

Partnership for Innovation and Knowledge Transfer

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Jim Murray and Emily Rowan

Dr. James W. Murray is presently the Senior Associate Vice President of the Partnerships and Innovation Program at the University of Alberta, having previously been Associate Vice President (Research/Industry Relations) and Director of the Industry Liaison Office at the University of Alberta. He was educated at the University of Alberta, obtaining his B.Sc. in 1957, thence moving on to Princeton University, where he obtained his MA in 1963 and his PhD in 1964. Under Dr Murray's leadership the University of Alberta was first in Canada in 1997, 1998 and 1999 with royalties of \$4.3 million generated by the numerous patents issued and licenses negotiated. His work and activities have lead to the creation of some 130 knowledge based companies in Alberta and BC.

Emily Rowan is currently the Communications and Office Manager for the Partnerships and Innovation Program at the University of Alberta. She is a graduate of the University of Alberta and Simon Fraser University with degrees in Political Science and Communications. Ms Rowan has been working in the area of technology transfer since 1994 with the Industry Liaison Office here at the University of Alberta and in April 1999 took on the challenge with Dr Jim Murray in setting up the first industrial affiliates program in Canada. She has extensive knowledge and expertise in the area of knowledge mapping and promotion of university based research and innovation.

Introduction

It is widely understood that productivity growth is the key to economic success in the global knowledge-based economy. In broad terms, productivity is the ratio of the value of what is produced to the cost of producing it. Productivity can be increased by reducing

the denominator (the cost of production), or by increasing the numerator (the value of what is produced). This requires innovation – the introduction of new goods, services or processes that increase the value of what we produce relative to the cost of production.

Innovation is increasingly based on advances in science and technology. In the global knowledge-based economy, research-based innovation is of critical importance in generating high value-added economic activity, increased wealth, economic diversification, well-paying jobs, longer and healthier lives, improved environmental conditions, and increased revenues from associated taxes. Research-based innovation is about expanding our ability to create new wealth and improve social conditions, with win-win outcomes.

Canadian universities and colleges are well-placed to strengthen Canada's innovation capacity and productivity performance. They are positioned to play a more prominent role in fueling national economic growth and social development. Universities and colleges operate as one player in the broader system of innovation. They are increasingly leveraging their resources and expertise by forming strategic alliances with affiliated research hospitals and research institutes, industry, Networks of Centres of Excellence (NCEs), risk capital providers, federal regional agencies, and provincial science and research authorities, to name a few. In this environment, some universities and colleges have achieved notable success in commercializing the results of publicly-funded research and courseware.

Establishing the conditions necessary to enable universities and colleges to perform to their full potential in commercializing the results of teaching and research must become a national priority. Canada's ability to maintain a high standard of living and prosper in the global knowledge-based economy is critically dependent on our ability to find innovative solutions to the medical, environmental, social and economic challenges of the 21st century.

Canadian universities do perform world-class research. They perform 21% of all R&D conducted in Canada, employ 31% of Canada's R&D personnel, and produce 65% of Canadian scientific

publications. Yet they account for only 4.4% of Canadian inventions patented in the U.S. University research (be it basic research directed by a principal investigator or project research directed by university researchers with industrial partners) is critical to generating the intellectual foundation for practical innovations. In some cases, university research results in scientific breakthroughs that have immediate practical application. In other cases, research generates new knowledge and insights, which generate practical benefits far into the future. Often the greatest benefits are the least expected. The point is that both basic and project research are valuable and necessary cornerstones of a healthy economy.

Most people in the innovation business are convinced that Canadian universities have tremendous unrealized potential to strengthen Canada's economy. To illustrate this potential, we refer the reader to a recent study by the Association of University Technology Managers Inc. (AUTM). In 1997, AUTM concluded that American and Canadian universities together generated US\$28.7 billion in total benefits to the economy, supporting an estimated 245,930 jobs. Consistent with their methodology, we calculate that Canada's share amounted to US\$0.5 billion in economic benefits and 3,935 jobs. (This is not an estimate of Canadian universities' total economic impact. It is an estimate of the economic impact of the 14 Canadian universities which report to AUTM, and which account for 50% of Canadian university R&D expenditures.)

This brings us to the next logical step in the road to more fully realizing the benefits of Canadian university innovation. The following is a program that is currently being developed at the University of Alberta under in the Office of the Vice President – Research and External Affairs. It is the next step in the process of turning innovation and knowledge into concrete returns for society. It is based on the idea of “technology pull” – that is, going to members of industry and asking them what they want from a research university; fulfilling their requirements; creating intellectual property to be shared between the industry partners and the university; and then sharing the results.

