



SCOPE AND SCALE: KINGSTON'S APPROACH TO INNOVATION

A response to the Government of
Canada's Innovation Strategy,
submitted by innovation
stakeholders in Kingston, Ontario

October 2002

EXECUTIVE SUMMARY	1
1. INTRODUCTION	2
2. KINGSTON’S APPROACH	4
3. SUGGESTED IMPROVEMENTS TO INNOVATION STRATEGY	7
3.1 SUPPORTING INDIRECT RESEARCH COSTS.....	7
3.2 SUPPORTING ACADEMIC INSTITUTIONS IN IDENTIFYING INTELLECTUAL PROPERTY WITH COMMERCIAL POTENTIAL.....	7
3.3 INCREASING SUPPORT TO GRANTING COUNCILS	10
3.4 BUILDING COLLABORATIVE NETWORKS	10
3.5 INCREASING SUPPORT FOR TARGETED COMMERCIALIZATION PROGRAMS.....	11
3.6 INCREASING SUPPORT TO NRC’S INDUSTRIAL RESEARCH ASSISTANCE PROGRAM (IRAP)	12
4. SKILLS CHALLENGES	14
4.1 INCREASING SUPPORT FROM PROVINCIAL GOVERNMENT.....	14
4.2 INCREASING THE OUTPUT OF HIGHLY QUALIFIED PERSONNEL (HQP).....	14
5. STAKEHOLDER-LED INNOVATION INITIATIVES IN KINGSTON	16
5.1 SUPPORT FROM INDUSTRY CANADA FOR COMMUNITY-DRIVEN INNOVATION INITIATIVES.....	17
5.1.1 <u>INNOVATION RECOMMENDATION #1: PROVIDING FUNDING FOR COMMUNITIES TO DEVELOP AND IMPLEMENT INNOVATION STRATEGY ROADMAPS</u>	17
5.1.2 <u>INNOVATION RECOMMENDATION #2: WORKING WITH PROVINCIAL PARTNERS ON FUNDING MECHANISMS FOR RESEARCH PARKS AND TECHNOLOGY INCUBATORS</u>	19
5.1.3 <u>INNOVATION RECOMMENDATION #3: LOCATING AN NRC PRESENCE IN KINGSTON</u>	19
5.1.4 <u>INNOVATION RECOMMENDATION #4: IDENTIFYING AND IMPLEMENTING THE LEVERAGE POTENTIAL OF PHYSICAL ASSETS IN COMMUNITIES WITH INNOVATION ROADMAPS</u>	20
5.1.5 <u>INNOVATION RECOMMENDATION #5: SUPPORTING THE DISSEMINATION OF KNOWLEDGE IN RAPIDLY CHANGING FIELDS TO SENIOR ELEMENTARY AND SECONDARY SCHOOL TEACHERS</u>	20
6. CONCLUSION	22

EXECUTIVE SUMMARY

Over the past four years, Kingston has been pursuing a community-driven innovation agenda, fueled by a network of academic, business, and economic development champions leveraging public and private resources.

Our accomplishments over this period are noted throughout this document. We have made great strides in our goal to develop globally competitive economic clusters in:

- biotechnology and life sciences
- information and communications technologies
- advanced materials

and we now have an emerging cluster in alternative energy.

Our recommendations to Industry Canada and Human Resources Development Canada will accelerate the pace of discovery and commercialization in Kingston and southeastern Ontario, and are based on current assessments of need, resource requirements, strategic focus, and partner commitments. Our key recommendations revolve around current community-driven innovation initiatives and include:

- support for Industry Canada's proposal to assist communities in developing and implementing innovation roadmaps or blueprints
- proposal for aligning federal support for research parks and technology incubators with similar provincial initiatives to improve leveraging opportunities and expedite timing of results
- proposal for locating a National Research Council presence in Kingston, that leverages our existing and emerging strengths in advanced materials, fuel cells, and alternative energy
- support for making the most effective and efficient use of the Government of Canada's physical assets in communities across the country as a resource for accelerating community-based innovation
- proposal to HRDC for supporting the dissemination of professional development material to senior elementary and secondary school teachers on rapidly changing fields, in recognition of their crucial roles as mentors and advisors to the next generation of innovators

1. INTRODUCTION

On behalf of the stakeholders involved in Kingston’s community-driven initiatives to improve our capacity to generate and commercialize knowledge, to capture the benefits of that knowledge creation for Kingston, the southeastern Ontario region and Canada as a whole, and to attract and retain the talent needed to sustain a knowledge-based economy over the long-term, we congratulate Industry Canada and Human Resources Development Canada for consulting widely on innovation policies and programs that will make the greatest impact on communities across the country. Kingston is proud of its collaborative efforts to drive toward a knowledge-based economy, and this document outlines many of our successes.

