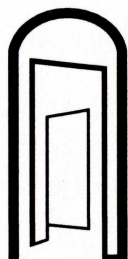




THE KILLAM TRUSTS

**1995
KILLAM
LECTURE**

Trustees of the Estate of the late Dorothy J. Killam



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**1995
KILLAM
LECTURE**

**“Research at Canadian Universities
and the Knowledge Based Society”**

Dr. David L. Johnston

Chair, Canadian Institute for Advanced Research
Former Principal, McGill University

Trustees of the Estate of the late Dorothy J. Killam



Izaak Walton Killam

**Born in 1885 at Yarmouth,
Nova Scotia**

**Died in 1955 at his Quebec
Fishing Lodge**



***Dorothy Brooks Killam, née
Johnston***

**Born in St. Louis, Missouri in
1899**

**Died in 1965 at La Leopolda,
her villa in France**

1995 KILLAM LECTURE

In late 1994 the Trustees of the Estate of the late Dorothy J. Killam, together with the Deans of Graduate Studies at the five universities holding Killam endowments and the Head of the Killam Program at the Canada Council, decided that the Killam Trusts should join with other interested parties in stimulating public discussion about of the future of research at the graduate and post-graduate levels at Canadian universities. The Killam Trustees took the matter up with the Canadian Institute for Advanced Research, of which Dr. David Johnston is Chair; this 1995 Killam Lecture is the result.

The Lecture was delivered to an invited audience of over 300 drawn from both "town" and "gown", at Hart House, University of Toronto, on Friday, November 3, 1995.

The Killam Trustees believe this important Lecture has achieved the joint purpose of the Killam Trusts and the CIAR of setting the stage for the coming national debate on this vital subject.

We are most grateful to Dr. Johnston for this thoughtful and inspired Lecture. Readers may obtain copies by writing to the address on the back page of this pamphlet.



THE KILLAM TRUSTS

The Killam Trusts were established through the generosity of one of Canada's leading business figures, Izaak Walton Killam, who died in 1955, and his wife, Dorothy Johnston Killam, who died in 1965. The gifts were made by Mrs. Killam both during her lifetime and by Will, according to a general plan conceived by the Killams

during their joint lifetimes. They are held by five Canadian universities and the Canada Council. The universities are The University of British Columbia, University of Alberta, The University of Calgary, the Montreal Neurological Institute at McGill University and Dalhousie University.

The Killam Trusts support Killam Chairs, professors' salaries, and general university purposes; but the most important part of the Killam Program is support for graduate and post-graduate work at Canadian universities through the Killam Scholarships. In each of the Killam universities and at the Canada Council, they are the most prestigious awards of their kind.

The Canada Council also presents annually the Killam Prizes in Medicine, Science and Engineering. Worth \$50,000 each, these are Canada's most prestigious awards in these fields.

To date, over 3,500 Killam Scholarships have been awarded and 37 Killam Prize winners chosen. The current market value of the Killam endowments is approximately \$250 million.

In the words of Mrs. Killam's Will:

"My purpose in establishing the Killam Trusts is to help in the building of Canada's future by encouraging advanced study. Thereby I hope, in some measure, to increase the scientific and scholastic attainments of Canadians, to develop and expand the work of Canadian universities, and to promote sympathetic understanding between Canadians and the peoples of other countries."

John H. Matthews

W. Robert Wyman

M. Ann McCaig

George T.H. Cooper, Q.C., Managing Trustee

Trustees of the Estate of the late Dorothy J. Killam
November, 1995.

