTH ISLAND

1. North Island College

a. Description

North Island College is a community college with two year programs that lead to diplomas or enable university transfer The college serves an area of the North Island and the west coast approximately 80,000 square kilometres from Klemtu to Bamfield. There are campuses at Courtenay, Campbell River and Port Alberni. The college also operates centres at Ahousaht, Bella Coola, Cortes Island Gold River, Port Alice, Port Hardy, Port McNeil and Ucluelet.

b. S&T related Programs

These programs include:

- Aquaculture & Fisheries;
- Computer Science;
- Electronics;
- Nursing;
- Mathematics & Science;
- Aircraft and transportation manufacturing; and
- Salmon Farm Technician.

2. NiTech (Campbell River)

Nitech is an organization of technology companies on the northern part of Vancouver Island. Its purpose is to promote local technology companies and provide a networking forum for these companies

3. Business Development Bank

The BDC is a federal crown corporation with a mandate to provide financing to small business. Many of its financial products are geared to high technology sectors. These include an E-Commerce implementation fund and a fund for expansion financing for knowledge-based firms. There is a BDC office in Campbell River.

4. Courtenay High Tech Business Incubator

This facility offers reduced rent and fibre optic connectivity to small technology start up companies. All 14 offices in the incubation centre are occupied.

APPENDIX V

SURVEY RESULTS REGARDING THE INNOVATION SUPPORT SYSTEM

APPENDIX V: SURVEY RESULTS REGARDING THE INNOVATION SUPPORT SYSTEM

As part of this study, we conducted a study of 263 regional businesses, 50 CED professionals and 50 representatives of the S&T infrastructure. The questionnaires were designed, in part, to obtain feedback from the respondents regarding the effectiveness of the innovation support system. More specifically, the respondents were asked to:

- Rate how well the region or regions have been served by the regional innovation support system and to provide reasons for their ratings;
- Identify the major strengths of the system;
- Identify the major weaknesses of the system;
- Rate the extent to which various factors constrain the ability of businesses to develop new products, processes and technologies; and
- Provide recommendations regarding actions that could be taken by government, by higher education and research institutions, and by industry to promote and support innovation in their region.

The results were summarized in the main body of the report. This appendix provides a more detailed summary of the responses to these questions.

A. PERCEIVED EFFECTIVENESS OF THE S&T SUPPORT SYSTEM

The general perception of the respondents from each of the three groups is that the regions have not been particularly well supported by the provincial S&T support system.

TABLE V.1

SATISFACTION WITH THE S&T INFRASTRUCTURE

Question: On a scale of 1 to 5, where 1 is not at all successful, 3 is somewhat successful, and 5 is extremely successful, how well served do you think that the regions have been by the S&T infrastructure in BC?

Level of Satisfaction	S&T Support System		CED Professionals		Industry	
	No.	Percent	No.	Percent	No.	Percent
1 - Not Successful	2	4.0%	10	20.0%	52	19.8%
2	25	50.0%	21	42.0%	68	25.9%
3 - Somewhat Successful	20	40.0%	13	26.0%	87	33.1%
4	2	4.0%	3	6.0%	38	14.4%
5 - Very Successful	0	0.0%	0	0.0%	7	2.7%
No Response	1	2.0%	3	6.0%	11	4.2%
Number of Responses	50	100.0%	50	100.0%	263	100.0%
Average Response	2.4		2.1		2.4	

The low ratings generally do not reflect dissatisfaction with the existing regional resources but rather reflect concerns that simply not enough resources have been invested in the S&T infrastructure in the regions. We asked the respondents the reasons for the ratings that they gave. The CED professionals indicated that they were most concerned about the lack of awareness regarding the resources that may be available, difficulties in accessing resources located outside of the region, and the lack of resources located in the region.

TABLE V.2

REASONS FOR RATING GIVEN TO S&T SUPPORT SYSTEM
CED PROFESSIONALS

Response	No.	Percent
Number of respondents	50	100.0%
Low awareness of resources due to poor communication	11	22.0%
Difficult to access resources located outside the region	8	16.0%
No infrastructure in the area	6	12.0%
Regional Technology Councils viewed positively	4	8.0%
IRAP and ITA viewed positively	4	8.0%
Programs not matching needs	4	8.0%
Colleges viewed positively	3	6.0%
Regional Tech Council focussed where it is based	2	4.0%

The S&T representatives that responded to this question most commonly identified the amount of resources that were dedicated to the regions as a reason for their rating.