Kingston is now embarking on a new phase in our economic development strategy to build a stronger, globally-competitive economy — an economy that will benefit the province and the country. We are working on the vision that we can create “World Class Products for Global Markets” in biotechnology, information and communications technologies, and advanced materials. Our quality of life – based on a stimulating cultural environment, including numerous historical attractions, and access to extensive waterfront opportunities, will further enable our knowledge-based cluster development strategies.

Many elements of the Innovation Strategy — and particularly those initiatives targeting basic research, the commercialization of research, support for sectors of strategic importance to Canada, and assistance for community-driven innovation agendas—will step up our efforts. We look forward to implementing these initiatives in the Kingston region.

The stakeholders involved in this collaboration are:

- Kingston Economic Development Corporation (KEDCO)
- Queen’s University
- St. Lawrence College
- Kingston General Hospital (KGH)
- City of Kingston
- PARTEQ Innovations

- Kingston Technology Council (KTC)
- Kingston Area Network (KANnet)
- Canadian Microelectronics Corporation (CMC)

This document has two major sections:

- recommendations for improvements to Canada’s Innovation Strategy, as outlined in *Knowledge Matters* and *Achieving Excellence*
- suggestions for Industry Canada’s involvement in stakeholder-led innovation initiatives in the Kingston region

FUELING ENTREPRENEURSHIP IN KINGSTON	
<ul style="list-style-type: none"> ▪ Firewalk™ business commercialization and readiness program matches young entrepreneurs with mentors in information technology and biotechnology sectors – program has expanded to accept 50 students, and plans are underway to coordinate office space with other early-stage companies in Kingston ▪ First Capital Challenge (FCC) is an annual competition for the best plan to launch a high-potential new business in Kingston. The competition encourages students, entrepreneurs, researchers and other talented individuals interested in the Kingston community to put their ideas to work in exciting new companies. 	<ul style="list-style-type: none"> ▪ Retired Executives Living in Kingston (RELIKs) offers networking and mentoring to young entrepreneurs, including a business plan competition – this group organized a tour for Queen’s MBA Science and Technology students to introduce them to Kingston-based companies involved in research and development ▪ <i>Rural Success Stories</i>, a booklet profiling small businesses in rural settings in central eastern Ontario, published by KEDCO in cooperation with the Ontario Ministry of Agriculture, Food and Rural Affairs and the Frontenac Federation of Agriculture, inspires others who wish to establish businesses in a rural setting

2. KINGSTON'S APPROACH

Over the past four years, Kingston has developed a tightly integrated and collaborative approach to developing our knowledge-based economy. The potential for cluster development in biotechnology/life sciences, information technology and communications, and advanced materials was externally validated in a 1998 report prepared by Coopers and Lybrand for Advantage Kingston, a public-private partnership on economic transformation.

The Coopers and Lybrand report concluded that Kingston hosts a large number of existing and potential engines of knowledge creation and commercialization. This combination of **scale and scope** produces the tight linkages, effective networking and collaborative behaviours necessary to develop Kingston's capacity to innovate.

In terms of **scope**, Kingston hosts:

- **Queen's University**, a leading university in Canada in commercialization productivity and licensing revenue, which has spun out 19 companies, and ranks 9th in research intensity according to a 2001 *Research Money* report
- **Kingston General Hospital (KGH)**, which is the main site of the Southeastern Academic Health Sciences Centre, provides tertiary care in a teaching hospital environment along with an innovative physician remuneration plan (Alternative Funding Plan) that paves the way for more clinicians to participate in basic and clinical research
- **Royal Military College (RMC)** which offers leading-edge facilities for chemical, physical, and engineering measurement capabilities that rank among the best in Canada
- **Canadian Forces School of Electronics and Communications** which provides basic, intermediate and advanced training to military personnel employed in the field of communications and electronics
- **DuPont Canada's Research and Development Centre and Corporate Engineering Centre** – DuPont has recently announced plans to build a pilot manufacturing site for fuel cell components tested in Kingston