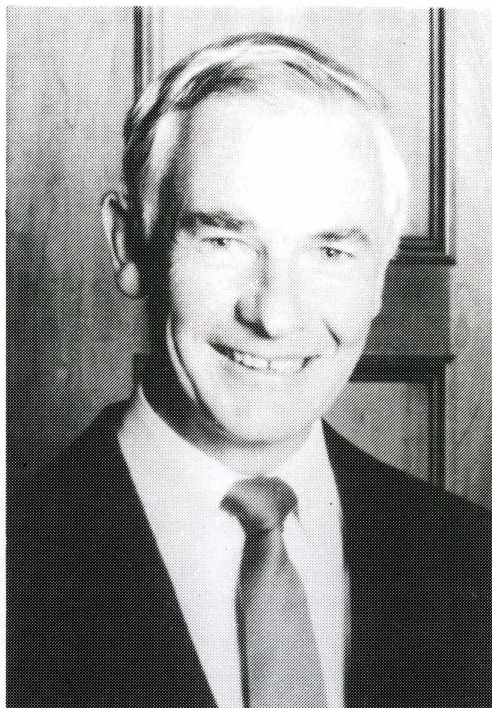
DR. DAVID L. JOHNSTON

Born in Sudbury, Ontario in 1941, David Johnston completed his university studies with distinction in three countries: the United States (Harvard A.B. 1963), England (Cambridge LL.B. 1965) and Canada (Queen's LL.B. 1966). His academic specializations are securities regulation, corporation and labour law, and law related to the environment and sustainable development. He is the author of four books and numerous articles in academic journals.

David Johnston began his professional career as Assistant Professor in the Faculty of Law at Queen's University (1966), moving to the Law Faculty at the University of Toronto in 1968. He became Dean of the Faculty of Law at the University of Western Ontario in 1974. In 1979 he was named Principal and Vice-Chancellor of McGill University. In July, 1994 he joined the McGill Faculty of Law as a full-time professor.

Among many honours accorded David Johnston are honorary doctorates from ten universities and the Order of Canada (Officer). He was named to the All American Hockey Team twice during his student days at Harvard University, and maintains a personal interest in fitness and sport.

David Johnston has served on many provincial and federal task forces and committees and on the boards of a number of companies including Canada Trust, Domtex, Seagram, EMCO, Southam, and CGI, as well as Harvard's Board of Overseers. He was President of the Association of Universities and Colleges of Canada (1985-87) and of the Conférence des recteurs et des principaux des universités du Québec (1985-87). He chaired the National Round Table on Environment and the Economy (1988-1991) and was a member of the Federal Government's Steering Group on Prosperity. He currently chairs the Federal Government's Advisory Board on the Information Highway and the Canadian Institute for Advanced Research.



Dr. David L. Johnston

1995 KILLAM LECTURE
“RESEARCH AT CANADIAN UNIVERSITIES
AND THE KNOWLEDGE BASED SOCIETY”

**I. Acknowledgment of Izaak and Dorothy Killam,
Killam Trustees and Dorothy Johnston Killam**

II. Where are we in history?

We are in the midst of the information revolution. This revolution is changing our economic, social and cultural institutions as profoundly as the industrial and agricultural revolutions which have gone before. However, there is a striking difference; these earlier revolutions “evolved” over decades and even centuries. In contrast, the information revolution is evolving over weeks and months and years. The pace of change is faster than history has ever experienced. Profound change creates opportunity and fear.

The key challenge of the information revolution is deciding whether we can shape and ride this new wave or whether we will be engulfed by it. Riding the wave will require innovation, ideas, and adaptability. It will also require imagination and will.

All of these assets lie in Canadian research universities. In my view, the research university is the key institution in our society to meet the challenge of the information revolution. Canadian universities, through ideas and innovation, will become the engines of economic growth and enhanced civility in the knowledge-based society of the 21st century.

How do we ensure that our universities play this important role in the 21st century? Let me suggest a collective course of action for us as educators and for our universities that may

guide us in the remaining four years of the millennium and launch us into the next.

I propose nine action principles. They are based on the unifying theme that ideas and innovation will drive the knowledge-based society. Our purpose is to create an environment where innovation and ideas can **reach out and touch and embrace one another** to build an economically competitive and more civic society. Please remember those verbs "reach out and touch and embrace one another" linking ideas and innovation because I shall end with them in 30 minutes time in a slightly different but directly related context.