TABLE V.3

REASONS FOR RATING GIVEN TO S&T SUPPORT SYSTEM
S&T REPRESENTATIVES

Response	No.	Percent
Number of respondents	50	100.0%
Not sufficient resources dedicated to regions	13	26.0%
Regional Technology Councils viewed positively	5	10.0%
S&T network not integrated/poor communication	5	10.0%
Services varies greatly by location	4	8.0%
IRAP and ITA viewed positively	4	8.0%

Programs not designed for regional application/delivery	4	8.0%
No clear provincial policies or plans	4	8.0%

In comparison to the CED professionals, the S&T representatives were less likely to identify awareness of, or access to, resources as constraints or concerns. This group's own high awareness of the location and design of resources could be partly responsible for this difference.

For the businesses, the most commonly identified concerns were the general lack of related infrastructure in the regions, limited access to technical and other information, and access to financing. A significant number of these individuals also appreciated the work of their local college, the technology council and the ITA.

TABLEV.4

REASONS FOR RATING GIVEN TO S&T SUPPORT SYSTEM
REGIONAL BUSINESSES

Response	No.	Percent
Number of respondents	263	100.0%
Lack of infrastructure in the regions	33	12.5%
Limited access to tech and program information	21	8.0%
Universities and Colleges viewed positively	17	6.5%
IRAP and ITA viewed positively	16	6.1%
Tech Councils viewed positively	16	6.1%
Not knowledgeable of what is out there	15	5.7%
Limited access to funding	15	5.7%
Don't need help/do it on our own	14	5.3%
No networking systems	12	4.6%
General lack of regional tech industry development	10	3.8%
Education system not giving appropriate skills	9	3.4%
Problems with recruiting and retaining technical staff	8	3.0%
Get everything from vendors	8	3.0%
Poor access to equipment and labs	6	2.3%
Community Futures viewed positively	4	1.5%

B. STRENGTHS OF THE EXISTING INNOVATION SYSTEM

The respondents were asked to identify the strengths of the existing system. In general, the strengths of the existing system were identified by survey participants to be:

- The quality of the research undertaken at BC universities and university-colleges;
- The strength of the college system;
- The support provided by the National Research Council programs and regional staff; and
- The support provided by the Regional Technology Councils and Tech Centres.

The responses of the CED professionals to this question are summarized below.

TABLEV.5

MAJOR STRENGTHS OF THE EXISTING INNOVATION SUPPORT SYSTEM
CED PROFESSIONALS

Question: What would you identify as some of the major strengths of the existing innovation support system?

Strength	Responses	Percent
Number of respondents	50	100.0%
Federal Programs (NRC, ITAs and WD mentioned)	7	14.0%
High quality University system	4	8.0%
Good college system	4	8.0%
Regional Technology Councils	4	8.0%
Local University is helping (UNBC)	3	6.0%
High quality level of people involved in the system	2	4.0%
Telecommunications network	2	4.0%

The S&T representatives generally identified the resources based in the regions including the Regional Technology Councils, IRAP, the technology centres, and the college system.

TABLE V.6

MAJOR STRENGTHS OF THE EXISTING INNOVATION SUPPORT REGIONAL S&T REPRESENTATIVES

Question: What would you identify as some of the major strengths of the existing innovation support system?

Major Strengths	Responses	Percent
Number of respondents	50	100.0%
Regional Technology Councils	16	32.0%
IRAP	15	30.0%
Technology Centres	3	6.0%
College system	7	14.0%
Federal regional research facilities	4	8.0%
UNBC	4	8.0%
Federal R&D tax credits	3	6.0%
Community Futures	3	6.0%

Many of the businesses did not identify any strengths associated with the S&T support system which is, no doubt, a function of their lack of interaction with that system. Many businesses were not very familiar with specific elements of the system and felt that they could not comment on its characteristics.

TABLE V.7

MAJOR STRENGTHS OF THE EXISTING INNOVATION SUPPORT REGIONAL BUSINESSES

Question: What would you identify as some of the major strengths of the existing innovation support system?