- **Alcan International's** second largest materials Research and Development Centre in Canada which maintains fundamental capabilities in chemical analysis, evaluation of materials performance and integrity, mathematical modeling and micro structural characterization
- **Canadian Microelectronics Corporation** which provides advanced tools and technologies that enable high-quality research and HQP training in microelectronics and related industries. Through its National Design Network, CMC provides state-of-the-art software, hardware and other forms of intellectual property required to design microchips and systems, and facilitates the fabrication of completed systems using the most advanced technologies.
- **High Performance Computing Virtual Laboratory (HPCVL)** which offers a secure high-performance computing environment to encourage interdisciplinary, computationally-intensive research at Queen's, RMC, Carleton University and University of Ottawa -- it was recently recognized as the top academic supercomputing facility in Canada
- **St. Lawrence College** which has developed an innovative biotechnology training program, producing highly-valued laboratory personnel skilled in cellular and molecular biology techniques

In terms of **scale**, Kingston has all the ingredients for a knowledge-based economy, including world-class research institutions, an excellent, research-intensive health care system, a well-educated population, plus an enviable quality of life that features miles of waterfront access, historical attractions, and a thriving arts and culture scene. Richard Florida, acknowledged as an expert on the "creative class," has validated that Kingston has the ingredients to attract and retain the talent needed to build and sustain a knowledge-based economy.

Our size makes it possible to reach across sectors and build an expanding constellation of networks, arrangements and partnerships between university, industry and government that provide the fuel for our competitive advantage in science and technology-based innovation. Innovation flows from our research-intensive educational and health care institutions to our community, and from Kingston back to the institutions through funding program such as the Community-University Research Alliance (CURA) program or the Industrial Research Assistance Program (IRAP).

We are **committed to collaboration** as the underlying process of how to create knowledge, and to commercialize that knowledge. While we cannot prejudge the outcomes or successes of knowledge creation and commercialization, we are committed to letting our talent pool, our entrepreneurs, our researchers, and our professional services industry know that we will form the alliances necessary to make excellence happen in Kingston.

Just as Kingston’s size permits collaboration as the “how” to create excellence, so to does Kingston’s size allow us to know “who” must be involved in creating excellence. As a group of academics exploring critical success factors for economic clusters notes, “the concentration of a large number of firms is not sufficient to transform a particular locale into a vibrant and dynamic cluster ... What is required is the presence of an ‘economic community’ – places with strong, responsive relationships between the economy and community that ... “are mediated by key people and organizations that bring the economic, social and civic interests in the community together to collaborate.” *

Our strategy for building a knowledge-based economy is based on sectoral strategies for biotechnology and life sciences, information and communication technologies, advanced materials, and alternative energy. Cross-cutting strategies to boost capacity in entrepreneurship, arts and culture, talent attraction and retention, and networking contribute to the success of cluster development in all of these sectors.

NETWORKING MECHANISMS TO ENGAGE CLUSTERS	
<ul style="list-style-type: none"> ▪ Queen’s University holds quarterly Community Networking Breakfasts to engage local champions on issues of concern to Kingston ▪ Kingston Technology Council holds monthly luncheons, with guest speakers, on topics of interest to local entrepreneurs and supporters of technology 	<ul style="list-style-type: none"> ▪ Kingston Technology Council sponsors annual Technology Awards program, recognizing innovators in business and technology, including partners from outside Kingston ▪ Biotechnology Breakfast series draws entrepreneurs, academics, business people, and graduate and undergraduate students, to hear

* David Wolfe, “Social Capital and Cluster Development in Learning Regions,” found at http://www.utoronto.ca/progris/Wolfe_SocialCapital.pdf.

3. SUGGESTED IMPROVEMENTS TO INNOVATION STRATEGY

The following section summarizes Kingston's position on those elements of the Innovation Strategy that will have the greatest impact on our community-driven innovation initiatives.

3.1 SUPPORTING INDIRECT RESEARCH COSTS

Industry Canada has proposed that the Government of Canada support indirect costs for research.

Kingston's economic development strategy is highly linked to the research strengths at Queen's University and Kingston General Hospital. **Ongoing funding for the indirect costs of university and hospital-based research at a minimum of 40% is needed to keep Canada on an internationally competitive basis with other jurisdictions.** With the security of ongoing funding for indirect research costs, Queen's and Kingston General Hospital can implement their long-range, institutional strategies for strengthening and deepening established and emerging research groups. Security of funding will have spillover benefits for the community, including employment for Highly Qualified Personnel (HQP), innovative education and training programs, and greater interest in basic research where many innovations are founded. Furthermore, we are anxious to develop collaborations at the interstices between and among these research groups where innovation is likely to occur. Without that security, community-driven innovation initiatives will be more tentative, slower, and less effective – resulting in less innovation and fewer commercializable discoveries.