I make two more preliminary points. The first is the complexity of our task. As Ralf Dahrendorf said in a recent essay, *A Precarious Balance: Economic Opportunity, Civil Society, and Political Liberty*, "The overriding task of the First World in the decade ahead is to maximize - to the extent possible - wealth creation, social cohesion, and political freedom, realizing that the promotion of any one of these goals may only be achieved at the expense of the others." We draw some comfort from the fact that our Canadian dilemma is not unique.

The second preliminary point is to bring a sense of urgency to the task. This is not a time for dithering. Last Monday's Quebec referendum and our government's debt burdens sound the alarm. We in the research universities must heed the advice of Burke: "The greatest evil is that when critical issues are at stake, good people sit idly by".

III. Nine Point Programme

1. UNIVERSITIES TO ADVANCE LEARNING

The first point of the programme, and the theme upon which all others are based, is to remember our base. The university's

overriding purpose is to advance learning - that is to create knowledge and to train minds. This means that our universities do not perform research simply for the sake of discovery. We do research because "discovery", which requires the critical appraisal of knowledge, is the best environment in which to educate our students.

2. TEACHING AND RESEARCH ARE INEXTRICABLY INTERMIXED

It follows that teaching and research are inextricably intermixed. This is the second principle. A wedge cannot be driven between teaching and research. One is essential to the other. This, too, is hard. What does it mean?

- (a) It means we do not carve out research professorships freed from all teaching duties. A qualification is necessary. Teaching - and learning - should be broadly defined to include graduate student and post-doctoral fellow supervision, mentoring of junior faculty, guidance of major research projects which in themselves provide the cradle for intensive teaching. It includes undergraduate teaching. I know of no better way of testing one's most advanced ideas on the dimly known than crystallizing them in understandable language connected to commonly understood anchor points of knowledge. Is there a better regular test bed for this exercise than a first year undergraduate class of 18 year olds? And what an exciting adventure in learning for 18 year olds - to sense the excitement of discovery and continuously unfolding truth by peering over the abyss of ignorance with one who has peered for a scholarly lifetime.
- (b) A second quite specific consequence follows. The preferred environment for research is one where it is

tested punctually and longitudinally. The test for punctuality is whether the quality of new thinking going on in a lab, study, library, or field site draws bright students to it, and engages and enhances them now. The longitudinal test is whether the quality of new thinking trains disciples who themselves go into the field to disseminate it. Does the new thinking become an established school of thought in its own right? Does it retain the renewing and revitalizing capacity to be self-critical? This type of competition and human absorption of ideas is an excellent forge to fashion true steel from carbonized iron.

- (c) There is a third quite practical point that flows from this. We should insist that government research laboratories be largely dismantled and folded into the research university or other receptors which have the training of people as their principal mission. In government laboratories we should keep only research for applied work on safety and standards. Even much of that can be contracted out. Approximately \$2 billion of the \$8 billion the federal government currently spends on science and technology is conducted in government research laboratories. The research is unduly sheltered from the competition and examination of ideas that come from inquiring students and the interactive explanation process of teaching. Moreover our public investment in the type of research loses its major benefit when isolated in a government lab - training new knowledge workers and launching them into careers where their knowledge is enhanced and/or applied. We should be quite specific on this point of recycling government laboratory destined funds.
- (d) The fourth point is the overwhelming importance of rigorous peer review. There is criticism of this system

as an old boys' club, in my judgment largely unjustified. The alternatives are dramatically worse - allocation by political decision, block grants that do not reward quality and innovation, etc. And our current peer review system is remarkably efficient. The Medical Research Council applies only 3% of its monies to administration because it can rely so heavily on volunteer labour. And this may be the most important criticism of research in government labs. It is largely insulated from peer review.