The Concept

The University of Alberta's ambitious and inspiring vision is to become indisputably recognized as one of the world's leading learning institutions in the coming millennium. This vision requires urgent and innovative actions in response to the fundamental paradigms of the knowledge age: to win in the knowledge age, organizations must maximize the productivity of knowledge and relationships as the primary capital for creating socio-economic value.

There is a strong correlation between innovation prowess and sustained superior performance in all socioeconomic sectors. Recent studies on national economic productivity have demonstrated the dominant impact of innovation leverage on economic performance. The most successful international enterprises are forming strategic alliances with external sources of knowledge and innovation to win and keep market leadership.

In response to the imperatives of the knowledge age, the University of Alberta has created a Partnerships for Innovation Program (PIP). This is a novel project that will play an important role as the University realizes its vision of becoming indisputably recognized as one of the world's leading learning and research institutions.

The mission of PIP is to deploy the potential synergy between the University's enormous and diverse knowledge capital and the demand for knowledge and innovation that exists in organizations beyond the University in Alberta, in Canada and around the world.

PIP will seek partnerships with diverse organizations to become co-investors with the University in creating mutually-beneficial innovations. This strategy breaks paths with the "technology-push" approach that has previously characterized university industry liaison activities, whereby the results of academic research have been marketed after the fact. PIP will provide the capability to actively connect the demands for innovation and knowledge of the University's partners with the supply web of knowledge on campus. Through strategic alliances, the partners' innovation needs will be defined and, in co-operation with faculty members, solutions will be

developed to meet them. This modus operandi will ensure that the University becomes the innovation and knowledge source of choice for its partners.

The Scope of Activity

The PIP venture will be broad enough to serve, benefit and satisfy the University's entire community. The partnerships that it proposes to establish are not aimed exclusively at corporations. The University has very strong faculties that embrace various fields that are not directly technological. Thus, partnerships may be established between arts, socio-economic and government organizations, and faculties at the University that have interest and expertise in such fields. Nor does PIP expect to be restrained by geographic constraints. Today's international efforts and the consequent globalization of society will become the accepted norm of the next century. PIP will therefore be active in a well-planned and organized manner with any ethically acceptable organization anywhere that needs enhanced knowledge and technology, as long as the partnership is also in the interests of the University.

The subject of knowledge transfer and innovation is critically important to large, medium-sized and small organizations throughout the world. Many international organizations are actively seeking knowledge, but are often reluctant to enter into technology transfer agreements. Therefore, it is natural that they may show considerable interest in joining in a knowledge transfer and innovation program. They can explore and be intimately involved in their future knowledge and innovation needs, leading towards a long-term technology transfer relationship with the University.

The Canadian Innovation Scene

Despite the importance of innovation, Canada has an innovation gap, according to the Organization for Economic Cooperation and Development (OECD). The gap is due in part to

low levels of investment in research and development (R&D) by the industrial sector. In 1997, R&D investment by the industrial sector in Canada amounted to 1% of the GDP and was the second-lowest among the G7 countries. Universities are a very important element of our national capacity for innovation. They perform 21% of all Canadian R&D and account for 31% of Canada's R&D personnel. University research generates 65% of Canadian scientific publications, is of world-class quality and trains many highly-skilled people who are on the leading edge of technological innovation.

As noted earlier, however, the 1997 AUTM Survey concluded that American and Canadian universities generated US\$28.7 billion in total benefits to the economy supporting an estimated 246,000 jobs. Canada's share of this sector is \$0.5 billion in economic benefits and 3,000 jobs. This is not an estimate of Canadian universities' total economic impact, but of the economic impact of the 14 largest Canadian universities which report to AUTM and which account for 50% of Canadian universities' R&D expenditures. Had these universities generated economic returns at a level commensurate with their share of the research investment, they should have contributed almost US\$1.5 billion more in economic benefits and created 12,788 more jobs in 1997. Thus, it is important that Canadian universities develop new innovative programs to use more effectively the broad range of knowledge and expertise that they possess.

Conditions for Success

The determinants of success for PIP derive from the rich knowledge base at the University. Innovating power, manifested by the speedy and continual creation of improved and new products, processes, services and knowledge, is more than ever critical to the sustainable success of organizations in all sectors of a thriving economy. Knowledge capital – that is, human capital and research information – is the primary driver of innovation dynamics that create and maintain superior innovating power. For sustained

superior performance, organizations must increasingly reach beyond their internal resources to meet their rapidly changing and growing needs for new and multi-disciplinary knowledge.