3.2 SUPPORTING ACADEMIC INSTITUTIONS IN IDENTIFYING INTELLECTUAL PROPERTY WITH COMMERCIAL POTENTIAL

Queen's and PARTEQ Innovations, the University's technology transfer office, have demonstrated that, with the right strategy and long-term institutional commitment, the efficiency of technology transfer from the research lab to commercialization can be significant. On an historical

funding base of less than \$100 million per year, PARTEQ has raised over \$335 million to invest in licensed technology and over \$450 million has been invested in the development of licensed technology.

PARTEQ was established in 1987 funded by a line of credit underwritten by the University, and all outstanding debt was paid off by 1999-2000. Financial returns are reinvested in university and hospital-based research projects such as the interdisciplinary Queen's Cancer Research Institute that brings together researchers in cancer biology and genetics, clinical trials, and cancer care epidemiology.

Through its success with PARTEQ, Queen's has demonstrated the importance of:

- on-site commercialization offices
- running a commercialization arm as a business
- having money, time and expertise to develop the portfolio of technologies
- having experienced patent agents in-house
- having a "captive" source of venture capital for early stage seed development

Kingston's strategy to develop a knowledge-based economy depends heavily on the ability of PARTEQ to help researchers identify and develop commercializable products and services, to nurture successful spin-off companies, and to keep those companies growing and thriving in Kingston. **We feel strongly therefore, that the Government must develop a portfolio of policies and programs that will encourage and support commercialization offices at universities.** Key elements should include:

- internships for training in commercialization management
- support, on a competitive basis, for commercialization entities at universities
- early stage financing for inventions, for example small venture funds for universities on a competitive basis possibly through the Business Development Bank of Canada
- financial support for developing physical infrastructure (e.g. incubators) in smaller urban areas and regions of Canada

These elements are essential to develop and keep Canadian based companies that can re-invest in R&D and create an environment at the local community level that encourages the retention of HQP.

SPIN-OFF COMPANIES FROM KINGSTON-BASED RESEARCH	
<ul style="list-style-type: none"> ▪ Performance Plants Inc. modifies the metabolism and morphology of plants to enhance growth and improve resistance to drought, to meet the demands of a rapidly growing world population ▪ Neurochem Inc., a public biopharmaceutical company focusing on therapeutic discoveries for Alzheimer’s disease and other diseases of aging, has generated \$80 million in investment ▪ Cytochroma Inc. is an applied genomics and drug discovery company, utilizing genomic information to identify novel therapeutic drugs ▪ Cellegy Pharmaceuticals Inc., formerly Vaxis Therapeutics, develops and commercializes novel therapeutic treatments for peripheral vascular diseases ▪ Fuel Cell Technologies Inc. is a leader in developing and commercializing solid oxide fuel cell (SOFC) power systems to generate electricity and heat for residential, small commercial, remote, and off-grid applications ▪ Cortec DNA Service Laboratories Inc. provides core technologies, including oligos and DNA sequencing, to advance gene-based research 	<ul style="list-style-type: none"> ▪ Millenium Biologix Inc. specializes in tissue engineering and skeletal repair, partnering with the Canadian Space Agency and NASA on bone-loss experiments in zero gravity environments ▪ Molecular Mining Corp. provides advanced data mining, prediction and modelling technology to accelerate drug discovery and development ▪ Portable Health Intelligence Inc. produces clinical applications for mobile computing devices used in peri-operative patient care and acute pain management ▪ Cardiomics Inc. uses proteomics to identify and validate proteins targets for the development of therapeutics or diagnostics in acute ischemia (heart attack) and to identify cardioprotective proteins ▪ GB therapeutics Inc. is a drug discovery company with core competencies in medicinal chemistry and biology, focusing on diseases related to the central nervous system and cardiovascular system ▪ Qubit Systems Inc. provides high-quality integrated laboratory packages for biological research and teaching, and has been recognized for excellence in export development

3.3 INCREASING SUPPORT TO GRANTING COUNCILS

Industry Canada has proposed that support to granting councils be increased. As a community, Kingston is highly supportive of this initiative. **Significant increases to the granting councils are required to meet the needs of new faculty who are, in almost all cases, more heavily engaged in research than their predecessors – and more aware of entrepreneurial opportunities.** We support the process of peer review as the only criterion on which research funding from granting councils should be awarded.