3 . WE SHOULD LEAD THE WORLD IN INFORMATION TECHNOLOGY

My third action principle is this. We should lead the world in information technology, and its application in education and knowledge creation. I have the pleasure of chairing the Government of Canada's Information Highway Advisory Council. Its final report is entitled: "The Challenge of the Information Highway - Connection, Community, Content". For our research universities we should turn the interrogative quality - challenge - into an imperative. Carpe Diem - Seize the opportunity or better still, lead the opportunity.

Given time limitations, let me identify only three specific examples from the report to illuminate our path:

- (a) The first is SchoolNet. Thanks to this federal-provincial-school board-private sector collaborative programme about \$60 million of federal taxpayers' money will connect every one of Canada's 16,500 schools and 3,600 public libraries to the Internet by 1997-98. The U.S. hopes to accomplish this by 2000 at an estimated cost of \$50 billion, the Japanese by the year 2015 at similar large costs. Therefore we Canadians are far ahead of our competitors in applying this

technology to schools. We do it more cheaply than others. This comparative cost advantage will be a constant theme in our next four years.

However Internet linkage is only 5% of the job. The other 95% is to turn our teachers from content providers to coaches and enablers, and create in Canada the educational software with these enablers. At present over 90% of the educational software used in English-speaking schools in Canada is foreign. In French-speaking schools in Canada it is 50%. But much of this is simply translation into French from foreign material. Our Faculties of Education with intensive support from our Faculties of Science, Engineering, Arts, Management and Medicine should be leaders in information technology and learning, and teaching the teachers as pioneers in this new frontier. There is our challenge. It's right in our universities. As Pogo said: "We have found the enemy and it is us."

- (b) A second specific initiative is lifelong learning. In the fourth month of our Council's tenure, our working group on learning and training changed our Council's terms of reference - jobs, reinforce Canadian culture and identity, and accessibility - to add a new principle. Lifelong learning should be a key design element in the building of the information highway. Please think about that - the why and the how and the what.

What this principle intends is a change in our culture - lifelong learning - adaptability - equality of opportunity - using these new tools to help ourselves. Imagine the leadership role for our universities.

- (c) The third specific initiative has to do with scholarly publication, libraries and digitally-based information. Our recommendations propose we move as

quickly as possible to electronic publishing for our scholarship, electronic data bases for our libraries, electronic interactive connection for our teaching and our students' learning. The greatest single obstacle? We professors - especially those of us over 40 - who won't explore whether and how these new tools can help us and our interactive audiences.

4. WHO PAYS FOR OUR UNIVERSITIES?

Let me come to a fourth and very difficult point. Who pays for our universities?

The capacities of our federal and provincial governments to finance us is declining. It will continue to do so at least into the next millennium. Two provinces, Ontario, and Quebec, have been slower to address deficits and the steps they now must take will be quite prescriptive, thus joining all Canadian governments. The wealth generating capacity of Canada has declined in relative terms by over 20% in the past two decades. Public expenditures, including university operating grants and research and capital support, are beyond the capacity of the state to pay. We shall not be spared.

The current federal transfer payments system for post-secondary education is unsustainable for several reasons in addition to fiscal constraint:

- (a) First, it is part of the established program financing system. Tax points and cash are transferred from the federal government for use by the provinces. The share for post-secondary education is approximately one third. Health is two thirds. This is an unequal contest. In any competition for the same dollar between health and education, line ups for operating rooms will trump line ups in university classrooms.

- (b) Secondly, there is no obligation on the provincial governments to use the transferred money for education. It can be used for roads, debt servicing, regional development, etc.
- (c) Thirdly, education is a provincial sphere of jurisdiction.

The federal government will not continue to collect taxes and pay them over to the provinces with no control over how they are spent and no political credit for providing these services.

What is the solution? Remember how the federal payment role began. It was the result of the Massey-Levesque Royal Commission on the Arts in 1950. Prime Minister St. Laurent responded to its recommendation that 50 cents per capita be paid by the federal government to the provinces for universities. It was a national sequel to the post-World War II veterans' education grants. But it was a different time in federal-provincial relations.

So what should we do? Let me suggest several initiatives.