Strengths	Responses	Percent
Number of respondents	263	100.0%
Technology Council	15	5.7%
High speed internet connections	14	5.3%
IRAP	14	5.3%

Strengths	Responses	Percent
Community support system	11	4.2%
Local College	7	2.7%
UNBC	5	1.9%
BC's Universities	5	1.9%
Expertise of local companies	6	2.3%
Networking with local companies	6	2.3%

C. WEAKNESSES OF THE EXISTING INNOVATION SYSTEM

We also asked our three survey groups to identify specific weaknesses in the S&T support system. The S&T support staff view the lack of resources, distance from those resources, underdeveloped telecommunications and funding to be the major weaknesses of the current system.

TABLE V.8

MAJOR WEAKNESSES OF THE S&T SUPPORT SYSTEM
S&T REPRESENTATIVES

Question: What would you identify as some of the major weaknesses or gaps in the existing system?

Major Weakness	Responses	Percent
Number of respondents	50	100.0%
Lack of related resources/Distance from resources	12	24.0%
Telecommunications infrastructure	10	20.0%
Funding from government in decline	10	20.0%
Communication with regions poor	7	14.0%
Collaboration and coordination between agencies poor	6	12.0%
Access to financing	6	12.0%

The telecommunications issue varied significantly between regions. As would be expected, more isolated and low population areas that do not have sophisticated modern systems are the most concerned about this issue.

Like the S&T representatives, the CED professionals are the most concerned about the lack of local resources and the distance from relevant resources. They are also concerned about the information flow between the regions and these resources.

TABLE V.9

MAJOR WEAKNESSES OF THE S&T SUPPORT SYSTEM
CED PROFESSIONALS

Question: What would you identify as some of the major weaknesses or gaps in the existing system?

Major Weaknesses	Responses	Percent
Number of respondents	50	100.0%
No local resources/Distance from the relevant resources	21	42.0%
Poor communication/linkages with resources and agencies	10	20.0%
Telecommunications infrastructure.	3	6.0%
Low funding levels for programming	3	6.0%
Need to focus on small businesses	2	4.0%

More business respondents were able to identify a weakness than were able to identify a strength of the support system. Some of the industry representatives took the opportunity with this question to identify their individual problem areas. They took the perspective that if they had a need that wasn't being met then this was a weakness of the support system regardless of their familiarity or lack of familiarity with the workings of the system.

TABLE V.10

MAJOR WEAKNESSES OF THE S&T SUPPORT SYSTEM
REGIONAL BUSINESSES

Question: What would you identify as some of the major weaknesses or gaps in the existing system?

Major Weaknesses	Responses	Percent
Number of respondents	263	100.0%
No local resources/Distance from the relevant resources	31	11.8%
Lack opportunity for networking and collaboration of others in industry	23	8.7%
No provision of technical information	17	6.5%
Lack of access to equipment and expertise	17	6.5%
Financing issues	16	6.1%
Education system not preparing appropriately skilled workers	15	5.7%
Lack of market information	14	5.3%

Major Weaknesses	Responses	Percent
Underdeveloped telecommunications	11	4.2%
Lack of awareness of available resources	9	3.4%
No tech transfer or product development support	8	3.0%
No local ITA	6	2.3%

D. CONSTRAINTS TO INNOVATION

We asked the CED representatives, S&T representatives and businesses who had reported at least some innovation activity during the past three years about the major constraints to development of new products, processes and technologies in the regional context.

All the factors were identified as at least somewhat of a constraint by the CED professionals (the lowest average rating was 3.3 in severity on a scale of 1 to 5, where is not at all a constraint and 5 is a major constraints). Access to financing and the high costs of development were seen as the most significant constraints with awareness of resources and access to equipment and expertise also considered major constraints.

TABLEV.11

COMMUNITY ECONOMIC PROFESSIONALS
CONSTRAINTS TO DEVELOPING PRODUCTS PROCESSES AND TECHNOLOGIES

Question: There are a number of factors that can constrain the ability of businesses to develop new products, processes and technologies. Based on your experience and on a scale of 1 to 5, where 1 is no constraint at all, 3 is somewhat of a constraint and 5 is a major constraint, to what extent have the following factors served as constraints for businesses located in your region?