3.4 BUILDING COLLABORATIVE NETWORKS

Industry Canada has proposed that building collaborative networks among government, academe, industry and non-government organizations is the best way to focus federal capacity on emerging science-based issues and opportunities. We are highly supportive of this “fourth pillar” approach. As the Canadian Microelectronics Corporation (headquartered in Kingston and an active participant in Kingston’s innovation initiatives), has noted in their feedback on the Innovation Strategy, collaborative networks can respond quickly and flexibly to industry’s needs for HQP and research, and to academe’s needs for research tools, design infrastructure, and training.

The BIOCAP Canada Foundation is another fourth pillar organization based in Kingston; BIOCAP is bringing Canadian universities to the table with governments, industries and non-governmental organizations to find biology-based solutions to the challenges of climate changes.

We believe that the fourth pillar approach would provide a better framework for SME involvement in collaborative networks by providing a more focused, “one window”, stable approach to innovation in targeted areas. Based on the Kingston experience, our SME partners have been frustrated with the public-private partnership approach when government priorities – either strategic or financial – shift without warning. The fourth pillar approach should mitigate this problem.

3.5 INCREASING SUPPORT FOR TARGETED COMMERCIALIZATION PROGRAMS

Industry Canada has proposed increasing support for commercialization programs targeted at sectors of strategic interest for Canada. We strongly support this proposal. Kingston has a global vision for our biotechnology cluster – “World Class Products for Global Markets” – and is in the process of devising a multi-pronged strategy to push this vision forward. Several of our technology-based firms have been successful in acquiring second-round financing from U.S.-based or E.U.-based venture capitalists, and have set up sales offices around the world.

Support from Industry Canada for commercialization programs targeted at strategic sectors should be comprehensive and embrace:

- funding for **physical infrastructure** e.g. research parks and incubators – Kingston urgently needs to provide incubator and growth space for many of our biotechnology and ICT firms since out-migration to the Greater Toronto Area and Montreal has become an acute problem
- funding for **programming** to build sectoral networks, implement outreach programs, and provide business services deemed essential to running a “best practices” incubator or research park
- funds for **education and training of HQP**

BIOTECHNOLOGY ACTION PLAN – OUTCOMES 1999-2002	
<ul style="list-style-type: none"> ▪ 10-point Biotechnology Action Plan developed to raise awareness about biotechnology in the Kingston area, establish networking opportunities in the biotechnology sector, and increase local sources of funding for biotechnology ventures 	<ul style="list-style-type: none"> ▪ Biotech-in-a-Box program developed to support training of high school teachers and students in advanced technologies used in the biotechnology industry, partnering with St. Lawrence College, and three local school boards
<ul style="list-style-type: none"> ▪ Project manager appointed to implement the community-driven Biotechnology Action Plan, through Queen’s/KEDCO partnership 	<ul style="list-style-type: none"> ▪ KingstonBiotech booth launched at BIO2002 in Toronto, featuring local entrepreneurs, education and training providers, and economic development experts
<ul style="list-style-type: none"> ▪ Biotechnology Breakfast Series launched, a networking arrangement for entrepreneurs, researchers, venture capitalists, intellectual property specialists and students 	<ul style="list-style-type: none"> ▪ Memorandum of understanding signed by seven major partners on pressing need for commercialization facilities

3.6 INCREASING SUPPORT TO NRC'S INDUSTRIAL RESEARCH ASSISTANCE PROGRAM (IRAP)

IRAP has assisted almost 70 companies since 1997-98 on projects worth approximately \$4 million. We are highly supportive of this historically strong program because of its unique, grassroots approach to identifying and assisting SMEs with technology development. Given their community-wide perspective, the Industrial Technology Advisors (ITAs) are in an excellent position to help community-driven innovation initiatives respond to local needs.

The ITAs, however, labour under a number of challenges that constrain their ability to boost the innovation quotient among SMEs:

- response time from IRAP, possibly owing to centralized audit requirements, has slowed down substantially over the past 12 months, leaving SMEs in a state of uncertainty and slowing down the pace of R&D
- a chronic shortfall of cash funding frustrates many innovation programming initiatives, particularly in those directed at increasing youth employment in advanced technology research and development
- IRAP does not integrate easily with other funding programs such as NSERC, GEOInnovations, SR&ED credits and provincial centres of excellence programs such as Communications and Information Technologies Ontario (CITO). This lack of integration leaves many synergy possibilities with university and college programs untapped and diminishes the growth potential of IRAP.