- (a) First attempt to rescue at least the cash transfer and if possible the tax points from bloc transfers to be spent on people. These are an enhanced student loan program and research including direct and indirect costs, primarily administered by our three research granting councils and the Canada Council. These are accepted fields of federal jurisdiction. There are well-established and well-working precedents in each.
- (b) For the next initiative, let us focus on:
 - i) Us - the trustees, professors and staff, students and alumni - taking more fiscal responsibility for our universities. Let me explain by example. My first university has an unusual governing structure. Its 30 member Board of Trustees - called by the now

archaic name Overseers - are all elected by mail ballot by its alumni - over 100,000 around the world - 6 Overseers elected annually for non-renewable five year terms. Its endowment is \$8 billion raised by those alumni - the yield from the endowment supports 30% of operating expenditures. It is mid-way through a campaign to raise another \$2.1 billion. Imagine the sense of responsibility of the alumni in this endeavour.

- ii) Second, students. We should recognize that our current tuition system is one of the most regressive imaginable. In spite of government-controlled tuition charges with the objective of accessibility, there has been little change in the percentage of students from lower economic strata attending our universities in the past half century. What there has been is very generous subsidies for increasing numbers of students from upper economic strata. Tuition charges range from 15-30% of university operating costs across the country.

I suggest we strive to establish a federal-provincial consensus that tuition charges will not exceed a maximum of say 50% of the discipline operating costs; that each university be given freedom to set its tuition fees within that range; that generous federal and provincial funded loans to students ensure that no student making satisfactory progress in a university program be financially barred from attending university full or part time; that income tax contingent repayment plans for the loan be implemented by federal-provincial agreement; that no interest be charged while income is below an established threshold; and that the loan be forgiven if the income does not reach that threshold say 20

years after graduation or age 50. For those able to repay this loan through this income surtax I suggest we conceptualize a charitable target of returning the 50% balance, inflation adjusted, through one's alumni lifetime by donations to one's university as a principle of intergenerational equity. I suggest we discuss this from the first day of classes directly with our students.

- (c) Regarding bricks and mortar I suggest that we largely postpone new initiatives for the next four years. Thus where provincial granting structures have special segregated capital budgets for our universities, I suggest we fold these into operations and building maintenance budgets for the next four years. Whether or not our universities are overbuilt is debatable. But we must learn to use information technology, distance learning, inter-institutional collaboration and existing plant much more imaginatively and cooperatively. One way of achieving this is putting these dollars into a people focused pot for the remaining four years of this millennium.
- (d) For the fourth initiative under this head of finances, let us focus on a final aspect of federal-provincial arrangements. When the current federal government came into power in 1993, it initiated a job creation infrastructure program with \$2 billion of federal money to be matched by \$2 billion of provincial and \$2 billion of municipal money. The projects have been primarily physical infrastructures - roads, sewers, bridges. The jobs have been short term. The benefits while real have done little to build a knowledge-based economy. In fact they have deflected our attention from its essential underpinnings - ideas and innovation as the key drivers of economic growth.

Let us work now to obtain the agreement of all major political parties that there will be an infrastructure program following the next election and it will be focused on strengthening the R & D base of our society, not on building bridges and roads but building people - knowledge workers. Funding the initiatives described earlier will be the basis. This should be undertaken as a collective university project.

5. INTERNATIONAL STUDENTS

The fifth principle is to augment considerably the presence of international students in our universities. In so doing we augment the role of our universities as world centres of study. Why?

The most significant initiative we can take to invigorate our learning environment is to broaden and diversify it. We should regard international students - undergraduate and graduate - as a remarkable intellectual and cultural enrichment for our campuses and our country. Until a decade or so ago Canadian universities were net importers of educated people and of university opportunity especially at the graduate level. How many of us in this room have taken degrees abroad? Today that situation is reversed. Canadian universities are amongst the most attractive in the world for quality, relevance, and cost.