Constraining Factor	Not At All 1	2	Some-what 3	4	Major 5	Total	Average
Access to the funding needed to develop or commercialize new products, processes and/or technologies	0	0	6	14	29	49	4.5
	0.0%	0.0%	12.2%	28.6%	59.2%	100.0%	
The high cost of developing new products or processes	0	1	7	11	30	49	4.4
	0.0%	2.0%	14.3%	22.4%	61.2%	100.0%	
Access to the equipment or facilities needed to develop or introduce new products, processes or technologies.	0	3	7	8	28	46	4.3
	0.0%	6.5%	15.2%	17.4%	60.9%	100.0%	

Constraining Factor	Not At All 1	2	Some-what 3	4	Major 5	Total	Average
Access to expertise in government labs, universities or other research facilities.	0	5	5	7	30	47	4.3
	0.0%	10.6%	10.6%	14.9%	63.8%	100.0%	
Awareness of the resources that may be available to assist regional companies	0	2	9	12	26	49	4.3
	0.0%	4.1%	18.4%	24.5%	53.1%	100.0%	
The fit between the needs of regional businesses and the research interests of government labs, universities or other research facilities.	0	2	8	6	17	33	4.2
	0.0%	6.1%	24.2%	18.2%	51.5%	100.0%	
Mechanisms in place to facilitate technology transfer and commercialization.	0	1	12	12	19	44	4.1
	0.0%	2.3%	27.3%	27.3%	43.2%	100.0%	
Access to government assistance programs or tax credit programs	1	0	13	15	19	48	4.1
	2.1%	0.0%	27.1%	31.3%	39.6%	100.0%	
Availability of the skilled workers needed to develop or introduce new products, processes or technologies	1	5	9	15	20	50	4.0
	2.0%	10.0%	18.0%	30.0%	40.0%	100.0%	
Uncertainty regarding the market potential for any products or technologies that may be developed	0	2	9	24	13	48	4.0
	0.0%	4.2%	18.8%	50.0%	27.1%	100.0%	
The time that their staff have available to spend on projects	0	6	9	15	18	48	3.9
	0.0%	12.5%	18.8%	31.3%	37.5%	100.0%	
The ability of the businesses to successfully launch new products or technologies	0	2	9	28	8	47	3.9
	0.0%	4.3%	19.1%	59.6%	17.0%	100.0%	
Government regulations regarding new products, processes, or technologies	1	8	7	9	5	30	3.3
	3.3%	26.7%	23.3%	30.0%	16.7%	100.0%	
Access to markets including export markets	2	12	11	11	10	46	3.3
	4.3%	26.1%	23.9%	23.9%	21.7%	100.0%	

The S&T representatives generally ranked the constraints as less severe than did the CED professionals but still ranked only one factor under 3. Both groups thought access to financing was a major issue but the S&T staff ranked access to skilled labour as the number one constraint while the CED professionals had ranked it 9th in severity. Access to equipment and expertise was seen as an important constraint by both groups.

TABLE V.12

S&T REPRESENTATIVES
CONSTRAINTS TO DEVELOPING PRODUCTS PROCESSES AND TECHNOLOGIES

Question: There are a number of factors that can constrain the ability of businesses to develop new products, processes and technologies. Based on your experience and on a scale of 1 to 5, where 1 is no constraint at all, 3 is somewhat of a constraint and 5 is a major constraint, to what extent have the following factors served as constraints for businesses located in your region?

Constraining Factor	Not At All 1	2	Some-what 3	4	Major 5	Total	Average
Availability of the skilled workers needed to develop or introduce new products, processes or technologies	0	4	10	15	17	46	4.0
	0.0%	8.7%	21.7%	32.6%	37.0%	100.0%	
Access to the funding needed to develop or commercialize new products, processes and/or technologies	0	4	17	11	11	43	3.7
	0.0%	9.3%	39.5%	25.6%	25.6%	100.0%	
Access to the equipment or facilities needed to develop or introduce new products, processes or technologies.	1	6	17	11	10	45	3.5
	2.2%	13.3%	37.8%	24.4%	22.2%	100.0%	
The fit between the needs of regional businesses and the research interests of government labs, universities or other research facilities.	0	7	19	13	6	45	3.4
	0.0%	15.6%	42.2%	28.9%	13.3%	100.0%	
Awareness of the resources that may be available to assist regional companies	1	5	20	14	5	45	3.4
	2.2%	11.1%	44.4%	31.1%	11.1%	100.0%	
The time that their staff have available to spend on projects	4	4	17	12	7	44	3.3
	9.1%	9.1%	38.6%	27.3%	15.9%	100.0%	
Access to expertise in government labs, universities or other research facilities.	3	8	18	13	4	46	3.2
	6.5%	17.4%	39.1%	28.3%	8.7%	100.0%	
Mechanisms in place to facilitate technology transfer and commercialization.	2	3	10	7	3	25	3.2
	8.0%	12.0%	40.0%	28.0%	12.0%	100.0%	
Uncertainty regarding the market potential for any products or technologies that may be developed	3	2	6	7	2	20	3.2
	15.0%	10.0%	30.0%	35.0%	10.0%	100.0%	