We recommend that Industry Canada consider overhauling IRAP's mandate to make it more flexible in responding to community-driven innovation initiatives, and to ensure that financial requirements, decision times, and cash flow support – rather than hinder – innovation in SMEs.

**Information and Communications Technologies
Partners and Programs in Kingston**

- KANnet, a consortium of broadband users, including the Limestone District School Board, Algonquin and Lakeshore Catholic School Board, Queen's, RMC, St. Lawrence, Kingston General Hospital, KEDCO and the City of Kingston, partners with other municipalities, institutions, and non-profit organizations on "smart community" initiatives
- Kingston selected as a finalist in Industry Canada's "Smart Communities" competition
- "Smart Teams" competition launched to encourage students to apply technologies to their interests, while enriching the community
- Ongoing development of "smart community" content initiatives, including digital city hall, on-line business development support tools, and high school courses
- KANnet hosts Public Access Terminals through the Community Access Program (CAP) at disadvantaged youth centres, tourism centres, and housing assistance offices
- High Performance Computing Virtual Laboratory (HPCVL) facility, funded by Canada Foundation for Innovation, provides supercomputing infrastructure for researchers at Queen's, RMC, Carleton University and University of Ottawa

4. SKILLS CHALLENGES

As the home to two universities and a community college aiming to offer applied degrees, Kingston is fully cognizant of the needs for critical thinking, analytical skills, verbal and oral communications, research skills, as well as personal creativity and intellectual independence. As well, many innovations are being planned and introduced that ensure education and training of graduates is responsive to needs for highly qualified personnel.

Our recommendations to Industry Canada for programs or policies that would make the greatest impact on the skills challenge in Kingston are outlined below.

4.1 INCREASING SUPPORT FROM PROVINCIAL GOVERNMENT

While we recognize that provincial programs are outside the purview of Industry Canada's proposed innovation strategy, it is essential to recognize that community-based innovation requires complementary actions between the two levels of government to support the basic operations of universities and colleges.

It is essential that provincial governments provide adequate support for the basic operations of our publicly funded post-secondary universities, and to the maintenance of their physical infrastructure, particularly now that demand for post-secondary education is stretching already-thin resources. Furthermore, we encourage the federal government to work with universities to understand the need for more flexible tuition fee policies.

4.2 INCREASING THE OUTPUT OF HIGHLY QUALIFIED PERSONNEL (HQP)

While the Canada Research Chairs program helps to attract more faculty members from outside Canada, we need to increase the Canadian supply of future instructors, teachers and professors by training more MA, M.Sc., and Ph.D students.

We believe this is best accomplished by increasing granting council budgets since over 70 percent of research grant awards are spent on research personnel training. The granting councils – SSHRC, NSERC and CIHR – are very supportive of training HQP but they need more

funds to allocate to meritorious research projects that will train the next generation of researchers.

Queen’s University, as part of its contribution to the Innovation Strategy and Kingston’s community-driven innovation initiative, is prepared to contribute to the higher output of HQP by streamlining the requirements to complete graduate degrees while maintaining the quality of these degrees.

INNOVATIVE EDUCATION AND TRAINING PROGRAMS IN KINGSTON	
<ul style="list-style-type: none"> ▪ Queen’s Master’s of Business Administration in Science and Technology (MBAst) is ranked #1 in Canada and second in the world by <i>Business Week</i> ▪ the new Integrated Learning Centre at Queen’s will provide engineering students with a multidisciplinary learning environment that integrates engineering theory with practice, and promotes team-oriented, problem-solving skills ▪ Queen’s is planning a School of Human Health that will offer an interdisciplinary undergraduate education ranging from biomedical science to translating discoveries from the lab and clinic into interventions that work at the population-wide level 	<ul style="list-style-type: none"> ▪ St. Lawrence College is seeking approval from the provincial government for applied degrees in microelectronics and biotechnology, leveraging off clusters of strength in Kingston ▪ Faculty of Health Sciences at Queen’s has received strategic training grants from the Canadian Institutes of Health Research to train HQP in the fields of interdisciplinary cancer research, proteomics, and gastrointestinal diseases ▪ Biomedical Computing Program at Queen’s offers Canada’s only undergraduate program in computational biology and medical informatics

5. STAKEHOLDER-LED INNOVATION INITIATIVES IN KINGSTON

Kingston's ability to be a stronger community is inextricably linked to our capacity to share knowledge and capitalize on our geographic, research, cultural, institutional and business strengths and the proximity that allows innovators access to networks and information. Properly supported and nurtured, this capacity will build Kingston's economy by fostering high levels of innovation, generating new business and research ventures, increasing the productivity of local companies, and attracting new industries and investments. This is our competitive advantage – **scope** and **scale**.