But just as we have achieved that enviable and hard won position of attracting talented people from around the world - temporarily or permanently - we have hiked international student fees dramatically. In my province that fee of \$7200 for two terms exceeds the average cost per student so Quebec makes a marginal profit on these students. But let us accept international student fees at that level and focus on practical initiatives.

- (a) Recognize first that we are in a state of decline. International students at Canadian universities have diminished each year for the past three years in spite of the relative weakening of the Canadian dollar versus many foreign currencies.
- (b) Recognize second that we are missing significant economic opportunities. We fail to understand even the *immediate* economic benefits from these students let alone longer term gains. Economic analysis at my university shows that even if an international student received a scholarship covering the \$7200 tuition charge, he or she and visiting family and friends spent 2 to 2 1/2 times that amount in the local economy. And if we regard university teaching as the ultimate in high tech jobs, consider the economic boost from international students increasing the demand for university professors. Is there a better export-oriented industry built on ideas and innovation?
- (c) We have no coordinated effort amongst our Canadian universities to market our undergraduate and graduate programs abroad and to recruit collectively or collaboratively. We have no coordinated approach to financial packages for international students which could be built on a grant/loan/net benefit to our economy approach similar to the proposals for our Canadian student loan package referred to earlier. Should we not work together to set this right? Our first principle might be that just as the Athens of old or the Oxford-Cambridge-London of the 20th century were intellectual magnets, so should Canada be in the 21st century. The immediate benefit would be economic, cultural and intellectual.
- (d) Let me stress the remarkable comparative advantage of Canadian universities. Our cost per student is half

to two-thirds that of good quality U.S. state supported universities, and one-sixth that of the leading U.S. private universities. Yet our quality on a discipline-by-discipline basis is frequently comparable. Our cost advantage to the U.K., and the other OECD countries is very favourable. Our accessibility rates are now the highest in the world for Canadian students - exceeding accessibility rates even in the United States. What a remarkable and hard won competitive advantage we have - very high quality at low cost.

When I tell my friends in businesses that my University McGill - and the same is true for the University of Toronto, Dalhousie, U.B.C. and the others represented here - that we produce comparable quality teaching and research at one fifth the cost per student, they say: "That's unbelievable". And I reply that yes there is something magical about the effort to produce that. But it is real.

- (e) I could expand on this point of international students to raise related objectives of distance learning and campuses abroad where we also have considerable comparative advantage. Time prevents this. But the core point is to reflect the world's diversity in our university enterprise, and thus expand and enhance our intellectual and cultural horizons as a result.

6. THE IMPERATIVE OF COLLABORATION ACROSS INSTITUTIONS

The most successful educational experiment I have seen in the last decades is the federal government's centres of excellence programme. Why? Because they focus on internationally measured quality and force us to function across institutions with substantial grant money as the carrot. Will they be

renewed for Phase III given the current ferocious public finance constraints? It depends on us. How well can we satisfy the five objectives from the Phase I and Phase II experiments? These were:

- a) demonstrate world leading quality research,
- b) train talent pools who can meet Canadian R & D needs,
- c) demonstrate inter-institutional collaboration,
- d) build Canadian businesses through pooled university-industry collaboration, and
- e) demonstrate the ability to manage these investments and relationships efficiently and effectively across institutional lines.

The key test is collaboration. Have we met the test? Let me illustrate our challenge with only one negative example. One centre of excellence with which I am associated had to freeze its grant to researchers and students in 18 institutions for 8 months because technology transfer offices in 4 of them could not agree with the network on a collaborative arrangement to transfer technology spawned from these grants to build Canadian businesses. This in spite of the fact that a \$52 million investment fund from several Canadian financial institutions had been created to fund the technology transfer. The impasse was finally resolved by the Centre of Excellence agreeing to give each of these four institutions a right of first refusal to look for local investment before pooling their research with other institutions and taking advantage of the \$52 million investment fund.