Constraining Factor	Not At All 1	2	Some-what 3	4	Major 5	Total	Average
The ability of the businesses to successfully launch new products or technologies	2	4	3	5	3	17	3.2
	11.8%	23.5%	17.6%	29.4%	17.6%	100.0%	
The high cost of developing new products or processes	4	9	14	12	5	44	3.1
	9.1%	20.5%	31.8%	27.3%	11.4%	100.0%	
Access to markets including export markets	3	5	4	6	3	21	3.0
	14.3%	23.8%	19.0%	28.6%	14.3%	100.0%	
Government regulations regarding new products, processes, or technologies	5	8	7	3	0	23	2.3
	21.7%	34.8%	30.4%	13.0%	0.0%	100.0%	

On the other hand, businesses saw time and money as the main constraints. The lack of time for staff to undertake related projects, problems with accessing funding and government programs and the general cost of development were viewed as the greatest constraints. Also appearing to be important is finding the technical and marketing skills necessary for a successful product development and launch.

TABLE V.13

REGIONAL BUSINESSES
CONSTRAINTS TO DEVELOPING PRODUCTS PROCESSES AND TECHNOLOGIES

Question: There are a number of factors that can constrain the ability of businesses to develop new products, processes and technologies. Based on your experience and on a scale of 1 to 5, where 1 is no constraint at all, 3 is somewhat of a constraint and 5 is a major constraint, to what extent have the following factors served as constraints for businesses located in your region?

Constraining Factor	Not At All 1	2	Some-what 3	4	Major 5	Total	Average
Access to the funding needed to develop or commercialize new products, processes and/or technologies	9	10	25	39	72	155	4.0
	5.8%	6.5%	16.1%	25.2%	46.5%	100.0%	
The time that their staff have available to spend on projects	7	21	38	45	51	162	3.7
	4.3%	13.0%	23.5%	27.8%	31.5%	100.0%	
The high cost of developing new products or processes	7	18	34	50	49	158	3.7
	4.4%	11.4%	21.5%	31.6%	31.0%	100.0%	

Constraining Factor	Not At All 1	2	Some-what 3	4	Major 5	Total	Average
Access to government assistance programs or tax credit programs	19	47	21	28	35	150	3.1
	12.7%	31.3%	14.0%	18.7%	23.3%	100.0%	
The ability of the businesses to successfully launch new products or technologies	12	57	24	40	19	152	3.0
	7.9%	37.5%	15.8%	26.3%	12.5%	100.0%	
Availability of the skilled workers needed to develop or introduce new products, processes or technologies	24	51	23	32	27	157	2.9
	15.3%	32.5%	14.7%	20.4%	17.2%	100.0%	
Uncertainty regarding the market potential for any products or technologies that may be developed	24	37	35	36	18	150	2.9
	16.0%	24.7%	23.3%	24.0%	12.0%	100.0%	
Awareness of the resources that may be available to assist regional companies	16	48	46	33	14	157	2.9
	10.2%	30.6%	29.3%	21.0%	8.9%	100.0%	
Mechanisms in place to facilitate technology transfer and commercialization.	25	58	14	18	17	132	2.6
	18.9%	43.9%	10.6%	13.6%	12.9%	100.0%	
Access to expertise in government labs, universities or other research facilities.	29	22	9	12	14	86	2.5
	33.7%	25.6%	10.5%	14.0%	16.3%	100.0%	
The fit between the needs of regional businesses and the research interests of government labs, universities or other research facilities.	25	21	11	12	10	79	2.5
	31.6%	26.6%	13.9%	15.2%	12.7%	100.0%	
Government regulations regarding new products, processes, or technologies	46	53	18	8	20	145	2.3
	31.7%	36.6%	12.4%	5.5%	13.8%	100.0%	
Access to markets including export markets	38	58	16	16	12	140	2.3
	27.1%	41.4%	11.4%	11.4%	8.6%	100.0%	
Access to the equipment or facilities needed to develop or introduce new products, processes or technologies.	52	46	13	15	12	138	2.2
	37.7%	33.3%	9.4%	10.9%	8.7%	100.0%	

The following table illustrates the differences in ratings across the three respondent groups.