The community's economic development goals – endorsed by the City of Kingston and implemented by the Kingston Economic Development Corporation – are to:

- brand Kingston as an innovative jurisdiction that is known for its leading-edge models of wealth creation, strength of natural environment, heritage, knowledge base and research/business linkages
- expand Kingston's private sector in key areas such as manufacturing and small business sectors where Kingston has a knowledge advantage.
- stimulate entrepreneurship in world-class products and services that compete in global markets.

The City of Kingston's working document on economic prosperity (part of its strategic plan process) notes that action is needed on several fronts if Kingston is to be a leader in innovation. The City has identified the following as priorities:

- effective partnership between institutions and businesses to create new opportunities for wealth and job creation
- incubation of new businesses and support systems for mentoring, and securing business capital
- marketing Kingston to investors and tourists, nationally and internationally

5.1 SUPPORT FROM INDUSTRY CANADA FOR COMMUNITY-DRIVEN INNOVATION INITIATIVES

We are cognizant that the proposals outlined in the Innovation Strategy are meant to be applicable across the country. At the same time, we are hopeful that new programs will be flexible in order to accommodate the unique circumstances of community innovation roadmaps.

The following section outlines a number of recommendations to Industry Canada that will support proposed or ongoing innovation initiatives in which government, academic and industry stakeholders are currently engaged in Kingston.

5.1.1 Innovation Recommendation #1: Providing funding for communities to develop and implement innovation strategy roadmaps

We applaud Industry Canada's proposal to provide funding to smaller communities to help them develop innovation strategies tailored to their unique circumstances.

Kingston has already engaged local leaders from the academic, private and public sectors in formulating our innovation strategy. We are now at the point where we must converge sectorally-based initiatives and cross-sectoral activities into a blueprint or roadmap for accelerating the pace of innovation in Kingston.

With locally-generated resources, and leveraging available sources of discrete funding, Kingston has been able to do an informal assessment for facilities and training needs, compile an inventory of research strengths and facilities, and produce an evaluation of accomplishments over the past four years.

To move forward, we require professional resources for:

- formally validating needs assessments
- conducting site selection evaluations for incubator space and a future research park
- developing new curricula for HQP training
- developing outreach programming for students
- marketing and branding Kingston as a technology cluster

For example, the “Biotech-in-a-Box” series of training workshops and equipment kits for senior secondary school teachers has been developed as one of the outcomes of the Biotechnology Action Plan, in partnership with the local school boards and a number of scientific equipment and pharmaceutical companies. The demand for this training now outstrips the ability to supply the training and the equipment. Furthermore, inquiries have been received from as far away as Alberta for more information. Clearly, there is at least a local, if not provincial and national demand, to roll out this program that brings leading-edge technology and skills learning right to the high school biology or chemistry laboratory.

Other research centres in Kingston are developing outreach activities in the fields of advanced materials and high performance computing. Given that many of these programming initiatives would require the same resources, a collaborative approach to outreach programming would clearly generate economies of scale, and potentially, reach out to national and provincial audiences efficiently and effectively.

We recommend that Industry Canada provide assistance to communities, such as Kingston, that have made progress toward economic transformation but require additional resources to accelerate results, to formulate innovation roadmaps.

HARNESSING TECHNOLOGY IN KINGSTON'S HOSPITALS	
<ul style="list-style-type: none"> ▪ DNA sequencer will help unlock genetic codes for breast cancer and hemophilia ▪ Canada's first cardiac imaging system in place at Kingston General Hospital, making it a showcase site for strategic alliance partner, General Electrical Medical Systems ▪ High-speed videoconferencing link with Queen's allows orthopaedic surgeon to pre-plan surgeries, reduce waiting lists, and reduce patient risk 	<ul style="list-style-type: none"> ▪ OR2010, an operating room dedicated to research in computer-assisted surgery, now under construction with funding from Canada Foundation for Innovation ▪ Wireless system for pain management now in second stage clinical trial, with prospects for wireless network handling electronic patient charting ▪ Telepsychiatry program, using videoconferencing, links Kingston-based practitioners, with patients in rural and remote areas

5.1.2 Innovation Recommendation #2: Working with provincial partners on funding mechanisms for research parks and technology incubators

The current incubator space available is approximately 7,000 sq ft located in the Biosciences Complex at Queen's. Demand for this space has now outstripped the supply, and we lack the ability to accommodate growing and maturing technology-intensive companies. We have recently lost one biotechnology company to Markham for lack of suitable laboratory and office space close to university and hospital research facilities.