But we miss the opportunity to build Canadian critical mass businesses where we have none - local or Canadian - at present. This is the story of Canada in its less attractive moments of federal-provincial relations - 10 balkanized regions in a country that already must struggle to establish

critical mass in a competitive world. We must make a compelling success of these centres of excellence. We must demonstrate our capacity to collaborate across institutional and provincial boundaries.

7. COLLABORATION ACROSS DISCIPLINES

The most interesting intellectual problems for the 21st century are those that cut across disciplines. The most complex enigmas for our governments are those that depend on complex cross-system solutions. Our universities are not well equipped for this challenge. We are discipline oriented. Moreover we focus our Ph.D. training and much of our research on sub-disciplinary originality. We often lack the mechanisms such as effective transdisciplinary research and teaching centres to build intellectual bridges across these independent streams, or to mix the metaphor, to link the stovepipes. We tend to write for our narrow highly specialized audiences with our own jargon. We often make insufficient effort to frame, articulate and advance our ideas so they can be enhanced and applied in other settings, be they popular literature, government policy, commercialized technology or organizational change.

One institution that attempts to do this is The Canadian Institute for Advanced Research. It is a bold and remarkable experiment. It, and institutions like it, require our collaboration to make them succeed and seed other experiments.

Let me outline several of CIAR's unusual strengths:

- (i) CLAR plays a special role in building our country and its communities. It focuses on the two ingredients that are increasingly essential to successful societies and sustainable communities, namely ideas and innovation, and human development - Canada's ingenuity capital;

- (ii) It is a rare institution in Canada that mobilizes very talented people into national and international networks to tackle complex problems in the sciences and social sciences, cutting across disciplinary, institutional and regional boundaries - a virtual research centre that educates people to think in comprehensive systems;
- (iii) It is committed to transfer new knowledge and ideas from the work of its programs out into the world of real economic growth, public policy and applied knowledge;
- (iv) In a world where the competition for talent is increasingly severe and where talented people are increasingly mobile, CIAR is pivotal in its ability to bring talented Canadians back home, to keep talent here, and to inject talent from outside the country to strengthen Canadian research and its applications;
- (v) CIAR is cost effective, leveraging a modest annual budget of less than \$10 million into tens of millions of dollars of research and outreach activities; and
- (vi) CIAR's core funding comes from Canada's private sector with supporting grants from the federal and provincial governments, not the other way around.

I dwell on this because it is a uniquely Canadian collaborative creation pooling talent across disciplines and regions, and enhancing our capacity to do world class research and apply it in our public institutions and private enterprise. Our ability to make it succeed will test whether we can use ideas and innovation as the drivers of the knowledge-based society.

8. INTELLECTUAL PROPERTY

I suggest we reconsider how we stimulate and deal with intellectual property today in our universities. Remember the

first maxim - ideas and innovation drive the knowledge-based society of the 21st century. We are institutions for the advancement of learning. Our conflict of interest policies regarding intellectual property should be reviewed intensively every 5 years because patterns are changing so quickly. Students and their needs should be at the top of our concerns. Profit for the university at the bottom, not because we don't need it but because if it becomes too important it gets in the way of higher order concerns.

When I was a student, C.P. Snow's dichotomy of the two cultures - science and the humanities - was much discussed. Today we have the two cultures of pure and applied research - the university lab and industrial application. But the pace of change has caused the secultures to converge on the spectrum requiring us to develop new ways of managing the convergence. In the past two decades much has changed to develop a better accommodation of these two cultures. Much remains to be done. Let me suggest several ideas.

- (a) First we should clearly recognize two different cultural orientations, discovery for its own sake disseminated as fully and widely, and as quickly as possible, for the benefit of all, *contrasted* with the immediately privatized and often secret exploitation of an idea for the profit of a few.
- (b) The second is to recognize that the mission of the university is to advance learning and that it is insufficient simply to create knowledge for a closed circle of creators. To be advanced it must be moved beyond and be applied.
- (c) Thirdly, it is important to have in place clear and simple rules to deal with conflicts which will inevitably rise. But the rules should not reflect a spirit of

command, control and constraint but rather of creating and enabling.