TABLE V.14

CONSTRAINTS TO DEVELOPING PRODUCTS PROCESSES AND TECHNOLOGIES THREE INTERVIEW GROUPS SUMMARY

Constraining Factor	CED	S&T Staff	Industry
Access to the funding needed to develop or commercialize new products, processes and/or technologies	4.5	3.7	4.0
The high cost of developing new products or processes	4.4	3.1	3.7
The time that their staff have available to spend on projects	3.9	3.3	3.7
Access to government assistance programs or tax credit programs	4.1	2.9	3.1
The ability of the businesses to successfully launch new products or technologies	4.0	3.2	3.0
Awareness of the resources that may be available to assist regional companies	4.3	3.4	2.9
Uncertainty regarding the market potential for any products or technologies that may be developed	3.9	3.2	2.9
Availability of the skilled workers needed to develop or introduce new products, processes or technologies	4.0	4.0	2.9
Mechanisms in place to facilitate technology transfer and commercialization.	4.1	3.2	2.6
The fit between the needs of regional businesses and the research interests of government labs, universities or other research facilities.	4.2	3.4	2.5
Access to expertise in government labs, universities or other research facilities.	4.3	3.2	2.5
Access to markets including export markets	3.3	3.1	2.3
Government regulations regarding new products, processes or technologies	3.3	2.3	2.3
Access to the equipment or facilities needed to develop or introduce new products, processes or technologies.	4.3	3.5	2.2

E. RECOMMENDATIONS FOR IMPROVEMENT

Each of the three groups was also asked to provide recommendations regarding actions that could be taken by government, higher education and research institutions, and industry to strengthen the innovation support system in the regions. The responses are summarized below:

1. Government

a. Business Respondents

The most common recommendations for government that were provided by the 263 businesses surveyed were to increase access to funding (particularly for research and development) and to increase funding and support for training and education as summarized below:

- Increase/improve access to funding by increasing the amount of funding available, expanding tax credits, and/or improving program guidelines or processes (79 respondents);
- Increase funding and support for training and education and/or promote further development of the local universities, university-colleges, and colleges (28 respondents);
- Increase interaction between government and industry such that government will better understand the needs of local industry (21 respondents);
- Increase and/or expand services and resources available locally (20 respondents);
- Support local business development through small business programs, the attraction of new businesses, and the strategic use of government purchasing power (19 respondents);
- Assist in marketing, market development, and addressing trade issues (19 respondents);
- Increase awareness of the resources that are available through promotion, directories and lists (10 respondents); and
- Improve the internet and telecommunications infrastructure (9 respondents).

b. Public Sector Respondents

The recommendations for government that were most commonly provided by the CED professionals and representatives of the S&T infrastructure were to increase program funding and to increase awareness of the resources available as summarized below.

TABLE V.15

RECOMMENDATIONS FOR GOVERNMENT ACTION TO PROMOTE INNOVATION REPRESENTATIVES OF CED AND S&T ORGANIZATIONS

Question: What actions would you recommend that the government take to promote and support innovation in your region?

Recommendation	CED Professionals	S&T Infrastructure
Number of Respondents	50	50
Increase program funding	4	12
Develop strategy/policies	-	7
Improve agency coordination/communication	-	7
Increase access to financing	4	7
Increase awareness of resources and benefits of S&T	11	6
Work to create innovation culture	2	6
Improve access to resources	-	5
Improve information flow	8	-
Improve telecommunications	4	-

2. Higher Education and Research Institutions

a. Business Respondents

The most common recommendations for academia and the research institutions that were provided by the 263 businesses surveyed were to increase access to funding (particularly for research and development) and to increase funding and support for training and education as summarized below:

- Increase interaction with industry to ensure that education, training and research programs are consistent with the needs of local industry (38 respondents);
- Increase the use of co-op programs (23 respondents);
- Increase local delivery of programs through means such as satellite operations and use of online courses (17 respondents);
- Expand business management programs (15 respondents);
- Ensure that the programs are modern and kept up to date (11 respondents);
- Increase the research activities (10 respondents);
- Increase awareness of the programs and resources available (7 respondents);

- Make greater use of partnerships with industry (7 respondents);
- Increase access to equipment and facilities (4 respondents); and
- Convert the local university-college into a full university (4 respondents).