The Government of Ontario has made some funding available for feasibility studies for biotechnology incubators and research parks on a competitive basis.

We recommend that Industry Canada align federal support for incubator space and research parks with similar provincial initiatives to accelerate the pace of discovery and commercialization in technology-intensive sectors.

5.1.3 Innovation Recommendation #3: Locating an NRC presence in Kingston

We applaud NRC's involvement in community-based consultations in the Atlantic provinces, Saskatoon and Montreal to identify and develop technology clusters where Canada has the potential to develop world-class expertise. We would like to encourage NRC to consider locating in urban areas/regions that currently lack an NRC presence. The innovation quotient of government-funded research has been well-documented, and we encourage the Government of Canada to consider spreading that accelerator effect outside the National Capital Region and the Montreal urban area.

We recommend to Industry Canada that the National Research Council initiate discussions with Kingston's innovation partners with regard to eventually locating a physical R&D presence in Kingston.

Initially, an NRC presence may take the form of an exchange of laboratory personnel with university or hospital or industry labs. We would be happy to expose NRC personnel – both scientific and management – with the research capacity in Kingston in biotechnology,

information and communications technologies, advanced materials and alternative energy, such as fuel cells. We believe that greater awareness of our research strengths and how they fit with NRC's priorities will make an NRC presence in Kingston a strategic move for this federal agency.

5.1.4 Innovation Recommendation #4: Identifying and implementing the leverage potential of physical assets in communities with innovation roadmaps

Both the federal and provincial governments have a sizable physical presence in Kingston, including Canadian Forces Base Kingston, federal and provincial correctional facilities, and various health care facilities. We believe that a long-term plan, that takes community economic development strategies into account, for these assets will benefit all stakeholders by rationalizing the use of real estate and physical plant.

We recommend that Industry Canada take the lead among federal departments and agencies with a physical presence in Kingston to determine how those assets can best be utilized to advance innovation in Kingston and Canada-wide.

5.1.5 Innovation Recommendation #5: Supporting the dissemination of knowledge in rapidly changing fields to senior elementary and secondary school teachers

We agree with HRDC's recognition that "people are a country's greatest resource in today's global knowledge-based economy." However, as much as we agree with the goals and milestones set out in *Knowledge Matters*, and are cognizant that education is largely a provincial responsibility, there is a gap in the education strategy, particularly at the secondary school level, that should be addressed.

The ever increasing demand for highly qualified personnel, skilled and trained in today's rapidly-changing fields such as biotechnology, requires constant upgrading of knowledge and skills of those individuals who are highly influential in guiding our young adults in high schools. The demand for our Biotech-in-a-Box program has indicated that there are many teachers who would like to hone their knowledge base and be able to teach state-of-the-art techniques in their classrooms.

It is these teachers who are providing advice and guidance on careers, and influencing career and post-secondary choices for graduating high school students.

Professional development through web-based material would allow teachers to develop their knowledge further and keep them up-to-speed in rapidly changing fields.

We recommend that the Human Resources Development Canada and Industry Canada take the lead within the Government of Canada to support professional development initiatives directed at improving the knowledge of senior elementary and secondary school teachers about rapidly expanding fields of knowledge.

6. CONCLUSION

Kingston's vision for an innovation economy is to:

- produce world-class products and services for global markets
- stimulate entrepreneurship in the biotechnology, information and communications technologies, and advanced materials sectors
- develop a sustainable model for collaboration between institutions and agencies involved in economic development, to ensure that the benefits of innovation are captured for the local and regional economy
- brand Kingston as an innovative jurisdiction that is known for its leading-edge models of knowledge base and research/business linkages, wealth creation, strength of natural environment, heritage.

We have accomplished a number of objectives leading to the realization of this vision over the past four years that are outlined in Appendix 1.

The next phase of our roadmap toward this vision is outlined in Section 5 as innovation recommendations. Currently, our ability to move toward our next set of objectives is limited by financial resources – we have the vision, the plan, the partners, the enthusiasm, and the ability to lever some locally-generated resources. In partnership with Industry Canada and Human Resources Development Canada, we will achieve our vision for innovation in Kingston and southeastern Ontario.