(d) Fourthly, they should be flexible.

Let me illustrate this approach to rules by example. Consider how differently we treat two different forms of intellectual property in the university: copyright and patents. In the case of copyright which protects the expression of ideas as in a book, we have virtually no rules other than do not plagiarize. We allow, indeed encourage, the creators, our professors, who are writers of books, to commercialize these and to receive all of the profits for themselves, notwithstanding that this creation was done as part of their university responsibilities. And when one of our colleagues in literature at Manitoba receives the Booker Prize for her latest book, we break open the champagne as we would for one of our scientific creators at McMaster winning a Nobel Prize.

But in the case of patents, where royalties come to a professor for inventing a new process or new technology as opposed to its expression in a book, then the shoe is almost entirely on the other foot. The property is seen as the university's and in most universities we allow only a portion of the royalties to go to the patent creator. Why should we have two such dramatically different proceedings for these two forms of intellectual property and how have these two cultures grown up?

Let me put this into several questions so we can get our minds around this puzzle.

- i) I publish a book. I receive 100% of the royalties for the expressing of the ideas, even though I have done it on "university time" using university students, university libraries and data bases.
- ii) What if the key idea in that book is patentable? I patent it. I then contract with a corporation to exploit

it. I receive royalties. I then receive equity in that corporation in place of royalties. I then receive a grant from a public granting council and later a research contract from a corporation for my next patent and next book. This is all part of my job doing research at the university with university students.

- iii) What happens when I write a new edition of the book based on that activity and file a new patent and again receive royalties and equity?

My own solution is that we base our patent relationship with our professors as we now do with copyright and begin from that foundation. That may be wrong. I do it for the sake of simplicity and to keep our focus on the optimal advancement of learning. But this is a puzzle for each of us to work out through careful sustained, and I suggest, collaborative effort. And I only make this somewhat radical suggestion of equal treatment of copyright and patent to force us to think fundamentally about new arrangements for how we create intellectual property - ideas and innovations - and the university's responsibility to craft and convey them for the widest social benefit.

9. CANADA

Finally let me come to my ninth and last point: Canada, our own two culture challenge. We have just been through a referendum in Quebec which came within 30,000 votes of splitting this nation asunder. Canada is the most civic society that history, in my judgment, has yet seen. In fact, holding such a referendum and its 94% voter participation is demonstration of that. But what Monday's vote reminds us is that this civic society is at risk. While our universities are apolitical, it is appropriate that we engage in the task of renewing and rebuilding this civic society. It is time for us to reach out and

rebuild based on our traditions of equality of opportunity, individual initiative and compassionate community responsibility, capacity to collaborate, and tolerance, respect and appreciation for difference. If Canada cannot live with difference and build on it as enriching and invigorating with all our advantages, God help the global village of the 21st century. Remember those eloquent lines of St. Éxuperay in Le Petit Prince: "I am different from you. But because I am different I do not diminish you. I enrich you."

What can we do? Two collective projects, and I end with these.

- (a) First, until twenty years ago our universities required competence in a second language as a graduation requirement. The rationale for this was to know one is to know none. Intellectually this was a good thing. An educated person was expected to understand another culture to have a better appreciation of his or her own. We have strayed from that intellectual rigour. Is it not time to return to it - to enhance the education of our students? Is it not time to recognize in this officially bilingual nation that one who successfully proceeds through its universities should function in those two languages and understand the two cultures which underlie those languages?
- (b) The second project is this. Can we find the will to meet a target by the year 2000 that one quarter of our students and faculty are voluntarily and directly involved in a one term minimum Quebec-rest of Canada scholarly exchange? If ideas and innovation are the

Secretary to the Killam Trusts
c/o Faculty of Graduate Studies, Dalhousie University
Room 314, Arts & Administration Building, Halifax, Nova Scotia Canada B3H 4H6
Tel. (902) 494-1329 Fax (902) 494-8797
E-mail: ETHOMPSON@DAL.CA