In addition, 59 business respondents indicated that one or more specific types of technical, degree, or trades education or training programs should be established or expanded.

b. Public Sector Respondents

The recommendation for higher education and research institutions that was most commonly provided by the CED professionals and representatives of the S&T infrastructure was to increase contact and collaboration with industry as summarized below.

TABLE V.16

RECOMMENDATIONS FOR ACTION BY HIGHER EDUCATION AND RESEARCH INSTITUTIONS TO PROMOTE INNOVATION

Question: What actions would you recommend that the higher education and research institutions in BC take to promote and support innovation in your region?

Recommendations	CED Professionals	S&T Infrastructure
Increase contact and collaboration with industry	15	11
Address local education needs	3	8
Increase research and tech transfer activities	5	7
More coop programs	2	4
More distance education	3	3
Support tech clusters and tech incubators		3
Emphasize entrepreneurship and technology		3
Relief time for faculty		2
Promote own expertise and services	11	
Emphasize applied technology	2	

3. Recommendations for Industry Action

The most common recommendations for industry that were provided by the 263 businesses surveyed were to increase the networking activities, particularly at the regional level, and increase the use of strategic alliances related to research, product development, manufacturing, and/or marketing. The recommendations were as follows:

- Increase networking and interaction with other members of industry and/or government (56 respondents);
- Increase the use of strategic alliances related to research, product development, manufacturing, and/or marketing (24 respondents);
- Work to increase awareness of the importance of science, technology and innovation within their organizations, industry, government, and the general public (19 respondents);
- Expand or improve marketing of their products and services (19 respondents);
- Increase participation in co-op education and apprenticeship programs (15 respondents);
- Increase investment in research and development and/or the development of new products, services and processes (12 respondents);
- Increase the level of interaction with education and training organizations (10 respondents);
- Increase support or assistance for small businesses (6 respondents); and
- Organize into a regional or sectoral association or working group (5 respondents).

The recommendations for industry that were most commonly provided by the CED professionals and representatives of the S&T infrastructure are summarized in the table below.

TABLE V.17

RECOMMENDATIONS FOR INDUSTRY ACTION TO PROMOTE INNOVATION

Question: What actions would you recommend that industry take to promote and support innovation in your region?

Recommendations	CED Professionals	S&T Infrastructure
Increase networking and collaboration	10	15
Be more aggressively innovative	17	14
Increase R&D		6
Be more Entrepreneurial		5

All three groups saw an increase in networking and collaboration as key recommendations for industry.

APPENDIX VI

RELATIONSHIP BETWEEN THE REPORT AND THE TERMS OF REFERENCE

APPENDIX VI: RELATIONSHIP BETWEEN THE REPORT AND TERMS OF REFERENCE

Objectives Established in the Terms of Reference	Discussion
Identify the key players	The key players under each element of the regional innovation system are described in Chapter III, Section C and discussed in detail in Appendices III and IV
Identify the "gaps" in information needs or barriers to access	Chapter III, Section D provides a detailed review of strengths, weaknesses and gaps for each component of the innovation system
Analyse the type and source of business and technological information sought	Information needs are highlighted in Chapter III under the elements of the innovation system. The responses of industry to specific questions related to information needs are presented in Appendix V. Best practices are reviewed in Chapter IV
Evaluate the strengths and deficiencies of existing rural resources	Chapter III, Section E provides a detailed review of strengths, weaknesses and gaps for each component of the innovation system . Respondent ratings of the system are presented in Chapter III, Section D
Identify emerging sectoral trends	Emerging sector trends are discussed for existing and emerging clusters in Chapter II, Section III
Identify unique regional/geographic strengths and disparities	Regional issues are highlighted throughout the report with specific text provided in Chapter III, Section F and Appendix IV
Recognize emerging technology clusters and priorities	Emerging clusters are described in Chapter II, Section III
Identify necessary technical infrastructure to support the commercialization of science and technology opportunities	A review of the technical infrastructure is provided in Chapter III, Sections D and E with strategic directions detailed in Chapter V, Section C
Develop a list of actionable priorities and performance criteria to evaluate progress and success	Actionable priorities are detailed in Chapter V, Section D and Performance Criteria are detailed in Chapter V, Section E
Communications strategy	Input was provided to the Advisory Committee in the development of the communications strategy