Universities are the principal providers of knowledge capital. No other enterprise commands the diversity, depth and potential power of knowledge that grows and resides in a major university like the University of Alberta.

Knowledge alliances between users and developers of innovations will increasingly be the determinants of successful projects. Users will buy into the innovations from their conception, and the all-important knowledge transfer will take place during the innovation process.

The globalization of business is a major innovation driver. The University's increasing thrust into the international arenas and its PIP activities will leverage each other to maximize the competitive advantage of the University in the global market.

The above conditions provide highly promising opportunities for the University and its faculty to increase substantially the socioeconomic value they provide through their knowledge capital, and the earnings, prestige and public support they gain in return. The proposed partnership is an essential vehicle to seize these opportunities and realize their potential benefits for the investors in the partnership.

The Value Proposition

The project will be considered to be successful when the University and its partners both gain considerably from the activities of PIP. There are many benefits to be gained by both parties, as outlined in Table 1.

Table 1: Benefits from PIP's Activities

Benefits to the University	Benefits to the Partners
Build long-term local, national and international partnerships with a variety of organizations.	Efficient access to the multidisciplinary competencies and knowledge bases of the University
Use these long-term relationships to increase the U of A's resources.	Opportunity to benchmark current practices and future innovation plans by connecting with U of expertise.
Obtain first-hand knowledge of future needs of partners	Opportunity to leverage research dollars in areas of crucial interest.
Opportunities to create important innovations and to be consequently recognized and rewarded appropriately.	Forum for knowledge sharing and problem solving.
Opportunity to learn about the educational and human capital needs of our partners and to meet those demands through continuing education programs	Enhanced access to graduates for human capital development
Competitive positioning for the U of A to attract revenue from increasing global investment in international network of innovation	Better corporate visibility through the U of A to its broad academic and alumni contacts.

The Market

Outsourcing

In increasingly knowledge-intensive economies, the already large market for university innovations in products, services and processes is growing rapidly and extensively. The linkages that the University has today with outside organizations are proof that the demand for knowledge is well-established.

Studies by reputable international organizations have confirmed a strong correlation between economic prosperity and creativity in all sectors of society. A recent study by IMD International, the Swiss-based executive management school, attributes the US economy's commanding competitiveness almost entirely to leveraging innovations.

There is increasing outsourcing of strategic R&D and innovations by knowledge intensive industries. For example, a

survey on the pharmaceutical industry in *The Economist* of February 21, 1998 shows that drug companies doubled their outsourcing of R&D from 1990 to 1996. The same survey concludes that drug companies must significantly accelerate their innovation processes to be competitive and to offset the growing market share of generic drugs. Increasingly, companies have been choosing outsourcing as a strategy for improving their innovating power.

The University's outstanding ability to innovate and educate enhances both the creative capability of its partners and, more importantly, the effective use of innovations and knowledge. This ability is not restricted to technological fields. The arts, education, and social sciences all stand to gain from partnerships with the University in search of innovation.

Market size

The number of corporations, arts councils, social organizations and government agencies that may be targets for recruitment as partners in this project is unlimited.

In the technology field alone, the University has already established partnerships with a number of very reputable major corporations. However, there are, for example, over 1,500 biopharmaceutical companies in the United States alone, most of which are well-funded with available cash. In addition, the majority of these companies are well-versed in outsourcing for products and services, including serious research collaborations. Yet University faculty have approached barely a handful of these. The same statistics apply to all other fields including, of course, the social sciences and humanities. Many of the technological innovation that we produce today have significant social ramifications. These need to be put into the equation as the research and development proceeds.

Conclusion

The prevailing demands of the knowledge economy are challenging organizations worldwide to harness knowledge capital more extensively and innovatively to create greater socioeconomic value. For the coming, distinctively knowledge-based millennium, leaders have singled out intensive knowledge-driven innovation as the decisive success factor for all organizations.

The growing number of corporate universities, learning centers and business-led strategic knowledge links contains a strong and urgent message for academia: rise to the challenge of the knowledge age, or slip into mediocrity.

Thus, the knowledge movement has generated highly promising opportunities for universities, as primary creators and transferors of knowledge capital. But the University cannot rely only on its existing ways to respond resourcefully to these challenges and seize the opportunities. This realization led to the creation of PIP, as a means of leveraging the University's knowledge capital through partnerships with organizations worldwide.

It is only by establishing firm and enduring global partnerships that the University can be confident of becoming indisputably recognized as one of the world's leading learning institutions.

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